

MAIN CATALOG 2020

Motor protection and control

Manual motor starters,
contactors and overload relays





Motor protection and control

Manual motor starters,
contactors and overload relays

OVERVIEW

MANUAL MOTOR STARTERS
AND CIRCUIT BREAKERS
FOR TRANSFORMER
PROTECTION

AF, EK CONTACTORS AND
NF CONTACTOR RELAYS

B, M MINI CONTACTORS,
K, M MINI CONTACTOR
RELAYS

AS CONTACTORS AND
NS CONTACTOR RELAYS

OVERLOAD RELAYS

THERMISTOR PROTECTION
RELAYS

SELF RESETTING CURRENT
LIMITING MODULE

DRAS AND DRAF
ENCLOSED STARTERS

ELECTRONIC
COMPACT STARTERS

UNIVERSAL
MOTOR CONTROLLER

CUSTOMER MADE MOTOR
STARTING SOLUTION

CERTIFICATIONS AND
APPROVALS - GENERAL
TECHNICAL DATA

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MARKETING MATERIAL

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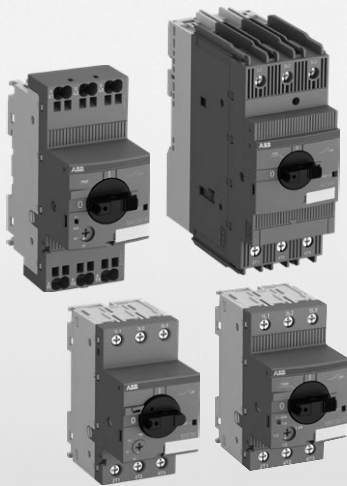
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Protection and control

To keep things running you need control

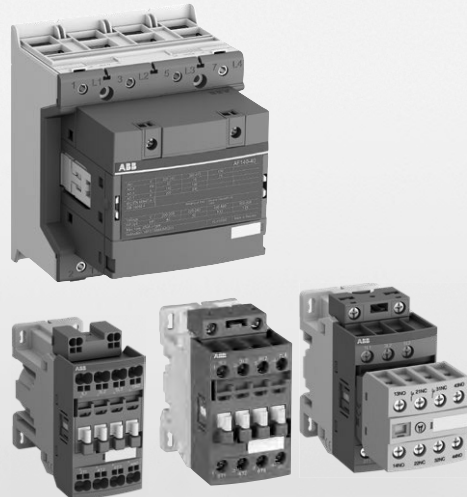
02



Manual motor starters and circuit breakers for transformer protection

- Fuseless motor protection up to 80 A
- Designed to perfectly combine with ABB contactors
- Harmonized accessory range

03



Contactors and contactor relays

- 3-pole and 4-pole AC / DC electronic control coil from 9 up to 2850 A AC-1, 500 kW AC-3
- GAF contactors for solar application
- UA...UA..RA for capacitor switching
- AFS contactors for safety applications

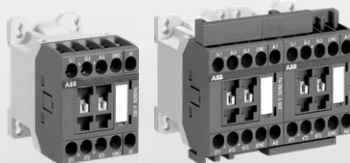
04



Mini contactors and mini contactor relays

- Up to 20 A AC-1 / 5.5 kW AC-3 400 V
- Flattest mini contactors on the market
- 3 different connecting terminals available
- Wide accessories assortment

05



Contactors and contactor relays designed for OEM's

- Compact and powerful - up to 7.5 kW AC-3
- Designed for OEM's
- Specially suitable for motor control application

06



Overload relays

- Thermal and electronic type
- Up to 200 A (thermal) and 1250 A (electronic)
- Direct mounting to AF contactors

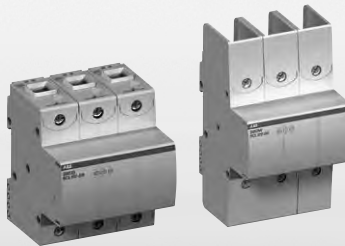
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Thermistor protection relays

- Monitoring of the winding temperature of motors which have PTC temperature sensors installed
- Evaluation of various motor conditions such as overheating, overload and insufficient cooling
- ATEX approval available for the use in hazardous areas

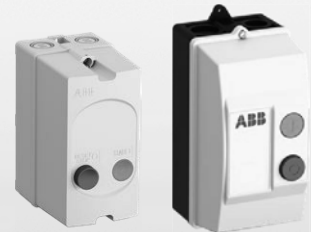
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Self resetting current limiting module

- Increases the short-circuit breaking capacity of downstream devices
- Ideal solution for group protection

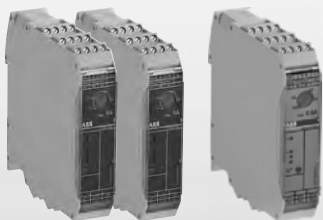
09



Enclosed starters

- For machine or wall mounting motor starter
- Up to 7.5 kW
- Robust IP66 and type 4X enclosure

10



Electronic compact starters

- Forward and reverse running, motor protection, emergency stop
- Space saving up to 90% with only 22.5mm width
- Up to 75% reduced time in wiring and installation: less error-prone wiring

11



Universal motor controller

- Provision of detailed operational, diagnostic and service data continuously
- Effective data source for modern predictive maintenance systems in any plant
- Seamless integration into ABB Ability™ System 800xA platform

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Customer made motor starting solution guide

- Coordination type 1 and 2 for
 - Direct-on-line starting
 - Reversing starters
 - Start-delta starters
- Full range of connecting kits

Protection and control

To keep things running you need control

ABB's protection and control solutions set the standard in sustainable performance, reliability and shapes your daily life. ABB certified products and processes make it easier to design and service equipment through easy engineering, optimized logistics, simple installations, energy savings, reduced maintenance and long lasting solutions.

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01



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02



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03



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01 Appliances
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02 Elevator
—
03 Food & beverage

From small controls to power distribution

For system integrators, OEMs, engineering consultants and distributors to panel builders and industrial end-users, ABB's comprehensive range of motor starting solutions, products and services delivers the certainty of consistent quality and performance.



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04



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05

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06



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04 EV charging
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05 Wind power
—
06 Solar power

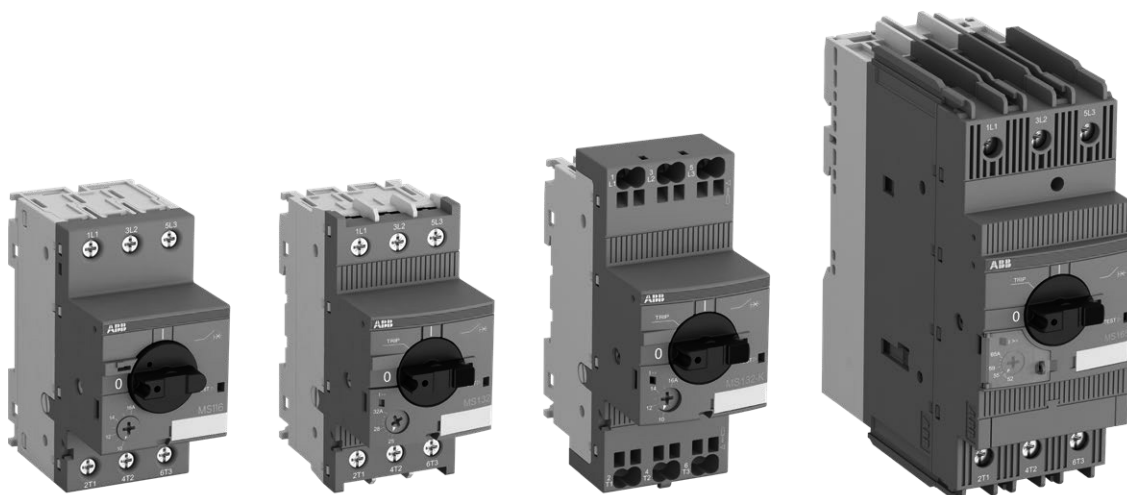
Control matters, productivity and safety relies on keeping things running. ABB's control and protection solutions ensure performance when it is needed the most.

Manual motor starters

A complete motor protection concept
Up to 80 A

Protect equipment and installations with manual motor starters

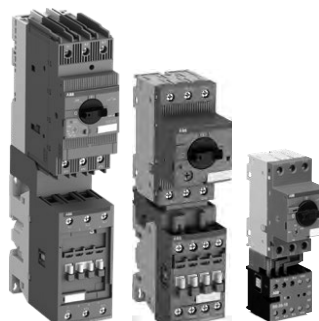
Manual motor starters, are mainly used to switch motors ON/OFF manually and to provide fuseless protection against short-circuits, overloads and phase failures. ABB manual motor starters save costs, space and ensure a quick reaction under short-circuit condition by switching the motor off within milliseconds.



Well coordinated and IE3 ready starter combinations

ABB provides coordination tables for the selection of low voltage equipment specifically designed for starting and protecting IE2 and IE3 motors.

ABB's SOC tool (Selected Optimized Coordination) is available at:
<https://applications.it.abb.com/SOC/Page/Selection.aspx>



Combines naturally with ABB contactor ranges

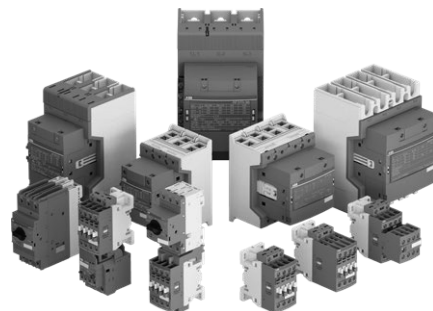
ABB manual motor starters match perfectly and are easy to connect with ABB motor control devices, to create type 1 or type 2 motor starting solutions

AF contactors

One range for motor starting and power switching
Up to 2850 A AC-1

Featuring AF technology as standard

ABB range of AF contactors is the industry benchmark. The integrated electronically controlled coil offers multiple benefits over conventional alternatives, and together with ABB's wide product offering an optimal configuration, every time.



Complete global range

AF contactor range features a full assortment of accessories, thermal or electronic overload relays, connecting accessories, is available as standard globally and meets all major international and national standards, and marine applications

3-pole and 4-pole range

AF is available as 3-pole contactors from 9A up to 1060 A AC-3 or up to 2850 A AC-1 and as 4-pole contactors up to 525 A AC-1 all with AC / DC wide operational voltage range coils.

Just push-it

The next generation of spring technology
Up to 38 A

Reliable as ever connections for manual motor starters and for contactors

With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions, and the connections are just as reliable. So for speed, ease and reliability, just push it.

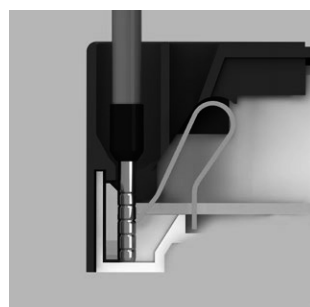
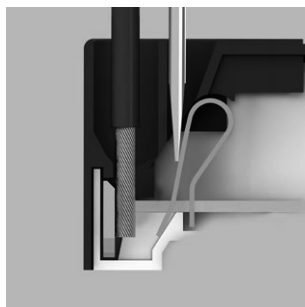


Faster than ever installation, Easier than ever wiring



Push-in mode or spring mode in the same terminal

For the very first time on the market, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.



AFS contactors

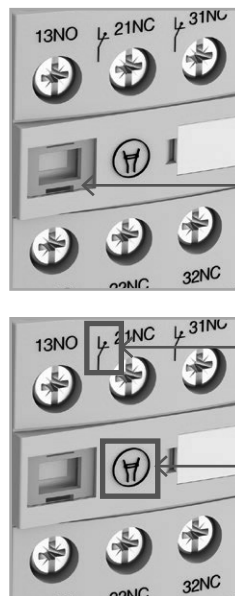
Because safety matters
Up to 750 A

Contactors dedicated for safety application

Easy to identify with its yellow signature, while enjoying the latest AF technology on board, AFS contactor is the chain link specially dedicated for safety application systems.



Designed for machine safety applications, AFS contactors come with fixed front auxiliary contact blocks, making them ideal for monitoring and controlling circuits.



Factory-mounted, non-removable, safety cap



Mechanically linked and mirror contacts



Safety down to the detail

Contactors status is guaranteed with mechanically linked and mirror contacts . Non removable safety cap prevent unexpected manual operation.

B mini contactors

Efficient and space saving
Up to 5.5 kW AC-3

The flattest mini contactor on the market

B mini contactors are ideally suited for applications where reliability is a must and space is at a premium. The dimensions, technical features and the variety of the assortment provide customers a high flexibility in a wide-range of applications.

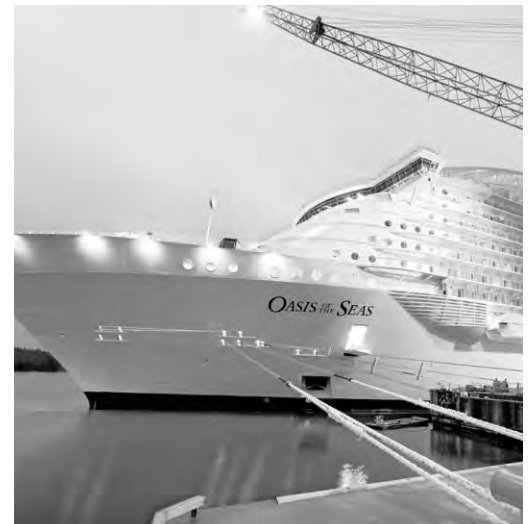


Hides in any place

B mini contactors can be used in any place such as for house or hotel fittings, small house equipment, swimming pools, your workshop or garage door as well as for bakeries or any machine that requires a very small control device. Mini contactors has its marine approvals like any other ABB big brother.

Small in all variants

B mini contactors or mini interface relays have screw, flat pin or soldering pin terminals; noise free AC or DC operated coil always within the same small dimensions and its compact reversing starter has no spacing required for its built-in mechanical interlock. Its screw or din rail mount also helps make it simple to engineer compact panels.

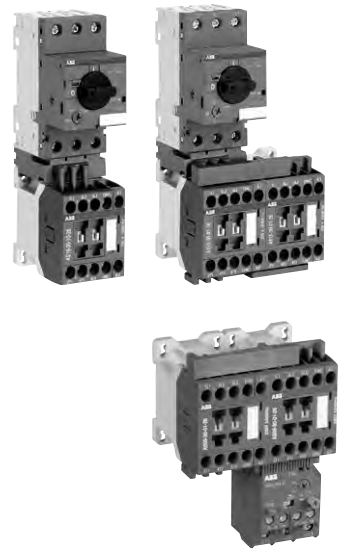
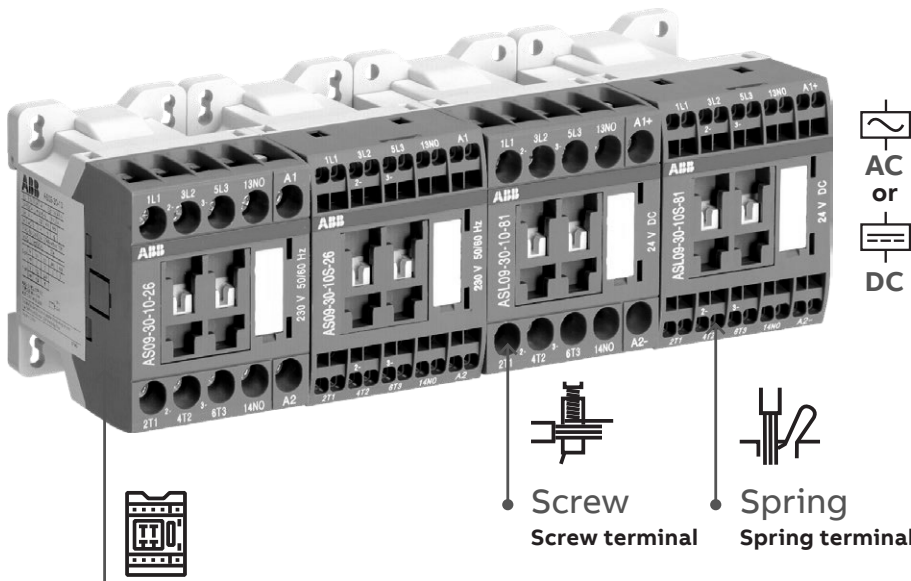


AS contactors

Compact and powerful
Up to 16 A AC-3

Designed for OEMs

AS solution has been specially designed for OEM applications. It allows to assemble starting solutions in compact size either with AC coil or DC coil and with screw terminals or spring terminals.



W 45 x H 68 x D 72.5 mm

All in same dimensions

AS contactors feature AC and DC control circuits, screw or spring terminals all in 45 mm width modules with no spacing required even when they are combined with motor protection devices for direct-on-line reversing or star delta starters.



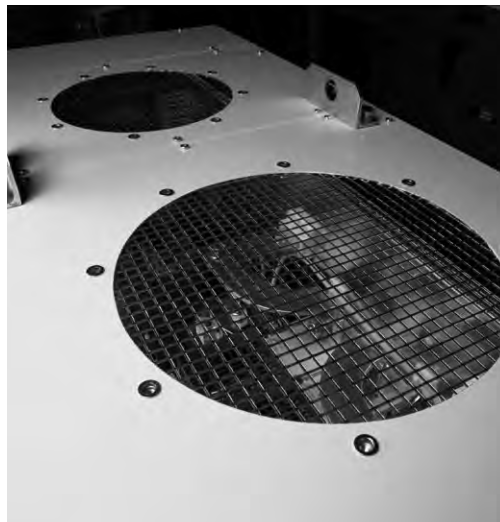
Screw
Screw terminal



Spring
Spring terminal

Mainly for motor control

Combined with motor protection devices, AS 3-pole contactors are specially suitable for motor control applications such as ventilation systems, air conditioning, small pumps, escalators, laundries or food and baking equipment

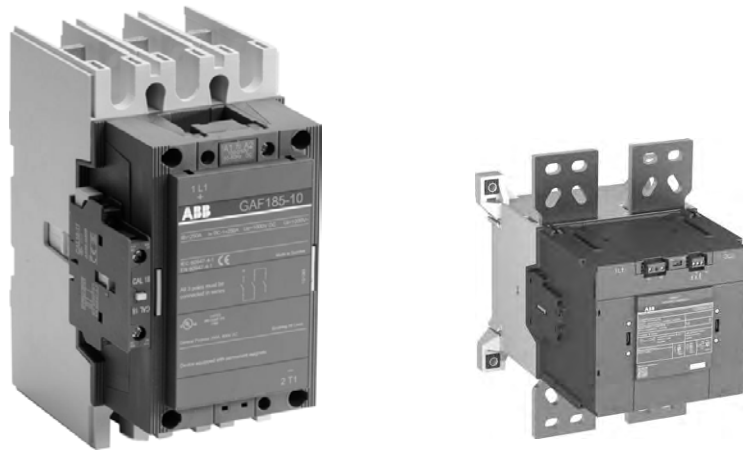


GF and GAF contactors

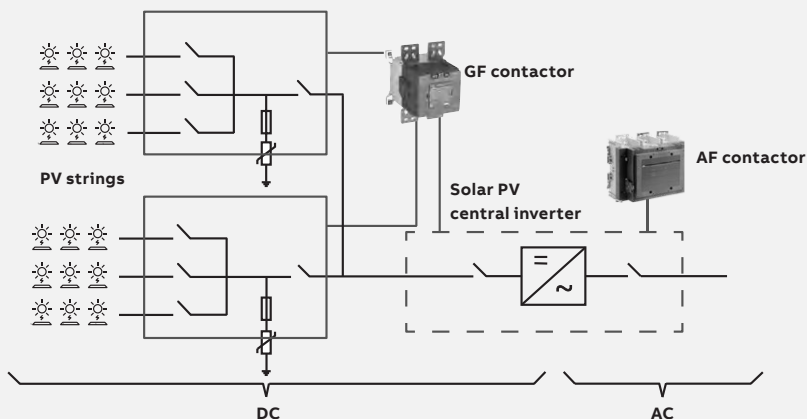
A compact and efficient way to switch DC loads

Optimal for central inverters

ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution. Thanks to their breaking performance of DC circuits, GF contactors will switch DC-PV3 inverter loads up to 1325 A 1500 V DC and GAF contactors will switch DC loads up to 2050 A 1000 V DC-1.



PV solar plant



UA and UA..RA contactors

For capacitor switching up to 80 kvar

Safely switch your capacitor banks without contacts welding

ABB offers the widest contactor range on the market for the capacitor switching demanding application. UA..RA contactors with damping resistors, are used when inrush peak currents are far exceeding 100 times. UA contactors is a simple solution used when peak currents are less or equal to 100 times nominal rms current.

Power factor correction

Industrial sites have low power efficiency due to motor winding inductances. Capacitor bank panels are added for power factor correction.

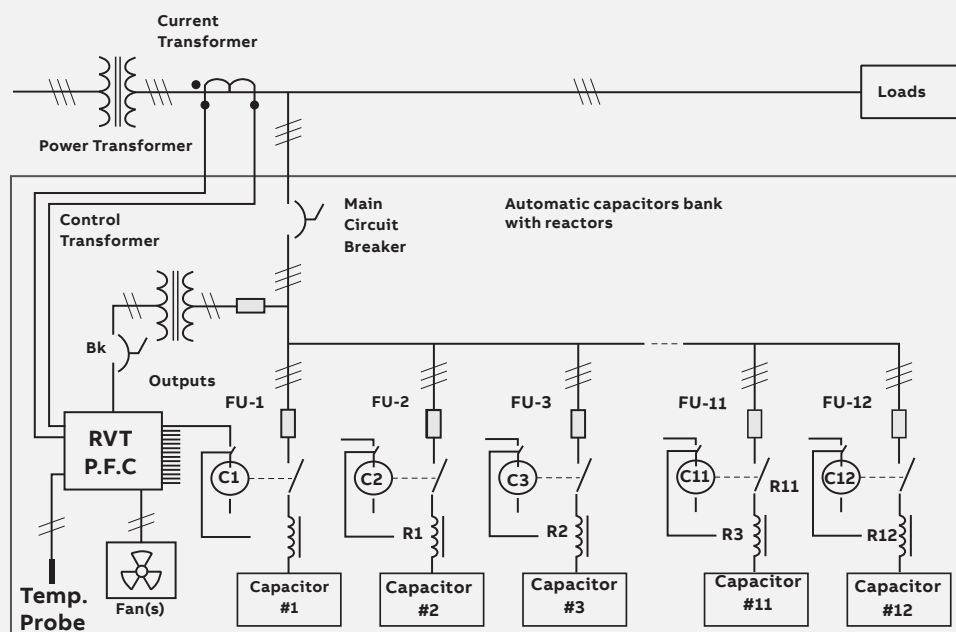
An automatic power factor correction system consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.

Switching capacitor banks with standard contactors may cause electrical damages like contact welding, coil burning or even fire on the installation.

ABB provides a choice of contactors dedicated for capacitor switching applications and CAPCAL a selection tool, available on the ABB Website:

<https://new.abb.com/low-voltage/products/motor-protection/contactors-for-capacitor-switching>



HF range

Great functionality in only 22.5 mm

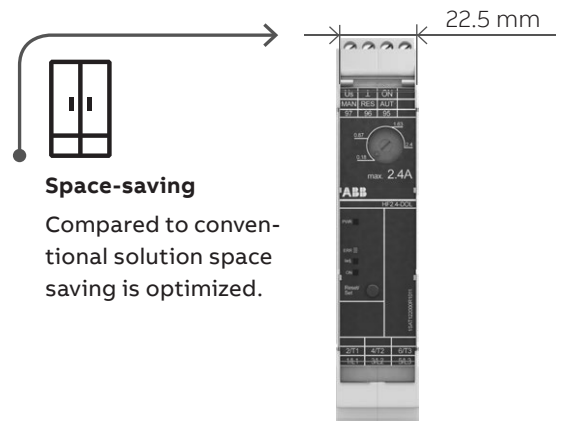
Electronic compact starters

Direct-on-line, reverse start, overload protection and emergency stop is all integrated in one compact device of only 22.5 mm width. Reliable 30 millions switching cycles for motors up to 3 kW / 400 V AC, reduced wiring time and faults are additional benefits.



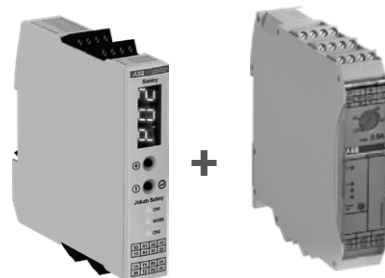
Short-circuit protection

Coordinated short circuit protection for single and group mounting with manual motor starters is available.



Space-saving

Compared to conventional solution space saving is optimized.



Safety and ATEX

In combination with Sentry safety relays the HF-Starter reaches SIL3, PL e certification. Feel free to use safety tools like FSDT and Sistema. The libraries are online on ABB.com. Additionally safety variants are ATEX certified.



Control of cooling tanks

The HF range is used to control pumps and compressor for cooling.



Solar tracker

The panels follow the sun and need to be switched frequently in a small cabinet.



Snow canons

Similar to the solar tracker the snow canon is switched left and right to ensure equal snow conditions.



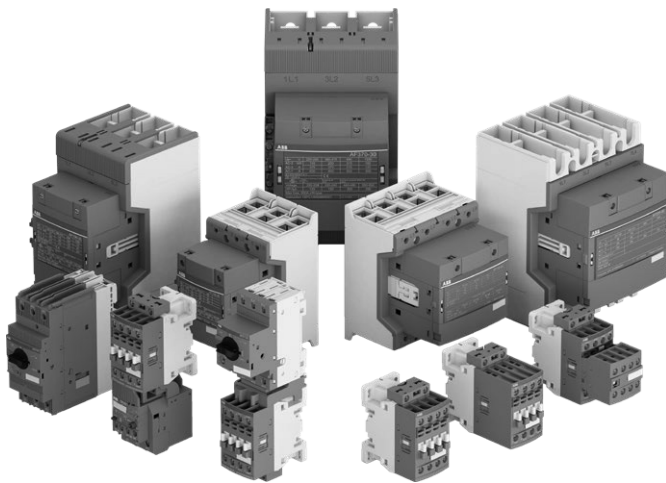
Straightening metal

The metal is unrolled directly from the coil. The motor needs to be switched frequently.

Contactors and motor protection for rolling stock

Sustainable mobility for a better world

Specifically designed and manufactured for rolling stock applications (1), our products can be installed in any environment including passenger or driver cabins, for main or urban line trains, underground trains or trams circulating frequently in tunnels or underground passages.



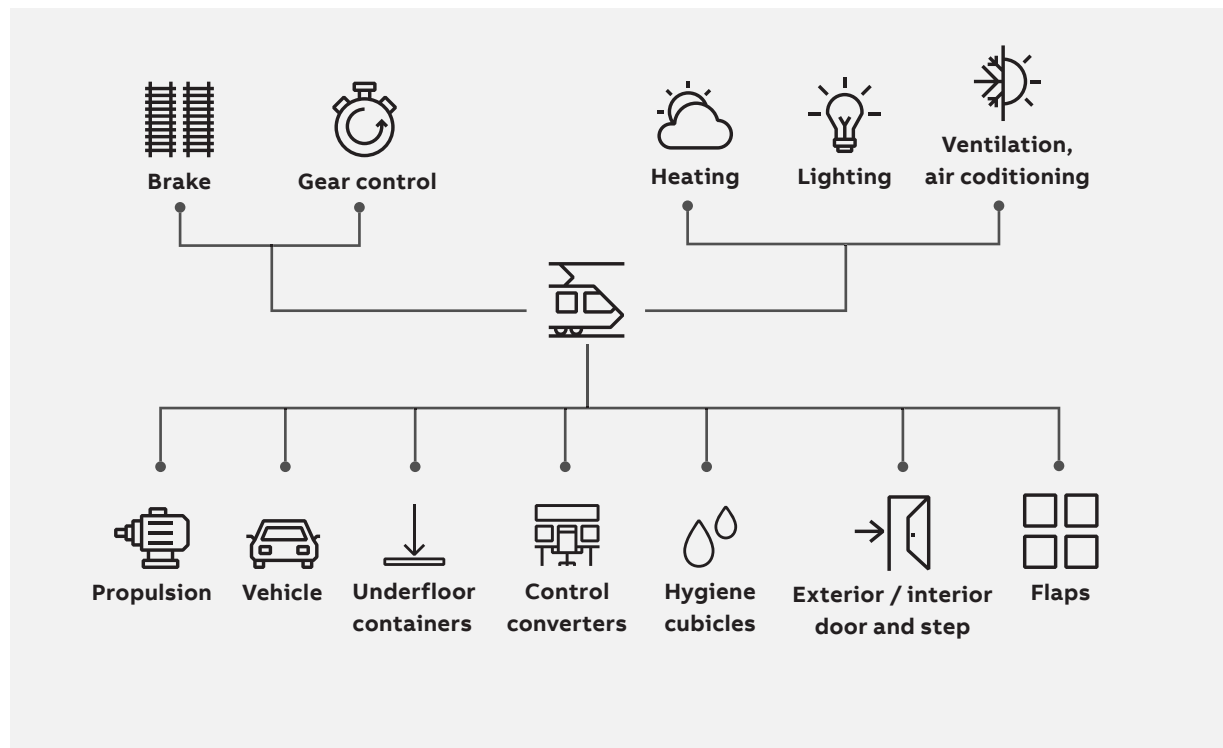
With the latest technology in our products for rolling stock you can

- Simplify your installation thanks to compact solution and modular frame size
- Reduce train energy consumption with lighter devices increasing passenger capacity and less coil energy consumption improving power management.
- Optimize your logistics and stocks
- Protect persons and equipment with products specifically designed to meet the latest rolling stock requirements
- Secure uptime thanks to AF technology, handle the large voltage fluctuation to battery use
- Reduce maintenance costs, downtimes and make troubleshooting easier with real motor protection.

(1) Important notice:
Standard contactors are not suitable for rolling stock applications due to the specific requirements in terms of norms, performance and approvals.
For rolling stock applications, please contact your local ABB sales representative.



Discover the Contactors and motor protection for rolling stock catalog



How to use this catalog

ABB MOTOR PROTECTION AND CONTROL

3/19

AF116 ... AF146 3-pole contactors

55 to 75 kW
AC / DC operated



AF146-30-00



AF146-30-00B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|-------------------------|----------------------|-------------------------------|---------------------------|----------|------------|-------------|
| Rated operational power | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | Pkg (1 pcs) |
| 400 V AC-3 kW | AC-1 A | 480 V 500 V AC | | | | kg |

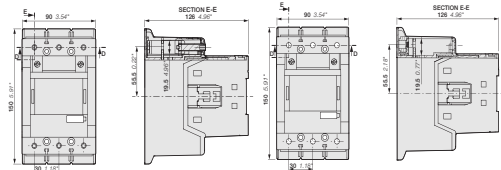
For connection with built-in cable clamps

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00-11 | ISFL427001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00-12 | ISFL427001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00-13 | ISFL427001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00-14 | ISFL427001R1400 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00-11 | ISFL447001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00-12 | ISFL447001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00-13 | ISFL447001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00-14 | ISFL447001R1400 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00-11 | ISFL467001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00-12 | ISFL467001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00-13 | ISFL467001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00-14 | ISFL467001R1400 | 1.750 |

With bar connections

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|-----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00B-11 | ISFL427002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00B-12 | ISFL427002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00B-13 | ISFL427002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00B-14 | ISFL427002R1400 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00B-11 | ISFL447002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00B-12 | ISFL447002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00B-13 | ISFL447002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00B-14 | ISFL447002R1400 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00B-11 | ISFL467002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00B-12 | ISFL467002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00B-13 | ISFL467002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00B-14 | ISFL467002R1400 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-00

AF116, AF140, AF146-30-00B

Main dimensions mm, inches

03



Product order code

click on the product order code to obtain the data sheet, the agreement and all technical information regarding that reference.



Product order code

For direct product details information, use product type or order code, ex:
new.abb.com/products/af09-30-10-13
or
new.abb.com/products/1SBC137001R1310



Web catalog



Print catalog



Find more information on our marketing material page.



Chart and datas of motor rated operational powers and currents are available in the customer made motor starting solutions chapter.



The products in this catalog can also be found together with product news life cycle status, data sheets, certificates and tools at:

<https://new.abb.com/low-voltage/products/motor-protection>

Ordering details

Orders can be placed either by using the type code or the order code. The type codes or order codes generally relate to single devices like a contactor, overload relays or an accessory but they can sometimes relate to an indivisible set (ex: connecting kits) or a bag (ex 50 function markers). See the description of the device.

Packaging unit

Products are generally packed as single units but very small products or accessories are often proposed in collective packs. Please refer to the “Package quantity” in the ordering detail charts.

Standards and approvals for the products

Products in this catalogue are designed tested and have third party approvals and markings in compliance with major international or local standards such as EN/IEC 60947-1, EN /IEC947-4-1, EN/IEC 60947-2, EN/IEC 60947-5-1 or UL 60947-4-1. See approvals and certification section.

Standards and approvals for design and manufacturing

ABB has set up a quality assurance organization in compliance with the requirements of ISO 9001 standard and ABB factories are ISO 9001 approved.

Guarantee

The information contained in this catalogue reflects the current state of our knowledge and aims to present our products and their possible applications as defined with the standards. The product data, ratings and utilization conditions are indicated in their respective sections, thus the information does not guarantee special utilizations or combination of characteristics that have not been defined or tested according to normalized values or test conditions defined with the standards.

Liability

The devices in this catalogue do not endanger safety when they are selected, mounted, commissioned used maintained and deposed with the rules and standards that apply to them.



Railways applications for rolling stock are not covered with this catalogue

The products in this catalog do generally not meet the special requirements and approvals for rolling stock applications. ABB offers specifically approved products, processes and support for this application.

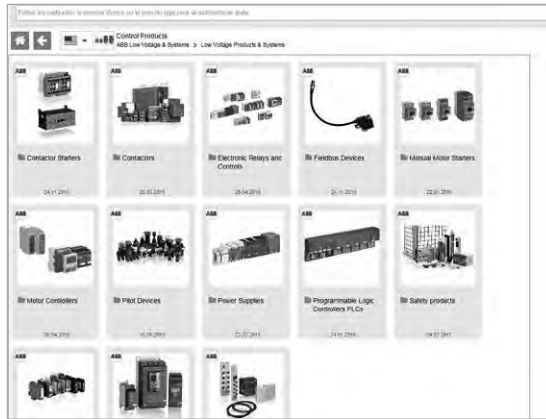
For rolling stock application see our dedicated portal



<https://new.abb.com/low-voltage/products/motor-protection/contactors-and-motor-protection-for-railway-applications>

Main online tools

2D and 3D CAD models, ABB CAD Download center



Cadenas portal: Download 2D or 3D files according to your needs (STEP, IGES...)

Selected Optimized Coordination tables - SOC



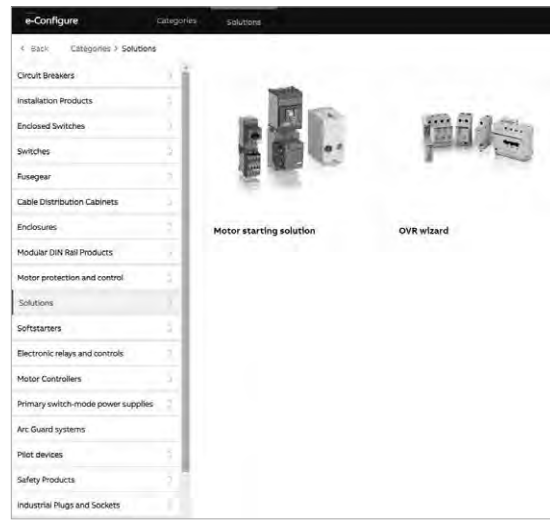
Selected Optimized Coordination tables SOC

Data sheets instructions, manuals and certificates



For direct product details information, use product type or order code, EX: www.abb.com/productdetails/AF09-30-10-13 or www.abb.com/productdetails/15BL13700R1310

Configurators e-Configure



<https://econfigure.xe.abb.com/global/#/categories/cfg-solution-Configurators>

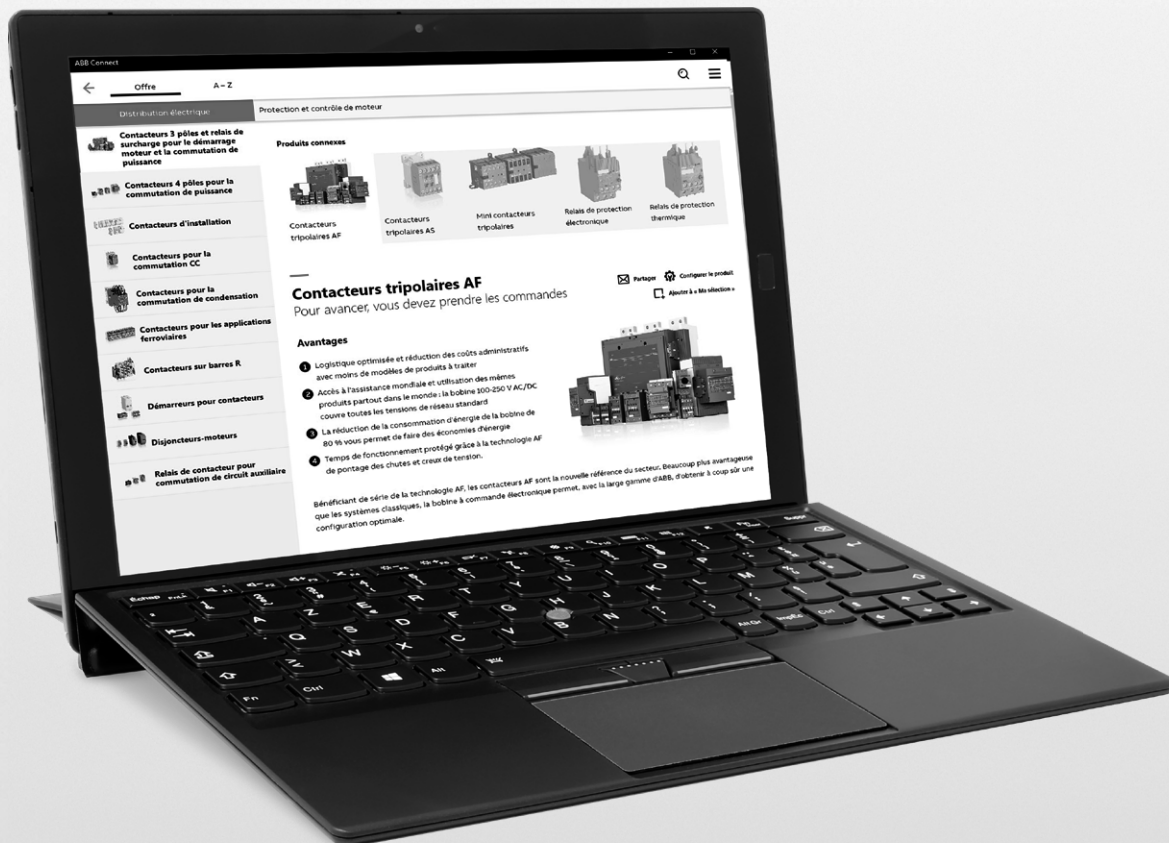


ABB Connect

Your digital assistant

Connect to your electrification solutions with your digital assistant, access the latest news and create your own digital workspace; search '**ABB Connect**' on the Apple App Store, Google Play Store or Microsoft Store and download today.



Find the latest product details



Make your phone or tablet your workspace



Tap and stay connected to all the latest information



Scan and download ABB Connect for iOS, Android or Windows 10

new.abb.com/low-voltage/service/abb-connect

General overview motor protection and control

3-pole contactors

B mini contactors

Contactors



| | | | | | | | | | | | | | | |
|-------------------------------|---------------------------------------|---|------------|------------|--------------------------|-----------------------|-----------------------|------|-----------------------|-----------------------|-----|----|----|------|
| IEC (1) | AC-3 Rated operational power | $\theta \leq 60^\circ\text{C}$ (2), 400 V | kW | 4 | 5.5 | 4 | 5.5 | 7.5 | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| UL/CSA | 3-phase motor rating | 480 V | hp | 3 | 5 | 5 | 7.5 | 10 | 5 | 7.5 | 10 | 15 | 20 | 25 |
| AC / DC Control supply | | Type | — | — | — | — | — | — | AF09 AF12 AF16 | AF26 AF30 AF38 | | | | |
| AC Control supply | | Type | B6 | B7 | AS09 AS12 AS16 | AF09 AF12 AF16 | AF26 AF30 AF38 | | | | | | | |
| DC Control supply | | Type | BC6 | BC7 | ASL09 ASL12 ASL16 | AF09 AF12 AF16 | AF26 AF30 AF38 | | | | | | | |
| IEC | AC-3 Rated operational current | $\theta \leq 60^\circ\text{C}$ (2), 400 V | A | 8.5 | 11.5 | 9 | 12 | 15.5 | 9 | 12 | 18 | 26 | 32 | 38 |
| | AC-1 Rated operational current | $\theta \leq 40^\circ\text{C}$, 690 V | A | 20 (400 V) | 20 (400 V) | 22 | 24 | 24 | 25 | 28 | 30 | 45 | 50 | 50 |
| UL/CSA | General use rating | 600 V | A | 12 (300 V) | 16 | 20 | 20 | 20 | 25 | 28 | 30 | 45 | 50 | 50 |
| NEMA | NEMA Size | — | | — | — | 00 | 00 | 0 | 00 | 0 | — | 1 | — | — |

(1) 1000 V IEC ratings available for AF80, AF96 and AF146 ... AF2650 contactors.

(2) $\theta \leq 55^\circ\text{C}$ for mini contactors and AF400 ... AF2650 contactors.

Main accessories

| | | | | |
|---------------------------------|--------------------------|----------------|--|--|
| Auxiliary contact blocks | Front mounting | CAF6 | CA3-10 (1 x N.O.) CA3-01 (1 x N.C.) | CA4-10 (1 x N.O.) CA4-01 (1 x N.C.) |
| | Side mounting | CA6 | CAL4-11 (1 x N.O. + 1 x N.C.) | |
| Timers | Electronic | | TEF3-ON TEF3-OFF | TEF4-ON TEF4-OFF |
| Interlocking units (3) | Mechanical | | VM3 | VM4 |
| | Mechanical / Electrical | | | VEM4 |
| Connection sets | For reversing contactors | BSM6-30 | BER16C-3 | BER16-4 BER38-4 |
| Surge suppressors | Varistor (AC/DC) | RV-BC6 | RV5 (24...440 V) | Built-in surge protection |
| | RC type (AC) | | RC5-1 (24...440 V) | |
| | Transil diode (DC) | RD7 | RT5 (12...264 V) | |

(3) See available reversing contactors VB6, VB7 and VAS09 ... VAS16.

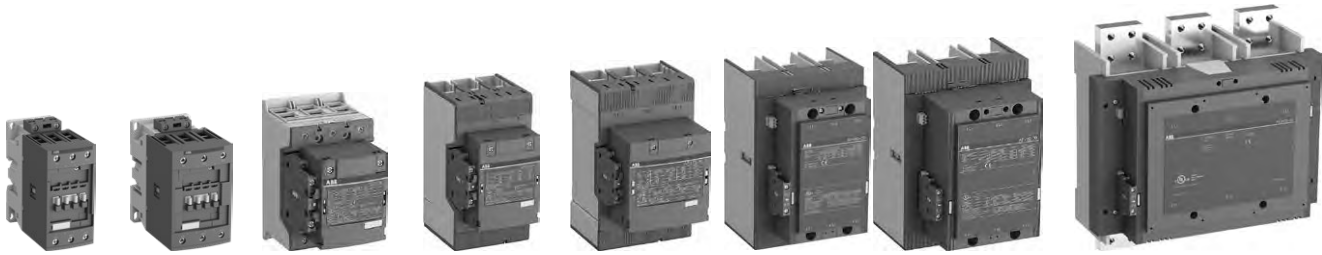
Overload relays

| | | | | | |
|--|-------------------|--|------------------------------|--------------------------|---|
| Thermal relays | | Class 10 (Class 10A for TF140, TA200DU) | T16 (0.10...16 A) | T16 (0.10...16 A) | TF42 (0.10...38 A) |
| Electronic relays | | Class 10E, 20E, 30E | E16DU (0.10...18.9 A) | | EF19 (0.10...18.9 A) EF19 (0.10...18.9 A) EF45 (9...45 A) |
| Accessories (for single mounting) | Thermal relays | | DB16 | | DB42 |
| | Electronic relays | | DB16E | | DB19EF DB45EF |

Manual motor starters

| | | | | |
|--------------------|---|---|---|---|
| | Thermal / magnetic protection Class 10 | MS116 (0.10...32 A) Ics up to 50 kA for class 10A | MS116 (0.10...32 A) Ics up to 50 kA for class 10A | MS165 (10...80 A) Ics up to 100 kA |
| | Magnetic only types | MS132 (0.10...32 A) Ics up to 100 kA | MS132 (0.10...32 A) Ics up to 100 kA | MO165 (16...80 A) Ics up to 100 kA |
| | | MO132 (0.16...32 A) | MO132 (0.16...32 A) Ics up to 100 kA | |
| Accessories | For contactor mounting | BEA7/132 | BEA16-3 BEA16-4 | BEA38-4 |

(4) BEA65-4 suitable for MS165 and MO165 only.



| | | | | | | | | | | | | | | | | | | | | | | |
|----------------|-----|-----|-----------|-----|-------------------|-----|-----|-------------|-----|-------------------|-----|-----|-------------|-----|--------------------|------|------|------------------------------------|------|------|------|------|
| 18.5 | 22 | 30 | 37 | 45 | 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 200 | 250 | 315 | 400 | — | 475 | 560 | — | — | — |
| 30 | 40 | 50 | 60 | 60 | 75 | 100 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | — | 800 | 900 | — | — | — |
| AF40 AF52 AF65 | | | AF80 AF96 | | AF116 AF140 AF146 | | | AF190 AF205 | | AF265 AF305 AF370 | | | AF400 AF460 | | AF580 AF750 AF1250 | | | AF1350 AF1650 AF2050 AF2650 AF2850 | | | | |
| AF40 AF52 AF65 | | | AF80 AF96 | | AF116 AF140 AF146 | | | AF190 AF205 | | AF265 AF305 AF370 | | | AF400 AF460 | | AF580 AF750 AF1250 | | | AF1350 AF1650 AF2050 AF2650 AF2850 | | | | |
| AF40 AF52 AF65 | | | AF80 AF96 | | AF116 AF140 AF146 | | | AF190 AF205 | | AF265 AF305 AF370 | | | AF400 AF460 | | AF580 AF750 AF1250 | | | AF1350 AF1650 AF2050 AF2650 AF2850 | | | | |
| 40 | 53 | 65 | 80 | 96 | 116 | 140 | 146 | 190 | 205 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | — | 860 | 1060 | — | — | — |
| 70 | 100 | 105 | 125 | 130 | 160 | 200 | 225 | 275 | 350 | 400 | 500 | 600 | 600 | 700 | 800 | 1050 | 1260 | 1350 | 1650 | 2050 | 2650 | 2850 |
| 60 | 80 | 90 | 105 | 115 | 160 | 200 | 200 | 250 | 300 | 350 | 400 | 520 | 550 | 650 | 750 | 900 | 1210 | 1350 | 1650 | 2100 | 2700 | 2850 |
| 2 | — | — | 3 | — | — | 4 | — | — | — | 5 | — | — | — | 6 | — | 7 | — | — | 8 | — | — | — |

| | | | | | | | | | | | | | |
|---------|---------|---------------------------------|----------|----------|-----------|--------------------------------|--|--|--|---------|--|--|--|
| | | CAL19-11 (1 x N.O. + 1 x N.C.) | | | | CAL18-11 (1 x N.O. + 1 x N.C.) | | | | | | | |
| VM96-4 | | VM19 (for same size contactors) | | | | VM750H VM750V | | | | VM1650H | | | |
| BER65-4 | BER96-4 | BER140-4 | BER205-4 | BER370-4 | BEM460-30 | BEM750-30 | | | | | | | |




| | | | | | | | |
|----------------------|-------------------|-----------------------------------|-----------------------------------|---------------------|---------------------|---------------------|-------------------------|
| TF65 (22...67 A) | TF96 (40...96 A) | TF140DU (66...142 A) θ ≤ 55 °C | TA200DU (66...200 A) θ ≤ 55 °C | EF370 (115...380 A) | EF460 (150...500 A) | EF750 (250...800 A) | EF1250DU (350...1250 A) |
| EF65 (20...70 A) | EF96 (20...100 A) | EF146 (54...150 A) | EF205 (63...210 A) | | | | |
| DB65 (only for TF65) | DB96 | | DB200 | | | | |
| | DB96 | | | | | | |

General overview motor protection and control

4-pole contactors

B mini contactors









| | | | | | |
|------------------------|--------------------------------|---|------|------------|-----|
| IEC | AC-1 Rated operational current | $\theta \leq 40^\circ\text{C}, 690\text{ V}$ | A | 16 | 20 |
| UL/CSA | General use rating | 600 V | A | 12 (300 V) | 16 |
| AC / DC Control supply | |  | Type | — | — |
| AC Control supply | |  | Type | B6 | B7 |
| DC Control supply | |  | Type | BC6 | BC7 |

Contactor relays

K mini contactor relays



| | | | | | | |
|------------------------|---------------------------------|--|------|---|---|---|
| IEC | AC-15 Rated operational current | 400 V | A | 3 | | |
| UL/CSA | Pilot duty | | | A600 | | |
| | | | |  |  |  |
| AC Control supply | |  | Type | K6-22Z | K6-31Z | K6-40E |
| DC Control supply | |  | Type | KC6-22Z | KC6-31Z | KC6-40E |
| AC / DC Control supply | |  | Type | — | — | — |

Specific contactors

DC Circuit switching



100 A, 440 V, DC-1
GA75, GAE75 types



275 to 2050 A, 1000 V, DC-1
GAF185 to GAF2050 types

Contactors



| | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| 25 | 30 | 45 | 55 | 70 | 100 | 125 | 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 25 | 30 | 45 | 55 | 60 | 80 | 105 | 160 | 175 | 230 | 250 | 300 | 350 | 420 | 540 | — |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | — | — |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
| AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |

Contactor relays



| | | | | | |
|-------------------|---------------|---------------|-------------------|--------------|--------------|
| 3 | | | 3 | | |
| A600, Q300 | | | A600, Q600 | | |
| | | | | | |
| NS22E | NS31E | NS40E | NF22E | NF31E | NF40E |
| NSL22E | NSL31E | NSL40E | NF22E | NF31E | NF40E |
| — | — | — | NF22E | NF31E | NF40E |

Capacitor switching



12.5 to 80 kvar
 UA16..RA to UA110..RA types
 UA16 to UA110 types



—

For more information please find our electronic data sheets online, for example:

or www.abb.com/productdetails/MS116-0.16
www.abb.com/productdetails/1SAM250000R1001

Manual motor starters & circuit breakers for transformer protection

Manual motor starters

2/3 **Presentation**

2/8 **Overview**

With thermal and electromagnetic protection

Ordering details - 0.10 to 80 A

2/10 MS116 manual motor starters

2/11 MS132 manual motor starters

2/12 MS132-K manual motor starters with Push-in Spring terminals

2/13 MS165 manual motor starters

With electromagnetic protection

Ordering details - 0.16 to 80 A

2/14 MO132 manual motor starters magnetic only

2/15 MO165 manual motor starters magnetic only

2/16 **Technical data**

2/28 **Circuit breakers for transformer protection**

With thermal and electromagnetic protection

Ordering details - 0.10 to 25 A

2/29 MS132-T circuit breakers for transformer protection

2/30 MS132-KT circuit breakers for transformer protection
with Push-in Spring terminals

2/31 **Technical data**

2/34 **Accessories**

MS and MO manual motor starters

A complete motor protection concept



Fuseless protection saves costs, space and ensures a quick reaction under overload and short-circuit condition by switching off the motor within milliseconds. The full range of motor starters offers protection from 0.1 A to up to 100 A. The new family range has a harmonized range of accessories and offers the same features up to 80 A.



Protection and control

Protect equipment and installations

ABB offers a broad range of manual motor starters, for protection and control in almost every situation including hazardous areas, protecting installations from short-circuits, overloads and phase failures while also controlling the current flow through a simple ON/OFF switch.



Continuous operation

Secure uptime

Fuseless motor protection reduces maintenance costs and downtimes by avoiding fuse replacement after faults. Furthermore, MS132 and MS165 feature a magnetic trip indicator making troubleshooting easier.



Speed up your projects

Simplified design

Manual motor starters can be connected easily with ABB contactors or soft starters using the respective accessory. Additionally, the main range of accessories is shared across multiple starters (both with screw and Push-in Spring terminals available), making logistics and planning simpler.

MS and MO manual motor starters

A complete motor protection concept

Right solution for your application

MS116 offers protection up to 32 A and a breaking capacity up to 100 kA – all in a 45 mm wide housing. They are designed to meet requirements of most standard applications.

All-in-one

ABB offers fuseless protection against short-circuits, phase failures and overloads including disconnect function – all in one single compact product.

Troubleshooting made easy

MS132 and MS165 feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faster.

High performance in compact size

MS132 and MS165 manual motor starters cover short-circuit breaking capacities up to 100 kA. In addition, every manual motor starter is temperature compensated up to 60 °C.



Protection wherever you are

Manual motor starters are suitable for worldwide use. The wide range of certifications covers standards like IEC (CB), cULus, CCC, EAC and various ship approvals. MS132 and MS165 also apply to ATEX standards for hazardous areas.



Ready for IE3 motors

MS116/MS132/MO132/MS165/MO165 comply with the latest IE3 N/H and NE/HE motors. NE/HE requires utilization category AC-3e.



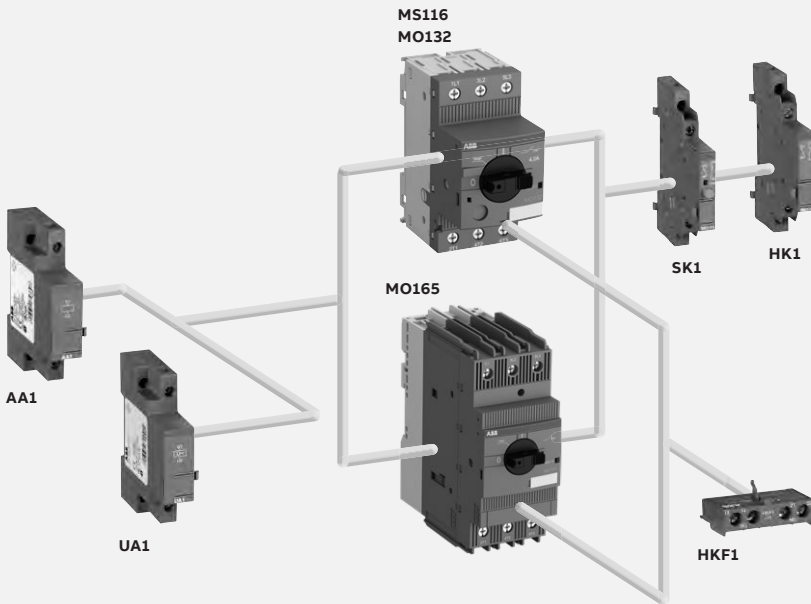
Just push it

With the new Push-in Spring terminals, one push is all you need for a faster than ever installation, an easier than ever wiring and a reliable as ever connection.



Protection and control

The right accessories for your applications



Harmonized range of accessories

All types up to 80 A share the same main accessories like auxiliary contacts, signaling contacts, shunt trips and undervoltage releases. This significantly reduces the part list and makes selection of the right accessories easy.

Compatible with Unifix AD new distribution system

Unifix AD allows an easy, safe and fast mounting of various components (manual motor starters, Tmax XT, circuit breakers, contactors etc.) without drilling the busbars, it's sufficient to clip them on the busbar system.



Save wiring time
and avoid mistakes by
using a connecting link



**Up to 5 manual
motor starters**
can be fitted next
to each other

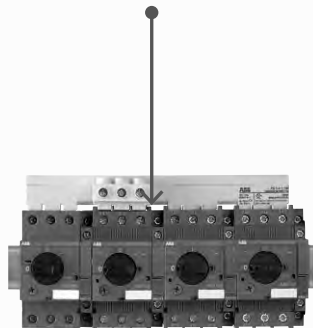


With a lockable handle
maintenance will be safe
for every technician



Easy to connect

Save wiring time and avoid mistakes by using a connecting link between ABB manual motor starters and soft starters or contactors. This creates harmonious and compact starter combinations that are easy to mount.



Busbar connectors and enclosures

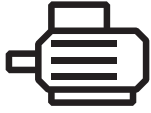
With busbar connectors, up to 5 manual motor starters can be fitted next to each other with optional spacing for auxiliary contacts. Enclosures or door handle kits are available as well.



Safety at work

With a lockable handle maintenance will be safe for every technician. For MS132 and MS165 a lock can seal the handle without the need for an additional accessory.

Application examples



Motor protection

No matter what type of starter is required by the application (direct-on-line, star-delta, soft starter or variable frequency drive), MS and MO manual motor starters (also known as motor protection circuit breakers or manual motor protectors) are the right protection devices for electric motors from 100 mA up to 100 A.



Starter protection

MO (magnetic-only) manual motor starters are typically used, when motor overload protection is provided by a separate overload protection device. This setup is specially beneficial for applications that require auto- or remote-reset of the starter in case of an overload tripping event (e.g. windmills or HVAC fans).



Circuit protection and control

ABB's manual motor starters are fuseless circuit breakers (approved acc. to IEC60947-2) that can be used to control circuits and protect cables / lines in industrial and commercial applications from overloads and short-circuits. The built-in disconnect function allows the usage as main On-/Off-switch, typically for de-centralized applications (e.g. small machinery or laboratory systems).





Resistive loads

Manual motor starters are not only for motors! They are also an efficient solution for AC-1 applications, where it is required to protect and switch resistive loads (for example resistive furnaces or heaters).



DC loads

Manual motor starters are not only for AC applications! MS132 and MS165 manual motor starters are also rated for direct current loads (e.g. for motors used in solar panel tracking systems).



Extreme conditions

Regardless if high-altitudes, shock and vibration environments or hazardous areas, ABB's manual motor starters are designed and certified to withstand harsh conditions. Specific versions for rolling stock applications are part of our offer.



Manual motor starters

Overview


MS116

MS132

MS165
Type

| Type | MS116 | MS132 | MS165 |
|--|--------------------|--------------------|--------------------|
| Thermal and electromagnetic protection | Yes | Yes | Yes |
| Electromagnetic protection | - | - | - |
| Phase loss sensitivity | Yes | Yes | Yes |
| Switch position | ON/OFF | ON/OFF/TRIP | ON/OFF/TRIP |
| Magnetic trip indication | - | Yes | Yes |
| Lockable handle without accessories | - | Yes | Yes |
| Disconnecting feature | Yes | Yes | Yes |
| Width | 45 mm | 45 mm | 55 mm |
| Rated operational current I _e | 0.10 ... 32 A | 0.10 ... 32 A | 10 ... 80 A |
| Setting range | 0.10 ... 32 A | 0.10 ... 32 A | 10 ... 80 A |
| Ambient air temperature | -25 ... +55 °C (1) | -25 ... +60 °C (1) | -25 ... +60 °C (1) |

(1) Compensated

Accessories

| | | | |
|---|-----------|-----|--|
| Auxiliary contact | HKF1, HK1 | | |
| Signaling contact for tripped alarm | SK1 | | |
| Signaling contact for short-circuit alarm | - | CK1 | |
| Shunt trip | AA1 | | |
| Undervoltage release | UA1 | | |

Table for short-circuit ratings for 400/415 V AC

| | Standard range MS116 | Performance range MS132, MS165 |
|--|-------------------------|-----------------------------------|
|--|-------------------------|-----------------------------------|

Selection parameters

| Rated operational power | Setting range for thermal release | Type | Short-circuit breaking capacity | | Type | Short-circuit breaking capacity | |
|-------------------------|-----------------------------------|------------|---------------------------------|-----------------|-------------------------|---------------------------------|-----------------|
| | | | I _{cu} | I _{cs} | | I _{cu} | I _{cs} |
| 0.03 kW (1) | 0.1 ... 0.16 A | MS116-0.16 | 100 kA | 50 kA | MS132-0.16 (2) | 100 kA | 100 kA |
| 0.06 kW | 0.16 ... 0.25 A | MS116-0.25 | 100 kA | 50 kA | MS132-0.25 (2) | 100 kA | 100 kA |
| 0.09 kW | 0.25 ... 0.4 A | MS116-0.4 | 100 kA | 50 kA | MS132-0.4 (2) | 100 kA | 100 kA |
| 0.18 kW | 0.4 ... 0.63 A | MS116-0.63 | 100 kA | 50 kA | MS132-0.63 (2) | 100 kA | 100 kA |
| 0.25 kW | 0.63 ... 1.0 A | MS116-1.0 | 100 kA | 50 kA | MS132-1.0 (2) | 100 kA | 100 kA |
| 0.55 kW | 1.0...1.6 A | MS116-1.6 | 100 kA | 50 kA | MS132-1.6 (2) | 100 kA | 100 kA |
| 0.75 kW | 1.6...2.5 A | MS116-2.5 | 75 kA | 50 kA | MS132-2.5 (2) | 100 kA | 100 kA |
| 1.5 kW | 2.5...4.0 A | MS116-4.0 | 75 kA | 50 kA | MS132-4.0 (2) | 100 kA | 100 kA |
| 2.2 kW | 4.0...6.3 A | MS116-6.3 | 50 kA | 50 kA | MS132-6.3 (2) | 100 kA | 100 kA |
| 4.0 kW | 6.3...10 A | MS116-10 | 50 kA | 50 kA | MS132-10 (2) | 100 kA | 100 kA |
| 5.5 kW | 8...12 A | MS116-12 | 50 kA | 25 kA | MS132-12 | 100 kA | 100 kA |
| 7.5 kW | 10...16 A | MS116-16 | 16 kA | 16 kA | MS132-16 (2) / MS165-16 | 100 kA | 100 kA |
| 7.5 kW | 14 ... 20 A | | | | MS165-20 | 100 kA | 100 kA |
| 7.5 kW | 16...20 A | MS116-20 | 16 kA | 10 kA | MS132-20 (2) | 100 kA | 100 kA |
| 11 kW | 18 ... 25 A | | | | MS165-25 | 100 kA | 100 kA |
| 11 kW | 20...25 A | MS116-25 | 16 kA | 10 kA | MS132-25 (2) | 50 kA | 50 kA |
| 15 kW | 25...32 A | MS116-32 | 16 kA | 10 kA | MS132-32 (2) | 50 kA | 25 kA |
| 15 kW | 23 ... 32 A | | | | MS165-32 | 100 kA | 100 kA |
| 22 kW | 30 ... 42 A | | | | MS165-42 | 50 kA | 50 kA |
| 22 kW | 40 ... 54 A | | | | MS165-54 | 50 kA | 30 kA |
| 25 kW | - | | | | | | |
| 30 kW | 52 ... 65 A | | | | MS165-65 | 50 kA | 30 kA |
| 37 kW | 62 ... 73 A | | | | MS165-73 | 30 kA | 30 kA |
| 45 kW | 70 ... 80 A | | | | MS165-80 | 30 kA | 30 kA |

(1) 690 V AC

(2) Available with Push-in Spring terminals.



MO132



MO165



MS132-T

| | | |
|----------------|----------------|--------------------|
| - | - | - |
| Yes | Yes | Yes |
| - | - | - |
| ON/OFF/TRIP | ON/OFF/TRIP | ON/OFF/TRIP |
| - | - | - |
| Yes | Yes | Yes |
| Yes | Yes | Yes |
| 45 mm | 55 mm | 45 mm |
| 0.16 ... 32 A | 16 ... 80 A | 0.16 ... 25 A |
| - | - | 0.10 ... 25 A |
| -25 ... +60 °C | -25 ... +60 °C | -25 ... +60 °C (1) |

| | |
|-----------|-----------|
| HKF1, HK1 | HKF1, HK1 |
| SK1 | SK1 |
| - | CK1 |
| AA1 | AA1 |
| UA1 | UA1 |

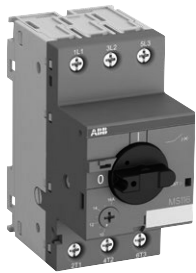
| | |
|--|--|
| Performance range MO132, MO165 | Transformer protection MS132-T |
|--|--|

| Type | Short-circuit breaking capacity | | Type | Short-circuit breaking capacity | |
|---------------------|---------------------------------|-----------------|-----------------|-----------------------------------|--|
| | I _{cu} | I _{cs} | | I _{cu} / I _{cs} | |
| MO132-0.16 | 100 kA | 100 kA | MS132-0.16T (2) | 100 kA | |
| MO132-0.25 | 100 kA | 100 kA | MS132-0.25T (2) | 100 kA | |
| MO132-0.4 | 100 kA | 100 kA | MS132-0.4T (2) | 100 kA | |
| MO132-0.63 | 100 kA | 100 kA | MS132-0.63T (2) | 100 kA | |
| MO132-1.0 | 100 kA | 100 kA | MS132-1.0T (2) | 100 kA | |
| MO132-1.6 | 100 kA | 100 kA | MS132-1.6T (2) | 100 kA | |
| MO132-2.5 | 100 kA | 100 kA | MS132-2.5T (2) | 100 kA | |
| MO132-4.0 | 100 kA | 100 kA | MS132-4.0T (2) | 100 kA | |
| MO132-6.3 | 100 kA | 100 kA | MS132-6.3T (2) | 100 kA | |
| MO132-10 | 100 kA | 100 kA | MS132-10T (2) | 100 kA | |
| MO132-12 | 100 kA | 100 kA | MS132-12T | 100 kA | |
| MO132-16 / MO165-16 | 100 kA | 100 kA | MS132-16T (2) | 100 kA | |
| MO165-20 | 100 kA | 100 kA | | | |
| MO132-20 | 100 kA | 100 kA | MS132-20T (2) | 100 kA | |
| | | | | | |
| MO132-25 / MO165-25 | 50 kA / 100 kA | 50 kA / 100 kA | MS132-25T (2) | 50 kA | |
| MO132-32 | 50 kA | 25 kA | | | |
| MO165-32 | 100 kA | 100 kA | | | |
| MO165-42 | 50 kA | 50 kA | | | |
| MO165-54 | 50 kA | 30 kA | | | |
| | | | | | |
| MO165-65 | 50 kA | 30 kA | | | |
| MO165-73 | 30 kA | 30 kA | | | |
| MO165-80 | 30 kA | 30 kA | | | |

Transformer protection:
The instantaneous short-circuit current setting is 20 times the rated operational current.

MS116 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection



MS116-16

2CDC241004V0017



MS116-25

2CDC241017V0017



MS116-0.16-HKF1-11

2CDC241019V0017



MS116-32-HKF1-11

2CDC241020V0017

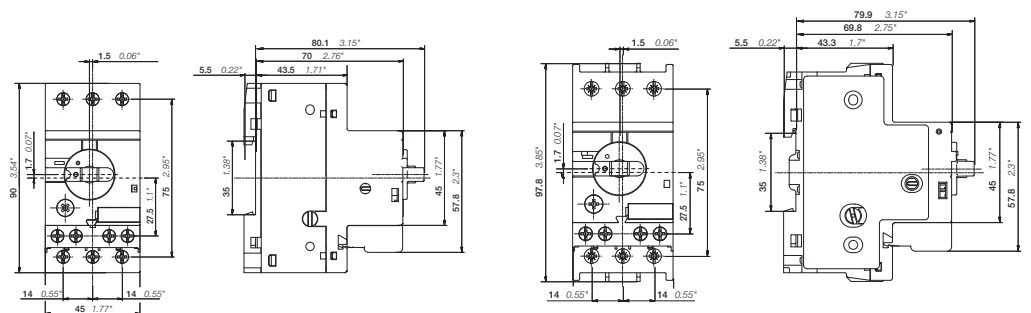
MS116 is a compact and economic range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks and locking devices for protection against unauthorized changes are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Rated operational power 400 V AC-3, AC-3e kW | Setting range A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------|---|---|------------|-----------------|----------------------|
| 0.03 (1) | 0.10 ... 0.16 | 50 | 2.00 | MS116-0.16 | 1SAM250000R1001 | 0.225 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25 | 1SAM250000R1002 | 0.225 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4 | 1SAM250000R1003 | 0.225 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63 | 1SAM250000R1004 | 0.225 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0 | 1SAM250000R1005 | 0.225 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6 | 1SAM250000R1006 | 0.265 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5 | 1SAM250000R1007 | 0.265 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0 | 1SAM250000R1008 | 0.265 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3 | 1SAM250000R1009 | 0.265 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10 | 1SAM250000R1010 | 0.265 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12 | 1SAM250000R1012 | 0.265 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16 | 1SAM250000R1011 | 0.265 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20 | 1SAM250000R1013 | 0.310 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25 | 1SAM250000R1014 | 0.310 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32 | 1SAM250000R1015 | 0.310 |

Mounted Auxiliary Contacts 1 N.O. + 1 N.C.

| Rated operational power | Setting range | Short-circuit breaking capacity Ics at 400 V AC | Rated instantaneous short-circuit current setting Ii | Type | Order code | Weight (1 pce) |
|-------------------------|---------------|---|--|--------------------|-----------------|----------------|
| 0.03 (1) | 0.10 ... 0.16 | 50 | 2.00 | MS116-0.16-HKF1-11 | 1SAM250005R1001 | 0.240 |
| 0.06 | 0.16 ... 0.25 | 50 | 3.10 | MS116-0.25-HKF1-11 | 1SAM250005R1002 | 0.240 |
| 0.09 | 0.25 ... 0.40 | 50 | 5.00 | MS116-0.4-HKF1-11 | 1SAM250005R1003 | 0.240 |
| 0.18 | 0.40 ... 0.63 | 50 | 7.90 | MS116-0.63-HKF1-11 | 1SAM250005R1004 | 0.240 |
| 0.25 | 0.63 ... 1.00 | 50 | 12.5 | MS116-1.0-HKF1-11 | 1SAM250005R1005 | 0.240 |
| 0.55 | 1.00 ... 1.60 | 50 | 20.0 | MS116-1.6-HKF1-11 | 1SAM250005R1006 | 0.280 |
| 0.75 | 1.60 ... 2.50 | 50 | 31.3 | MS116-2.5-HKF1-11 | 1SAM250005R1007 | 0.280 |
| 1.50 | 2.50 ... 4.00 | 50 | 50.0 | MS116-4.0-HKF1-11 | 1SAM250005R1008 | 0.280 |
| 2.20 | 4.00 ... 6.30 | 50 | 78.8 | MS116-6.3-HKF1-11 | 1SAM250005R1009 | 0.280 |
| 4.00 | 6.30 ... 10.0 | 50 | 150 | MS116-10.0-HKF1-11 | 1SAM250005R1010 | 0.280 |
| 5.50 | 8.00 ... 12.0 | 25 | 180 | MS116-12.0-HKF1-11 | 1SAM250005R1012 | 0.280 |
| 7.50 | 10.0 ... 16.0 | 16 | 240 | MS116-16.0-HKF1-11 | 1SAM250005R1011 | 0.280 |
| 7.50 | 16.0 ... 20.0 | 10 | 300 | MS116-20-HKF1-11 | 1SAM250005R1013 | 0.326 |
| 11.0 | 20.0 ... 25.0 | 10 | 375 | MS116-25-HKF1-11 | 1SAM250005R1014 | 0.326 |
| 15.0 | 25.0 ... 32.0 | 10 | 480 | MS116-32-HKF1-11 | 1SAM250005R1015 | 0.326 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS116 ≤ 16 A & MS116-HKF1-11 ≤ 16 A

MS116 ≥ 20 A & MS116-HKF1-11 ≥ 20 A

Main dimensions mm, inches

MS132 manual motor starters

0.10 to 32 A – with thermal and electromagnetic protection



MS132-10

ZCDC241002V0013



MS132-32

ZCDC241006V0017



MS132-0.16-HKF1-11

ZCDC241021V0017



MS132-32-HKF1-11

ZCDC241022V0017

MS132 is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A in width of 45 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Rated operational power 400 V AC-3, AC-3e kW | Setting range A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------|---|---|------------|-----------------|----------------------|
| 0.03 (1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16 | 1SAM350000R1001 | 0.215 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25 | 1SAM350000R1002 | 0.215 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.00 | MS132-0.4 | 1SAM350000R1003 | 0.215 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63 | 1SAM350000R1004 | 0.215 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0 | 1SAM350000R1005 | 0.215 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6 | 1SAM350000R1006 | 0.265 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5 | 1SAM350000R1007 | 0.265 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0 | 1SAM350000R1008 | 0.265 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3 | 1SAM350000R1009 | 0.265 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10 | 1SAM350000R1010 | 0.265 |
| 5.50 | 8.00 ... 12.0 | 100 | 180 | MS132-12 | 1SAM350000R1012 | 0.310 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16 | 1SAM350000R1011 | 0.310 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20 | 1SAM350000R1013 | 0.310 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25 | 1SAM350000R1014 | 0.310 |
| 15.0 | 25.0 ... 32.0 | 25 | 480 | MS132-32 | 1SAM350000R1015 | 0.310 |

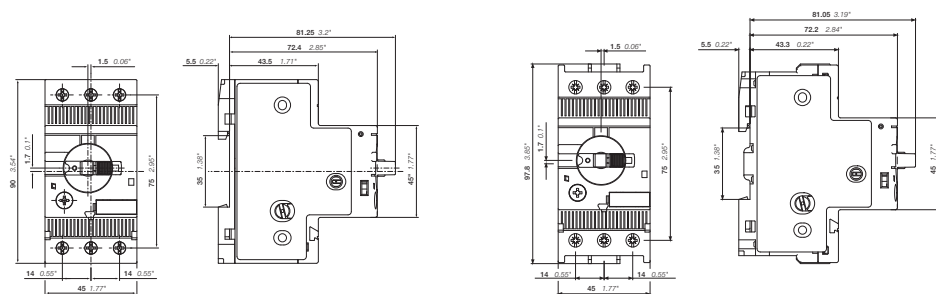
Mounted Auxiliary Contacts 1 N.O. + 1 N.C.

| | | | | | | |
|----------|---------------|-----|------|--------------------|-----------------|-------|
| 0.03 (1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16-HKF1-11 | 1SAM350005R1001 | 0.231 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25-HKF1-11 | 1SAM350005R1002 | 0.231 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.0 | MS132-0.4-HKF1-11 | 1SAM350005R1003 | 0.231 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63-HKF1-11 | 1SAM350005R1004 | 0.231 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0-HKF1-11 | 1SAM350005R1005 | 0.231 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6-HKF1-11 | 1SAM350005R1006 | 0.281 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5-HKF1-11 | 1SAM350005R1007 | 0.281 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0-HKF1-11 | 1SAM350005R1008 | 0.281 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3-HKF1-11 | 1SAM350005R1009 | 0.281 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10.0-HKF1-11 | 1SAM350005R1010 | 0.281 |
| 5.50 | 8.00 ... 12.0 | 100 | 180 | MS132-12.0-HKF1-11 | 1SAM350005R1012 | 0.326 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16.0-HKF1-11 | 1SAM350005R1011 | 0.326 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20-HKF1-11 | 1SAM350005R1013 | 0.326 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25-HKF1-11 | 1SAM350005R1014 | 0.326 |
| 15.0 | 25.0 ... 32.0 | 25 | 480 | MS132-32-HKF1-11 | 1SAM350005R1015 | 0.326 |

Mounted Auxiliary Contacts 2 N.O. + 0 N.C.

| | | | | | | |
|------|-----------|-----|-----|------------------|-----------------|-------|
| 7.50 | 10 ... 16 | 100 | 240 | MS132-16-HKF1-20 | 1SAM350006R1011 | 0.326 |
|------|-----------|-----|-----|------------------|-----------------|-------|

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS132 ≤ 10 A

MS132 ≥ 12 A

Main dimensions mm, inches

MS132-K manual motor starters with Push-in Spring terminals

0.10 to 32 A – with thermal and electromagnetic protection



MS132-32K

ZCDC241025V0017

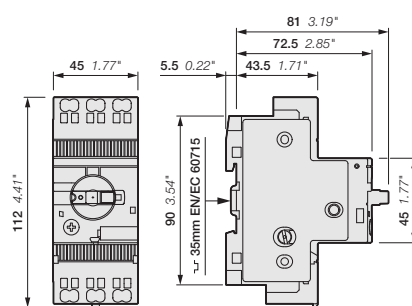
The MS132-K series is a compact and powerful range for motor protection up to 15 kW (400 V) / 32 A with a width of only 45 mm. The innovative Push-in Spring terminals enable tool-free wiring and eliminate the need for routine re-tightening.

The MS132-K also has a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication.

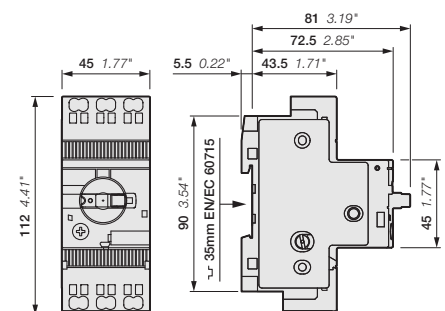
The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Rated operational power 400 V AC-3, AC-3e kW | Setting range A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------|---|---|-------------|-----------------|----------------------|
| 0.03(1) | 0.10 ... 0.16 | 100 | 2.00 | MS132-0.16K | 1SAM350010R1001 | 0.256 |
| 0.06 | 0.16 ... 0.25 | 100 | 3.10 | MS132-0.25K | 1SAM350010R1002 | 0.256 |
| 0.09 | 0.25 ... 0.40 | 100 | 5.00 | MS132-0.4K | 1SAM350010R1003 | 0.256 |
| 0.18 | 0.40 ... 0.63 | 100 | 7.90 | MS132-0.63K | 1SAM350010R1004 | 0.256 |
| 0.25 | 0.63 ... 1.00 | 100 | 12.5 | MS132-1.0K | 1SAM350010R1005 | 0.256 |
| 0.55 | 1.00 ... 1.60 | 100 | 20.0 | MS132-1.6K | 1SAM350010R1006 | 0.298 |
| 0.75 | 1.60 ... 2.50 | 100 | 31.3 | MS132-2.5K | 1SAM350010R1007 | 0.280 |
| 1.50 | 2.50 ... 4.00 | 100 | 50.0 | MS132-4.0K | 1SAM350010R1008 | 0.286 |
| 2.20 | 4.00 ... 6.30 | 100 | 78.8 | MS132-6.3K | 1SAM350010R1009 | 0.289 |
| 4.00 | 6.30 ... 10.0 | 100 | 150 | MS132-10K | 1SAM350010R1010 | 0.296 |
| 7.50 | 10.0 ... 16.0 | 100 | 240 | MS132-16K | 1SAM350010R1011 | 0.316 |
| 7.50 | 16.0 ... 20.0 | 100 | 300 | MS132-20K | 1SAM350010R1013 | 0.317 |
| 11.0 | 20.0 ... 25.0 | 50 | 375 | MS132-25K | 1SAM350010R1014 | 0.316 |
| 15.0 | 25.0 ... 32.0 | 25 | 480 | MS132-32K | 1SAM350010R1015 | 0.316 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.
(1) 690 V



MS132-K > 10 A

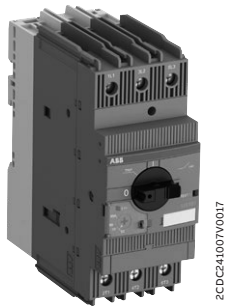


MS132-K ≤ 10 A

Main dimensions mm, inches

MS165 manual motor starters

10 to 80 A – with thermal and electromagnetic protection



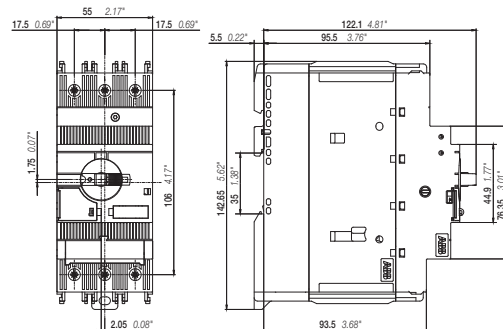
MS165-65

ZDCD241007V0017

MS165 is a compact and powerful range for motor protection up to 45 kW (400 V) / 80 A in width of 55 mm. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starter is suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Rated operational power 400 V AC-3, AC-3e kW | Setting range A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------|---|---|----------|-----------------|----------------------|
| 7.5 | 10 ... 16 | 100 | 240 | MS165-16 | 1SAM451000R1011 | 0.950 |
| 7.5 | 14 ... 20 | 100 | 300 | MS165-20 | 1SAM451000R1012 | 0.950 |
| 11 | 18 ... 25 | 100 | 375 | MS165-25 | 1SAM451000R1013 | 0.960 |
| 15 | 23 ... 32 | 100 | 480 | MS165-32 | 1SAM451000R1014 | 0.970 |
| 22 | 30 ... 42 | 50 | 630 | MS165-42 | 1SAM451000R1015 | 0.970 |
| 22 | 40 ... 54 | 30 | 810 | MS165-54 | 1SAM451000R1016 | 0.970 |
| 30 | 52 ... 65 | 30 | 975 | MS165-65 | 1SAM451000R1017 | 0.980 |
| 37 | 62 ... 73 | 30 | 1022 | MS165-73 | 1SAM451000R1018 | 1.000 |
| 45 | 70 ... 80 | 30 | 1120 | MS165-80 | 1SAM451000R1019 | 1.000 |

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range.



MS165

Main dimensions mm, inches

MO132 manual motor starters magnetic only

0.16 to 32 A – with electromagnetic protection



2CDC2401.BV0017

MO132-6.3



2CDC24015V0017

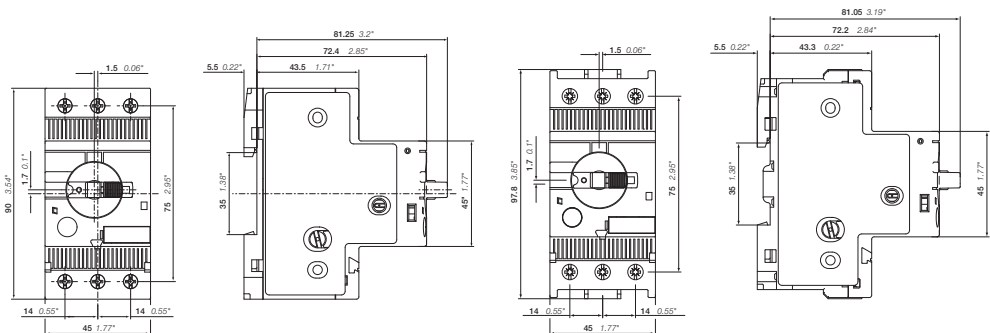
MO132-32

The MO132 manual motor starter magnetic only is a compact and powerful range for motor protection up to 15 kW (400 V AC) in width of 45 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits.

The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication. The manual motor starters magnetic only are suitable for three- and single-phase applications. The manual motor starters magnetic only are lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase busbars and power in-feed blocks are available as accessory.

| Rated operational power 400 V AC-3, AC-3e kW | Rated operational current A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------------------|---|---|------------|-----------------|----------------------|
| 0.03 (1) | 0.16 | 100 | 2.00 | MO132-0.16 | 1SAM360000R1001 | 0.215 |
| 0.06 | 0.25 | 100 | 3.10 | MO132-0.25 | 1SAM360000R1002 | 0.215 |
| 0.09 | 0.40 | 100 | 5.00 | MO132-0.4 | 1SAM360000R1003 | 0.215 |
| 0.12 | 0.63 | 100 | 7.90 | MO132-0.63 | 1SAM360000R1004 | 0.215 |
| 0.25 | 1.0 | 100 | 12.5 | MO132-1.0 | 1SAM360000R1005 | 0.215 |
| 0.55 | 1.6 | 100 | 20.0 | MO132-1.6 | 1SAM360000R1006 | 0.265 |
| 0.75 | 2.5 | 100 | 31.3 | MO132-2.5 | 1SAM360000R1007 | 0.265 |
| 1.5 | 4.0 | 100 | 50.0 | MO132-4.0 | 1SAM360000R1008 | 0.265 |
| 2.2 | 6.3 | 100 | 78.8 | MO132-6.3 | 1SAM360000R1009 | 0.265 |
| 4.0 | 10 | 100 | 125 | MO132-10 | 1SAM360000R1010 | 0.265 |
| 5.5 | 12 | 100 | 150 | MO132-12 | 1SAM360000R1012 | 0.310 |
| 7.5 | 16 | 100 | 200 | MO132-16 | 1SAM360000R1011 | 0.310 |
| 7.5 | 20 | 100 | 250 | MO132-20 | 1SAM360000R1013 | 0.310 |
| 11 | 25 | 50 | 313 | MO132-25 | 1SAM360000R1014 | 0.310 |
| 15 | 32 | 25 | 400 | MO132-32 | 1SAM360000R1015 | 0.310 |

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.
(1) 690 V



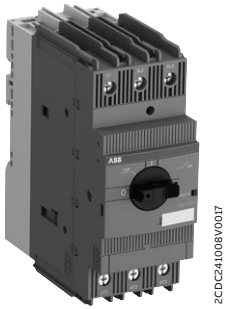
MO132 ≤ 10 A

MO132 ≥ 12 A

Main dimensions mm, inches

MO165 manual motor starters magnetic only

16 to 80 A – with electromagnetic protection



MO165-65

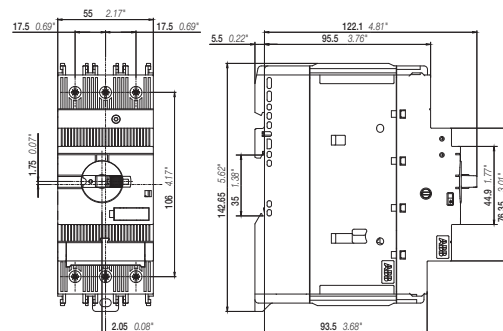
2CDC241008V0017

The MO165 manual motor starter magnetic only is a compact and powerful range for motor protection up to 45 kW (400 V AC) in width of 55 mm. The devices are used to manually switch on and off loads/motors and to protect them reliably and without the need for a fuse from short-circuits. The manual motor starter offers a rated service short-circuit breaking capacity up to 100 kA at 400 V AC. A combination together with overload relays or motor controllers allows the protection of motors. Further features are the built-in disconnect function, trip-free mechanism and a rotary handle with a clear switch position indication.

The manual motor starters magnetic only are suitable for three- and single-phase applications. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, 3-phase bus bars and power in-feed blocks are available as accessory.

| Rated operational power 400 V AC-3, AC-3e kW | Rated operational current A | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting Ii A | Type | Order code | Weight (1 pce) kg |
|---|--------------------------------|---|---|----------|-----------------|----------------------|
| 7.5 | 16 | 100 | 240 | MO165-16 | 1SAM461000R1011 | 0.950 |
| 7.5 | 20 | 100 | 300 | MO165-20 | 1SAM461000R1012 | 0.950 |
| 11 | 25 | 100 | 375 | MO165-25 | 1SAM461000R1013 | 0.960 |
| 15 | 32 | 100 | 480 | MO165-32 | 1SAM461000R1014 | 0.970 |
| 22 | 42 | 50 | 630 | MO165-42 | 1SAM461000R1015 | 0.970 |
| 22 | 54 | 30 | 810 | MO165-54 | 1SAM461000R1016 | 0.970 |
| 30 | 65 | 30 | 975 | MO165-65 | 1SAM461000R1017 | 0.980 |
| 37 | 73 | 30 | 1022 | MO165-73 | 1SAM461000R1018 | 1.000 |
| 45 | 80 | 30 | 1120 | MO165-80 | 1SAM461000R1019 | 1.000 |

Note: For overload protection of motors, an appropriate thermal or electronic overload relay must be used.



MO165

Main dimensions mm, inches

MS116, MS132, MS165, MO132, MO165

Technical data

Main circuit – Utilization characteristics according to IEC/EN

| Type | MS116 | MS132 | MS165 | MO132 | MO165 |
|--|---|------------------------------------|------------------------------------|--------------------|------------------------------------|
| Standards | IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1 | | | | |
| Rated operational voltage Ue | 690 V AC | 690 V AC / 250 V DC | 690 V AC / 250 V DC | 690 V AC | 690 V AC / 250 V DC |
| Rated frequency | 50/60 Hz | DC, 50/60 Hz | DC, 50/60 Hz | 50/60 Hz | DC, 50/60 Hz |
| Operational frequency | 50/60 Hz | 0 ... 400 Hz | 0 ... 400 Hz | 0 ... 400 Hz | 0 ... 400 Hz |
| Trip class | 10A | 10 | 10 | - | - |
| Number of poles | 3 | | | | |
| Duty time | 100% | | | | |
| Mechanical durability | 100000 cycles | 100000 cycles | 50000 cycles | 100000 cycles | 50000 cycles |
| Electrical durability | up to 10 A | up to 100000 cycles | up to 100000 cycles | up to 25000 cycles | up to 100000 cycles |
| | up to 16 A | 100000 cycles | 50000 cycles | 25000 cycles | 50000 cycles |
| | 20 ... 65 A | 50000 cycles | 50000 cycles | 25000 cycles | 50000 cycles |
| | 65 ... 80 A | - | - | 20000 cycles | - |
| Rated impulse withstand voltage Uimp | 6 kV | 6 kV | 8 kV | 6 kV | 8 kV |
| Rated insulation voltage Ui | 690 V | 690 V | 1000 V | 690 V | 1000 V |
| Rated operational current Ie | See ordering details | | | | |
| Rated operational current DC-5 Ie 3 conducting paths in series up to 250 V | - | See "Rated operational current Ie" | See "Rated operational current Ie" | - | See "Rated operational current Ie" |
| Rated instantaneous short-circuit current setting Ii | See ordering details | | | | |
| Rated service short-circuit breaking capacity Ics | See table "Short-circuit breaking capacity and back-up fuses" | | | | |
| Rated ultimate short-circuit breaking capacity Icu | See table "Short-circuit breaking capacity and back-up fuses" | | | | |
| Rated service short-circuit breaking capacity DC Ics 3 conducting paths in series up to 250 V | - | 10 kA | 100 kA | - | 100 kA |
| Suitable for use in IT networks | Yes | | | | |

Short-circuit breaking capacity and back-up fuses

Ics Rated service short-circuit breaking capacity

Icu Rated ultimate short-circuit breaking capacity

Icc Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if Icc > Ics

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MS116-0.16 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.25 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.4 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-0.63 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-1.0 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-1.6 | 50 | 100 | - | 50 | 100 | - | 50 | 100 | - | 30 | 100 | - | 30 | 100 | - |
| MS116-2.5 | 50 | 75 | - | 50 | 75 | - | 10 | 30 | 25 (1) | 10 | 20 | 25 (1) | 5 | 10 | 25 (1) |
| MS116-4.0 | 50 | 75 | - | 50 | 75 | - | 6 | 18 | 25 (1) | 6 | 15 | 25 (1) | 2 | 3 | 25 (1) |
| MS116-6.3 | 50 | 50 | - | 50 | 50 | - | 6 | 18 | 63 (1) | 6 | 10 | 63 (1) | 2 | 3 | 40 (1) |
| MS116-10 | 50 | 50 | - | 50 | 50 | - | 6 | 18 | 63 (1) | 6 | 10 | 63 (1) | 2 | 3 | 50 (1) |
| MS116-12 | 25 | 50 | 80 (1) | 25 | 50 | 80 (1) | 6 | 15 | 63 (1) | 6 | 10 | 63 (1) | 2 | 3 | 50 (1) |
| MS116-16 | 16 | 16 | 80 (1) | 16 | 16 | 80 (1) | 6 | 15 | 63 (1) | 4 | 10 | 63 (1) | 2 | 3 | 63 (1) |
| MS116-20 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 80 (1) |
| MS116-25 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 100 (1) |
| MS116-32 | 10 | 16 | 125 (1) | 10 | 16 | 125 (1) | 3 | 15 | 125 (1) | 3 | 10 | 125 (1) | 2 | 3 | 100 (1) |

(1) Rated back-up fuse for short-circuit up to 50 kA

MS116, MS132, MS165, MO132, MO165

Technical data

Short-circuit breaking capacity and back-up fuses

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MS132-0.16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.4 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-0.63 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-1.0 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-1.6 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-2.5 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MS132-4.0 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 35 (1) | 20 | 20 | 35 (1) | 3 | 3 | 32 (1) |
| MS132-6.3 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 63 (1) | 20 | 20 | 63 (1) | 3 | 3 | 50 (1) |
| MS132-10 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 50 (1) |
| MS132-12 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 63 (1) |
| MS132-16 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 63 (1) |
| MS132-20 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 80 (1) |
| MS132-25 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 20 | 20 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |
| MS132-32 | 25 | 50 | 125 (1) | 25 | 50 | 125 (1) | 20 | 20 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |

(1) Rated back-up fuse for short-circuit up to 100 kA

| Type | 230 V AC | | | 400 V AC | | | 415 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | | 250 V DC (2) | | |
|----------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|--------------|-----------|---------|
| | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A |
| MS165-16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MS165-20 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MS165-25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 80 (1) | 100 | 100 | - |
| MS165-32 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MS165-42 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 50 | 50 | 125 | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MS165-54 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MS165-65 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MS165-73 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |
| MS165-80 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |

(1) Rated back-up fuse for short-circuit up to 100 kA

(2) 3 poles in series

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|-----------|-----------|-------------|
| | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A | Ics kA | Icu kA | gG, aM A |
| MO132-0.16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.4 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-0.63 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-1.0 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-1.6 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-2.5 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - |
| MO132-4.0 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 35 (1) | 20 | 20 | 35 (1) | 3 | 3 | 32 (1) |
| MO132-6.3 | 100 | 100 | - | 100 | 100 | - | 30 | 30 | 63 (1) | 20 | 20 | 63 (1) | 3 | 3 | 50 (1) |
| MO132-10 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 50 (1) |
| MO132-12 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 100 (1) | 20 | 20 | 100 (1) | 3 | 3 | 63 (1) |
| MO132-16 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 63 (1) |
| MO132-20 | 100 | 100 | - | 100 | 100 | - | 20 | 20 | 125 (1) | 20 | 20 | 125 (1) | 3 | 3 | 80 (1) |
| MO132-25 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 10 | 10 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |
| MO132-32 | 25 | 50 | 125 (1) | 25 | 50 | 125 (1) | 10 | 10 | 125 (1) | 10 | 10 | 125 (1) | 3 | 3 | 100 (1) |

(1) Rated back-up fuse for short-circuit up to 100 kA

MS116, MS132, MS165, MO132, MO165

Technical data

Short-circuit breaking capacity and back-up fuses

| Type | 230 V AC | | | 400 V AC | | | 415 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | | 250 V DC (2) | | |
|----------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|-----------|-----------|---------|--------------|-----------|---------|
| | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A | Ics kA | Icu kA | gG A |
| MO165-16 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MO165-20 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 75 | 75 | 125 (1) | 40 | 40 | 125 (1) | 10 | 10 | 63 (1) | 100 | 100 | - |
| MO165-25 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 80 (1) | 100 | 100 | - |
| MO165-32 | 100 | 100 | - | 100 | 100 | - | 100 | 100 | - | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MO165-42 | 50 | 50 | 125 (1) | 50 | 50 | 125 (1) | 50 | 50 | 125 | 50 | 50 | 125 (1) | 30 | 30 | 125 (1) | 10 | 10 | 100 (1) | 100 | 100 | - |
| MO165-54 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MO165-65 | 30 | 50 | 125 (1) | 30 | 50 | 125 (1) | 30 | 45 | 125 | 30 | 45 | 125 (1) | 20 | 20 | 125 (1) | 6 | 8 | 100 (1) | 100 | 100 | - |
| MO165-73 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |
| MO165-80 | 30 | 30 | 200 (1) | 30 | 30 | 200 (1) | 18 | 18 | 200 (1) | 18 | 18 | 200 (1) | 10 | 10 | 200 (1) | 6 | 8 | 160 (1) | 100 | 100 | - |

(1) Rated back-up fuse for short-circuit up to 100 kA

(2) 3 poles in series

Main circuit – Utilization characteristics according to UL/CSA

| Type | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|-------|----------|----------|----------|
| Standards | UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | | | | |
| Rated operational voltage Ue acc. to UL/CSA | 600 V AC | | 600 V AC | 600 V AC | 600 V AC |
| Trip class | 10A | | 10 | - | |
| Motor ratings (1) | Horsepower | | | | |
| | See table "Motor ratings, three phase" | | | | |
| | Full Load Amps (FLA) | | | | |
| | See table "Motor ratings, three phase" | | | | |
| | Locked Rotor Amps (LRA) | | | | |
| | See table "Motor ratings, three phase" | | | | |

(1) See product data sheets for UL/CSA single phase motor and general use ratings.

UL/CSA ratings overview

| Type | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|-------|-------------------|--------------------------------|---------------------------|--|
| Manual Motor Controller | x | x | x | x | x |
| Manual Motor Controller, Suitable as Motor Disconnect | x | x | x | x | x |
| Manual Motor Controller, Suitable for use in Group Installations | x | x | x | x | x |
| Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations | - | x | x | x | x |
| Manual self-protected Combination Motor Controller (Type E) | - | x | x | - | - |
| Combination Motor Controller (Type F) | - | with AF contactor | with AF contactor (up to 65 A) | with AF contactor and EOL | with AF contactor and EOL (up to 65 A) |

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Motor ratings, three phase – MS116

| Type | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|------------|----------|------|-------|----------|------|------|------------------|------|------|------------------|------|------|------------------|------|------|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS116-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS116-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS116-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS116-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS116-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 0.9 | 8 |
| MS116-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MS116-2.5 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1 1/2 | 2.5 | 15 |
| MS116-4.0 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 1 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MS116-6.3 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MS116-10 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MS116-12 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MS116-16 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MS116-20 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MS116-25 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MS116-32 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

UL/CSA Motor ratings, three phase – MS132

| Type | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|------------|----------|------|-------|----------|------|------|------------------|------|------|------------------|------|------|------------------|------|------|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MS132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MS132-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MS132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MS132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 1 | 6 |
| MS132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MS132-2.5 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1-1/2 | 2.5 | 15 |
| MS132-4.0 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 1 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MS132-6.3 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MS132-10 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MS132-12 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MS132-16 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MS132-20 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MS132-25 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MS132-32 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

UL/CSA Motor ratings, three phase – MS165

| Type | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|----------|----------|------|-------|----------|------|-----|------------------|------|-----|------------------|-----|-----|------------------|-----|------|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MS165-16 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MS165-20 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MS165-25 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MS165-32 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 30 | 32 | 174 |
| MS165-42 | 10 | 32.2 | 186.3 | 10 | 30.8 | 179 | 15 | 42 | 232 | 30 | 40 | 218 | 40 | 41 | 232 |
| MS165-54 | 15 | 48.3 | 267 | 15 | 46.2 | 257 | 20 | 54 | 290 | 40 | 52 | 290 | 50 | 52 | 290 |
| MS165-65 | 20 | 62.1 | 334 | 20 | 59.4 | 321 | 20 | 54 | 290 | 50 | 65 | 363 | 60 | 62 | 348 |
| MS165-73 | 20 | 62.1 | 334 | 20 | 59.4 | 321 | 25 | 68 | 365 | 50 | 65 | 363 | 60 | 62 | 348 |
| MS165-80 | 25 | 78.2 | 420 | 25 | 74.8 | 404 | 30 | 80 | 435 | 60 | 77 | 435 | 75 | 77 | 434 |

hp Horsepower
FLA Full Load Amps
LRA Locked Rotor Amps

Note: Manual motor starters should always be selected so that the actual motor current is within the setting range; see ordering detail pages. Horsepower (hp) ratings are for reference only.

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Motor ratings, three phase – MO132

| Type | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|------------|----------|------|-------|----------|------|------|------------------|------|------|------------------|------|------|------------------|------|------|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO132-0.16 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 | - | 0.16 | 0.96 |
| MO132-0.25 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 | - | 0.25 | 1.5 |
| MO132-0.40 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 | - | 0.4 | 2.4 |
| MO132-0.63 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 | - | 0.63 | 3.78 |
| MO132-1.0 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | - | 1 | 6 | 1/2 | 1 | 6 |
| MO132-1.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | - | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 | 3/4 | 1.6 | 9.6 |
| MO132-2.5 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1/2 | 2.5 | 15 | 1 | 2.5 | 15 | 1 1/2 | 2.5 | 15 |
| MO132-4.0 | 3/4 | 4 | 24 | 3/4 | 4 | 24 | 1 | 4 | 24 | 2 | 4 | 24 | 3 | 3.9 | 25.6 |
| MO132-6.3 | 1 | 6.3 | 37.8 | 1 | 6.3 | 37.8 | 1 1/2 | 6.3 | 37.8 | 3 | 4.8 | 32 | 5 | 6.1 | 36.8 |
| MO132-10 | 2 | 7.8 | 57.5 | 2 | 7.5 | 55 | 3 | 9.6 | 64 | 5 | 7.6 | 46 | 7 1/2 | 9 | 50.8 |
| MO132-12 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 3 | 9.6 | 64 | 7 1/2 | 11 | 63.5 | 10 | 11 | 64.8 |
| MO132-16 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MO132-20 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MO132-25 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MO132-32 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 25 | 27 | 146 |

UL/CSA Motor ratings, three phase – MO165

| Type | 200 V AC | | | 208 V AC | | | 220 ... 240 V AC | | | 440 ... 480 V AC | | | 550 ... 600 V AC | | |
|----------|----------|------|-------|----------|------|-----|------------------|------|-----|------------------|-----|-----|------------------|-----|------|
| | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA | hp | FLA | LRA |
| MO165-16 | 3 | 11 | 73.6 | 3 | 10.6 | 71 | 5 | 15.2 | 92 | 10 | 14 | 81 | 10 | 11 | 64.8 |
| MO165-20 | 5 | 17.5 | 105.8 | 5 | 16.7 | 102 | 5 | 15.2 | 92 | 10 | 14 | 81 | 15 | 17 | 93 |
| MO165-25 | 5 | 17.5 | 105.8 | 7 1/2 | 24.2 | 140 | 7 1/2 | 22 | 127 | 15 | 21 | 116 | 20 | 22 | 116 |
| MO165-32 | 7 1/2 | 25.3 | 146 | 10 | 30.8 | 179 | 10 | 28 | 162 | 20 | 27 | 145 | 30 | 32 | 174 |
| MO165-42 | 10 | 32.2 | 186.3 | 10 | 30.8 | 179 | 15 | 42 | 232 | 30 | 40 | 218 | 40 | 41 | 232 |
| MO165-54 | 15 | 48.3 | 267 | 15 | 46.2 | 257 | 20 | 54 | 290 | 40 | 52 | 290 | 50 | 52 | 290 |
| MO165-65 | 20 | 62.1 | 334 | 20 | 59.4 | 321 | 20 | 54 | 290 | 50 | 65 | 363 | 60 | 62 | 348 |
| MO165-73 | 20 | 62.1 | 334 | 20 | 59.4 | 321 | 25 | 68 | 365 | 50 | 65 | 363 | 60 | 62 | 348 |
| MO165-80 | 25 | 78.2 | 420 | 25 | 74.8 | 404 | 30 | 80 | 435 | 60 | 77 | 435 | 75 | 77 | 434 |

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Maximum short-circuit current ratings – MS116

| Type | Manual Motor Controllers | | | | | |
|------------|--|---|--------------------------|-------------|-------------------------|-------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect (2) | | for group installations | |
| | Fuses A | Circuit breaker A | 480 V kA | 600 V kA | 480 V kA | 600 V kA |
| MS116-0.16 | Any listed fuses. Size per NEC/CEC | Any listed UL489 / CSA C22.2 N° 5 circuit breaker. Size per NEC/CEC | 30 | 5 | 30 | 5 |
| MS116-0.25 | | | 30 | 5 | 30 | 5 |
| MS116-0.40 | | | 30 | 5 | 30 | 5 |
| MS116-0.63 | | | 30 | 5 | 30 | 5 |
| MS116-1.0 | | | 30 | 5 | 30 | 5 |
| MS116-1.6 | | | 30 | 5 | 30 | 5 |
| MS116-2.5 | | | 30 | 5 | 30 | 5 |
| MS116-4.0 | | | 18 | 5 | 18 | 5 |
| MS116-6.3 | | | 18 | 5 | 18 | 5 |
| MS116-10 | | | 18 | 5 | 18 | 5 |
| MS116-12 | | | 18 | 5 | 18 | 5 |
| MS116-16 | | | 18 | 5 | 18 | 5 |
| MS116-20 | | | 18 | 5 | 18 | 5 |
| MS116-25 | | | 18 | 5 | 18 | 5 |
| MS116-32 | | | 18 | 5 | 18 | 5 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

(2) Suitable as motor disconnect with padlock adaptor SA1 or SA3.

UL/CSA Maximum short-circuit current ratings – MS132

| Type | Manual Motor Controllers | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | Manual self-protected Combination Motor Controllers (Type E) (2) | |
|------------|---|--|----------------------|-------|-------------------------|-------|--|-------|--|--------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | 480 V | 600 V | 480 V | 600 V | 480 V | 600 V | 480Y / 277 V | 600Y / 347 V |
| | Fuses A | Circuit breaker A | kA | kA | kA | kA | kA | kA | kA | kA |
| MS132-0.16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.25 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.40 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-0.63 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-1.6 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-2.5 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-4.0 | | | 65 | 47 | 65 | 47 | 65 | 47 | 65 | 47 |
| MS132-6.3 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-10 | | | 65 | 18 | 65 | 18 | 65 | 18 | 65 | 18 |
| MS132-12 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-16 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-20 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-25 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |
| MS132-32 | | | 30 | 18 | 30 | 18 | 30 | 18 | 30 | - |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

(2) Requires the use of S1-M3-xx line-side terminal feeder block.

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Maximum short-circuit current ratings – MS116 with AF contactors

| Type | Motor Disconnect, Group Installations in Group Installations Coordination Type 2 | | |
|------------|---|-------------|-------------|
| | Minimum contactor size | 480 V kA | 600 V kA |
| MS116-0.16 | AF09-AF16 | 30 | 5 |
| MS116-0.25 | AF09-AF16 | 30 | 5 |
| MS116-0.40 | AF09-AF16 | 30 | 5 |
| MS116-0.63 | AF09-AF16 | 30 | 5 |
| MS116-1.0 | AF09-AF16 | 30 | 5 |
| MS116-1.6 | AF09-AF16 | 30 | 5 |
| MS116-2.5 | AF16 | 30 | 5 |
| MS116-4.0 | AF26-AF38 | 18 | 5 |
| MS116-6.3 | AF26-AF38 | 18 | 5 |
| MS116-10 | AF26-AF38 | 18 | 5 |
| MS116-12 | AF26-AF38 | 18 | 5 |
| MS116-16 | AF26-AF38 | 18 | 5 |
| MS116-20 | AF26-AF38 | 18 | 5 |
| MS116-25 | AF32-AF38 | 18 | 5 |
| MS116-32 | AF38 | 18 | 5 |

UL/CSA Maximum short-circuit current ratings – MS132 with AF contactors

| Type | Combination Motor Controllers (Type F) (1) Coordination type 1 | | |
|------------|--|--------------------|--------------------|
| | Minimum contactor size | 480Y / 277 V kA | 600Y / 347 V kA |
| MS132-0.16 | AF09 ... AF38 | 100 | 50 |
| MS132-0.25 | AF09 ... AF38 | 100 | 50 |
| MS132-0.40 | AF09 ... AF38 | 100 | 50 |
| MS132-0.63 | AF09 ... AF38 | 100 | 50 |
| MS132-1.0 | AF09 ... AF38 | 100 | 50 |
| MS132-1.6 | AF09 ... AF38 | 100 | 50 |
| MS132-2.5 | AF09 ... AF38 | 100 | 50 |
| MS132-4.0 | AF09 ... AF38 | 100 | 50 |
| MS132-6.3 | AF09 ... AF38 | 100 | 47 |
| MS132-10 | AF09 ... AF38 | 100 | 30 |
| MS132-12 | AF09 ... AF38 | 65 | 30 |
| MS132-16 | AF12 ... AF38 | 65 | 30 |
| MS132-20 | AF26 ... AF38 | 65 | - |
| MS132-25 | AF26 ... AF38 | 50 | - |
| MS132-32 | AF38 | 50 | - |
| | Coordination type 2 | | |
| MS132-0.16 | AF26 ... AF38 | 65 | 47 |
| MS132-0.25 | AF26 ... AF38 | 65 | 47 |
| MS132-0.40 | AF26 ... AF38 | 65 | 47 |
| MS132-0.63 | AF26 ... AF38 | 65 | 47 |
| MS132-1.0 | AF26 ... AF38 | 65 | 47 |
| MS132-1.6 | AF26 ... AF38 | 65 | 47 |
| MS132-2.5 | AF26 ... AF38 | 65 | 47 |
| MS132-4.0 | AF26 ... AF38 | 65 | 47 |
| MS132-6.3 | AF26 ... AF38 | 65 | 47 |
| MS132-10 | AF26 ... AF38 | 65 | 47 |
| MS132-12 | AF26 ... AF38 | 30 | - |
| MS132-16 | AF26 ... AF38 | 30 | - |
| MS132-20 | AF26 ... AF38 | 30 | - |
| MS132-25 | AF26 ... AF38 | 30 | - |
| MS132-32 | AF26 ... AF38 | 30 | - |

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Maximum short-circuit current ratings – MO132 with electronic overload relays and AF contactors

| Type | EOL | Combination Motor Controllers (Type F) (1) | | | |
|------------|---------|--|--------------------|---------------------|--|
| | | Coordination type 1 | | Coordination type 2 | |
| | | Minimum contactor size | 480Y / 277 V kA | 600Y / 347 V kA | |
| MO132-0.16 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-0.25 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-0.40 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-0.63 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-1.0 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-1.6 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-2.5 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-4.0 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-6.3 | EF19 | AF09 ... AF38 | 100 | 50 | |
| MO132-10 | EF19 | AF09 ... AF38 | 100 | 30 | |
| MO132-12 | EF19 | AF09 ... AF38 | 65 | 30 | |
| MO132-16 | EF19 | AF12 ... AF38 | 65 | 30 | |
| MO132-20 | EF19 | AF16 ... AF38 | 65 | - | |
| MO132-25 | EF45-30 | AF26 ... AF38 | 50 | - | |
| MO132-32 | EF45-45 | AF38 ... AF38 | 50 | - | |

NOTE : More coordination tables are available in our SOC (selected optimized coordination) tool: <https://applications.it.abb.com/SOC/Motor>.

(1) Requires the use of S1-M3-xx line-side terminal feeder block.

UL/CSA Maximum short-circuit current ratings – MS165

| Type | Manual Motor Controllers | | | | | | | | Manual self-protected Combination Motor Controllers (Type E) | |
|----------|--|---|----------------------|----------|-------------------------|----------|---|-----------------|--|-----------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | | | |
| | Fuses A | Circuit breaker A | 480 V kA | 600 V kA | 480 V kA | 600 V kA | 480Y / 277 V kA | 600Y / 347 V kA | 480Y / 277 V kA | 600Y / 347 V kA |
| MS165-16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-20 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-25 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-32 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-42 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-54 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-65 | | | 65 | 30 | 65 | 30 | 65 | 30 | 65 | 30 |
| MS165-73 | | | 50 | 10 | 50 | 10 | 50 | 10 | 50 | - |
| MS165-80 | 50 | 10 | 50 | 10 | 50 | 10 | 50 | - | | |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

UL/CSA Maximum short-circuit current ratings – MS165 with AF contactors

| Type | Manual self-protected Combination Motor Controllers (Type F) Coordination type 1 | | | | Manual self-protected Combination Motor Controllers (Type F) Coordination type 2 | | | |
|----------|--|-----------------|------------------------|-----------------|--|-----------------|------------------------|-----------------|
| | Minimum contactor size | 480Y / 277 V kA | Minimum contactor size | 600Y / 347 V kA | Minimum contactor size | 480Y / 277 V kA | Minimum contactor size | 600Y / 347 V kA |
| MS165-16 | AF09...AF38 | 65 | AF09...AF38 | 50 | AF26...AF38 | 65 | AF09...AF38 | 30 |
| MS165-20 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF09...AF38 | 30 |
| MS165-25 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF40...AF65 | 30 |
| MS165-32 | AF26...AF38 | 65 | AF26...AF38 | 50 | AF26...AF38 | 65 | AF40...AF65 | 30 |
| MS165-42 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-54 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-65 | AF40...AF65 | 65 | AF40...AF65 | 30 | AF40...AF65 | 65 | AF40...AF65 | 30 |
| MS165-73 | | | | | | | | |
| MS165-80 | | | | | | | | |

MS116, MS132, MS165, MO132, MO165

Technical data

More coordination tables are available in our SOC (selected optimized coordination) tool:
<https://applications.it.abb.com/SOC/Motor>

UL/CSA Maximum short-circuit current ratings – MO132

| Type | Manual Motor Controllers | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
|------------|--|--|----------------------|-------|-------------------------|-------|---|-------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | 480 V | 600 V | 480 V | 600 V | 480 V | 600 V |
| | Fuses A | Circuit breaker A | kA | kA | kA | kA | kA | kA |
| MO132-0.16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.25 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.40 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-0.63 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-1.0 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-1.6 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-2.5 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-4.0 | | | 65 | 47 | 65 | 47 | 65 | 47 |
| MO132-6.3 | | | 65 | 18 | 65 | 18 | 65 | 18 |
| MO132-10 | | | 65 | 18 | 65 | 18 | 65 | 18 |
| MO132-12 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-16 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-20 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-25 | | | 30 | 18 | 30 | 18 | 30 | 18 |
| MO132-32 | | | 30 | 18 | 30 | 18 | 30 | 18 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

UL/CSA Maximum short-circuit current ratings – MO165

| Type | Manual Motor Controllers | | for motor disconnect | | for group installations | | for tap conductor protection in group installations | |
|----------|--|--|----------------------|-------|-------------------------|-------|---|--------------|
| | Branch circuit protection, max. size per NEC/CEC (1) | | 480 V | 600 V | 480 V | 600 V | 480V / 277 V | 600V / 347 V |
| | Fuses A | Circuit breaker A | kA | kA | kA | kA | kA | kA |
| MO165-16 | Any Listed fuses. Size per NEC/CEC | Any Listed UL489 / CSA C22.2 No.5 circuit breaker. Size per NEC/CEC | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-20 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-25 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-32 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-42 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-54 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-65 | | | 65 | 30 | 65 | 30 | 65 | 30 |
| MO165-73 | | | 50 | 10 | 50 | 10 | 50 | 10 |
| MO165-80 | | | 50 | 10 | 50 | 10 | 50 | 10 |

(1) NEC: NFPA®70 National Electrical Code®; CEC: CSA C22.1 Canadian Electrical Code.

MS116, MS132, MS165, MO132, MO165

Technical data

UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors

| Type | Combination Motor Controllers (Type F) Coordination type 1 | | | | | |
|----------|---|-----------|-------------|--------------------|-----------|-------------|
| | 480Y / 277 V kA | OL Relay | Contactor | 600Y / 347 V kA | OL Relay | Contactor |
| MO165-16 | 65 | EF19-18.9 | AF09...AF38 | 50 | EF19-18.9 | AF09...AF38 |
| MO165-20 | 65 | EF45-30 | AF26...AF38 | 50 | EF45-30 | AF26...AF38 |
| MO165-25 | 65 | EF45-30 | AF26...AF38 | 50 | EF45-30 | AF26...AF38 |
| MO165-32 | 65 | EF45-45 | AF26...AF38 | 50 | EF45-45 | AF26...AF38 |
| MO165-42 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-54 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-65 | 65 | EF65 | AF40...AF65 | 30 | EF65 | AF40...AF65 |
| MO165-73 | | | | | | |
| MO165-80 | | | | | | |

UL/CSA Maximum short-circuit current ratings – MO165 with AF contactors

| Type | Combination Motor Controllers (Type F) Coordination type 1 | | | | | |
|----------|---|----------|-------------|--------------------|----------|-------------|
| | 480Y / 277 V kA | OL Relay | Contactor | 600Y / 347 V kA | OL Relay | Contactor |
| MO165-16 | 65 | TF42 | AF09...AF38 | 30 | TF42 | AF09...AF38 |
| MO165-20 | 65 | TF42 | AF26...AF38 | 30 | TF42 | AF09...AF38 |
| MO165-25 | 65 | TF42 | AF26...AF38 | 50 | TF42 | AF26...AF38 |
| MO165-32 | 65 | TF42 | AF26...AF38 | 50 | TF42 | AF26...AF38 |
| MO165-42 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-54 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-65 | 65 | TF65 | AF40...AF65 | 30 | TF65 | AF40...AF65 |
| MO165-73 | | | | | | |
| MO165-80 | | | | | | |

MS116, MS132, MS165, MO132, MO165

Technical data





General technical data





| Type | MS116 | MS132 | MS165 | MO132 | MO165 |
|---|---|---|---|---|---|
| Pollution degree | 3 | 3 | 3 | 3 | 3 |
| Phase loss sensitivity | Yes | Yes | Yes | No | No |
| Disconnect function acc. to IEC/EN 60947-2 | Yes | Yes | Yes | Yes | Yes |
| Ambient air temperature | | | | | |
| Operation | | | | | |
| Open - compensated | -25 ... +55 °C | -25 ... +60 °C | -25 ... +60 °C | - | - |
| Open | -25 ... +70 °C | -25 ... +70 °C | -25 ... +60 °C | -25 ... +60 °C | -25 ... +60 °C |
| Enclosed (IB132) | 0 ... +40 °C | 0 ... +40 °C | - | - | - |
| Storage | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C | -50 ... +80 °C |
| Ambient air temperature compensation | Acc. to IEC/EN60947-4-1 | Acc. to IEC/EN60947-4-1 | Acc. to IEC/EN60947-4-1 | - | - |
| Maximum operating altitude permissible | 2000 m | 2000 m | 2000 m | 2000 m | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting position | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) | Position 1-6 (optional for single mounting) |
| Mounting | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) | DIN-rail (EN 60715) |
| Group mounting | On request (2) | On request (2) | On request (2) | On request (2) | On request (2) |
| Recommended screw for mounting plate | - | - | M4 | - | M4 |
| Screw torque for mounting plate | - | - | 2 Nm | - | 2 Nm |
| Minimum distance to other units same type | | | | | |
| Horizontal | 0 mm | 0 mm | 0 mm | 0 mm | 0 mm |
| Vertical | 150 mm | 150 mm | 150 mm | 150 mm | 150 mm |
| Minimum distance to electrical conductive board | | | | | |
| Horizontal, up to 400 V | 0 mm | 0 mm | 0 mm | 0 mm | 0 mm |
| Horizontal, up to 690 V | > 1.5 mm | > 1.5 mm | > 1.5 mm | > 1.5 mm | > 1.5 mm |
| Vertical | 75 mm | 75 mm | 75 mm | 75 mm | 75 mm |
| Degree of protection | | | | | |
| Housing | IP20 | IP20 | IP20 | IP20 | IP20 |
| Main circuit terminals | IP10 | IP10 (1) | IP10 | IP10 | IP10 |






(1) Push-in Spring terminals : IP20

(2) Please refer to application note: **2CDC131183M0201**





Connecting characteristics - Main circuit





| Type | MS116 ≤ 16 A | MS116 ≥ 20 A |
|---|---------------------------------------|---------------------------|
| Connecting capacity | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 6 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x AWG 16-12 | AWG 16-8 |
| Stripping length | 9 mm | 10 mm |
| Tightening torque | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | Pozidriv 2 | Pozidriv 2 |





| Type | MS132 ≤ 10 A | MS132 ≥ 12 A |
|---|---------------------------------------|--|
| Connecting capacity | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x AWG 16-12 | AWG 16-8 |
| Stripping length | 9 mm | 10 mm |
| Tightening torque | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | Pozidriv 2 | Pozidriv 2 |

| Type | MS132-K with Push-in Spring terminals |
|---|---|
| Connecting capacity | |
|  Rigid solid | 1 or 2 x 1 ... 2.5 mm ² |
|  Rigid stranded | 1 or 2 x 1 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x 1 (push-in) / 0.5 (spring) ... 4 mm ² |
|  Flexible with insulated ferrule | 1 x 1 (push-in) / 0.5 (spring) ... 4 mm ² |
| | 1/2 x 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible | 1 or 2 x 0.5 (spring) ... 4 mm ² |
| Stranded acc. to UL/CSA | 1/2 x AWG 18 ... AWG 10 (push-in) / AWG 18 ... AWG 8 (spring) |
| | 1 x AWG 8 |
| Wire stripping length | 12 mm |
| Screwdriver | Flat Ø 3 mm x 0.5 mm |

Connecting characteristics - Main circuit

| Type | MS165 | |
|---|--------------|--------------------------|
| Connecting capacity | | |
|  Rigid stranded | 1 or 2 x | 1 ... 50 mm ² |
|  Flexible with ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible | 1 or 2 x | 1 ... 35 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 16-0 |
| Stripping length | | 16 mm |
| Tightening torque | | 4.0 Nm / 35 lb.in |
| Recommended screw driver | | Pozidriv 2 |

| Type | MO132 ≤ 10 A | | MO132 ≥ 12 A |
|---|---------------------|----------------------------------|--|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 16-12 | AWG 16-8 |
| Stripping length | | 9 mm | 10 mm |
| Tightening torque | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screw driver | | Pozidriv 2 | Pozidriv 2 |

| Type | MO165 | |
|---|--------------|--------------------------|
| Connecting capacity | | |
|  Rigid stranded | 1 or 2 x | 1 ... 50 mm ² |
|  Flexible with ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 1 ... 35 mm ² |
|  Flexible | 1 or 2 x | 1 ... 35 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 16-0 |
| Stripping length | | 16 mm |
| Tightening torque | | 4.0 Nm / 35 lb.in |
| Recommended screw driver | | Pozidriv 2 |

MS132-T circuit breakers for transformer protection

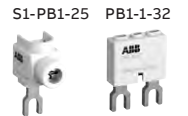
Low voltage transformers are used to supply power to control and auxiliary circuits in distribution and automation boards and to provide galvanic isolation. These transformers may be damaged by an electrical failure (short-circuit or overload on the primary side), therefore a proper protection should be provided.

Troubleshooting made easy
MS132-T feature a magnetic trip indicator. This way, every tripping event will be distinguished, making troubleshooting a lot easier and faster.



Complete portfolio

Manual motor starter accessories are suitable throughout the complete range. Moreover ABB offers special accessories for fast single-phase setup.



Transformer protection

MS132-T is an inrush compensated circuit breaker for control transformer protection. With the right selection, it provides overcurrent protection on the primary side of the transformer. This avoids expensive protection on the secondary side.



Circuit breakers for transformers protection are specially designed for fuseless protection of control transformers on the primary side against overloads and short-circuits.

Selection table MS132-T with ABB control transformers:

Please refer to document no. 2CDC131111D0201



Application example

Protection of transformers for power supply of control and auxiliary circuits, both in distribution and automation boards (checking, signaling, interlock, etc).

MS132-T circuit breakers for transformer protection

0.10 to 25 A – with thermal and electromagnetic protection



MS132-10T

2CDC241009V0017



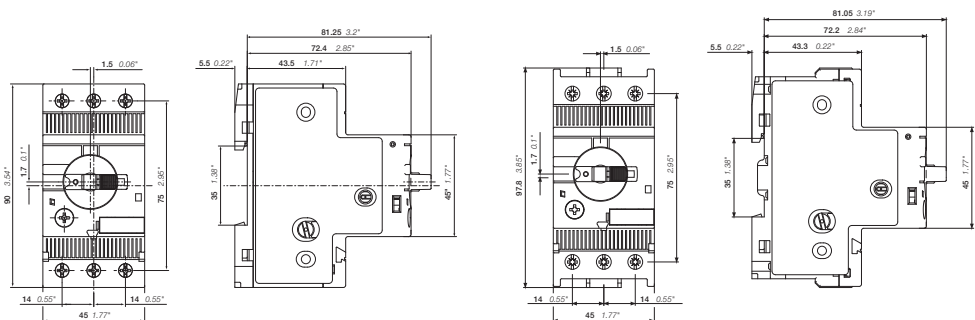
MS132-25T

2CDC241008F0014

Circuit breakers for transformer protection are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition by switching off the transformer within milliseconds. The short-circuit current setting is fixed to 20 times the operating current to handle the high inrush current generated by transformers. The device allows manual connection and disconnection of the transformer from the mains.

MS132-T is a 45 mm (width) compact and powerful range for transformer protection up to 12.5 kW (400 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases, shunt trips, power in-feed blocks are available as accessory. These are suitable throughout the MS116/MS132/MS165-range. Moreover ABB offers special accessories for fast single phase setup.

| Setting range | Short-circuit breaking capacity Ics at 400 V AC kA | Rated instantaneous short-circuit current setting li A | Type | Order code | Weight (1 pce) |
|---------------|--|--|-------------|-----------------|----------------|
| A | | | | | kg |
| 0.10 ... 0.16 | 100 | 3.2 | MS132-0.16T | 1SAM340000R1001 | 0.215 |
| 0.16 ... 0.25 | 100 | 5 | MS132-0.25T | 1SAM340000R1002 | 0.215 |
| 0.25 ... 0.40 | 100 | 8 | MS132-0.4T | 1SAM340000R1003 | 0.215 |
| 0.40 ... 0.63 | 100 | 12.6 | MS132-0.63T | 1SAM340000R1004 | 0.215 |
| 0.63 ... 1.00 | 100 | 20 | MS132-1.0T | 1SAM340000R1005 | 0.215 |
| 1.00 ... 1.60 | 100 | 32 | MS132-1.6T | 1SAM340000R1006 | 0.265 |
| 1.60 ... 2.50 | 100 | 50 | MS132-2.5T | 1SAM340000R1007 | 0.265 |
| 2.50 ... 4.00 | 100 | 80 | MS132-4.0T | 1SAM340000R1008 | 0.265 |
| 4.00 ... 6.30 | 100 | 126 | MS132-6.3T | 1SAM340000R1009 | 0.265 |
| 6.30 ... 10.0 | 100 | 200 | MS132-10T | 1SAM340000R1010 | 0.265 |
| 8.00 ... 12.0 | 100 | 240 | MS132-12T | 1SAM340000R1012 | 0.310 |
| 10.0 ... 16.0 | 100 | 320 | MS132-16T | 1SAM340000R1011 | 0.310 |
| 16.0 ... 20.0 | 100 | 400 | MS132-20T | 1SAM340000R1013 | 0.310 |
| 20.0 ... 25.0 | 50 | 500 | MS132-25T | 1SAM340000R1014 | 0.310 |



MS132T ≤ 10 A

MS132T ≥ 12 A

Main dimensions mm, inches

MS132-KT circuit breakers for transformer protection with Push-in Spring terminals

0.10 to 25 A – with thermal and electromagnetic protection

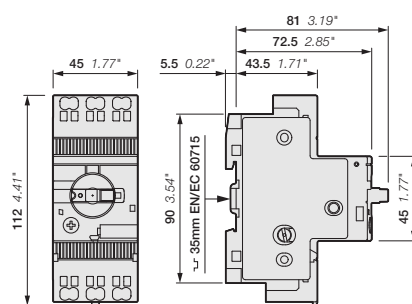


MS132-KT

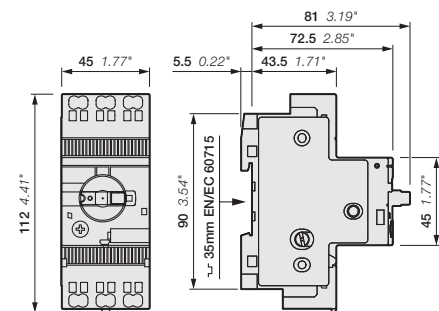
Circuit breakers for transformer protection with Push-in Spring terminals are electro-mechanical protection devices specially designed to protect control transformers on the primary side. They allow fuseless protection against overload and short-circuit, saving space and cost and ensuring a quick reaction under short-circuit condition by switching off the transformer within milliseconds. The short-circuit current setting is fixed to 20 times the operating current to handle the high inrush current generated by transformers. The device allows manual connection and disconnection of the transformer from the mains.

MS132-KT is a 45 mm (width) compact and powerful range for transformer protection up to 12.5 kW (400 V) / 25 A. This type has also a clear and reliable indication of fault in a separate window in the event of short-circuit tripping. Further features are the built-in disconnect function, temperature compensation, trip-free mechanism and a rotary handle with a clear switch position indication. The handle is lockable to protect against unauthorized changes. Auxiliary contacts, signaling contacts, undervoltage releases and shunt trips are available as accessory. These are suitable throughout the MS116/MS132/MS165-range.

| Setting range | Short-circuit breaking capacity I _{cs} at 400 V AC kA | Rated instantaneous short-circuit current setting I _i A | Type | Order code | Weight (1 pce) kg |
|---------------|--|--|--------------|-----------------|-------------------|
| 0.10 ... 0.16 | 100 | 3.2 | MS132-0.16KT | 1SAM340010R1001 | 0.256 |
| 0.16 ... 0.25 | 100 | 5 | MS132-0.25KT | 1SAM340010R1002 | 0.256 |
| 0.25 ... 0.40 | 100 | 8 | MS132-0.4KT | 1SAM340010R1003 | 0.256 |
| 0.40 ... 0.63 | 100 | 12.6 | MS132-0.63KT | 1SAM340010R1004 | 0.256 |
| 0.63 ... 1.00 | 100 | 20 | MS132-1.0KT | 1SAM340010R1005 | 0.256 |
| 1.00 ... 1.60 | 100 | 32 | MS132-1.6KT | 1SAM340010R1006 | 0.298 |
| 1.60 ... 2.50 | 100 | 50 | MS132-2.5KT | 1SAM340010R1007 | 0.280 |
| 2.50 ... 4.00 | 100 | 80 | MS132-4.0KT | 1SAM340010R1008 | 0.286 |
| 4.00 ... 6.30 | 100 | 126 | MS132-6.3KT | 1SAM340010R1009 | 0.289 |
| 6.30 ... 10.0 | 100 | 200 | MS132-10KT | 1SAM340010R1010 | 0.296 |
| 10.0 ... 16.0 | 100 | 320 | MS132-16KT | 1SAM340010R1011 | 0.316 |
| 16.0 ... 20.0 | 100 | 400 | MS132-20KT | 1SAM340010R1013 | 0.317 |
| 20.0 ... 25.0 | 50 | 500 | MS132-25KT | 1SAM340010R1014 | 0.316 |



MS132-KT > 10 A



MS132-KT < 10 A

Main dimensions mm, inches

MS132-T, MS132-KT

Technical data

Main circuit – Utilization characteristics according to IEC/EN

| Type | MS132-T / -KT |
|--|---|
| Standards | IEC/EN 60947-2, IEC/EN 60947-4-1, IEC/EN 60947-1 |
| Rated operational voltage U _e | 690 V AC |
| Rated frequency | 50/60 Hz |
| Operational frequency | 0 ... 400 Hz |
| Trip class | 10 |
| Number of poles | 3 |
| Duty time | 100% |
| Mechanical durability | 100000 cycles |
| Electrical durability | 50000 cycles |
| Rated impulse withstand voltage U _{imp} | 6 kV |
| Rated insulation voltage U _i | 690 V |
| Rated operational current I _e | See ordering details |
| Rated instantaneous short-circuit current setting I _i | See ordering details |
| Rated service short-circuit breaking capacity I _{cs} | See table "Short-circuit breaking capacity and back-up fuses" |
| Rated ultimate short-circuit breaking capacity I _{cu} | See table "Short-circuit breaking capacity and back-up fuses" |
| Suitable for use in IT networks | Yes |

Short-circuit breaking capacity and back-up fuses

I_{cs} Rated service short-circuit breaking capacity

I_{cu} Rated ultimate short-circuit breaking capacity

I_{cc} Prospective short-circuit current at installation location

Note: Maximum rated current of the back-up fuses if I_{cc} > I_{cs}

| Type | 230 V AC | | | 400 V AC | | | 440 V AC | | | 500 V AC | | | 690 V AC | | |
|-------------------|-----------------------|-----------------------|-------------|-----------------------|-----------------------|-------------|-----------------------|-----------------------|-------------|-----------------------|-----------------------|-------------|-----------------------|-----------------------|-------------|
| | I _{cs} kA | I _{cu} kA | gG, aM A | I _{cs} kA | I _{cu} kA | gG, aM A | I _{cs} kA | I _{cu} kA | gG, aM A | I _{cs} kA | I _{cu} kA | gG, aM A | I _{cs} kA | I _{cu} kA | gG, aM A |
| MS132-0.16T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-0.25T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-0.4T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-0.63T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-1.0T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-1.6T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-2.5T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) | 100 | 100 | -(1) |
| MS132-4.0T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 35 (2) | 20 | 20 | 35 (2) | 3 | 3 | 35 (2) |
| MS132-6.3T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 63 (2) | 20 | 20 | 63 (2) | 3 | 3 | 50 (2) |
| MS132-10T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 100 (2) | 20 | 20 | 100 (2) | 3 | 3 | 50 (2) |
| MS132-12T | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 100 (2) | 20 | 20 | 100 (2) | 3 | 3 | 63 (2) |
| MS132-16T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 125 (2) | 20 | 20 | 125 (2) | 3 | 3 | 63 (2) |
| MS132-20T / -KT | 100 | 100 | -(1) | 100 | 100 | -(1) | 30 | 30 | 125 (2) | 20 | 20 | 125 (2) | 3 | 3 | 80 (2) |
| MS132-25T / -KT | 50 | 50 | 125 (2) | 50 | 50 | 125 (2) | 30 | 30 | 125 (2) | 10 | 10 | 125 (2) | 3 | 3 | 100 (2) |

(1) No back-up fuse required, because short-circuit proof up to 100 kA

(2) Rated back-up fuse for short-circuits up to 100 kA

MS132-T, MS132-KT

Technical data

Main circuit – Utilization characteristics according to UL

| Type | MS132-T / -KT |
|---|------------------------------|
| Standards | UL 60947-1, UL 60947-4-1 |
| Rated operational voltage U _e acc. to UL/CSA | 600 V AC |
| Trip class | 10 |
| Motor ratings (1) Full Load Amps (FLA) | see table UL current ratings |

(1) See product data sheets for UL/CSA single phase motor and general use (AC-1) ratings.

UL/CSA ratings overview

| Type | MS132-T / -KT |
|---|----------------|
| Manual Controller for Control Transformer Protection | x |
| Manual Motor Controller | not applicable |
| Manual Motor Controller, Suitable as Motor Disconnect | not applicable |
| Manual Motor Controller, Suitable for use in Group Installations | not applicable |
| Manual Motor Controller, Suitable for Tap Conductor Protection in Group Installations | x |
| Manual self-protected Combination Motor Controller (Type E) | not applicable |
| Combination Motor Controller (Type F) | not applicable |

UL current ratings, single-phase – MS132-T / -KT

| Type | 120 V AC FLA | 220 ... 240 V AC FLA |
|-------------------|-----------------|-------------------------|
| MS132-0.16T / -KT | 0.16 | 0.16 |
| MS132-0.25T / -KT | 0.25 | 0.25 |
| MS132-0.4T / -KT | 0.4 | 0.4 |
| MS132-0.63T / -KT | 0.63 | 0.63 |
| MS132-1.0T / -KT | 1 | 1 |
| MS132-1.6T / -KT | 1.6 | 1.6 |
| MS132-2.5T / -KT | 2.5 | 2.5 |
| MS132-4.0T / -KT | 4 | 4 |
| MS132-6.3T / -KT | 6.3 | 6.3 |
| MS132-10T / -KT | 9.8 | 10 |
| MS132-12T | 9.8 | 12 |
| MS132-16T / -KT | 16 | 12 |
| MS132-20T / -KT | 20 | 17 |
| MS132-25T / -KT | 24 | 17 |

UL 508 — Manual controller for tap conductor protection and for control transformers

| Type | Max. short-circuit current rating when used with upstream protection device | |
|-------------------|---|-------------|
| | 480 V kA | 600 V kA |
| MS132-0.16T / -KT | 65 | 47 |
| MS132-0.25T / -KT | 65 | 47 |
| MS132-0.4T / -KT | 65 | 47 |
| MS132-0.63T / -KT | 65 | 47 |
| MS132-1.0T / -KT | 65 | 47 |
| MS132-1.6T / -KT | 65 | 47 |
| MS132-2.5T / -KT | 65 | 47 |
| MS132-4.0T / -KT | 65 | 47 |
| MS132-6.3T / -KT | 65 | 18 |
| MS132-10T / -KT | 65 | 18 |
| MS132-12T | 30 | 18 |
| MS132-16T / -KT | 30 | 18 |
| MS132-20T / -KT | 30 | 18 |
| MS132-25T / -KT | 30 | 18 |





MS132-T, MS132-KT

Technical data






General technical data

| Type | | MS132-T / - KT |
|---|-------------------------|---|
| Pollution degree | | 3 |
| Phase loss sensitivity | | Yes |
| Disconnect function acc. to IEC/EN 60947-2 | | Yes |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +60 °C |
| | Open | -25 ... +70 °C |
| | Enclosed (IB132) | 0 ... +40 °C |
| Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz |
| Mounting position | | Position 1-6 (optional for single mounting) |
| Mounting | | DIN-rail (EN 60715) |
| Group mounting | | - |
| Recommended screw for mounting plate | | - |
| Screw torque for mounting plate | | - |
| Minimum distance to other units same type | Horizontal | 0 mm |
| | Vertical | 150 mm |
| Minimum distance to electrical conductive board | Horizontal, up to 400 V | 0 mm |
| | Horizontal, up to 690 V | > 1.5 mm |
| | Vertical | 75 mm |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 (Push-in Spring terminals: IP20) |

Connecting characteristics - main circuit

| Type | | MS132-T ≤ 10 A | MS132-T ≥ 12 A |
|---|---|--|--|
| Connecting capacity |  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² |
| |  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 6 mm ² | |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 1 ... 2.5 mm ² 2.5 ... 6 mm ² | |
| Stranded acc. to UL/CSA | | 1 or 2 x AWG 16-12 | AWG 16-8 |
| Stripping length | | 9 mm | 10 mm |
| Tightening torque | | 0.8 ... 1.2 Nm / 10 ... 12 lb.in | 2.0 Nm / 18 lb.in |
| Recommended screwdriver | | Pozidriv 2 | Pozidriv 2 |

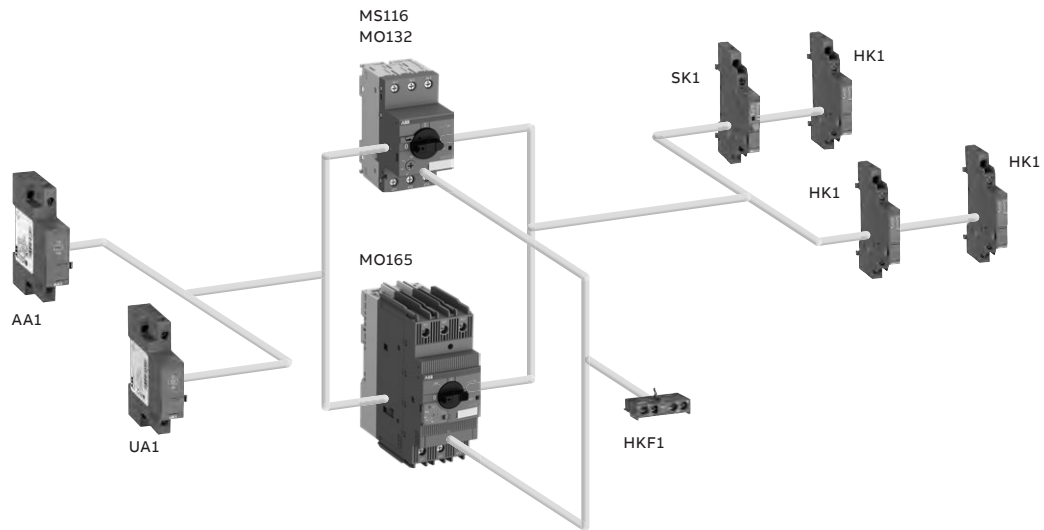
Connecting characteristics - main circuit

| Type | | MS132-KT with Push-in Spring terminals |
|---|----------|---|
| Connecting capacity | | |
|  Rigid solid | 1 or 2 x | 1 ... 2.5 mm ² |
|  Rigid stranded | 1 or 2 x | 1 ... 6 mm ² |
|  Flexible with ferrule | 1 or 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² |
| | 1/2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible | 1 or 2 x | 0.5 (spring) ... 4 mm ² |
| Stranded acc. to UL/CSA | | |
| | 1/2 x | AWG 18 ... AWG 10 (push-in) / AWG 18 ... AWG 8 (spring) |
| | 1 x | AWG 8 |
| Wire stripping length | | 12 mm |
| Screwdriver | | Flat Ø 3 mm x 0.5 mm |

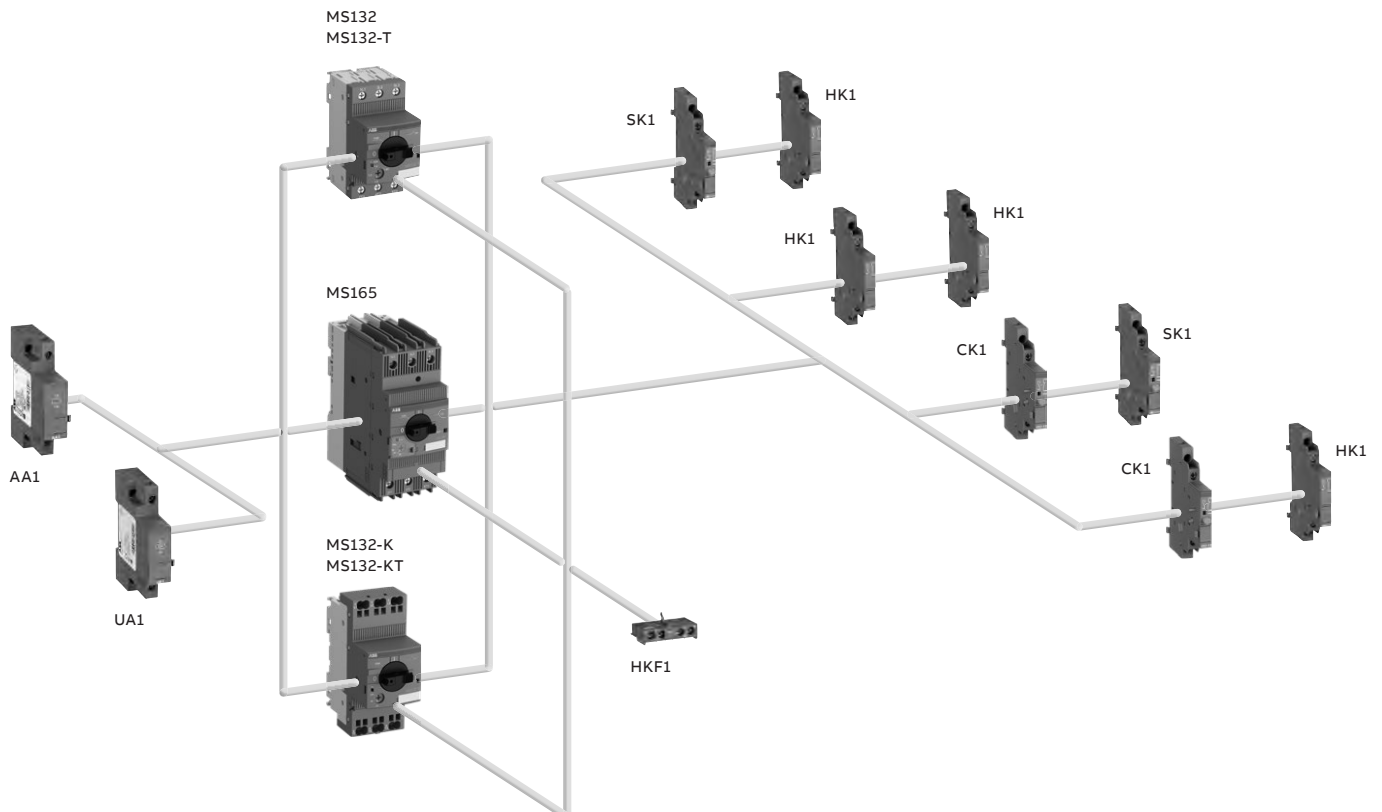
Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T

Manual motor starters with accessories (MS116, MO132, MO165)



Manual motor starters (MS132, MS165) and circuit breakers for transformer protection (MS132-T) with accessories



Note: The combination of MS132-K + UA1 + CK1 is not possible

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT



HKF1-11



HK1-11



SK1-11



CK1-11

Manual motor starters and MS132-T can be equipped with auxiliary contacts for lateral/front mounting, signaling contacts for lateral mounting, undervoltage releases and shunt trips. Two different signaling contacts are available. The accessories can be fitted wiring free and without tools. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. The signaling contact SK1 signals tripping regardless if it was caused by short-circuit or overload. The signaling contact CK1 signals tripping in case it was caused by short-circuit. Undervoltage releases are used for remote tripping of the manual motor starters, specially for emergency stop circuits. Shunt trips release the manual motor starters used for remote tripping. These main accessories are suitable throughout the MS116/MS132/MS165-range.

| Suitable for | Auxiliary contacts N.O. | Auxiliary contacts N.C. | Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|-------------------------|-------------------------|-------------|------|------------|---------|-------------------|
|--------------|-------------------------|-------------------------|-------------|------|------------|---------|-------------------|

Auxiliary contacts – mountable on the front

| | | | | | | | |
|---|---|---|--|---------|-----------------|----|-------|
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | | HKF1-11 | 1SAM201901R1001 | 10 | 0.015 |
| | 1 | 0 | | HKF1-10 | 1SAM201901R1003 | 10 | 0.013 |
| | 0 | 1 | | HKF1-01 | 1SAM201901R1004 | 10 | 0.013 |
| | 2 | 0 | | HKF1-20 | 1SAM201901R1002 | 10 | 0.015 |

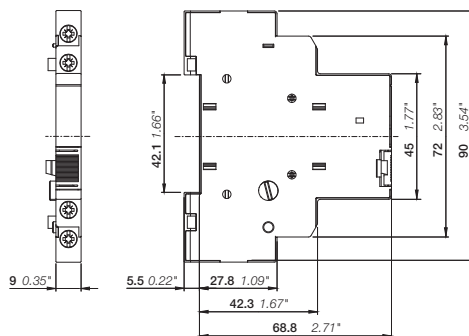
Auxiliary contacts – mountable on the right

| | | | | | | | |
|---|---|---|-------------------------------------|---------|-----------------|---|-------|
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | max. 2 pieces | HK1-11 | 1SAM201902R1001 | 2 | 0.035 |
| | 2 | 0 | max. 2 pieces | HK1-20 | 1SAM201902R1002 | 2 | 0.035 |
| | 0 | 2 | max. 2 pieces | HK1-02 | 1SAM201902R1003 | 2 | 0.035 |
| MS116, MS132, MO132, MS132-T, MS132-K, MS132-KT | 2 | 0 | max. 2 pieces with leading contacts | HK1-20L | 1SAM201902R1004 | 2 | 0.035 |

Signaling contacts – mountable on the right

| | | | | | | | |
|---|---|---|-------------------------|--------|-----------------|---|-------|
| MS116, MS132, MS165, MO132, MO165, MS132-T, MS132-K, MS132-KT | 1 | 1 | for tripped alarm | SK1-11 | 1SAM201903R1001 | 2 | 0.035 |
| | 2 | 0 | for tripped alarm | SK1-20 | 1SAM201903R1002 | 2 | 0.035 |
| | 0 | 2 | for tripped alarm | SK1-02 | 1SAM201903R1003 | 2 | 0.035 |
| MS132, MS165, MS132-T, MS132-K, MS132-KT | 1 | 1 | for short-circuit alarm | CK1-11 | 1SAM301901R1001 | 2 | 0.035 |
| | 2 | 0 | for short-circuit alarm | CK1-20 | 1SAM301901R1002 | 2 | 0.035 |
| | 0 | 2 | for short-circuit alarm | CK1-02 | 1SAM301901R1003 | 2 | 0.035 |

Note : For BEA connecting links with AF, AS and B mini contactors please refer to chapter 3, 4 and 5.



HK1

Main dimensions mm, inches

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T



AA1-24



UA1-24

| Suitable for | Rated control supply voltage | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|------------------------------|---------------|------|------------|---------|----------------------|
| | 50 Hz V AC | 60 Hz V AC | | | | |

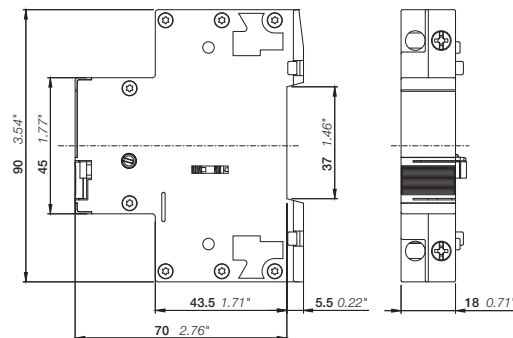
Shunt trips – mountable on the left

| | | | | | | |
|--|-------------|-------------|---------|-----------------|---|-------|
| MS116, MS132, MS165, MO132, MO165, MS132-T | 20 ... 24 | 20 ... 24 | AA1-24 | 1SAM201910R1001 | 1 | 0.100 |
| | 110 | 110 | AA1-110 | 1SAM201910R1002 | 1 | 0.100 |
| | 200 ... 240 | 200 ... 240 | AA1-230 | 1SAM201910R1003 | 1 | 0.100 |
| | 350 ... 415 | 350 ... 415 | AA1-400 | 1SAM201910R1004 | 1 | 0.100 |

Undervoltage releases – mountable on the left

| | | | | | | |
|--|-----|-----|---------|-----------------|---|-------|
| MS116, MS132, MS165, MO132, MO165, MS132-T | 20 | 24 | UA1-20 | 1SAM201904R1010 | 1 | 0.100 |
| | 24 | - | UA1-24 | 1SAM201904R1001 | 1 | 0.100 |
| | 48 | - | UA1-48 | 1SAM201904R1002 | 1 | 0.100 |
| | 60 | - | UA1-60 | 1SAM201904R1003 | 1 | 0.100 |
| | 110 | 120 | UA1-110 | 1SAM201904R1004 | 1 | 0.100 |
| | - | 208 | UA1-208 | 1SAM201904R1008 | 1 | 0.100 |
| | 230 | 240 | UA1-230 | 1SAM201904R1005 | 1 | 0.100 |
| | 400 | - | UA1-400 | 1SAM201904R1006 | 1 | 0.100 |
| | 415 | 480 | UA1-415 | 1SAM201904R1007 | 1 | 0.100 |
| | - | 575 | UA1-575 | 1SAM201904R1009 | 1 | 0.100 |

Note : For BEA...-4K Push-in Spring connecting links with AF09..K ... AF38..K please refer to chapter 3 - "Connection accessories for starting solutions with Push-in Spring terminals".



AA1, UA1

Main dimensions mm, inches

Accessories

With Push-in Spring terminals

Manual motor starters can be equipped with auxiliary contacts for lateral and front mounting as well as signaling contacts for lateral mounting. The accessories are equipped with Push-in Spring terminals that enable tool-free wiring. A variety of combinations is possible as required for the application. The auxiliary contacts change position with the main contacts. The signaling contact SK1 signals tripping regardless if it was caused by short-circuit or overload. These main accessories are suitable throughout the MS116/MS132/MS165-range.

| Suitable for | Auxiliary contacts N.O. | Auxiliary contacts N.C. | Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|-------------------------|-------------------------|-------------|------|------------|---------|----------------------|
|--------------|-------------------------|-------------------------|-------------|------|------------|---------|----------------------|

Auxiliary contacts - mountable on the front

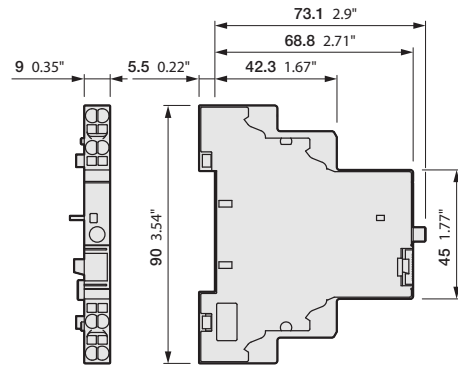
| | | | | | | | |
|--|---|---|--|----------|-----------------|----|-------|
| MS116, MS132, | 1 | 1 | | HKF1-11K | 1SAM201901R1201 | 10 | 0.016 |
| MS165 MO132, MO165, MS132-T, MS132-K, MS132-KT | 2 | 0 | | HKF1-20K | 1SAM201901R1202 | 10 | 0.016 |

Auxiliary contacts - mountable on the right

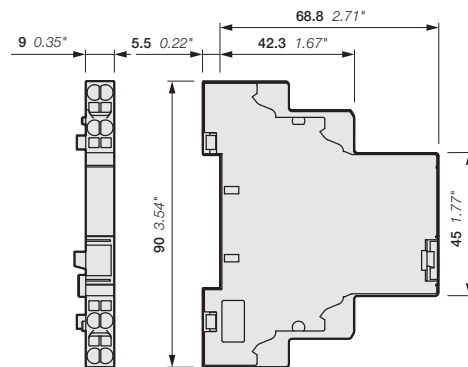
| | | | | | | | |
|----------------------------|---|---|-----------------------|----------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | max. 2 pieces | HK1-11K | 1SAM201902R1201 | 2 | 0.035 |
| MS165 MO132, MO165, | 2 | 0 | max. 2 pieces | HK1-20K | 1SAM201902R1202 | 2 | 0.035 |
| | 0 | 2 | max. 2 pieces | HK1-02K | 1SAM201902R1203 | 2 | 0.035 |
| MS132-T, MS132-K, MS132-KT | 2 | 0 | with leading contacts | HK1-20LK | 1SAM201902R1204 | 2 | 0.035 |

Signaling contacts - mountable on the right

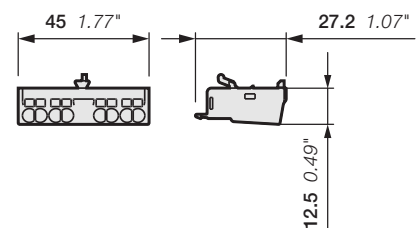
| | | | | | | | |
|----------------------------|---|---|-------------------|---------|-----------------|---|-------|
| MS116, MS132, | 1 | 1 | for tripped alarm | SK1-11K | 1SAM201903R1201 | 2 | 0.035 |
| MS165 MO132, MO165, | 2 | 0 | for tripped alarm | SK1-20K | 1SAM201903R1202 | 2 | 0.035 |
| MS132-T, MS132-K, MS132-KT | 0 | 2 | for tripped alarm | SK1-02K | 1SAM201903R1203 | 2 | 0.035 |



SK1-K



HK1-K



HKF1-K

Main dimensions mm, inches

Accessories

MS116, MS132, MS165, MO132, MO165, MS132-T





General technical data

| Type | HK1, SK1 | CK1 | HKF1 |
|---|---|----------------|--|
| Standards | IEC/EN 60947-1, IEC/EN 60947-5-1 | | |
| Rated operational voltage U _e | 690 V AC / 600 V DC | | 250 V AC / 250 V DC |
| Conventional free-air thermal current I _{th} | 6 A | | 5 A |
| Rated frequency | 50/60 Hz | | |
| Rated impulse withstand voltage U _{imp} | 6 kV | | |
| Rated insulation voltage U _i | 690 V AC | | 250 V AC |
| Pollution degree | 3 | | |
| Ambient air temperature | Operation | -25 ... +60 °C | |
| | Storage | -50 ... +80 °C | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | | |
| I _e / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | 24 V, 120 V | 6 A | 3 A |
| | 240 V | 4 A | 1.5 A |
| | 400 V | 3 A | - |
| | 440 V, 690 V | 1 A | - |
| I _e / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | 24 V | 2 A | 1 A |
| | 125 V | 0.55 A | 0.27 A |
| | 250 V | 0.27 A | 0.11 A |
| | 440 V, 600 V | 0.15 A | - |
| Minimum switching capacity | 17 V / 5 mA | | |
| Short-circuit protective device | N.C., 95-96 | 10 A Type gG | |
| | N.O., 97-98 | 10 A Type gG | |
| Duty time | 100 % | | |
| Mounting | Right side of manual motor starters / MS132-T | | Front of manual motor starters / MS132-T |
| Mounting positions | 1-6 | | |
| Mechanical durability | 100000 cycles | 10000 cycles | - |
| Electrical durability | 100000 cycles | 10000 cycles | - |

Contact utilization characteristics according to UL/CSA

| Type | HK1, SK1, CK1 | HKF1 |
|---|---|---------------------|
| Standards | UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-5-1 | (CSA C22.2 No.14) |
| Rated operational voltage U _e acc. to UL/CSA | 600 V AC / 600 V DC | 250 V AC / 250 V DC |
| Pilot duty | B600, Q600 | B300, R300 |
| AC thermal rated current | 5 A | 5 A |
| AC maximum volt-ampere making | 3600 VA | 3600 VA |
| AC maximum volt-ampere breaking | 360 VA | 360 VA |
| DC thermal rated current | 2.5 A | 1 A |
| DC maximum volt-ampere making-breaking | 69 VA | 28 VA |

Connecting characteristics - Auxiliary circuit

| Type | HK1, SK1, CK1 | HKF1 |
|---|---|---------------------------|
| Connecting capacity | | |
|  Rigid | 1 or 2 x 1 ... 1.5 mm ² | 1 ... 2.5 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.5 (spring) / 1 (push-in) ... 2.5 mm ² | |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 1.5 mm ² | |
|  Flexible | 1 or 2 x 0.5 (spring) / 1 (push-in) ... 2.5 mm ² | |
| Stranded acc. to UL/CSA | 1 or 2 x 0.75 ... 1.5 mm ² | |
| | 1 ... 2.5 mm ² (with Push-in Spring terminals) | |
| Stripping length | 1 or 2 x AWG 16-14 | |
| | AWG 20 - 14 (with Push-in Spring terminals) | |
| Tightening torque | 8 mm | |
| Recommended screw driver | 10 mm (with Push-in Spring terminals) | |
| Tightening torque | 0.8 ... 1.2 Nm / 7 lb.in | |
| | Pozidriv 2 | |
| Recommended screw driver | Flat Ø 3 mm x 0.5 mm (with Push-in Spring terminals) | |

Accessories





MS116, MS132, MS165, MO132, MO165, MS132-T

General technical data

| Type | | UA1 | AA1 |
|--|------------------------|---|---|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-1, UL 60947-5-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | |
| Rated control supply voltage | | see ordering details | AA1-24: 20-24 V 50/60 Hz; 20-70 V 50/60 Hz ON-Period = 5 s (1), 20-70 V DC ON-Period = 5 s (1) AA1-100: 110 V 50/60 Hz; 110-200 V 50/60 Hz ON-Period = 5 s (1), 110-200 V DC ON-Period = 5 s (1) AA1-230: 200-240 V 50/60 Hz, 200-350 V 50/60 Hz ON-Period = 5 s (1), 200-350 V DC ON-Period = 5 s (1) AA1-400: 350-415 V 50/60 Hz, 350-500 V 50/60 Hz ON-Period = 5 s (1), 350-500 V DC ON-Period = 5 s (1) |
| Rated frequency | | see ordering details | 50/60 Hz, DC |
| Operating voltage | Tripping | 0.35 ... 0.7 x Us | 0.7 ... 1.1 x Us |
| | Coil operating voltage | 0.85 ... 1.1 x Us | - |
| Power consumption | Holding | AC on request | - |
| | | DC on request | - |
| Rated impulse withstand voltage Uimp | | 6 kV | 6 kV |
| Rated insulation voltage Ui | | 690 V | 690 V |
| Pollution degree | | 3 | 3 |
| Ambient air temperature | Operation | -25 ... +60 °C | -25 ... +60 °C |
| | Storage | -50 ... +80 °C | -50 ... +80 °C |
| Resistance to shock acc. to IEC 60068-2-27 | | 15g / 11 ms | 15g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz | 5g / 3 ... 150 Hz |
| Mounting | | left side of manual motor starters / MS132-T | left side of manual motor starters / MS132-T |
| Mounting positions | | - | - |

(1) ON-Period: max. 5 s actuation time. Please consider 15 min OFF-period after max. 5 s ON-period, for voltages above the rated values.
The mechanical and electrical durability of manual motor starters in combination with UA1/AA1 is reduced. Values are provided on request.

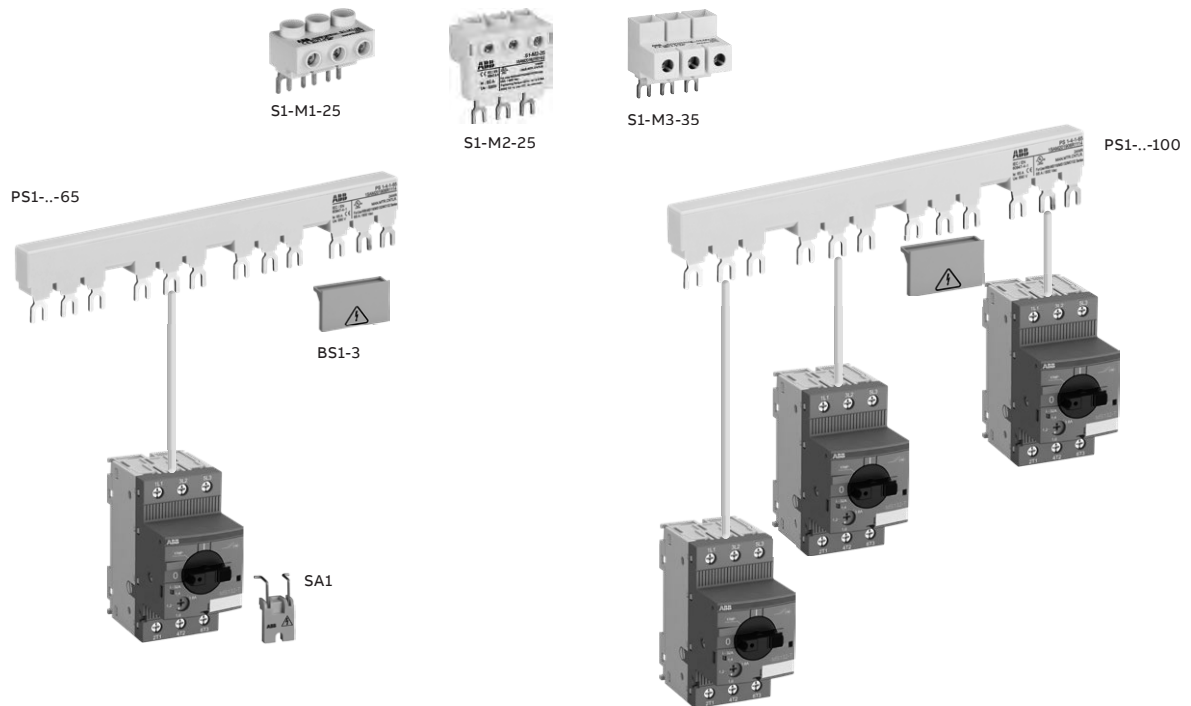
Connecting characteristics - Auxiliary circuit

| Type | | UA1 | AA1 |
|---|-------------------------|------------------------------|-----------|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² | |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² | |
| | 2 x | 0.75 ... 1.5 mm ² | |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | |
| | Stranded acc. to UL/CSA | 1 or 2 x | AWG 16-12 |
| Stripping length | | 10 mm | |
| Tightening torque | | 0.8 ... 1.2 Nm / 7 lb.in | |
| Recommended screwdriver | | Pozidriv 2 | |

Accessories

MS116, MS132, MS165, MO132, MO165

Manual motor starters with three-phase busbar systems (MS116, MS132, MO132)

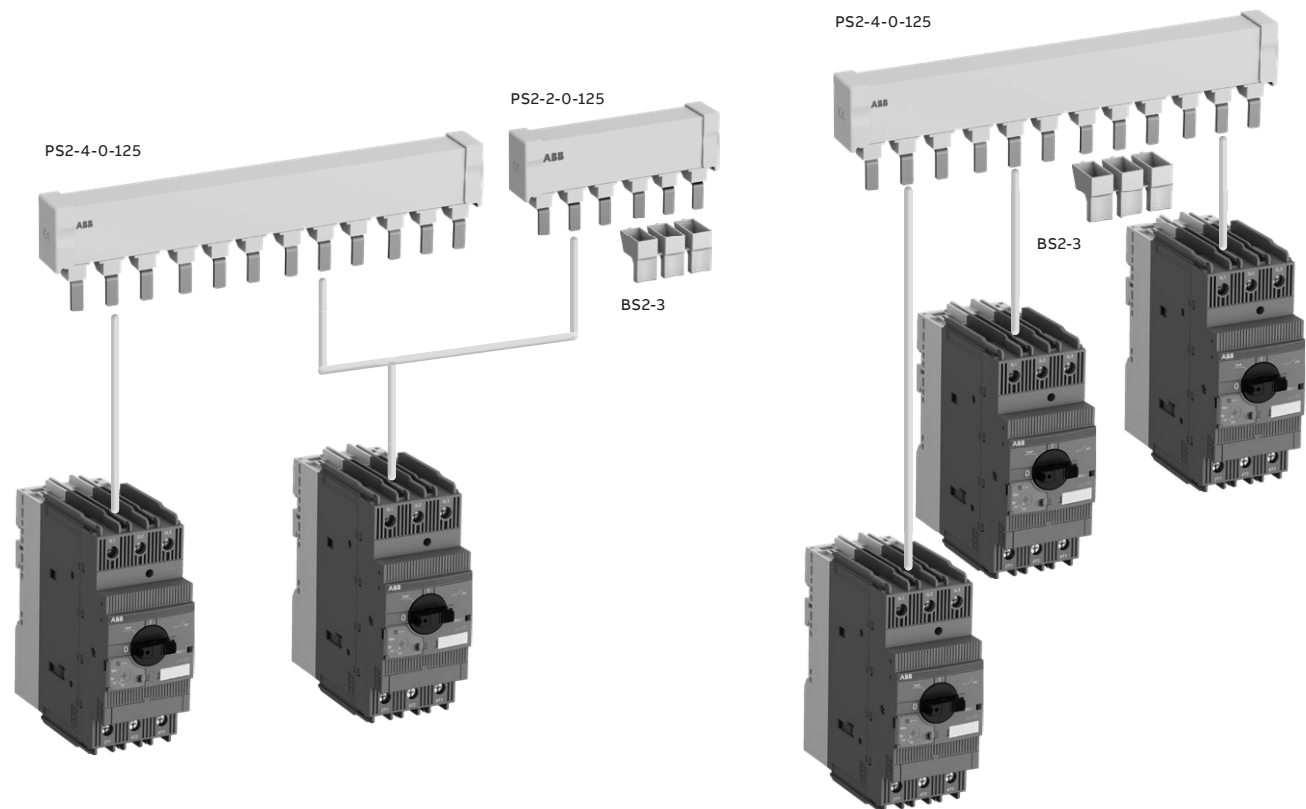


Three-phase busbar up to 65 A

Three-phase busbar up to 100 A

Note: busbars and feeder blocks are only suitable for screw versions.

Manual motor starters with three-phase busbar systems (MS165, MO165)



Three-phase busbar up to 125 A

Three-phase busbar up to 125 A

Accessories

MS116, MS132, MO132, MS132-T



PS1-2-0-65

2CDC241017F0010



PS1-3-1-100

2CDC241014F0010



S1-M3-35

159C101215F0014



S1-M2-25

159C101266F0014



TS1-M30-S1

2CDC241013V0019



SA2

2CDC241023F0013



SA1

5K1010891



PB1-1-32

2CDC241004F0014



S1-PB1-25

2CDC241005S0014

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 100 A are in the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected. Different three-phase feeder terminals are available according to the application.

Phase connecting links and phase power infeed blocks are also available for single-phase applications.

| Suitable for | Rated operational current | Number of manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---------------------------|---------------------------------|--------------------------------------|------|------------|---------|----------------|
| | A | | | | | | kg |

Three-phase busbars

| | | | | | | | |
|---------------------|-----|---|---|-------------|-----------------|----|-------|
| MS116, MS132, MO132 | 65 | 2 | 0 | PS1-2-0-65 | 1SAM201906R1102 | 10 | 0.034 |
| | 65 | 3 | 0 | PS1-3-0-65 | 1SAM201906R1103 | 10 | 0.055 |
| | 65 | 4 | 0 | PS1-4-0-65 | 1SAM201906R1104 | 10 | 0.077 |
| | 65 | 5 | 0 | PS1-5-0-65 | 1SAM201906R1105 | 10 | 0.098 |
| | 65 | 2 | 1 | PS1-2-1-65 | 1SAM201906R1112 | 10 | 0.036 |
| | 65 | 3 | 1 | PS1-3-1-65 | 1SAM201906R1113 | 10 | 0.060 |
| | 65 | 4 | 1 | PS1-4-1-65 | 1SAM201906R1114 | 10 | 0.087 |
| | 65 | 5 | 1 | PS1-5-1-65 | 1SAM201906R1115 | 10 | 0.108 |
| | 65 | 2 | 2 | PS1-2-2-65 | 1SAM201906R1122 | 10 | 0.040 |
| | 65 | 3 | 2 | PS1-3-2-65 | 1SAM201906R1123 | 10 | 0.067 |
| MS116, MS132, MO132 | 100 | 3 | 0 | PS1-3-0-100 | 1SAM201916R1103 | 10 | 0.084 |
| | 100 | 4 | 0 | PS1-4-0-100 | 1SAM201916R1104 | 10 | 0.117 |
| | 100 | 5 | 0 | PS1-5-0-100 | 1SAM201916R1105 | 10 | 0.154 |
| | 100 | 3 | 1 | PS1-3-1-100 | 1SAM201916R1113 | 10 | 0.094 |
| | 100 | 4 | 1 | PS1-4-1-100 | 1SAM201916R1114 | 10 | 0.134 |
| | 100 | 5 | 1 | PS1-5-1-100 | 1SAM201916R1115 | 10 | 0.172 |
| | 100 | 3 | 2 | PS1-3-2-100 | 1SAM201916R1123 | 10 | 0.105 |

Note: busbars are only suitable for screw versions

| Suitable for | Rated operational current | Rated cross section | Mounting form | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---------------------------|---------------------|---------------|------|------------|---------|----------------|
| | A | mm ² | | | | | kg |

Three-phase feeder terminals

| | | | | | | | |
|---------------------|-----|----|-------------------------|----------|-----------------|----|-------|
| MS116, MS132, MO132 | 65 | 25 | Flat | S1-M1-25 | 1SAM201907R1101 | 10 | 0.038 |
| | 65 | 25 | High | S1-M2-25 | 1SAM201907R1102 | 10 | 0.051 |
| | 65 | 25 | UL/CSA Type E/F and IEC | S1-M3-25 | 1SAM201907R1103 | 10 | 0.042 |
| | 100 | 35 | UL/CSA Type E/F and IEC | S1-M3-35 | 1SAM201913R1103 | 10 | 0.060 |

Terminal spacers, Type E

| | | | Type | Order code | Pkg qty | Weight (1 pce) | |
|--------------|---|---|-----------------------|------------|-----------------|----------------|-------|
| | | | | | | kg | |
| MS132 ≤ 10 A | - | - | UL/CSA Type E and IEC | TS1-M3-S1 | 1SAM301902R1001 | 2 | 0.012 |
| MS132 ≥ 12 A | - | - | UL/CSA Type E and IEC | TS1-M3-S2 | 1SAM301902R1002 | 2 | 0.012 |
| MS132-K | - | - | UL/CSA Type E and IEC | TS1-M3-K | 1SAM301903R1001 | 2 | 0.012 |

Note: For product availability, please consult your ABB local sales organization

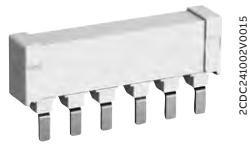
| Suitable for | Description | Type | Order code | Pkg qty | Weight (1 pce) |
|------------------------------|------------------------------|-------|-----------------|---------|----------------|
| | | | | | kg |
| MS116, MS132, MO132 | Protection cover for busbars | BS1-3 | 1SAM201908R1001 | 50 | 0.003 |
| MS116, MS132, MO132, MS132-T | Screw fixing kit | FS116 | 1SAM201909R1001 | 1 | 0.020 |
| | Padlock + two keys | SA2 | GJF1101903R0002 | 10 | 0.020 |
| MS116 | Lock handle | SA1 | GJF1101903R0001 | 10 | 0.003 |
| | Lock handle box SA1/SA2 | SA3 | GJF1101903R0003 | 10 | 0.050 |

Accessories for single-phase connection (IEC only)

| | | | | | |
|----------------------|--------------------------|-----------|-----------------|---|-------|
| MS116, MS132, MO132, | Phase connecting link | PB1-1-32 | 1SAM201914R1001 | 1 | 0.009 |
| MS132-T | Phase power infeed block | S1-PB1-25 | 1SAM201914R1002 | 1 | 0.013 |

Accessories

MS165, MO165



PS2-2-0-125

2CDC24102V0015



PS2-3-0-125

2CDC241003V0015



S2-M3-50

2CDC24102V0019



KA165

2CDC241010V0014



BS2-3

2CDC24100V0015



SA2

2CDC241023F0013

Three-phase busbars

Three-phase busbars ensure a quick and safe connection and are therefore a cost effective solution. A variety of different three-phase busbars up to 125 A are in the assortment. Between 2 and 4 manual motor starters with none, one or two lateral auxiliary contacts can be connected.

| Suitable for | Rated operational current A | Number of Manual motor starters | Number of lateral auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|--------------------------------|---------------------------------|--------------------------------------|-------------|-----------------|---------|----------------------|
| MS165, MO165 | 125 | 2 | 0 | PS2-2-0-125 | 1SAM401920R1002 | 10 | 0.100 |
| | 125 | 3 | 0 | PS2-3-0-125 | 1SAM401920R1003 | 10 | 0.162 |
| | 125 | 4 | 0 | PS2-4-0-125 | 1SAM401920R1004 | 10 | 0.226 |
| | 125 | 2 | 2 | PS2-2-2-125 | 1SAM401920R1022 | 10 | 0.117 |
| | 125 | 3 | 2 | PS2-3-2-125 | 1SAM401920R1023 | 10 | 0.197 |
| | 125 | 4 | 2 | PS2-4-2-125 | 1SAM401920R1024 | 10 | 0.277 |

Other busbar types on request.

Feeder block

| Suitable for | Rated operational current A | Rated cross section mm ² | Mounting form | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|--------------------------------|--|----------------|----------|-----------------|---------|----------------------|
| MS165, MO165 | 125 | 50 | UL508A and IEC | S2-M3-50 | 1SAM401923R1003 | 1 | 0.172 |

| Suitable for | Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|------------------------------|-------|-----------------|---------|----------------------|
| MS165, MO165 | Terminal shroud | KA165 | 1SAM401922R1001 | 10 | 0.025 |
| | Protection cover for busbars | BS2-3 | 1SAM401921R1001 | 10 | 0.005 |
| | Padlock + two keys | SA2 | GJF1101903R0002 | 10 | 0.020 |





Accessories

MS116, MS132, MS165, MO132, MO165

General technical data

| Type | PS1-xxx-65 | PS1-xxx-100 | PS2-xxx-125 | S1-Mx-25 | S1-Mx-35 |
|---|---|--------------------|--------------------|--------------------|--------------------|
| Standards | IEC/EN 60947-4-1, IEC/EN 60947-1, UL 60947-1, UL 60947-4-1 (UL 508), CSA C22.2 No.60947-4-1 (CSA C22.2 No.14) | | | | |
| Rated operational voltage U _e | 690 V | | | | |
| Rated operational voltage U _e acc. to UL/CSA | 600 V AC | | | | |
| Rated operational current I _e | 65 A | 100 A | 125 A | 65 A | 100 A |
| Rated operational current I _e acc. to UL/CSA | 65 A | 92 A | 125 A | 65 A | 92 A |
| Rated frequency | 50/60 Hz | | | | |
| Rated impulse withstand voltage U _{imp} | 6 kV | | | | |
| Rated insulation voltage U _i | 690 V AC | | | | |
| Pollution degree | 3 | | | | |
| Cross-section | 10 mm ² | 16 mm ² | 25 mm ² | 25 mm ² | 35 mm ² |
| Ambient air temperature | Operation | -25 ... +70 °C | | | |
| | Storage | -50 ... +80 °C | | | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | | | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | | | | |

Electrical connection - Main circuit

| Type | S1-Mx-25 | S1-Mx-35 |
|---|------------------------------|---------------------------|
| Connecting capacity | | |
|  Rigid | 1 x 6 ... 25 mm ² | 10 ... 35 mm ² |
|  Flexible with ferrule | 1 x 6 ... 16 mm ² | 10 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 x 6 ... 16 mm ² | 10 ... 35 mm ² |
|  Flexible | 1 x 6 ... 16 mm ² | 10 ... 35 mm ² |
| Stranded acc. to UL/CSA | 1 x AWG 10-4 | AWG 8-2 |
| Stripping length | 10 mm | 12 mm |
| Tightening torque | 2.5 Nm / 22 lb.in | 4.5 Nm / 40 lb.in |
| Recommended screwdriver | Pozidriv 2 | Hexagon SW4 |

Accessories

MS116, MS132, MO132



2CDC241004F0010

IB132-Y



2CDC241003F0010

IB132-G

IB132 are IP65 (NEMA Type 12) enclosures for single manual motor starter installation. Additional mounting of auxiliary and signaling contacts, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

DMS132 are IP65 (NEMA Type 12) door mounting kits for manual motor starter installation in any enclosure. Additional mounting of auxiliary, signaling, shunt trips and undervoltage release is possible. The handle is lockable in OFF position. For detailed specification see installation instruction.

| Suitable for | Description | Color | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|-------------|-------|------|------------|---------|-------------------|
|--------------|-------------|-------|------|------------|---------|-------------------|

IP65 enclosures (NEMA Type 12)

| | | | | | | |
|---------------------|---|------------|---------|-----------------|---|-------|
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | IB132-Y | 1SAM201911R1011 | 1 | 0.370 |
| | | Grey/black | IB132-G | 1SAM201911R1010 | 1 | 0.370 |

IP65 door mounting kits (NEMA Type 12)

| | | | | | | |
|---------------------|---|------------|----------|-----------------|---|-------|
| MS116, MS132, MO132 | Padlockable max. 3 padlocks with bail diameter 4 ... 6.5 mm | Yellow/red | DMS132-Y | 1SAM201912R1011 | 1 | 0.170 |
| | | Grey/black | DMS132-G | 1SAM201912R1010 | 1 | 0.170 |

Indication I-O-T and ON-OFF-T.



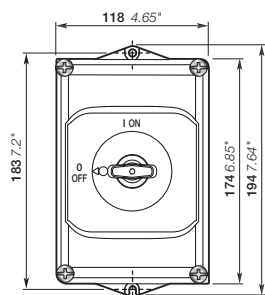
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DMS132-Y

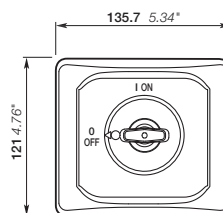
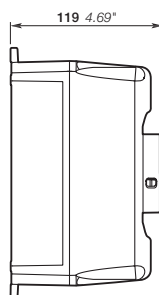


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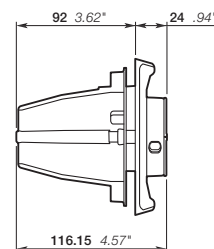
DMS132-G



IB132



DMS132



Main dimensions mm, inches

Accessories

MS116, MS132, MS165, MO132, MO165



MSHD-LB

2CDC241003R0011



MSHD-LY

2CDC241002S0011



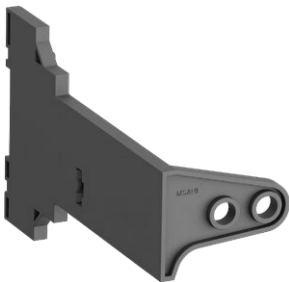
MSMN

2CDC241004F0011



MSH-AR

2CDC241000F0012



MSAH1

2CDC241017V0013

With this solution of door coupling rotary mechanisms it is possible to operate manual motor starters in the back of a switch cabinet from outside. The door coupling mechanism prevents opening of the door of a switch cabinet with the manual motor starter in ON position.

The complete mechanism includes handle, shaft, driver, shaft alignment ring and shaft supporter.

Most accessories fit for 6 mm shafts with a maximum length of 180 mm. The degree of protection for handles MSHD is IP64 (NEMA Type 1, 3R, 12).

| Suitable for | Description | Shaft length mm | Color | Type | Order code | Pkg qty pce | Weight (1 pce) kg |
|--------------|-------------|-----------------|-------|------|------------|-------------|-------------------|
|--------------|-------------|-----------------|-------|------|------------|-------------|-------------------|

Shafts

| | | | | | | | |
|--------|----------------------------------|-----|--|----------|-----------------|---|-------|
| MS116, | For MSHD handles. Shaft diameter | 85 | | OXS6X85 | 1SCA101647R1001 | 1 | 0.020 |
| MS132, | 6 mm. Shaft extension for door | 105 | | OXS6X105 | 1SCA108043R1001 | 1 | 0.020 |
| MO132, | coupling driver. | 130 | | OXS6X130 | 1SCA101655R1001 | 1 | 0.030 |
| MS165, | | 180 | | OXS6X180 | 1SCA101659R1001 | 1 | 0.040 |
| MO165 | | | | | | | |

IP64 handles (NEMA Type 1, 3R, 12)

| | | | | | | | |
|--------|--|--|--------|--------------|-----------------|---|-------|
| MS116, | Padlockable max. 3 padlocks | | Black | MSHD-LB (1) | 1SAM201920R1001 | 1 | 0.065 |
| MS132, | with bail diameter 5 ... 8 mm, door | | Yellow | MSHD-LY (1) | 1SAM201920R1002 | 1 | 0.065 |
| MO132, | interlock in ON position | | Black | MSHD-LTB (2) | 1SAM201920R1011 | 1 | 0.065 |
| MS165, | defeatable, for use with 6 mm | | Yellow | MSHD-LTY (2) | 1SAM201920R1012 | 1 | 0.065 |
| MO165 | OXS6...types up to 180 mm or driver shafts MSOX. | | | | | | |

Driver

| | | | | | | | |
|--------|-------------------------|--|--|-----------|-----------------|---|-------|
| MS116, | Coupling driver for use | | | MSMN (3) | 1SAM101923R0002 | 1 | 0.002 |
| MS132, | with 6 mm OXS6... types | | | MSMNO (4) | 1SAM101923R0012 | 1 | 0.002 |
| MO132, | up to 180 mm. | | | | | | |
| MS165, | | | | | | | |
| MO165 | | | | | | | |

Shaft alignment ring

| | | | | | | | |
|--------|---|--|--|--------|-----------------|---|-------|
| MS116, | The MSH-AR supports the long shafts for alignment to the handle inlet. It makes closing panel doors | | | MSH-AR | 1SAM201920R1000 | 1 | 0.010 |
| MS132, | more easy. Use for OXS6X > 105 mm. | | | | | | |
| MO132, | | | | | | | |
| MS165, | | | | | | | |
| MO165 | | | | | | | |

Shaft supporter

| | | | | | | | |
|--------|--|--|--|-------|-----------------|---|-------|
| MS116, | With the MSAH1 it is possible to support the shaft in the extension of handle (MSHD). It is mandatory for the usage of shafts >130 mm. | | | MSAH1 | 1SAM201909R1021 | 1 | 0.035 |
| MS132, | | | | | | | |
| MO132 | | | | | | | |

(1) Indication I-O and ON-OFF (recommended for MS116)

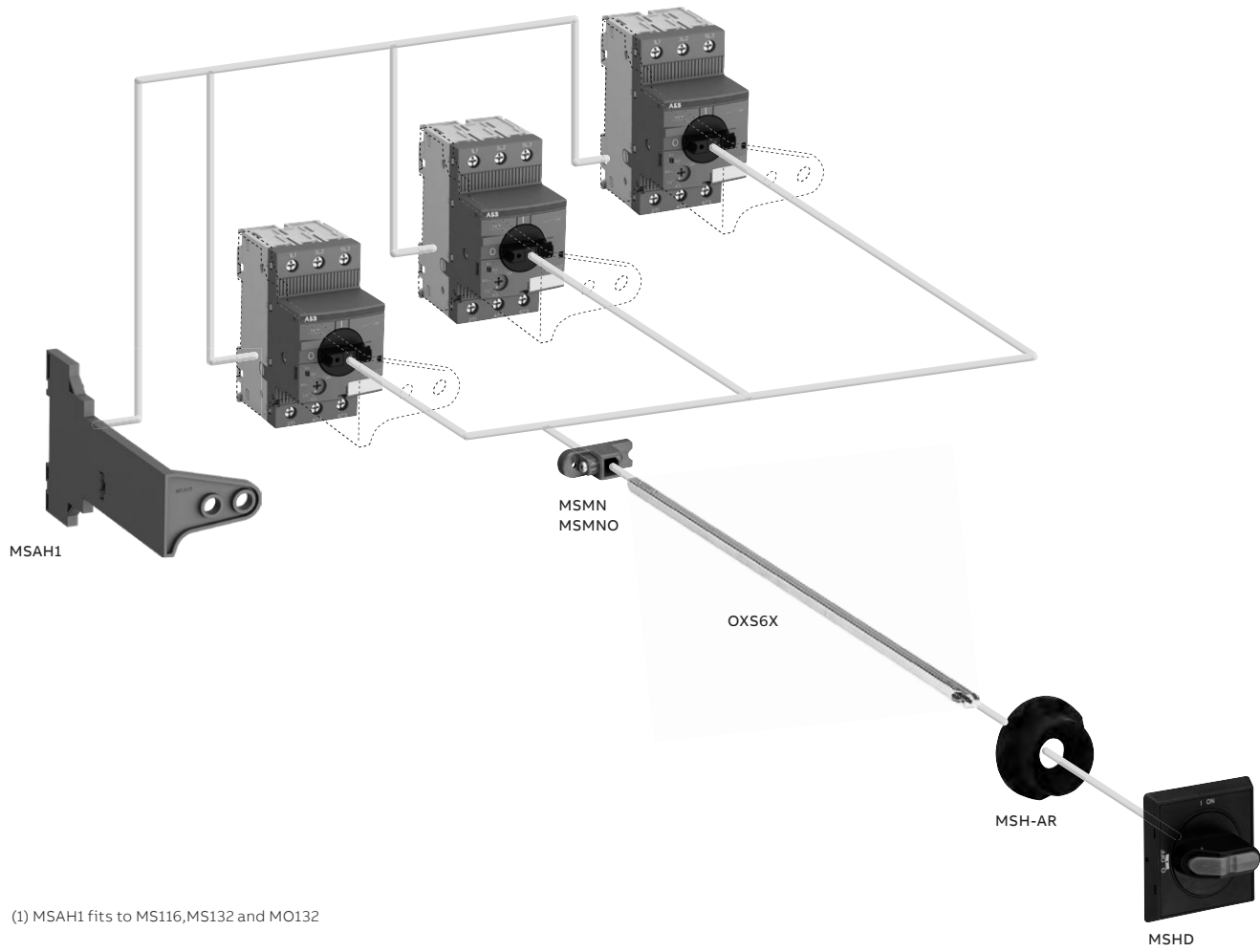
(2) Indication I-O and ON-OFF + Trip indication

(3) Coded - Positioning of ON indication dependent on mounting orientation of the MMS

(4) Uncoded - Positioning of ON indication independent of mounting orientation of the MMS.

Accessories

MS116, MS132, MS165, MO132, MO165



Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes. The grid covers most of the page below the 'Notes' header.



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/AF09-30-10-13
www.abb.com/productdetails/1SBL137001R1310

AF, EK contactors and NF contactor relays

| | |
|--------------|--|
| 3/3 | Overview |
| 3/11 | AF 3-pole contactors |
| 3/81 | AF..K 3-pole contactors with Push-in Spring terminals |
| 3/107 | AFS 3-pole contactors for safety applications |
| 3/147 | AF and EK 4-pole contactors |
| 3/185 | GAF Contactors for DC switching |
| 3/217 | UA..RA Contactors for capacitor switching |
| 3/235 | NF 4-pole and 8-pole contactor relays |
| 3/257 | Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays |
| 3/301 | Accessories for UA, UA..RA contactors and GA75, GAE75, GAF contactors |
| 3/327 | Accessories for EK550, EK1000 4-pole contactors |
| 3/339 | Terminal marking and positioning |
| 3/352 | Dimensions |
| 3/415 | Other contactor application data |
| 3/434 | Voltage code table |
| 3/440 | Questionnaire for product specifications |

AF contactors for motor starting and power switching up to 2850 A



The latest technology of electronically controlled coil is our standard. It offers multiple benefits over conventional alternatives, and together with ABB's wide product offering, it is an optimal configuration, every time.



Optimized logistics

Cut your costs

With its contactor and motor protection range, ABB has managed to reduce the number of contactor coils to just four. Total number of product variants has been reduced by up to 90%. This simplifies the customers' logistics while cutting storage and administration costs.



Continuous operation

Secure uptime

Prevent stoppages caused by voltage fluctuations. The AF contactor ensures distinct operation in unstable networks and signifies a major advance in motor control and power switching. Voltage sags, dips and surges pose no threat. The AF contactor secures your uptime.



Speed up your projects

Simplify design

Use the same part number in Europe, Asia and North America as one contactor coil now handles 100 V – 250 V AC / DC, 50 / 60 Hz. By reducing contactor coil energy consumption by up to 80%, panels can be built smaller and transformers more compact.

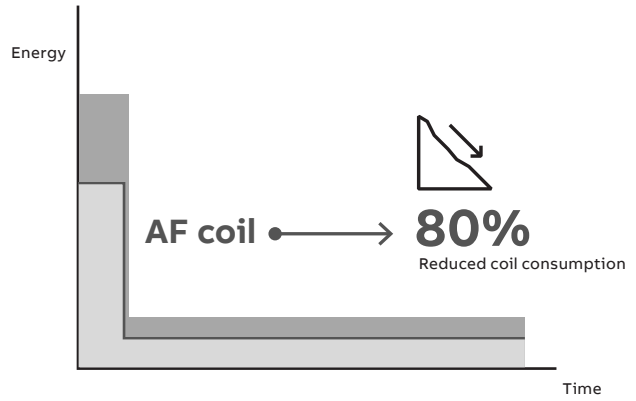
AF technology

Main Benefits

EO



Conventional AC coil



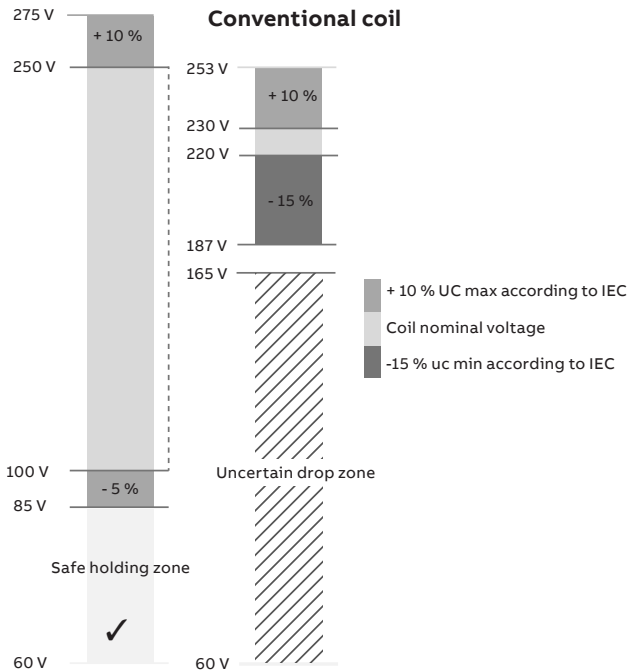
Reliable in all networks

The electronic system within the AF contactor continuously monitor the current and voltage apply to the coil. The contactor is safely operated in an always optimized condition and hum free.

Reduced coil consumption

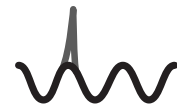
AF coil and energy consumption is reduced up to 80%. This allows a reduction of the temperature rise, the size of control transformers and size of cabinets.

AF coil



Wide control voltage range

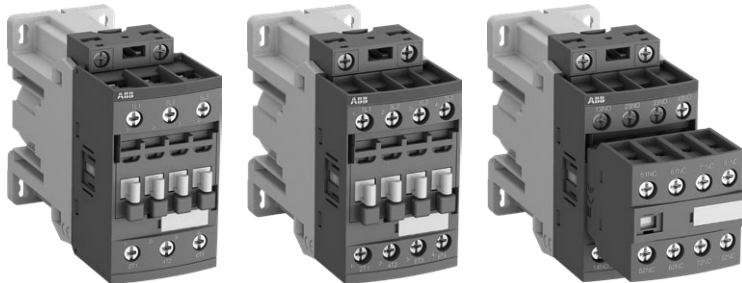
With conventional contactor technology, different contactors are needed for different network voltages. Thanks to the wide operating range of the AF contactor, it can operate just as well in Europe as in Asia or North America. The core coil of the AF contactor range covers 100-250 V AC / DC, 50 / 60 Hz.



Built-in surge suppression

With conventional contactor technology, it is recommended to use an external surge suppressor, an accessory that could cost as much as half of the contactor. With the AF technology, the surges are handled by the contactor and never reach the control circuit. One less product and one less complication to worry about.

Select AF contactor dedicated to your control circuit application



Direct coil control

Contactor coils are operated directly with an auxiliary contact or PLC-output or indirectly through an interface relay. For direct coil control, the switching capacity of coil operating device (auxiliary contact, solid state PLC-output, ...) must be verified versus the coil consumption at closing and at holding.

AF09...AF2850 - 4 to 400kW - AC / DC operated

| | AF09...AF370 | Coil code |
|------|---------------------|-----------|
| +10% | 24...60 V AC / DC | 11 |
| | 48...130 V AC / DC | 12 |
| | 100...250 V AC / DC | 13 |
| | 250...500 V AC / DC | 14 |
| -15% | AF400...AF1250 | |
| | 24...60 V DC | 68 |
| | 48...130 V AC / DC | 69 |
| | 100...250 V AC / DC | 70 |
| | 250...500 V AC / DC | 71 |
| | AF1350...AF2850 | |
| | 100...250 V AC / DC | 70 |

- AC / DC operation
- Wide control voltage range
- With built-in surge protection

AF09Z...AF38Z designed for PLC - 4 to 18.5 kW - 24 V DC operated

| Voltage range | Coil code |
|---------------|-----------|
| 24 V DC | 30 |

- Allow direct control by 24 V DC \geq 250 mA PLC-output
- Pull-in consumption 6 W 250 mA
- Holding consumption 1.7 W
- N.O. contact opening time 29 ms and closing time 53 ms
- With built-in surge protection

AF09Z...AF38Z for specific applications - 4 to 18.5 kW - AC / DC operated



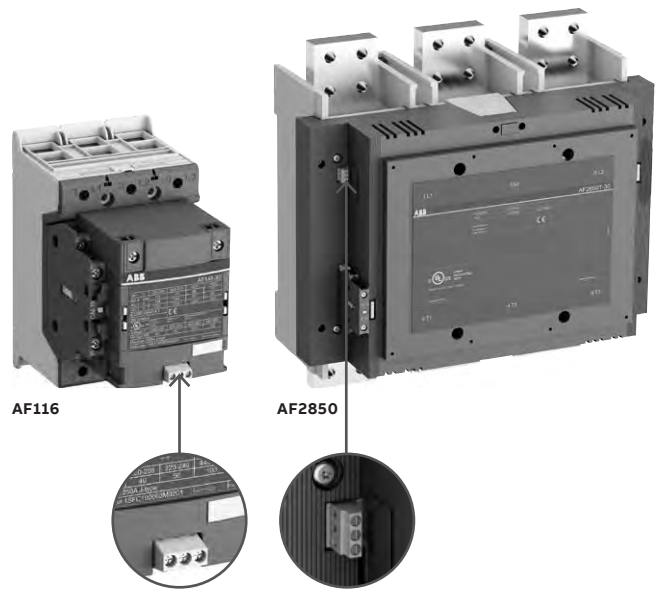
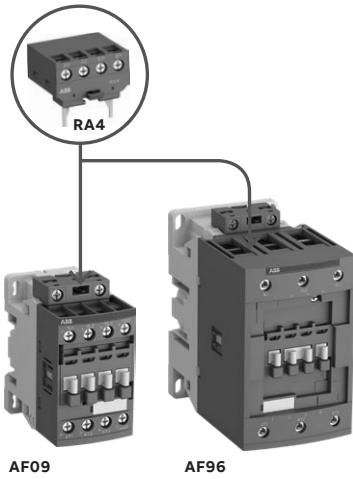
| Voltage range | Coil code |
|---------------------|-----------|
| 12...60 V DC | 20 |
| 24...60 V AC / DC | 21 |
| 48...130 V AC / DC | 22 |
| 100...250 V AC / DC | 23 |

- Coil 20 covers 12 ... 20 V DC applications
- Coil allow direct control by 24 V DC \geq 500 mA PLC-output
- Coil 21, 22 and 23 can withstand short voltage sags and dips with reference to SEMI F47 conditions of use
- With built-in surge protection

Select your AF coil interface for PLC

For contactors up to 2850 A AC-1 / General use

Coil interfaces are offered to operate all contactor size up to AF2850 with very low PLC output signals. They allow a galvanic isolation between the PLC circuit and the contactor coil circuit.



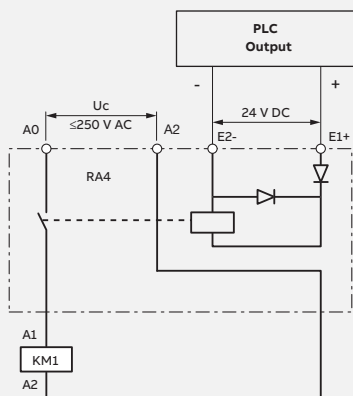
Interface relay

For control with 24 V DC \geq 20 mA PLC output. RA4 interface relay can be used for rated control circuit voltages U_c 24 ... 250 V 50/60Hz with the standard AF contactors up to 45 kW - 400 V / 60hp - 480 V and with NF contactor relays.

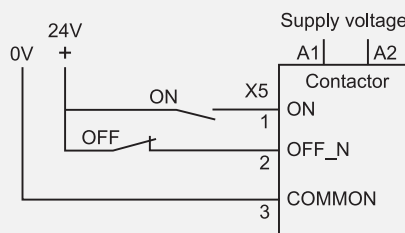
Built-in PLC interface

For control with 24 V DC \geq 10 mA PLC output. The built-in PLC interface operates the 100 ... 250 V AC / DC or 250 ... 500 V AC / DC AF contactor coil. Available for AF contactors from 55 kW - 400 V / 75 hp up to 560 kW - 400 V / 900 hp 480 V and up to 2850 A AC-1 / General use. Dedicated coil code from AF116 up to AF370 and standard feature from AF400 up to AF2850.

Control circuit with interface relay

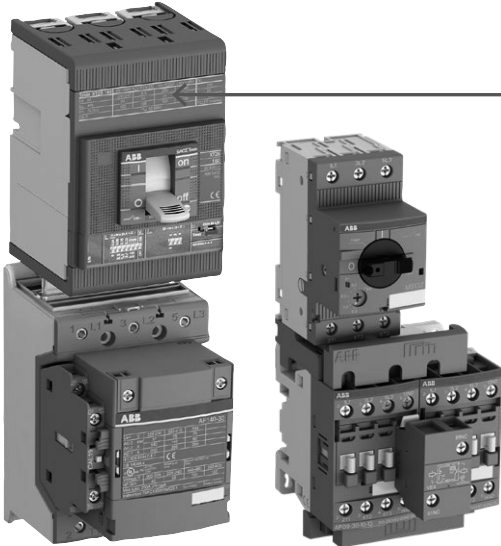


Control inputs with PLC plug



Contactors and motor protection

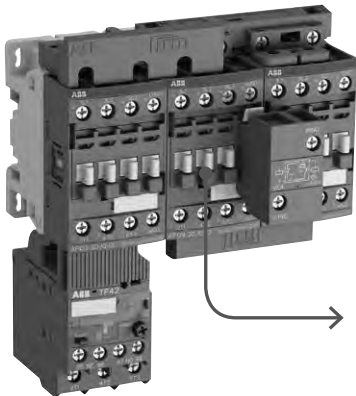
Advanced but simple



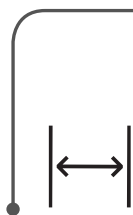
Easy, fast and secure starters assembly
 The AF contactor range is perfect for motor starting applications and for solutions where space is limited. You can create any motor starting type and save assembly time with a complete range of accessories and connection sets.



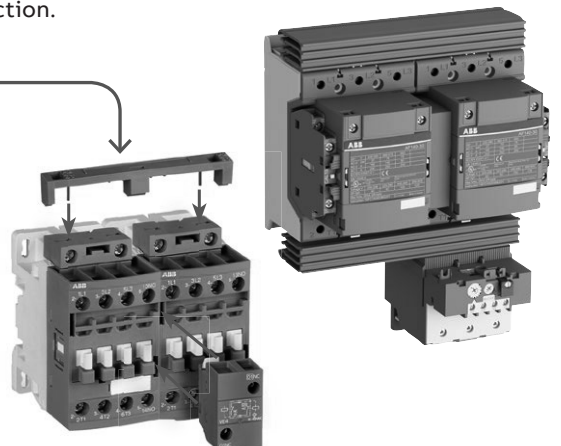
Protect from overload in all conditions
 Select thermal overload relays (trip class 10) or electronic overload relays (trip class 10E, 20E, 30E in the same product) to protect your motors against overload and phase failure.



Compact size
 The AF contactor is compact in size and has had its width reduced by up to 30% thanks to an 80% coil consumption reduction.



Save space
 Interlocking reversing pairs require no spacing between contactors, meaning you can fit more functionality into cabinets or other enclosures.



Contactors and motor protection

Flexible and safe

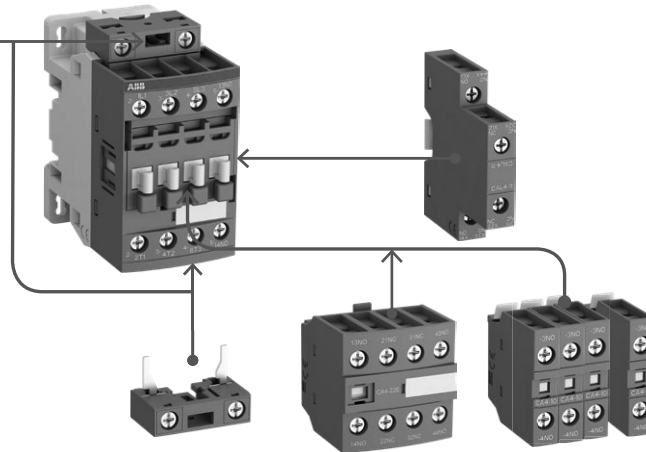
Easy to use accessories

Up to 96 A

Great flexibility

for coil terminal access

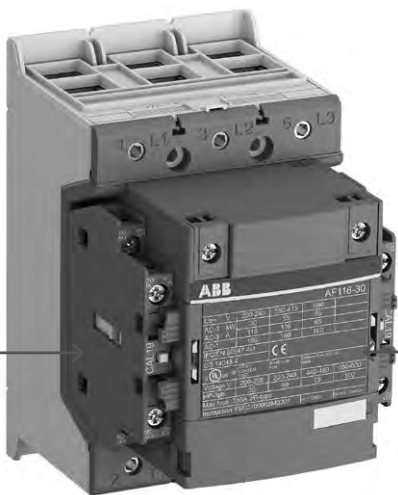
Contactors offer free choice of coil terminal access from top, bottom, both top and bottom or front.



Easy to use accessories

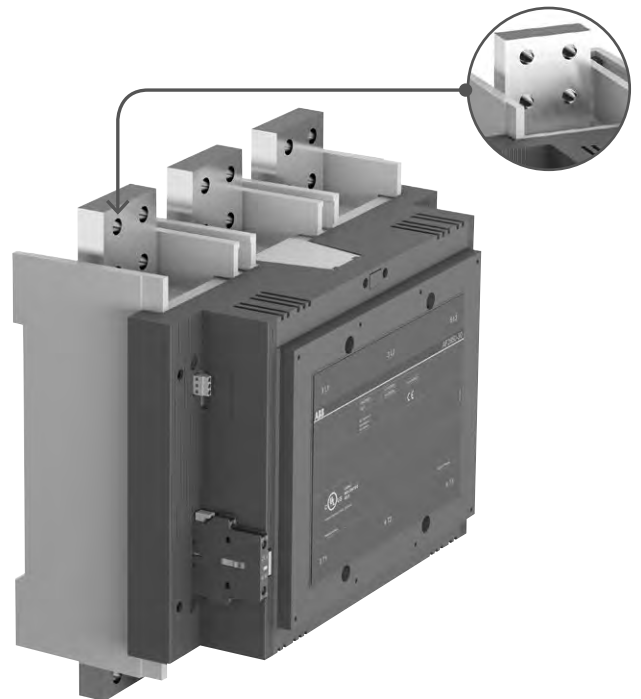
1-pole, 2-pole and 4-pole auxiliary contact blocks, front or side mounted, are available for a great flexibility.

Up to 2850 A



2 side mounted auxiliary contact blocks

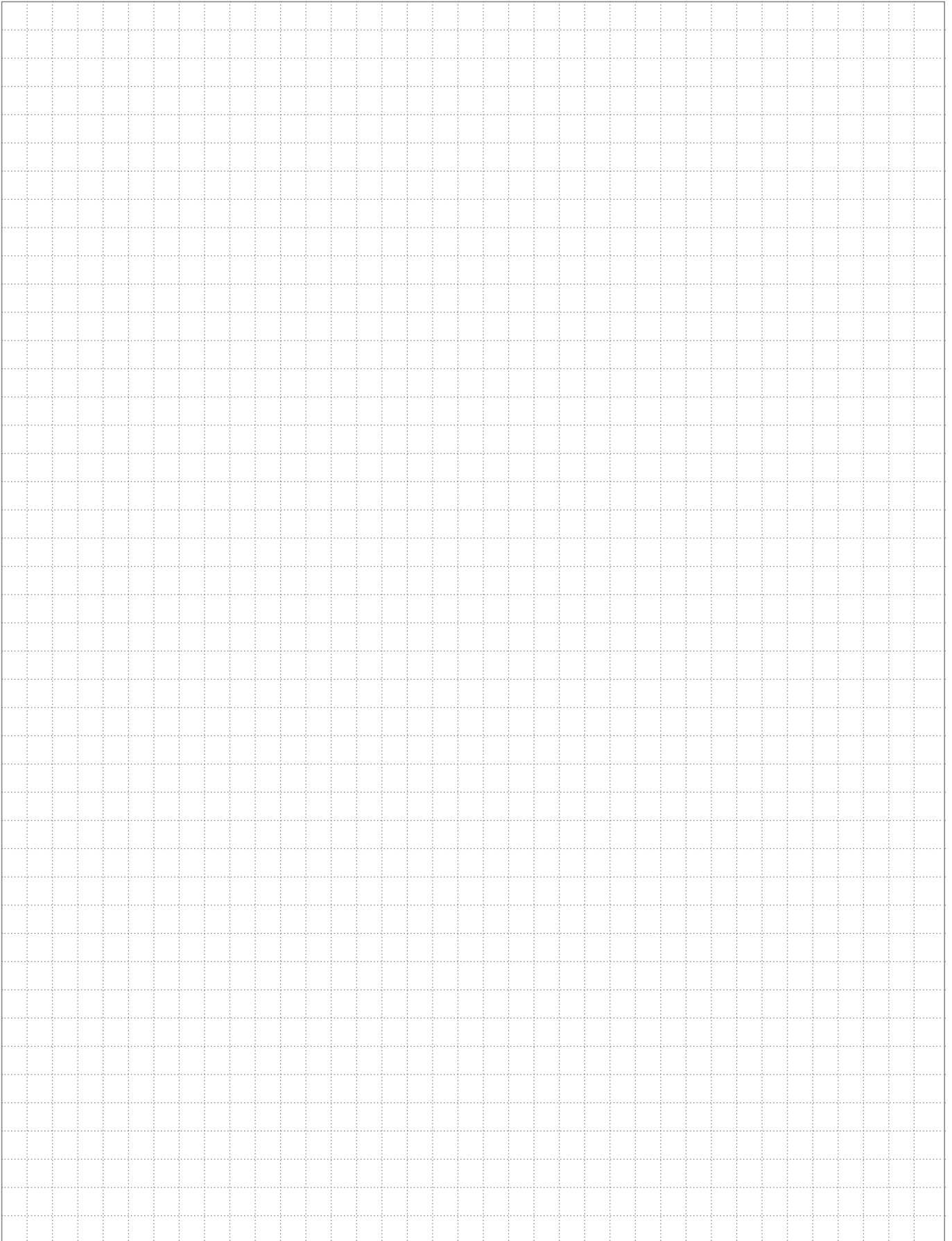
AF116 ... AF2850 contactors can take up to 2 side mounted auxiliary contact blocks without adding to its width. Coil connection terminals, mechanical and electrical interlocks and electronic timers are easily connected through the snap-to-connect function.



Simple connection and maintenance

The main terminals of AF116 ... AF2850 contactors are at the contactors' back to facilitate your bus bars connections. It also allows easy contact inspection and maintenance from AF400 and above.

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes.



AF 3-pole contactors

3/12 Overview

Ordering details

4 to 200 kW

| | | |
|------|-----------------|---|
| 3/14 | AF09 ... AF38 | AC / DC operated |
| 3/15 | AF09Z ... AF38Z | 24 V DC operated designed for PLC |
| 3/16 | AF09Z ... AF38Z | AC / DC operated for specific applications |
| 3/17 | AF40 ... AF96 | AC / DC operated |
| 3/18 | AF09 ... AF96 | Contactors and main accessories |
| 3/19 | AF116 ... AF146 | AC / DC operated |
| 3/20 | AF116 ... AF146 | AC / DC operated for faster opening utilization |
| 3/21 | AF190 ... AF370 | AC / DC operated |
| 3/22 | AF190 ... AF370 | AC / DC operated for faster opening utilization |
| 3/23 | AF116 ... AF370 | Contactors and main accessories |

4 to 560 kW (up to 2850 A AC-1) - with 1 N.O. + 1 N.C.

| | | |
|------|---------------------|---|
| 3/24 | AF26 ... AF38 | AC / DC operated |
| 3/25 | AF26Z ... AF38Z | AC / DC operated for specific applications |
| 3/26 | AF26 ... AF38 | Contactors and main accessories |
| 3/27 | AF40 ... AF96 | AC / DC operated |
| 3/28 | AF40 ... AF96 | Contactors and main accessories |
| 3/29 | AF116 ... AF146 | AC / DC operated |
| 3/30 | AF116 ... AF146 | AC / DC operated for faster opening utilization |
| 3/31 | AF190 ... AF370 | AC / DC operated |
| 3/32 | AF190 ... AF370 | AC / DC operated for faster opening utilization |
| 3/33 | AF116 ... AF370 | Contactors and main accessories |
| 3/34 | AF400 ... AF750 | AC / DC operated |
| 3/35 | AF1250 ... AF2850 | AC / DC operated |
| 3/36 | AF1350T ... AF2850T | AC / DC operated |
| 3/37 | AF400 ... AF2850 | Main accessories |

4 to 560 kW (up to 2850 A AC-1) - with 2 N.O. + 2 N.C.

| | | |
|------|-------------------|---|
| 3/38 | AF09 ... AF38 | AC / DC operated |
| 3/39 | AF09Z ... AF38Z | AC / DC operated for specific applications |
| 3/40 | AF40 ... AF96 | AC / DC operated |
| 3/41 | AF09 ... AF96 | Contactors and main accessories |
| 3/42 | AF116 ... AF146 | AC / DC operated |
| 3/43 | AF116 ... AF146 | AC / DC operated for faster opening utilization |
| 3/44 | AF190 ... AF370 | AC / DC operated |
| 3/45 | AF190 ... AF370 | AC / DC operated for faster opening utilization |
| 3/46 | AF116 ... AF370 | Contactors and main accessories |
| 3/47 | AF400 ... AF750 | AC / DC operated |
| 3/48 | AF1250 ... AF2850 | AC / DC operated |
| 3/49 | AF400 ... AF2850 | Contactors and main accessories |

3/50 Technical data

3/74 Electrical durability



For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/AF09-30-10-13
www.abb.com/productdetails/1SBL137001R1310

3-pole contactors, for motor control and power switching



| AC / DC Control supply | | | | Type | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---------------------------|---------------------------|--|-------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| IEC | AC-3 | Rated operational power | 220 - 230 - 240 V | kW | 2.2 | 3 | 4 | 6.5 | 9 | 11 | 11 | 15 | 18.5 | 22 | 25 |
| | | | 380 - 400 V | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 | 18.5 | 22 | 30 | 37 | 45 |
| | | $\theta \leq 60^\circ\text{C}$ for AF09 ... AF370 $\theta \leq 55^\circ\text{C}$ for AF400 ... AF2650 | 415 V | kW | 4 | 5.5 | 9 | 11 | 15 | 18.5 | 22 | 30 | 37 | 45 | 55 |
| | | | 440 V | kW | 4 | 5.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 |
| | | | 500 V | kW | 5.5 | 7.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 |
| | | 690 V | kW | 5.5 | 7.5 | 9 | 15 | 18.5 | 22 | 22 | 30 | 37 | 45 | 55 | |
| | | 1000 V | kW | — | — | — | — | — | — | — | — | — | — | 35 | 40 |
| Rated operational current | 380 - 400 V | A | 9 | 12 | 18 | 26 | 32 | 38 | 40 | 53 | 65 | 80 | 96 | | |
| AC-1 | Rated operational current | $\theta \leq 40^\circ\text{C}$, 690 V | A | 25 | 28 | 30 | 45 | 50 | 50 | 70 | 100 | 105 | 125 | 130 | |

| | | | | | | | | | | | | | | | |
|--------------------|----------------------|-------------|-----|------|-----|-----|-----|----|----|-----|----|-----|-----|-----|----|
| UL / CSA | 1-phase motor rating | 120 V | hp | 0.75 | 1 | 1.5 | 2 | 2 | 2 | 3 | 3 | 5 | 7.5 | 7.5 | |
| | | 240 V | hp | 1.5 | 2 | 3 | 3 | 5 | 5 | 7.5 | 10 | 15 | 15 | 20 | 20 |
| | 3-phase motor rating | 200 - 208 V | hp | 2 | 3 | 5 | 7.5 | 10 | 10 | 10 | 15 | 20 | 25 | 30 | 30 |
| | | 220 - 240 V | hp | 2 | 3 | 5 | 7.5 | 10 | 10 | 15 | 20 | 25 | 30 | 30 | 30 |
| | | 440 - 480 V | hp | 5 | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 60 | 60 |
| General use rating | 550 - 600 V | hp | 7.5 | 10 | 15 | 20 | 25 | 30 | 40 | 50 | 60 | 75 | 75 | 75 | |
| | 600 V | A | 25 | 28 | 30 | 45 | 50 | 50 | 60 | 80 | 90 | 105 | 115 | | |
| NEMA | NEMA Size | | | 00 | 0 | — | 1 | — | — | 2 | — | — | 3 | — | |

Main accessories

| | | | | | |
|--------------------------|--------------------------|--|---------|---------|---------|
| Auxiliary contact blocks | Front mounting | CA4-10 (1 x N.O.) CA4-01 (1 x N.C.) | | | |
| | Side mounting | CAL4-11 (1 x N.O. + 1 x N.C.) | | | |
| Timers | Electronic | TEF4-ON TEF4-OFF | | | |
| | Interlocking units | Mechanical | VM4 | VM96-4 | |
| | Mechanical / Electrical | VEM4 | | | |
| Connection sets | For reversing contactors | BER16-4 | BER38-4 | BER65-4 | BER96-4 |
| Surge suppressors | | Built-in surge protection | | | |

Overload relays

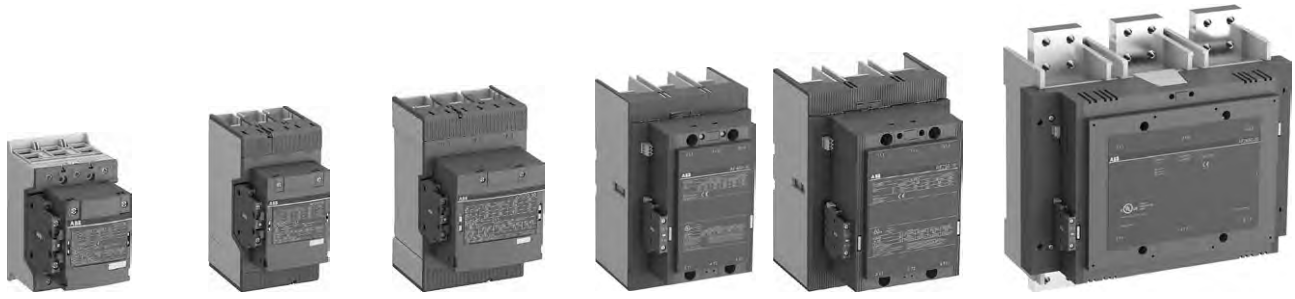
| | | | | | |
|--|-------------------|---|----------------------|---|------------------|
| | Thermal relays | Class 10 (Class 10A for TF140, TA200DU) | TF42 (0.10...38 A) | TF65 (22...67 A) | TF96 (40...96 A) |
| | Electronic relays | Class 10E, 20E, 30E | EF19 (0.10...18.9 A) | EF19 (0.10...18.9 A) EF45 (9...45 A) | EF65 (20...70 A) |

Manual motor starters

| | | | | |
|-------------|---|---|---|-------------|
| | Thermal / magnetic protection Class 10 | MS116 (0.10...32 A) lcs up to 50 kA for class 10 A | MS165 (10...80 A) lcs up to 100 kA (1) | |
| | Magnetic only types | MS132 (0.10...32 A) lcs up to 100 kA | MO165 (16...80 A) lcs up to 100 kA (1) | |
| Accessories | For contactor mounting | BEA16-4 | BEA38-4 | BEA65-4 (2) |

(1) MS165/MO165 are suitable for use with AF09 ... AF30 for North American applications.

(2) BEA65-4 suitable for MS165 and MO165 only.



| AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| 30 | 37 | 45 | 55 | 55 | 75 | 90 | 110 | 110 | 132 | 160 | 220 | — | 257 | 315 | — | — | — |
| 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 200 | 250 | 315 | 400 | — | 475 | 560 | — | — | — |
| 55 | 75 | 75 | 90 | 110 | 132 | 160 | 200 | 220 | 250 | 355 | 425 | — | 500 | 630 | — | — | — |
| 75 | 90 | 90 | 110 | 132 | 160 | 160 | 200 | 220 | 250 | 355 | 450 | — | 560 | 710 | — | — | — |
| 75 | 90 | 90 | 110 | 132 | 160 | 200 | 250 | 250 | 315 | 400 | 520 | — | 560 | 710 | — | — | — |
| 55 | 75 | 90 | 132 | 160 | 200 | 250 | 315 | 315 | 355 | 500 | 600 | — | 800 | 1000 | — | — | — |
| — | — | 75 | 110 | 132 | 160 | 185 | 200 | 220 | 280 | 355 | 400 | — | — | — | — | — | — |
| 116 | 140 | 146 | 190 | 205 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | — | 860 | 1060 | — | — | — |
| 160 | 200 | 225 | 275 | 350 | 400 | 500 | 600 | 600 | 700 | 800 | 1050 | 1260 | 1350 | 1650 | 2050 | 2650 | 2850 |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — | — |
| 30 | 40 | 40 | 50 | 60 | 75 | 100 | 125 | 125 | 150 | 200 | 250 | — | — | — | — | — | — |
| 40 | 50 | 50 | 60 | 75 | 100 | 125 | 150 | 150 | 200 | 250 | 300 | — | 400 | 450 | — | — | — |
| 75 | 100 | 100 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | — | 800 | 900 | — | — | — |
| 100 | 125 | 125 | 150 | 200 | 250 | 300 | 350 | 400 | 500 | 600 | 700 | — | 1000 | 1150 | — | — | — |
| 160 | 200 | 200 | 250 | 300 | 350 | 400 | 520 | 550 | 650 | 750 | 900 | 1210 | 1350 | 1650 | 2100 | 2700 | 2850 |
| — | 4 | — | — | — | 5 | — | — | — | 6 | — | 7 | — | — | 8 | — | — | — |

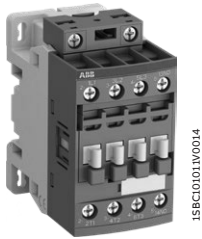
| | | | | | | | | | | | | | | |
|---------------------------------|--|--|----------|--------------------------------|--|----------|--|---------|-----------|--|--|-----------|--|--|
| CAL19-11 (1 x N.O. + 1 x N.C.) | | | | CAL18-11 (1 x N.O. + 1 x N.C.) | | | | | | | | | | |
| VM19 (for same size contactors) | | | | VM750H VM750V | | | | VM1650H | | | | | | |
| BER140-4 | | | BER205-4 | | | BER370-4 | | | BEM460-30 | | | BEM750-30 | | |

| | | | | | | | | | | | | | |
|---|--|---|--|---------------------|--|---------------------|--|---------------------|--|-------------------------|--|--|--|
| TF140DU (66...142 A) $\theta \leq 55^\circ\text{C}$ | | TA200DU (66...200 A) $\theta \leq 55^\circ\text{C}$ | | | | | | | | | | | |
| EF146 (54...150 A) | | EF205 (63...210 A) | | EF370 (115...380 A) | | EF460 (150...500 A) | | EF750 (250...800 A) | | EF1250DU (350...1250 A) | | | |

AF09 ... AF38 3-pole contactors

4 to 18.5 kW

AC / DC operated



AF09-30-10



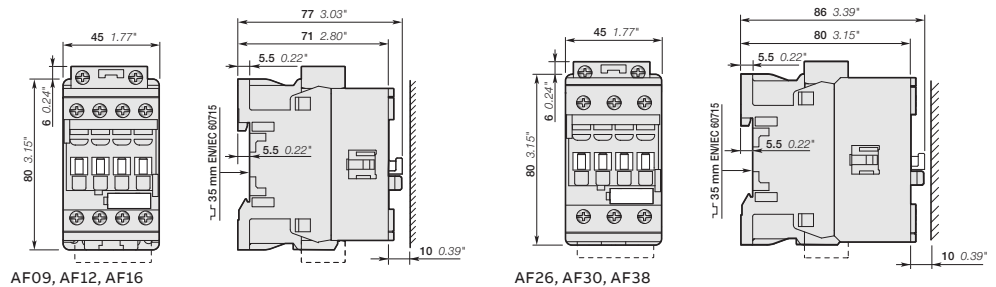
AF26-30-00

AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|-------------|---------------------------|---------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V AC-3 kW | AC-1 A | 480 V hp | 600 V AC A | V 50/60 Hz | V DC | | | kg | |
| 4 | 25 | 5 | 25 | 24...60 | 20...60 (1) | 1 0 | AF09-30-10-11 | 1SBL137001R1110 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-11 | 1SBL137001R1101 | 0.270 |
| | | | | 48...130 | 48...130 | 1 0 | AF09-30-10-12 | 1SBL137001R1210 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-12 | 1SBL137001R1201 | 0.270 |
| | | | | 100...250 | 100...250 | 1 0 | AF09-30-10-13 | 1SBL137001R1310 | 0.270 |
| | | | | | | 0 1 | AF09-30-01-13 | 1SBL137001R1301 | 0.270 |
| | | | | 250...500 | 250...500 | 1 0 | AF09-30-10-14 | 1SBL137001R1410 | 0.310 |
| | | | | | | 0 1 | AF09-30-01-14 | 1SBL137001R1401 | 0.310 |
| | | | | | | 1 0 | AF12-30-10-11 | 1SBL157001R1110 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-11 | 1SBL157001R1101 | 0.270 |
| | | | | 48...130 | 48...130 | 1 0 | AF12-30-10-12 | 1SBL157001R1210 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-12 | 1SBL157001R1201 | 0.270 |
| | | | | | | 1 0 | AF12-30-10-13 | 1SBL157001R1310 | 0.270 |
| | | | | | | 0 1 | AF12-30-01-13 | 1SBL157001R1301 | 0.270 |
| | | | | 250...500 | 250...500 | 1 0 | AF12-30-10-14 | 1SBL157001R1410 | 0.310 |
| | | | | | | 0 1 | AF12-30-01-14 | 1SBL157001R1401 | 0.310 |
| 1 0 | AF16-30-10-11 | 1SBL177001R1110 | 0.270 | | | | | | |
| 0 1 | AF16-30-01-11 | 1SBL177001R1101 | 0.270 | | | | | | |
| 48...130 | 48...130 | 1 0 | AF16-30-10-12 | 1SBL177001R1210 | 0.270 | | | | |
| | | 0 1 | AF16-30-01-12 | 1SBL177001R1201 | 0.270 | | | | |
| | | 1 0 | AF16-30-10-13 | 1SBL177001R1310 | 0.270 | | | | |
| | | 0 1 | AF16-30-01-13 | 1SBL177001R1301 | 0.270 | | | | |
| 250...500 | 250...500 | 1 0 | AF16-30-10-14 | 1SBL177001R1410 | 0.310 | | | | |
| | | 0 1 | AF16-30-01-14 | 1SBL177001R1401 | 0.310 | | | | |
| | | 0 0 | AF26-30-00-11 | 1SBL237001R1100 | 0.310 | | | | |
| | | 0 0 | AF26-30-00-12 | 1SBL237001R1200 | 0.310 | | | | |
| 100...250 | 100...250 | 0 0 | AF26-30-00-13 | 1SBL237001R1300 | 0.310 | | | | |
| | | 0 0 | AF26-30-00-14 | 1SBL237001R1400 | 0.350 | | | | |
| | | 0 0 | AF30-30-00-11 | 1SBL277001R1100 | 0.310 | | | | |
| | | 0 0 | AF30-30-00-12 | 1SBL277001R1200 | 0.310 | | | | |
| 48...130 | 48...130 | 0 0 | AF30-30-00-13 | 1SBL277001R1300 | 0.310 | | | | |
| | | 0 0 | AF30-30-00-14 | 1SBL277001R1400 | 0.350 | | | | |
| | | 0 0 | AF38-30-00-11 | 1SBL297001R1100 | 0.310 | | | | |
| | | 0 0 | AF38-30-00-12 | 1SBL297001R1200 | 0.310 | | | | |
| 100...250 | 100...250 | 0 0 | AF38-30-00-13 | 1SBL297001R1300 | 0.310 | | | | |
| | | 0 0 | AF38-30-00-14 | 1SBL297001R1400 | 0.350 | | | | |

(1) AF.-30...-11 not suitable for direct control by PLC-output.



Main dimensions mm, inches

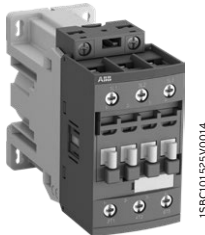
AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

24 V DC operated designed for PLC



AF09Z-30-10



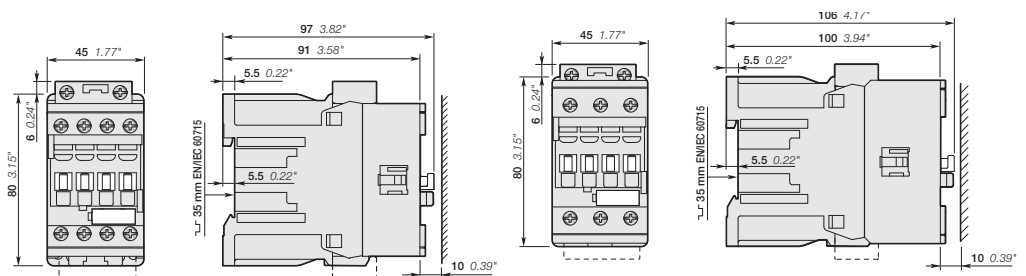
AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--|--|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------|----------------|-----------------|-----------------------------|
| Rated operational power 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ AC-1 A | 3-phase motor rating 480 V hp | General use rating 600 V AC A | | | | | |
| 4 | 25 | 5 | 25 | 24 | 1 0 | AF09Z-30-10-30 | 1SBL136001R3010 | 0.430 |
| | | | | | 0 1 | AF09Z-30-01-30 | 1SBL136001R3001 | 0.430 |
| 5.5 | 28 | 7.5 | 28 | 24 | 1 0 | AF12Z-30-10-30 | 1SBL156001R3010 | 0.430 |
| | | | | | 0 1 | AF12Z-30-01-30 | 1SBL156001R3001 | 0.430 |
| 7.5 | 30 | 10 | 30 | 24 | 1 0 | AF16Z-30-10-30 | 1SBL176001R3010 | 0.430 |
| | | | | | 0 1 | AF16Z-30-01-30 | 1SBL176001R3001 | 0.430 |
| 11 | 45 | 15 | 45 | 24 | 0 0 | AF26Z-30-00-30 | 1SBL236001R3000 | 0.480 |
| 15 | 50 | 20 | 50 | 24 | 0 0 | AF30Z-30-00-30 | 1SBL276001R3000 | 0.480 |
| 18.5 | 50 | 25 | 50 | 24 | 0 0 | AF38Z-30-00-30 | 1SBL296001R3000 | 0.480 |

Note: AF..Z contactors with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF12Z, AF16Z

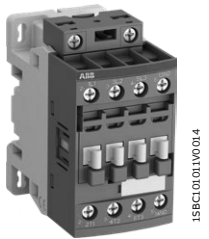
AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications



AF09Z-30-10



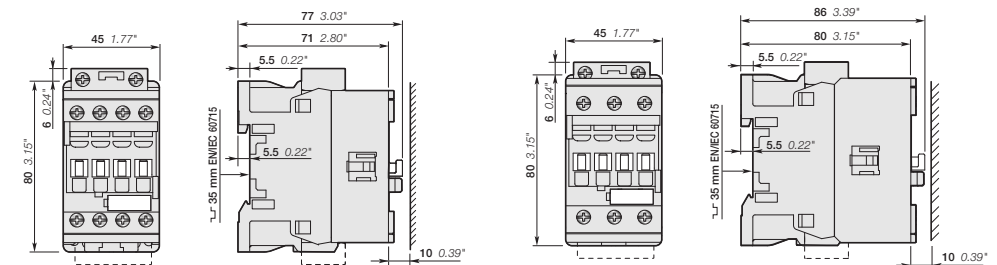
AF26Z-30-00

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - can manage large control voltage variations
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight | | | | | | |
|-------------------------|--|----------------------|--------------------|-------------------------------|----------|---------------------------|----------------|-----------------|-----------------|-------------|---------|----------------|-----------------|-----------------|-------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | | Pkg (1 pce) | | | | | |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | V 50/60 Hz | V DC | | | kg | | | | | | | |
| 4 | 25 | 5 | 25 | - | 12...20 | 1 0 | AF09Z-30-10-20 | 1SBL136001R2010 | 0.310 | | | | | | |
| | | | | | | 0 1 | AF09Z-30-01-20 | 1SBL136001R2001 | 0.310 | | | | | | |
| | | | | | 24...60 | 20...60 | 1 0 | AF09Z-30-10-21 | 1SBL136001R2110 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF09Z-30-01-21 | 1SBL136001R2101 | 0.310 | | | | | |
| | | | | | | | 1 0 | AF09Z-30-10-22 | 1SBL136001R2210 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF09Z-30-01-22 | 1SBL136001R2201 | 0.310 | | | | | |
| | | | | | 48...130 | 48...130 | 1 0 | AF09Z-30-10-23 | 1SBL136001R2310 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF09Z-30-01-23 | 1SBL136001R2301 | 0.310 | | | | | |
| | | | | | | | 1 0 | AF12Z-30-10-20 | 1SBL156001R2010 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF12Z-30-01-20 | 1SBL156001R2001 | 0.310 | | | | | |
| 5.5 | 28 | 7.5 | 28 | - | 12...20 | 1 0 | AF12Z-30-10-21 | 1SBL156001R2110 | 0.310 | | | | | | |
| | | | | | | 0 1 | AF12Z-30-01-21 | 1SBL156001R2101 | 0.310 | | | | | | |
| | | | | | 24...60 | 20...60 | 1 0 | AF12Z-30-10-22 | 1SBL156001R2210 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF12Z-30-01-22 | 1SBL156001R2201 | 0.310 | | | | | |
| | | | | | | | 1 0 | AF12Z-30-10-23 | 1SBL156001R2310 | 0.310 | | | | | |
| | | | | | | | 0 1 | AF12Z-30-01-23 | 1SBL156001R2301 | 0.310 | | | | | |
| | | | | | 7.5 | 30 | 10 | 30 | - | 12...20 | 1 0 | AF16Z-30-10-20 | 1SBL176001R2010 | 0.310 | |
| | | | | | | | | | | | 0 1 | AF16Z-30-01-20 | 1SBL176001R2001 | 0.310 | |
| | | | | | | | | | | 24...60 | 20...60 | 1 0 | AF16Z-30-10-21 | 1SBL176001R2110 | 0.310 |
| | | | | | | | | | | | | 0 1 | AF16Z-30-01-21 | 1SBL176001R2101 | 0.310 |
| 1 0 | AF16Z-30-10-22 | 1SBL176001R2210 | 0.310 | | | | | | | | | | | | |
| 0 1 | AF16Z-30-01-22 | 1SBL176001R2201 | 0.310 | | | | | | | | | | | | |
| 48...130 | 48...130 | 1 0 | AF16Z-30-10-23 | 1SBL176001R2310 | | | | | | 0.310 | | | | | |
| | | 0 1 | AF16Z-30-01-23 | 1SBL176001R2301 | | | | | | 0.310 | | | | | |
| | | 1 0 | AF16Z-30-10-20 | 1SBL236001R2000 | | | | | | 0.350 | | | | | |
| | | 0 0 | AF26Z-30-00-21 | 1SBL236001R2100 | | | | | | 0.350 | | | | | |
| 11 | 45 | 15 | 45 | - | 12...20 | 0 0 | AF26Z-30-00-22 | 1SBL236001R2200 | 0.350 | | | | | | |
| | | | | | | 0 0 | AF26Z-30-00-23 | 1SBL236001R2300 | 0.350 | | | | | | |
| | | | | | 24...60 | 20...60 | 0 0 | AF30Z-30-00-20 | 1SBL276001R2000 | 0.350 | | | | | |
| | | | | | | | 0 0 | AF30Z-30-00-21 | 1SBL276001R2100 | 0.350 | | | | | |
| 15 | 50 | 20 | 50 | - | 12...20 | 0 0 | AF30Z-30-00-22 | 1SBL276001R2200 | 0.350 | | | | | | |
| | | | | | | 0 0 | AF30Z-30-00-23 | 1SBL276001R2300 | 0.350 | | | | | | |
| | | | | | 24...60 | 20...60 | 0 0 | AF38Z-30-00-20 | 1SBL296001R2000 | 0.350 | | | | | |
| | | | | | | | 0 0 | AF38Z-30-00-21 | 1SBL296001R2100 | 0.350 | | | | | |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 0 0 | AF38Z-30-00-22 | 1SBL296001R2200 | 0.350 | | | | | | |
| | | | | | | 0 0 | AF38Z-30-00-23 | 1SBL296001R2300 | 0.350 | | | | | | |
| | | | | | 24...60 | 20...60 | 0 0 | AF38Z-30-00-20 | 1SBL296001R2000 | 0.350 | | | | | |
| | | | | | | | 0 0 | AF38Z-30-00-21 | 1SBL296001R2100 | 0.350 | | | | | |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF12Z, AF16Z

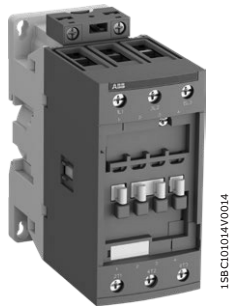
AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

AF40 ... AF96 3-pole contactors

18.5 to 45 kW

AC / DC operated



AF40-30-00

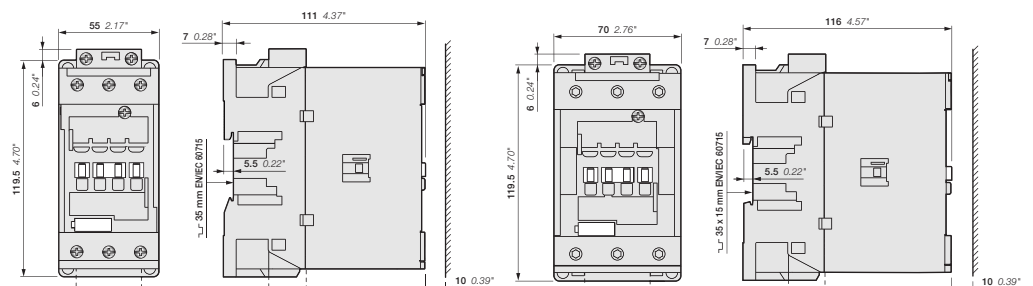


AF80-30-00

- AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|-------------|---------------------------|---------------|-----------------|--------|
| Rated operational power | operational current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | V 50/60 Hz | V DC | | | kg | |
| 18.5 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 0 0 | AF40-30-00-11 | 1SBL347001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF40-30-00-12 | 1SBL347001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF40-30-00-13 | 1SBL347001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF40-30-00-14 | 1SBL347001R1400 | 0.950 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 0 0 | AF52-30-00-11 | 1SBL367001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF52-30-00-12 | 1SBL367001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF52-30-00-13 | 1SBL367001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF52-30-00-14 | 1SBL367001R1400 | 0.950 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 0 0 | AF65-30-00-11 | 1SBL387001R1100 | 0.970 |
| | | | | 48...130 | 48...130 | 0 0 | AF65-30-00-12 | 1SBL387001R1200 | 0.970 |
| | | | | 100...250 | 100...250 | 0 0 | AF65-30-00-13 | 1SBL387001R1300 | 0.950 |
| | | | | 250...500 | 250...500 | 0 0 | AF65-30-00-14 | 1SBL387001R1400 | 0.950 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 0 0 | AF80-30-00-11 | 1SBL397001R1100 | 1.220 |
| | | | | 48...130 | 48...130 | 0 0 | AF80-30-00-12 | 1SBL397001R1200 | 1.220 |
| | | | | 100...250 | 100...250 | 0 0 | AF80-30-00-13 | 1SBL397001R1300 | 1.170 |
| | | | | 250...500 | 250...500 | 0 0 | AF80-30-00-14 | 1SBL397001R1400 | 1.170 |
| 45 | 130 | 60 | 115 | 24...60 | 20...60 (1) | 0 0 | AF96-30-00-11 | 1SBL407001R1100 | 1.220 |
| | | | | 48...130 | 48...130 | 0 0 | AF96-30-00-12 | 1SBL407001R1200 | 1.220 |
| | | | | 100...250 | 100...250 | 0 0 | AF96-30-00-13 | 1SBL407001R1300 | 1.170 |
| | | | | 250...500 | 250...500 | 0 0 | AF96-30-00-14 | 1SBL407001R1400 | 1.170 |

(1) For control by PLC-output, use RA4 interface relay.



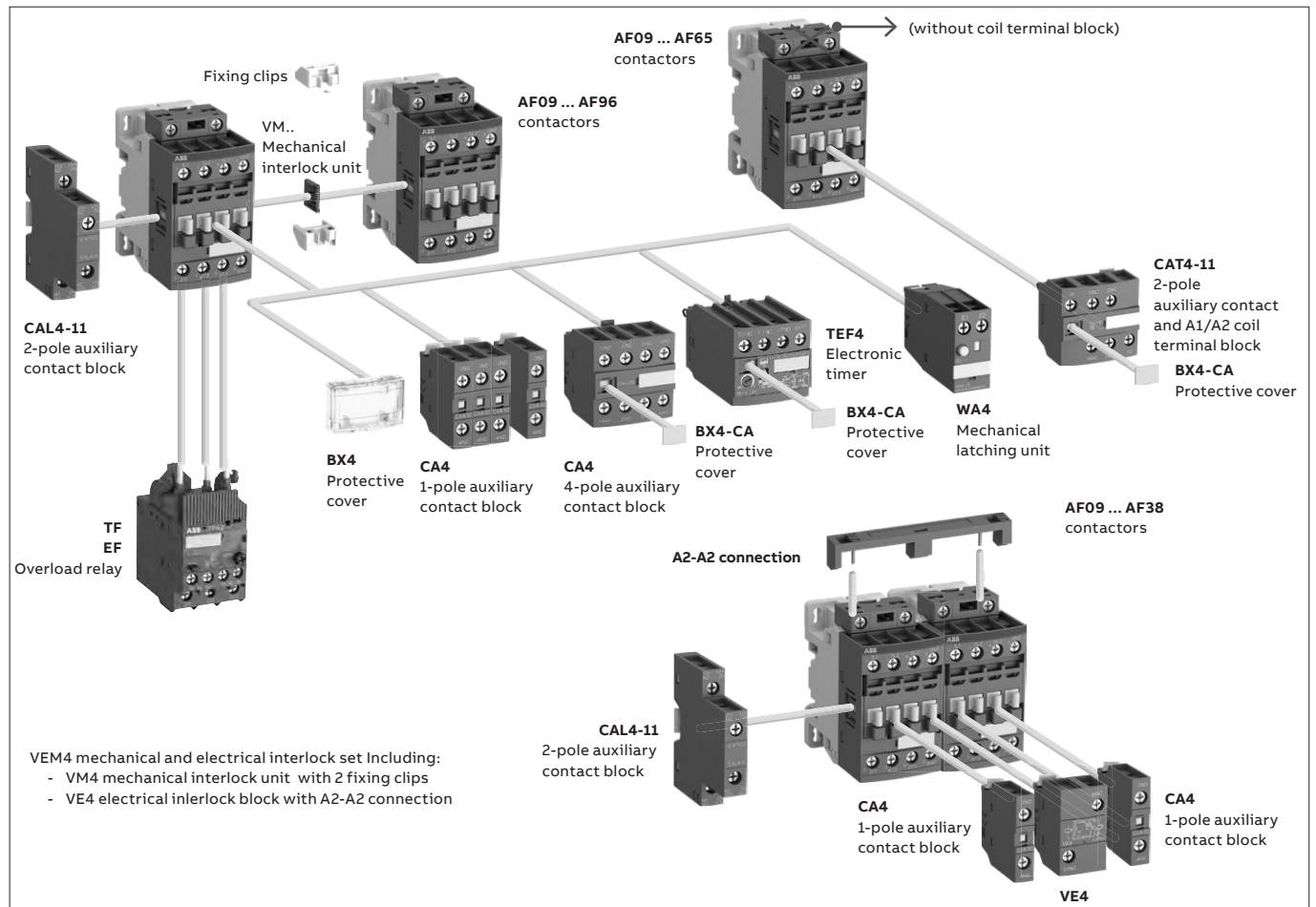
AF40, AF52, AF65

AF80, AF96

Main dimensions mm, inches

AF09 ... AF96 3-pole contactors

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
 Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | Electronic timer | Mechanical latching unit | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories | |
|---|------------|-----------------------------|---------------------------|----------------|------------|------------------|--------------------------|--|--------------------------|------------|
| | | | Auxiliary contact blocks | | | | | | Auxiliary contact blocks | |
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 (2) | VEM4 | 2-pole CAL4-11 | |
| | | | | | | | | | Left side | Right side |
| AF09(Z) ... AF38(Z) (1) | | | | | | | | | | |
| AF09 ... AF16 | 3 0 0 1 | ▶ | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | - |
| AF09 ... AF16 | 3 0 1 0 | ▶ | 2 max. | or 1 | - | or 1 | or 1 | - | + 1 | + 1 |
| AF26 ... AF38 | 3 0 0 0 | ▶ | 3 max. | - | - | - | - | + 1 (3) | + 1 | or 1 |
| AF09Z ... AF38Z 24 V DC designed for PLC - coil 30 (1) | | | | | | | | | | |
| AF09Z ... AF16Z | 3 0 0 1 | ▶ | 4 max. | - | or 1 | or 1 | - | -(3) | or 1 | + 1 |
| AF09Z ... AF16Z | 3 0 1 0 | ▶ | 2 max. | - | - | or 1 | - | -(3) | + 1 | or 1 |
| AF26Z ... AF38Z | 3 0 0 0 | ▶ | - | - | - | 1 | - | - | + 1 | + 1 |
| AF40 ... AF96 | | | | | | | | | | |
| AF40 ... AF65 | 3 0 0 0 | ▶ | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | + 1 |
| AF80, AF96 | 3 0 0 0 | ▶ | 4 max. | - | or 1 | or 1 | or 1 | - | + 1 | + 1 |

(1) Including add-on and built-in contacts : 4 N.C. auxiliary contacts max on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°; 5.
 (2) Use WA4 for AF09...AF65 and WA4-96 for AF80, AF96.
 Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
 For WA4 accessory use with contactor coil 30, please consult your ABB local sales organization.
 (3) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

Overload relays fitting details (4)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF09 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AF26 ... AF38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80, AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
 (4) Direct mounting - No kit required.

AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated



AF146-30-00

1SFLC010095V0001



AF146-30-00B

1SFLC010096V0001

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---------------|--|----------------------|--|---------------------------|----------|------------|--------|
| | Rated operational power | 3-phase motor rating | | | | | |
| 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ AC-1 A | 480 V hp | 600 V AC | | | | kg |

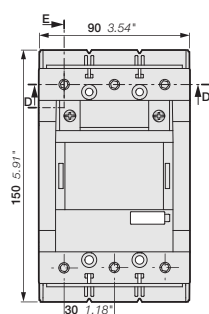
For connection with built-in cable clamps

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|--------------------|----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00-11 | 1SFL427001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00-12 | 1SFL427001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00-13 | 1SFL427001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00-14 | 1SFL427001R1400 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00-11 | 1SFL447001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00-12 | 1SFL447001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00-13 | 1SFL447001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00-14 | 1SFL447001R1400 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00-11 | 1SFL467001R1100 | 1.750 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00-12 | 1SFL467001R1200 | 1.750 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00-13 | 1SFL467001R1300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00-14 | 1SFL467001R1400 | 1.750 |

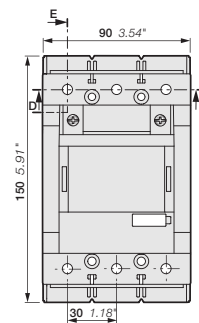
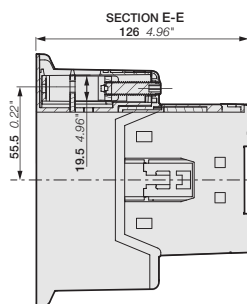
With bar connections

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|--------------------|-----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 0 0 | AF116-30-00B-11 | 1SFL427002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF116-30-00B-12 | 1SFL427002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF116-30-00B-13 | 1SFL427002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00B-14 | 1SFL427002R1400 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF140-30-00B-11 | 1SFL447002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF140-30-00B-12 | 1SFL447002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF140-30-00B-13 | 1SFL447002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00B-14 | 1SFL447002R1400 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 0 0 | AF146-30-00B-11 | 1SFL467002R1100 | 1.500 |
| | | | | 48...130 | 48...130 | 0 0 | AF146-30-00B-12 | 1SFL467002R1200 | 1.500 |
| | | | | 100...250 | 100...250 | 0 0 | AF146-30-00B-13 | 1SFL467002R1300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00B-14 | 1SFL467002R1400 | 1.500 |

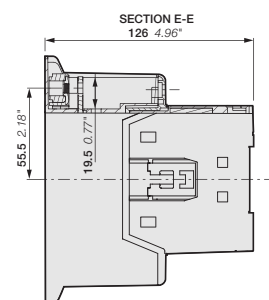
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-00



AF116, AF140, AF146-30-00B



Main dimensions mm, inches

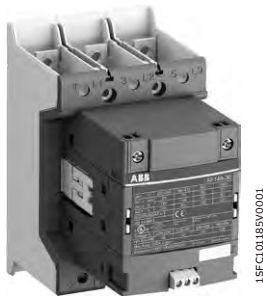
AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated for faster opening utilization



AF146-30-00



AF146-30-00B

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...500 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...250 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg |
|-------------------------|----------------------|--------------------|--|---------------------------|----------|------------|-----------------------------|
| Rated operational power | 3-phase motor rating | General use rating | | | | | |
| 400 V AC-3 kW | AC-1 A | 480 V hp | 600 V AC A | V 50/60 Hz V DC | | | |

For connection with built-in cable clamps

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|--------------------|----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 0 0 | AF116-30-00-33 | 1SFL427001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00-34 | 1SFL427001R3400 | 1.750 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 0 0 | AF140-30-00-33 | 1SFL447001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00-34 | 1SFL447001R3400 | 1.750 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 0 0 | AF146-30-00-33 | 1SFL467001R3300 | 1.750 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00-34 | 1SFL467001R3400 | 1.750 |

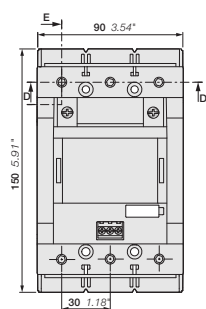
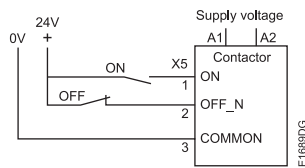
With bar connections

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|--------------------|-----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 0 0 | AF116-30-00B-33 | 1SFL427002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF116-30-00B-34 | 1SFL427002R3400 | 1.500 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 0 0 | AF140-30-00B-33 | 1SFL447002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF140-30-00B-34 | 1SFL447002R3400 | 1.500 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 0 0 | AF146-30-00B-33 | 1SFL467002R3300 | 1.500 |
| | | | | 250...500 | 250...500 | 0 0 | AF146-30-00B-34 | 1SFL467002R3400 | 1.500 |

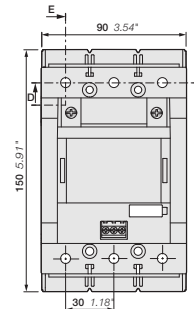
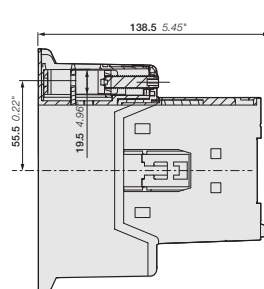
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

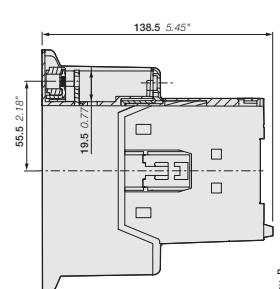
Control inputs



AF116, AF140, AF146-30-00



AF116, AF140, AF146-30-00B

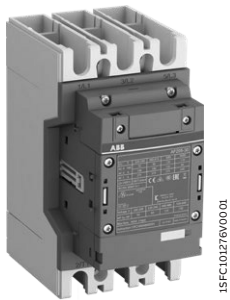


Main dimensions mm, inches

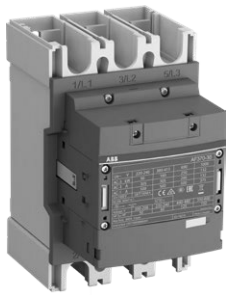
AF190 ... AF370 3-pole contactors

90 to 200 kW

AC / DC operated



AF205-30-00



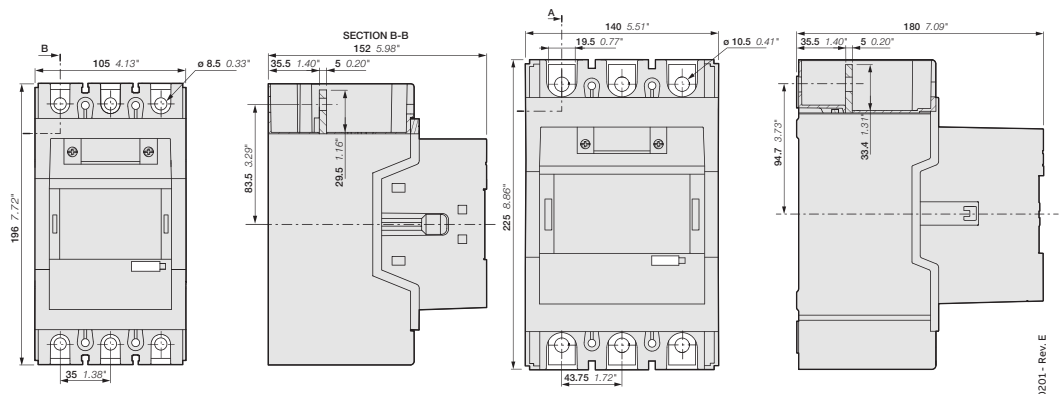
AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated power 400 V AC-3 kW | operational current $\theta \leq 40^\circ\text{C}$ AC-1 A | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|--|-----------|---------------------------------|----------------|-----------------|--------------------------------|
| | | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V 50/60 Hz | V DC | | | | |
| 90 | 275 | 125 | 250 | 24...60 | 20...60 | 0 0 | AF190-30-00-11 | 1SFL487002R1100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF190-30-00-12 | 1SFL487002R1200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF190-30-00-13 | 1SFL487002R1300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF190-30-00-14 | 1SFL487002R1400 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 0 0 | AF205-30-00-11 | 1SFL527002R1100 | 3.000 |
| | | | | 48...130 | 48...130 | 0 0 | AF205-30-00-12 | 1SFL527002R1200 | 3.000 |
| | | | | 100...250 | 100...250 | 0 0 | AF205-30-00-13 | 1SFL527002R1300 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 0 0 | AF265-30-00-11 | 1SFL547002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF265-30-00-12 | 1SFL547002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF265-30-00-13 | 1SFL547002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF265-30-00-14 | 1SFL547002R1400 | 4.605 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 0 0 | AF305-30-00-11 | 1SFL587002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF305-30-00-12 | 1SFL587002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF305-30-00-13 | 1SFL587002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF305-30-00-14 | 1SFL587002R1400 | 4.605 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 0 0 | AF370-30-00-11 | 1SFL607002R1100 | 4.605 |
| | | | | 48...130 | 48...130 | 0 0 | AF370-30-00-12 | 1SFL607002R1200 | 4.605 |
| | | | | 100...250 | 100...250 | 0 0 | AF370-30-00-13 | 1SFL607002R1300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF370-30-00-14 | 1SFL607002R1400 | 4.605 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205

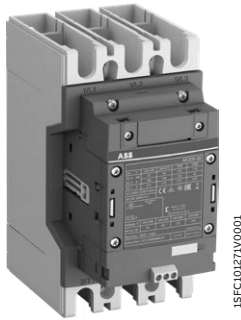
AF265, AF305, AF370

Main dimensions mm, inches

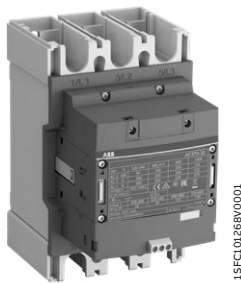
AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated for faster utilization



AF205-30-00



AF370-30-00

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 340 V DC. These contactors are of the block type design with 3 main poles.

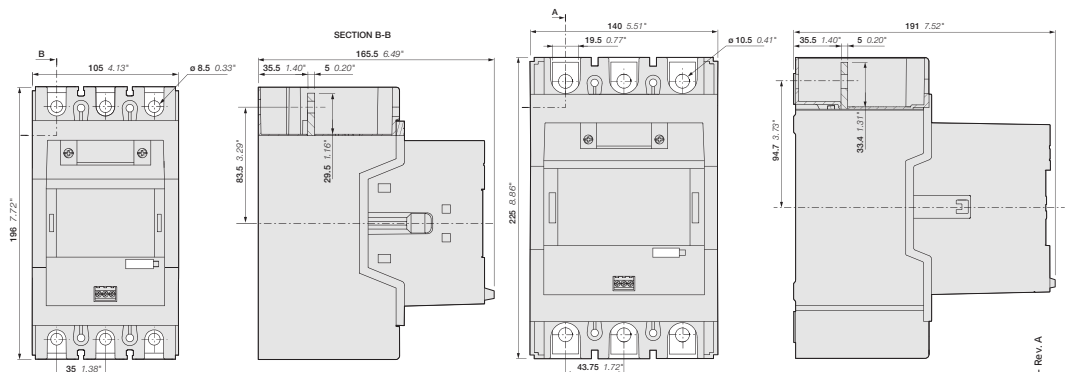
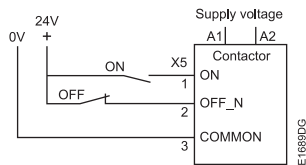
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power | UL / CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|---|--------------------------------------|--|-----------|---------------------------------|-------------|----------------|--|------------|
| | | | AC-3 kW | AC-1 A | | | | | V 50/60 Hz |
| 90 | 275 | 125 | 250 | 100...250 | 100...250 | 0 0 | AF190-30-00-33 | 1SFL487002R3300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF190-30-00-34 | 1SFL487002R3400 | 3.000 |
| 110 | 350 | 150 | 300 | 100...250 | 100...250 | 0 0 | AF205-30-00-33 | 1SFL527002R3300 | 3.000 |
| | | | | 250...500 | 250...500 | 0 0 | AF205-30-00-34 | 1SFL527002R3400 | 3.000 |
| 132 | 400 | 200 | 350 | 100...250 | 100...250 | 0 0 | AF265-30-00-33 | 1SFL547002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF265-30-00-34 | 1SFL547002R3400 | 4.605 |
| 160 | 500 | 250 | 400 | 100...250 | 100...250 | 0 0 | AF305-30-00-33 | 1SFL587002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF305-30-00-34 | 1SFL587002R3400 | 4.605 |
| 200 | 600 | 300 | 520 | 100...250 | 100...250 | 0 0 | AF370-30-00-33 | 1SFL607002R3300 | 4.605 |
| | | | | 250...500 | 250...500 | 0 0 | AF370-30-00-34 | 1SFL607002R3400 | 4.605 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



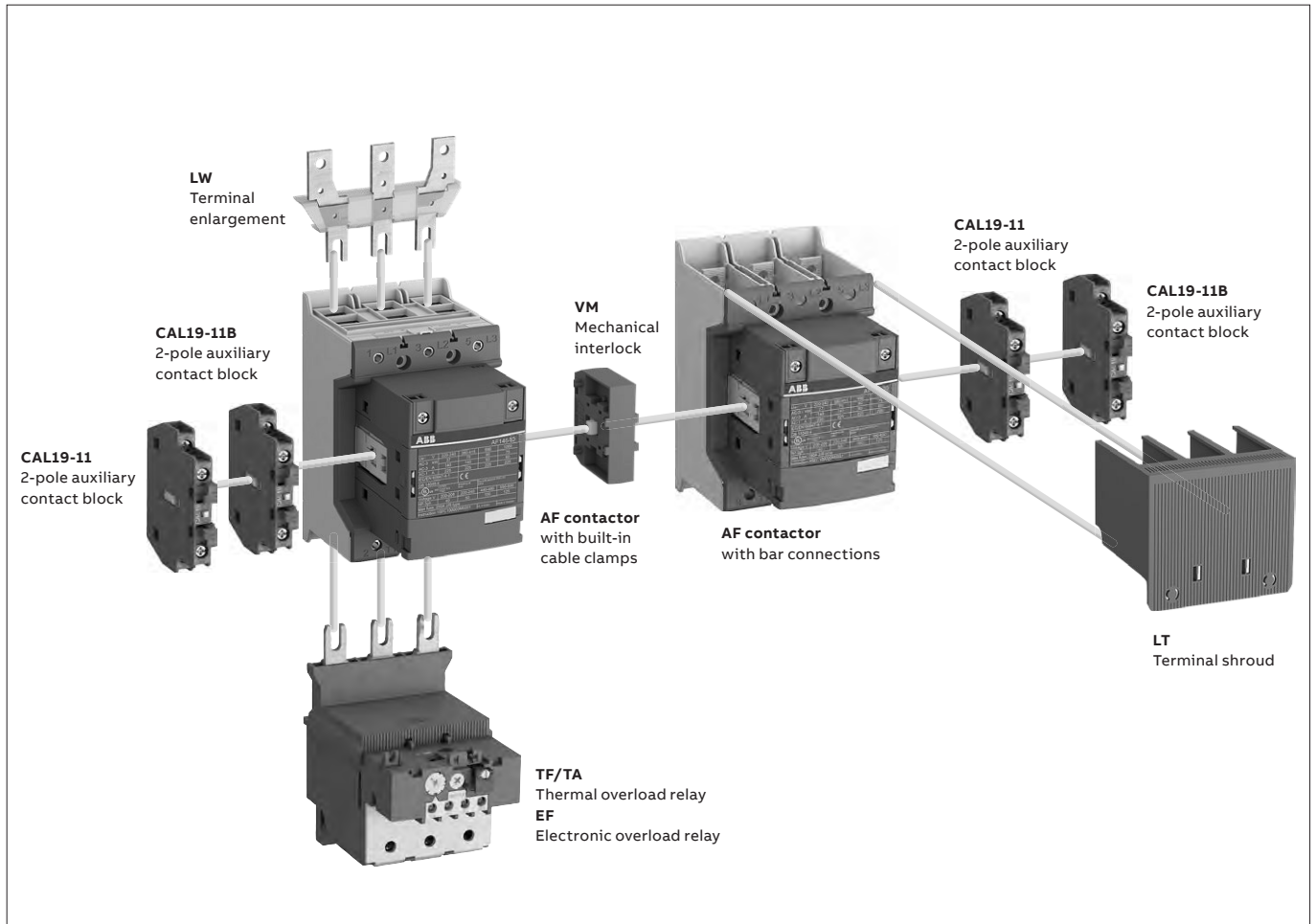
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 3-pole contactors

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | Mechanical interlock units (between two contactors) |
|-----------------|------------|------------------------------|--------------------------|---------------------|---|
| | | | Auxiliary contact blocks | | |
| | | | CAL19-11 (3) | CAL19-11B | |
| AF116 ... AF370 | 3 | 0 0 | ▶ 2 x CAL19-11 | + 2 x CAL19-11B | - |
| AF116 ... AF370 | 3 | 0 0 | ▶ 2 x CAL19-11 (1) | + 2 x CAL19-11B (1) | + VM... (2) |

- (1) Total number of auxiliary contact blocks for the two contactors.
- (2) Interlock type, according to the contactor ratings (see "Accessories").
- (3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

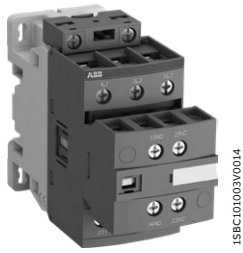
| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | - | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | - | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
 (1) Direct mounting - No kit required.

AF26 ... AF38 3-pole contactors

4 to 18.5 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts

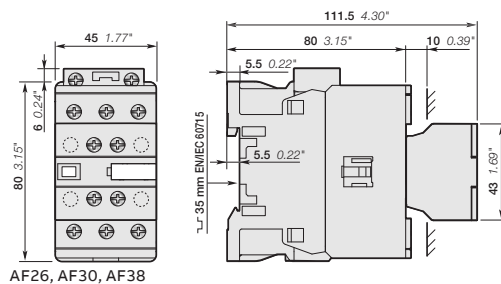


AF26-30-11

- AF26 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
 - control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | | | | | | |
|------|---|---|--|---------------------------|---------------|-----------------|--------|-------------------------------------|-------------------------------------|------------|---------------|-------------------|-------|
| | Rated operational power 400 V AC-3 kW | operational current θ ≤ 40 °C AC-1 A | | | | | | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V 50/60 Hz | V DC | Pkg (1 pce) kg | |
| 11 | 45 | 15 | 45 | 1 1 | AF26-30-11-11 | 1SBL237001R1111 | 0.350 | | | | | | |
| | | | | | | | | 24...60 | 20...60 (1) | 1 1 | AF26-30-11-12 | 1SBL237001R1211 | 0.350 |
| | | | | | | | | 48...130 | 48...130 | 1 1 | AF26-30-11-13 | 1SBL237001R1311 | 0.350 |
| | | | | | | | | 100...250 | 100...250 | 1 1 | AF26-30-11-14 | 1SBL237001R1411 | 0.390 |
| 15 | 50 | 20 | 50 | 1 1 | AF30-30-11-11 | 1SBL277001R1111 | 0.350 | | | | | | |
| | | | | | | | | 24...60 | 20...60 (1) | 1 1 | AF30-30-11-12 | 1SBL277001R1211 | 0.350 |
| | | | | | | | | 48...130 | 48...130 | 1 1 | AF30-30-11-13 | 1SBL277001R1311 | 0.350 |
| | | | | | | | | 100...250 | 100...250 | 1 1 | AF30-30-11-14 | 1SBL277001R1411 | 0.390 |
| 18.5 | 50 | 25 | 50 | 1 1 | AF38-30-11-11 | 1SBL297001R1111 | 0.350 | | | | | | |
| | | | | | | | | 24...60 | 20...60 (1) | 1 1 | AF38-30-11-12 | 1SBL297001R1211 | 0.350 |
| | | | | | | | | 48...130 | 48...130 | 1 1 | AF38-30-11-13 | 1SBL297001R1311 | 0.350 |
| | | | | | | | | 100...250 | 100...250 | 1 1 | AF38-30-11-14 | 1SBL297001R1411 | 0.390 |

(1) AF...-30-...-11 not suitable for direct control by PLC-output.



Main dimensions mm, inches

AF26Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications with 1 N.O. + 1 N.C. contacts



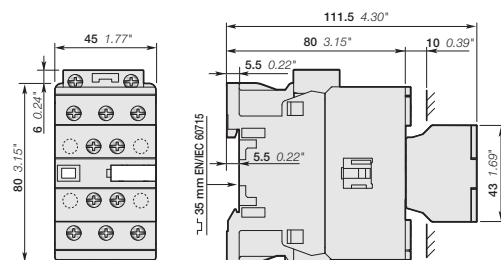
1SBC1003V0014

AF26Z-30-11

- AF26Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
 - control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - can manage large control voltage variations, allow direct control by PLC-output ≥ 24 V DC 500 mA, reduced panel energy consumption, very distinct closing and opening,
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--|---|-------------------------------------|-------------------------------------|--|-----------|-------------------------------|----------------|-----------------|-----------------------------|
| Rated operational power 400 V AC-3 kW | current $\theta \leq 40$ °C AC-1 A | 3-phase motor rating 480 V hp | General use rating 600 V AC A | V 50/60 Hz | V DC | | | | |
| 11 | 45 | 15 | 45 | - | 12...20 | 1 1 | AF26Z-30-11-20 | 1SBL236001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF26Z-30-11-21 | 1SBL236001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF26Z-30-11-22 | 1SBL236001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF26Z-30-11-23 | 1SBL236001R2311 | 0.390 |
| 15 | 50 | 20 | 50 | - | 12...20 | 1 1 | AF30Z-30-11-20 | 1SBL276001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF30Z-30-11-21 | 1SBL276001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF30Z-30-11-22 | 1SBL276001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF30Z-30-11-23 | 1SBL276001R2311 | 0.390 |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 1 1 | AF38Z-30-11-20 | 1SBL296001R2011 | 0.390 |
| | | | | 24...60 | 20...60 | 1 1 | AF38Z-30-11-21 | 1SBL296001R2111 | 0.390 |
| | | | | 48...130 | 48...130 | 1 1 | AF38Z-30-11-22 | 1SBL296001R2211 | 0.390 |
| | | | | 100...250 | 100...250 | 1 1 | AF38Z-30-11-23 | 1SBL296001R2311 | 0.390 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

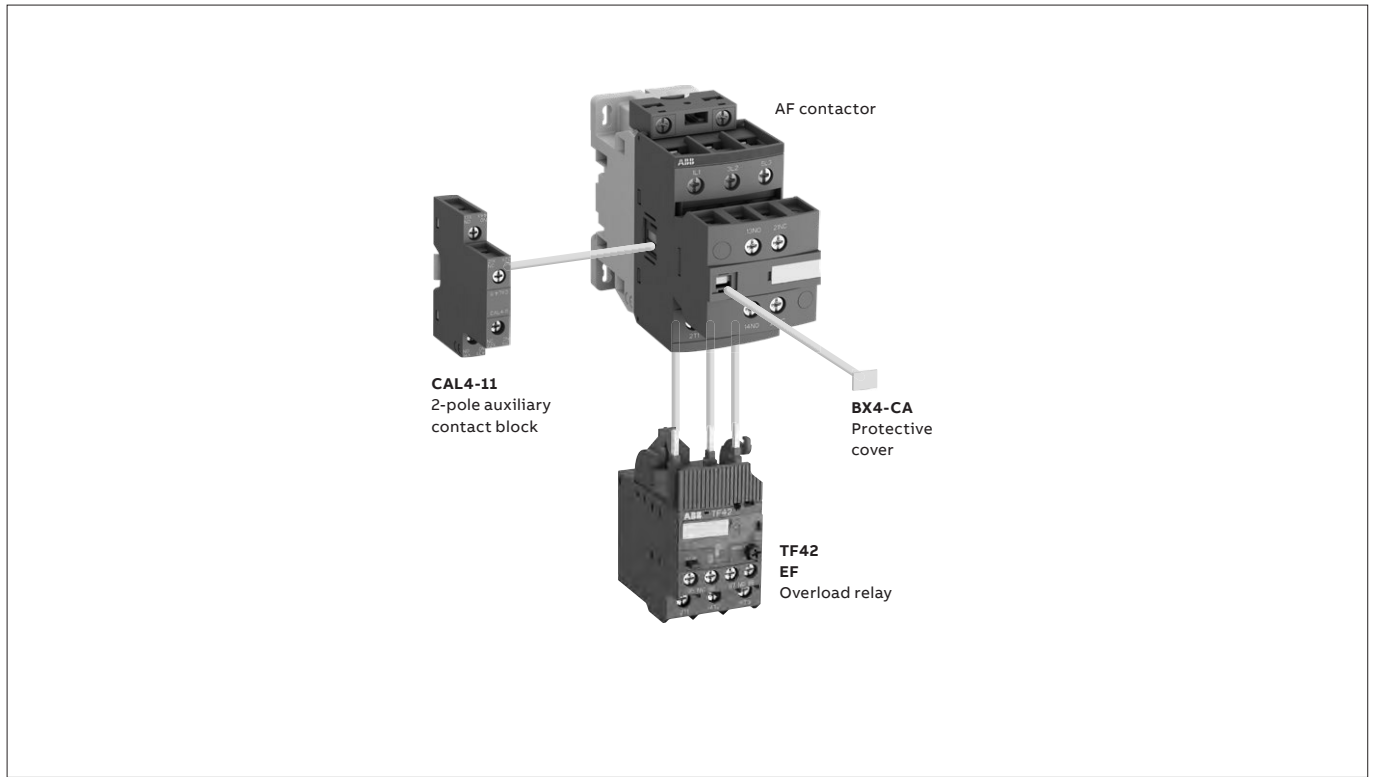


AF26Z, AF30Z, AF38Z

Main dimensions mm, inches

AF26 ... AF38 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Side-mounted accessories | | Auxiliary contact blocks | |
|-----------------|------------|-----------------------------|--|---|--------------------------|------------|
| | | | Mechanical interlock unit (between 2 contactors) | | 2-pole CAL4-11 | |
| | | | | | Left side | Right side |
| AF26 ... AF38 | 3 0 | 1 1 | VM4 | 1 | + 1 | or 1 |
| | | | | - | + 1 | + 1 |

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF26 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| | | EF45 (9...45 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

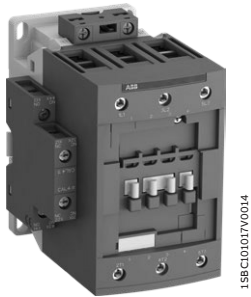
AF40 ... AF96 3-pole contactors

18.5 to 30 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF40-30-11



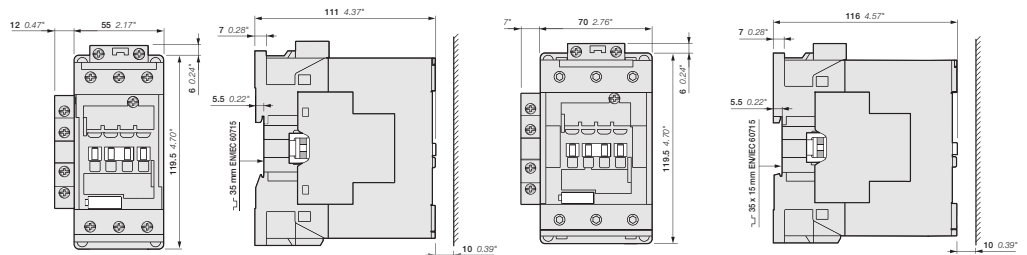
AF80-30-11

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- with 1 N.O. + 1 N.C. side mounted auxiliary contact block
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | | |
|-----------------------------------|--|--------------------------------------|---|---------------------------------|-------------|------------|---------------|-----------------|-------|
| | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | | Pkg (1 pce) | |
| 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ AC-1 A | hp | A | V 50/60 Hz | V DC | | kg | | |
| 185 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 1 1 | AF40-30-11-11 | 1SBL347001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF40-30-11-12 | 1SBL347001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF40-30-11-13 | 1SBL347001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF40-30-11-14 | 1SBL347001R1411 | 0.990 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 1 1 | AF52-30-11-11 | 1SBL367001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF52-30-11-12 | 1SBL367001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF52-30-11-13 | 1SBL367001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF52-30-11-14 | 1SBL367001R1411 | 0.990 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 1 1 | AF65-30-11-11 | 1SBL387001R1111 | 1.010 |
| | | | | 48...130 | 48...130 | 1 1 | AF65-30-11-12 | 1SBL387001R1211 | 1.010 |
| | | | | 100...250 | 100...250 | 1 1 | AF65-30-11-13 | 1SBL387001R1311 | 0.990 |
| | | | | 250...500 | 250...500 | 1 1 | AF65-30-11-14 | 1SBL387001R1411 | 0.990 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 1 1 | AF80-30-11-11 | 1SBL397001R1111 | 1.260 |
| | | | | 48...130 | 48...130 | 1 1 | AF80-30-11-12 | 1SBL397001R1211 | 1.260 |
| | | | | 100...250 | 100...250 | 1 1 | AF80-30-11-13 | 1SBL397001R1311 | 1.210 |
| | | | | 250...500 | 250...500 | 1 1 | AF80-30-11-14 | 1SBL397001R1411 | 1.210 |
| 45 | 130 | 60 | 115 | 24...60 | 20...60 (1) | 1 1 | AF96-30-11-11 | 1SBL407001R1111 | 1.260 |
| | | | | 48...130 | 48...130 | 1 1 | AF96-30-11-12 | 1SBL407001R1211 | 1.260 |
| | | | | 100...250 | 100...250 | 1 1 | AF96-30-11-13 | 1SBL407001R1311 | 1.210 |
| | | | | 250...500 | 250...500 | 1 1 | AF96-30-11-14 | 1SBL407001R1411 | 1.210 |

(1) For control by PLC-output, use RA4 interface relay.



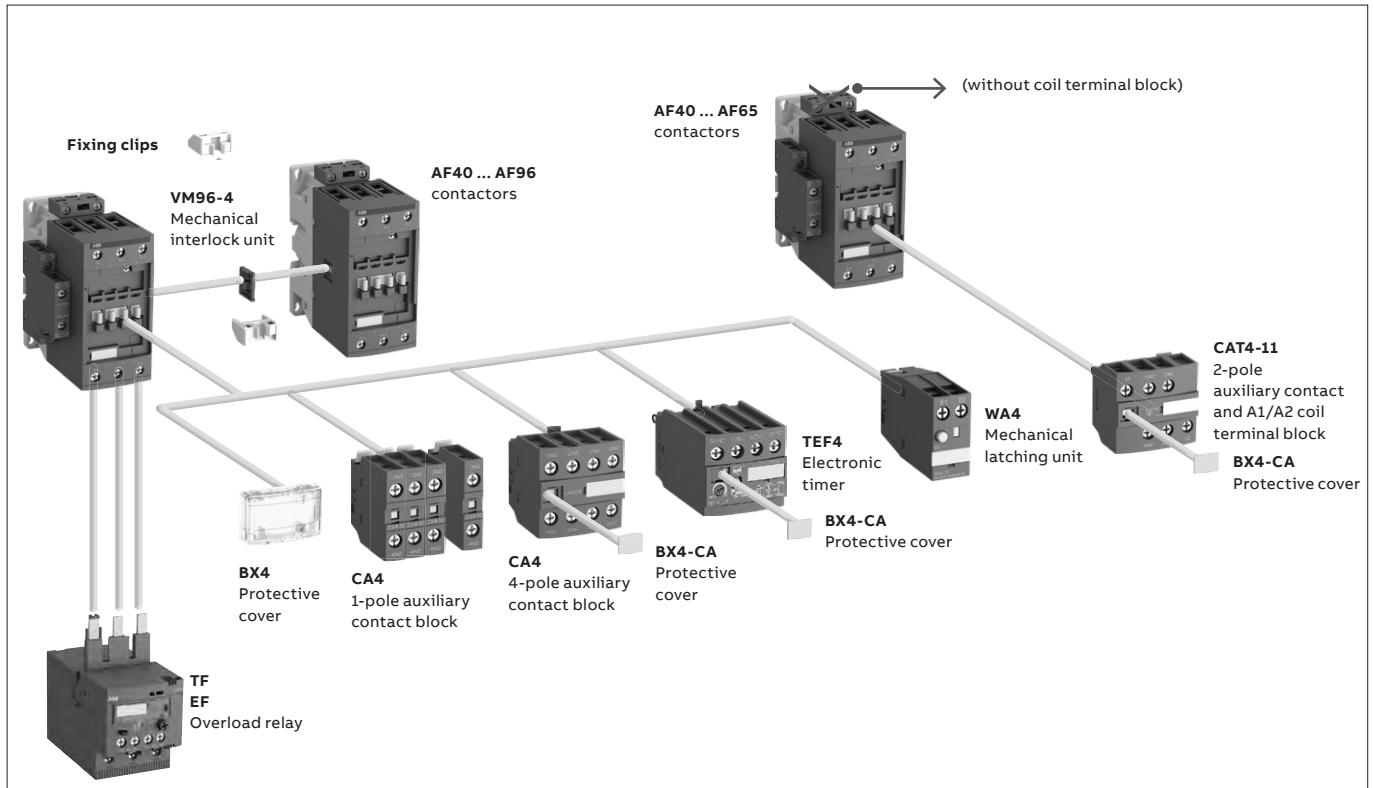
AF40, AF52, AF65-30-11...

AF80, AF96-30-11...

Main dimensions mm, inches

AF40 ... AF96 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Electronic timer | Mechanical latching unit (1) | Side-mounted accessories | Auxiliary contact blocks | |
|-----------------|------------|-----------------------------|---------------------------|----------------|------------|---|------------------|------------------------------|--------------------------|--------------------------|------------|
| | | | Auxiliary contact blocks | | | Mechanical interlock set (between 2 contactors) | | | | Left side | Right side |
| AF40 ... AF65 | 3 0 | 1 1 | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 | VM96-4 | 2-pole CAL4-11 | | |
| | | | 4 max. | or 1 | or 1 | | | | - | - | |
| AF80, AF96 | 3 0 | 1 1 | 4 max. | - | or 1 | or 1 | or 1 | +1 | - | 1 | |
| | | | 4 max. | - | or 1 | | | | - | 1 | |

(1) Use WA4 for AF09...AF65 and WA4-96 for AF80, AF96.
Accept 1-pole CA4 auxiliary contacts on each side of the mechanical latch.

Overload relays fitting details (2)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80, AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
(2) Direct mounting - No kit required.

AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF146-30-11

1SFC101001V001



AF146-30-11B

1SFC101008V001

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg |
|-------------------------|----------------------|-------------------------------|--------------------------------|--|---------------------------|----------|------------|-----------------------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | V 50/60 Hz V DC | | | | |

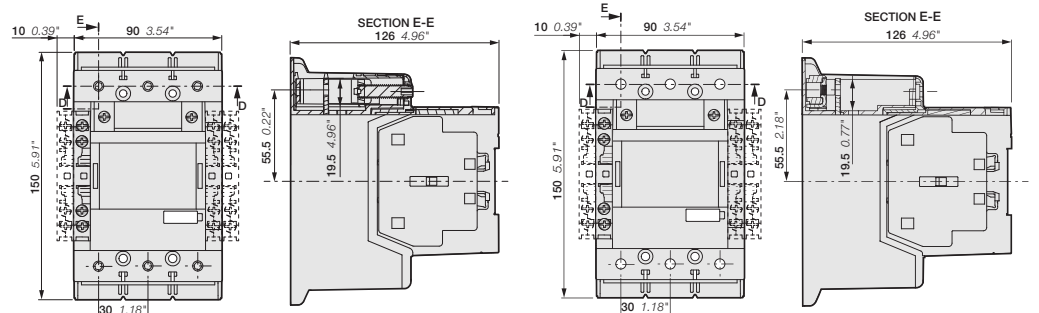
For connection with built-in cable clamps

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11-11 | 1SFL427001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11-12 | 1SFL427001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11-13 | 1SFL427001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11-14 | 1SFL427001R1411 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11-11 | 1SFL447001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11-12 | 1SFL447001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11-13 | 1SFL447001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11-14 | 1SFL447001R1411 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11-11 | 1SFL467001R1111 | 1.750 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11-12 | 1SFL467001R1211 | 1.750 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11-13 | 1SFL467001R1311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11-14 | 1SFL467001R1411 | 1.750 |

With bar connections

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|-----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 1 | AF116-30-11B-11 | 1SFL427002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF116-30-11B-12 | 1SFL427002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF116-30-11B-13 | 1SFL427002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11B-14 | 1SFL427002R1411 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF140-30-11B-11 | 1SFL447002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF140-30-11B-12 | 1SFL447002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF140-30-11B-13 | 1SFL447002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11B-14 | 1SFL447002R1411 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 1 | AF146-30-11B-11 | 1SFL467002R1111 | 1.500 |
| | | | | 48...130 | 48...130 | 1 1 | AF146-30-11B-12 | 1SFL467002R1211 | 1.500 |
| | | | | 100...250 | 100...250 | 1 1 | AF146-30-11B-13 | 1SFL467002R1311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11B-14 | 1SFL467002R1411 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-11B

Main dimensions mm, inches

AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts for faster opening utilization



AF146-30-11

1SFC01183V0001

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.



AF146-30-11B

1SFC01186V0001

| IEC | UL / CSA | | Rated control circuit voltage | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|-------------------------|--|--------------------|-------------------------------|---------------------------|----------|------------|-------------|
| Rated operational power | 3-phase current $\theta \leq 40^\circ\text{C}$ | General use rating | Uc min. ... Uc max. | | | | Pkg (1 pce) |
| 400 V | AC-1 | 480 V | V 50/60 Hz V DC | | | | kg |
| kW | A | hp | | | | | |

For connection with built-in cable clamps

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 1 | AF116-30-11-33 | 1SFL427001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11-34 | 1SFL427001R3411 | 1.750 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 1 1 | AF140-30-11-33 | 1SFL447001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11-34 | 1SFL447001R3411 | 1.750 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 1 | AF146-30-11-33 | 1SFL467001R3311 | 1.750 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11-34 | 1SFL467001R3411 | 1.750 |

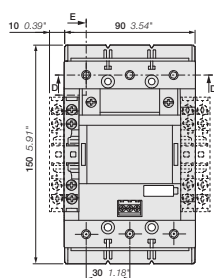
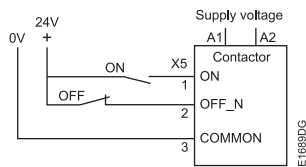
With bar connections

| | | | | | | | | | |
|----|-----|-----|-----|-----------|-----------|-----|-----------------|-----------------|-------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 1 | AF116-30-11B-33 | 1SFL427002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF116-30-11B-34 | 1SFL427002R3411 | 1.500 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 1 1 | AF140-30-11B-33 | 1SFL447002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF140-30-11B-34 | 1SFL447002R3411 | 1.500 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 1 | AF146-30-11B-33 | 1SFL467002R3311 | 1.500 |
| | | | | 250...500 | 250...500 | 1 1 | AF146-30-11B-34 | 1SFL467002R3411 | 1.500 |

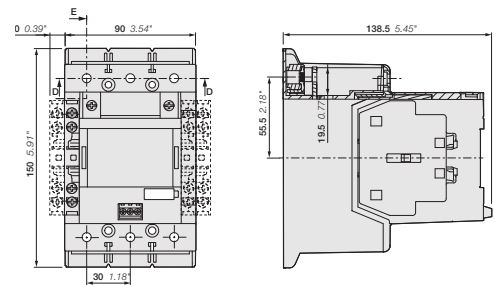
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF116, AF140, AF146-30-11



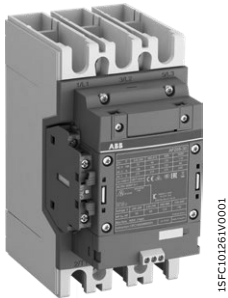
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

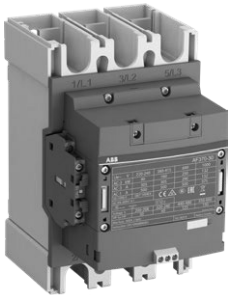
AF190 ... AF370 3-pole contactors

90 to 200 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF205-30-11



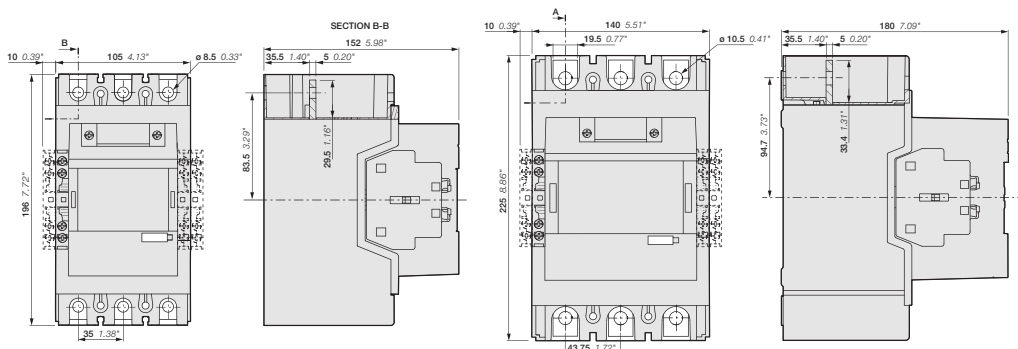
AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power | UL / CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg | | | | | | | | | | | |
|-----------------------------------|---|--------------------------------------|---|------------|---------------------------------|-------------|----------------|--|-------|-----|-----|-----|-----------|-----------|-----------|----------------|-----------------|-----------------|-------|
| | | | V 50/60 Hz | V DC | | | | | | | | | | | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | V 50/60 Hz | V DC | | | kg | | | | | | | | | | | |
| | | | | | | | | | 90 | 275 | 125 | 250 | 24...60 | 20...60 | 1 1 | AF190-30-11-11 | 1SFL487002R1111 | 3.000 | |
| | | | | | | | | | | | | | 48...130 | 48...130 | 1 1 | AF190-30-11-12 | 1SFL487002R1211 | 3.000 | |
| | | | | | | | | | | | | | 100...250 | 100...250 | 1 1 | AF190-30-11-13 | 1SFL487002R1311 | 3.000 | |
| | | | | 250...500 | 250...500 | 1 1 | AF190-30-11-14 | 1SFL487002R1411 | 3.000 | | | | | | | | | | |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 1 1 | AF205-30-11-11 | 1SFL527002R1111 | 3.000 | | | | | | | | | | |
| | | | | | | | | | | | | | | 48...130 | 48...130 | 1 1 | AF205-30-11-12 | 1SFL527002R1211 | 3.000 |
| | | | | | | | | | | | | | | 100...250 | 100...250 | 1 1 | AF205-30-11-13 | 1SFL527002R1311 | 3.000 |
| | | | | | | | | | | | | | | 250...500 | 250...500 | 1 1 | AF205-30-11-14 | 1SFL527002R1411 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 1 1 | AF265-30-11-11 | 1SFL547002R1111 | 4.640 | | | | | | | | | | |
| | | | | | | | | | | | | | | 48...130 | 48...130 | 1 1 | AF265-30-11-12 | 1SFL547002R1211 | 4.640 |
| | | | | | | | | | | | | | | 100...250 | 100...250 | 1 1 | AF265-30-11-13 | 1SFL547002R1311 | 4.640 |
| | | | | | | | | | | | | | | 250...500 | 250...500 | 1 1 | AF265-30-11-14 | 1SFL547002R1411 | 4.640 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 1 1 | AF305-30-11-11 | 1SFL587002R1111 | 4.640 | | | | | | | | | | |
| | | | | | | | | | | | | | | 48...130 | 48...130 | 1 1 | AF305-30-11-12 | 1SFL587002R1211 | 4.640 |
| | | | | | | | | | | | | | | 100...250 | 100...250 | 1 1 | AF305-30-11-13 | 1SFL587002R1311 | 4.640 |
| | | | | | | | | | | | | | | 250...500 | 250...500 | 1 1 | AF305-30-11-14 | 1SFL587002R1411 | 4.640 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 1 1 | AF370-30-11-11 | 1SFL607002R1111 | 4.640 | | | | | | | | | | |
| | | | | | | | | | | | | | | 48...130 | 48...130 | 1 1 | AF370-30-11-12 | 1SFL607002R1211 | 4.640 |
| | | | | | | | | | | | | | | 100...250 | 100...250 | 1 1 | AF370-30-11-13 | 1SFL607002R1311 | 4.640 |
| | | | | | | | | | | | | | | 250...500 | 250...500 | 1 1 | AF370-30-11-14 | 1SFL607002R1411 | 4.640 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205

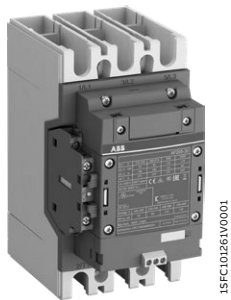
AF265, AF305, AF370

Main dimensions mm, inches

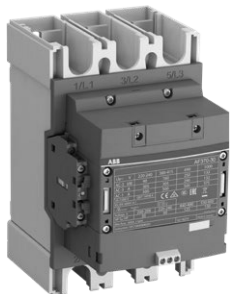
AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts for faster opening utilization



AF205-30-11



AF370-30-11

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

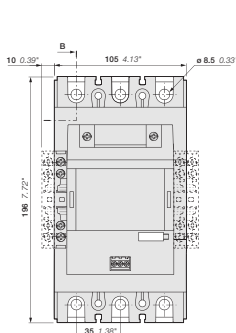
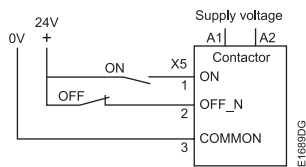
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight | | |
|---------------|--|----------------------|--|---------------------------|-----------|------------|----------------|--------------------|-------------|
| | Rated operational power | 3-phase motor rating | | | | | | General use rating | Pkg (1 pce) |
| 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ | 480 V | 600 V AC | | | | kg | | |
| | AC-1 A | hp | A | V 50/60 Hz | V DC | | | | |
| 90 | 275 | 125 | 250 | 100...250 | 100...250 | 1 1 | AF190-30-11-33 | 1SFL487002R3311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF190-30-11-34 | 1SFL487002R3411 | 3.000 |
| 110 | 350 | 150 | 300 | 100...250 | 100...250 | 1 1 | AF205-30-11-33 | 1SFL527002R3311 | 3.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF205-30-11-34 | 1SFL527002R3411 | 3.000 |
| 132 | 400 | 200 | 350 | 100...250 | 100...250 | 1 1 | AF265-30-11-33 | 1SFL547002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF265-30-11-34 | 1SFL547002R3411 | 4.640 |
| 160 | 500 | 250 | 400 | 100...250 | 100...250 | 1 1 | AF305-30-11-33 | 1SFL587002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF305-30-11-34 | 1SFL587002R3411 | 4.640 |
| 200 | 600 | 300 | 520 | 100...250 | 100...250 | 1 1 | AF370-30-11-33 | 1SFL607002R3311 | 4.640 |
| | | | | 250...500 | 250...500 | 1 1 | AF370-30-11-34 | 1SFL607002R3411 | 4.640 |

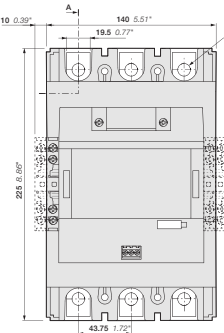
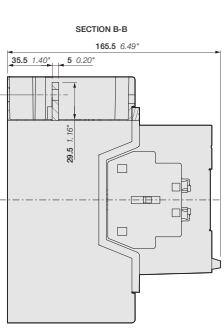
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

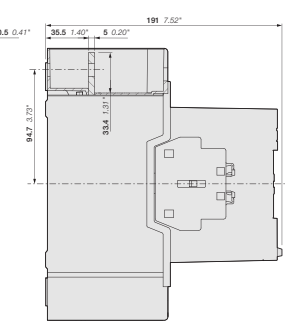
Control inputs



AF190, AF205



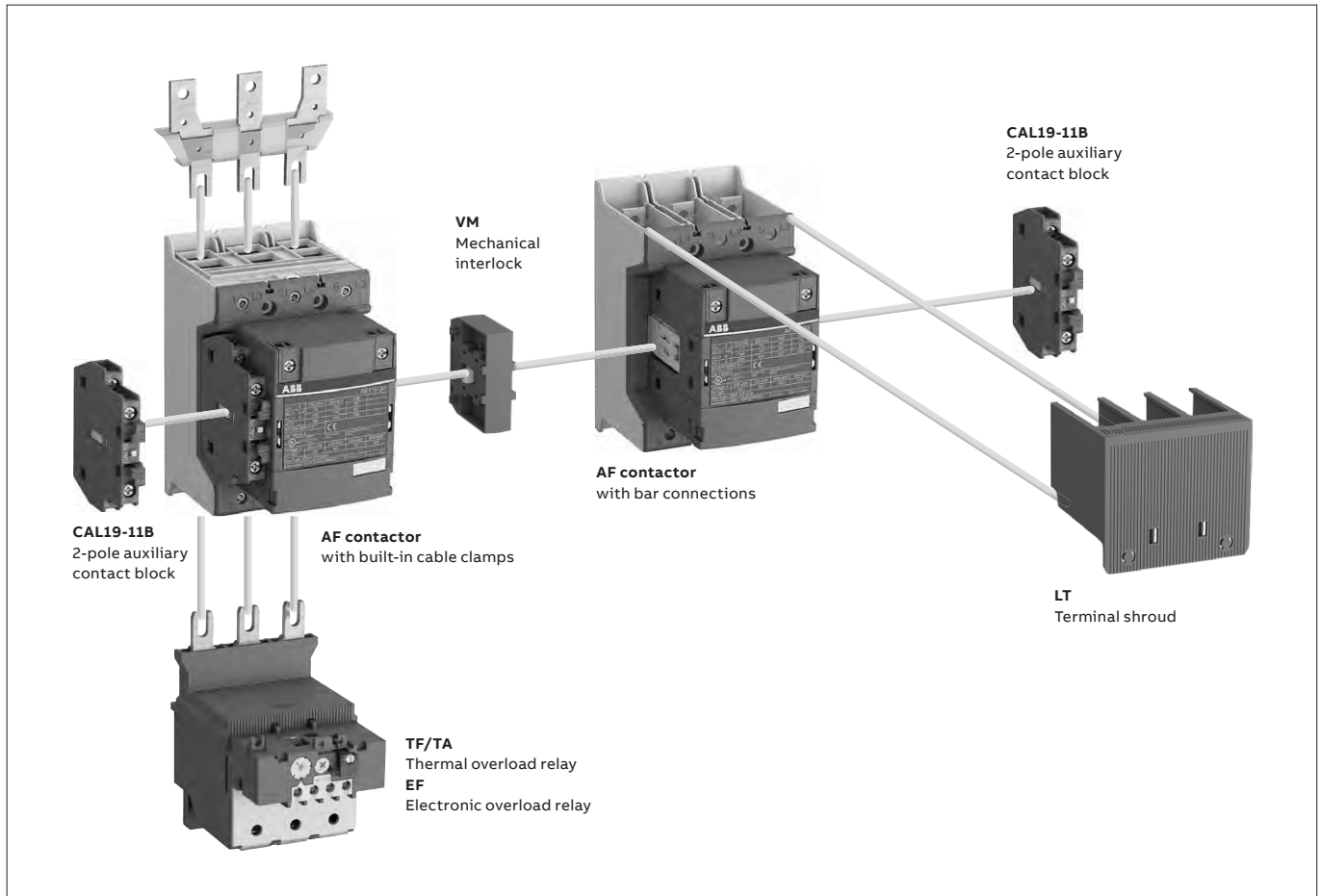
AF265, AF305, AF370



Main dimensions mm, inches

AF116 ... AF370 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | Mechanical interlock units (between two contactors) |
|-----------------|------------|------------------------------|--------------------------|----------------------|---|
| | | | Auxiliary contact blocks | | |
| | | | CAL19-11 (3) | CAL19-11B (3) | |
| AF116 ... AF370 | 3 0 | 1 1 | 1 x CAL19-11 | + 2 x CAL19-11B | - |
| AF116 ... AF370 | 3 0 | 1 1 | - | + 2 x CAL19-11B (1) | + VM... (2) |

- (1) Total number of auxiliary contact blocks for the two contactors.
- (2) Interlock type, according to the contactor ratings (see "Accessories").
- (3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | - | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | - | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
 (1) Direct mounting - No kit required.

AF400 ... AF750 3-pole contactors

200 to 400 kW

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF460-30-11



AF750-30-11

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

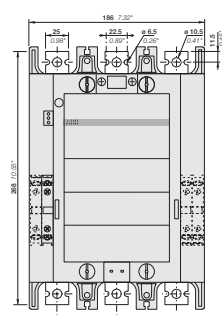
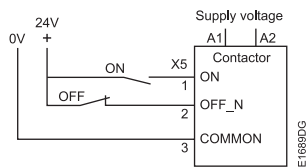
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power 400 V AC-3 kW | UL/CSA 3-phase motor rating 480 V hp | General use rating 600 V AC A | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|--|---|---|---|-----------|-------------------------------------|------|-------------|--------------------------------|--------|
| | | | V 50/60 Hz | V DC | | | | | |
| 200 | 600 | 350 | 550 | - | 24...60 | 1 1 | AF400-30-11 | 1SFL577001R6811 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF400-30-11 | 1SFL577001R6911 | 12.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF400-30-11 | 1SFL577001R7011 | 12.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF400-30-11 | 1SFL577001R7111 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 1 1 | AF460-30-11 | 1SFL597001R6811 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF460-30-11 | 1SFL597001R6911 | 12.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF460-30-11 | 1SFL597001R7011 | 12.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF460-30-11 | 1SFL597001R7111 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 1 1 | AF580-30-11 | 1SFL617001R6811 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF580-30-11 | 1SFL617001R6911 | 15.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF580-30-11 | 1SFL617001R7011 | 15.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF580-30-11 | 1SFL617001R7111 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 1 1 | AF750-30-11 | 1SFL637001R6811 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF750-30-11 | 1SFL637001R6911 | 15.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF750-30-11 | 1SFL637001R7011 | 15.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF750-30-11 | 1SFL637001R7111 | 15.000 |

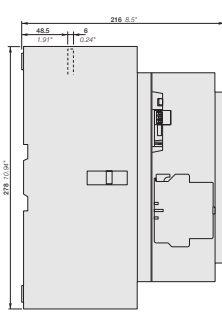
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
 (2) Up to 850 V DC for AF580, AF750.

AF400 ... AF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF400, AF460



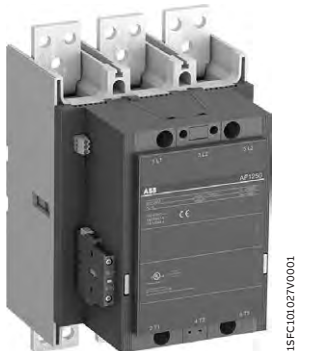
AF580, AF750

Main dimensions mm, inches

AF1250 ... AF2850 3-pole contactors

475 to 560 kW and 1260 to 2850 A AC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF1250-30-11

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

– control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range

(e.g. 100...250 V AC and DC)

- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.



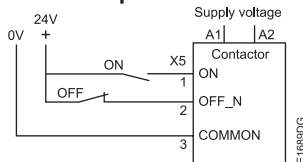
AF2650-30-11

| IEC Rated operational power | UL/CSA 3-phase motor rating 480 V hp | General use rating 600 V AC (2) A | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|---|--|---|-----------|---------------------------------|------|--------------|--------------------------------|--------|
| | | | V 50/60 Hz | V DC | | | | | |
| 400 V AC-3 kW | 1260 | - | 1210 | - | 24...60 | 1 1 | AF1250-30-11 | 1SFL647001R6811 (1) | 16.000 |
| | | | | 48...130 | 48...130 | 1 1 | AF1250-30-11 | 1SFL647001R6911 | 16.000 |
| | | | | 100...250 | 100...250 | 1 1 | AF1250-30-11 | 1SFL647001R7011 | 16.000 |
| | | | | 250...500 | 250...500 | 1 1 | AF1250-30-11 | 1SFL647001R7111 | 16.000 |
| 475 | 1350 | 800 | 1350 | 100...250 | 100...250 | 1 1 | AF1350-30-11 | 1SFL657001R7011 | 34.000 |
| 560 | 1650 | 900 | 1650 | 100...250 | 100...250 | 1 1 | AF1650-30-11 | 1SFL677001R7011 | 35.000 |
| - | 2050 | - | 2100 | 100...250 | 100...250 | 1 1 | AF2050-30-11 | 1SFL707001R7011 | 35.000 |
| - | 2650 | - | 2700 | 100...250 | 100...250 | 1 1 | AF2650-30-11 | 1SFL667001R7011 | 45.000 |
| - | 2850 | - | 2850 | 100...250 | 100...250 | 1 1 | AF2850-30-11 | 1SFL687001R7011 | 45.000 |

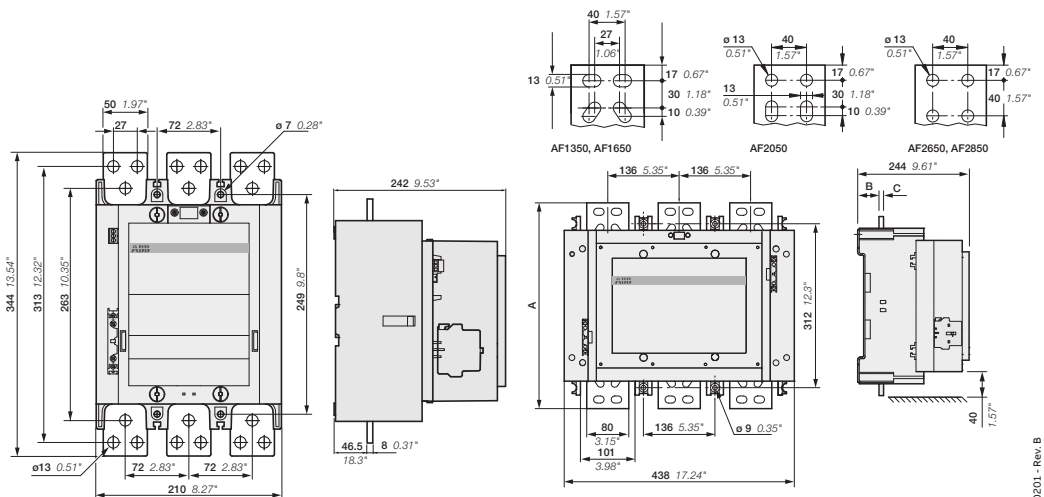
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole. (2) AF2650: Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC

Control inputs



| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|----------|------------------------|-----------------|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.09" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |



AF1250

AF1350, AF1650, AF2050, AF2650, AF2850

Main dimensions mm, inches

AF1350T ... AF2850T 3-pole contactors with built-in LVRT

475 to 560 kW and 1350 to 2850 A AC-1

AC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF2650-30T-11

1SFLC01016V0001

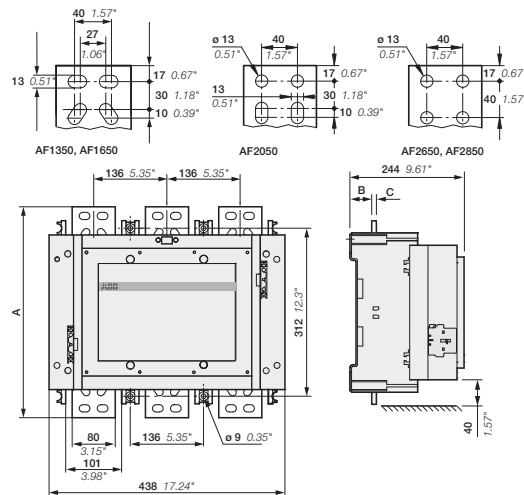
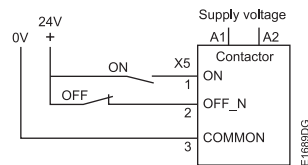
AF1350T .. AF2850T contactors are designed to meet the Low Voltage Ride Through requirements for grid connections withstand voltage drop-outs up to 1 sec without opening. These contactors are often used in grid connected applications where the demand of non interrupted power is required. When controlled through built-in PLC connection the contactor is operated directly without delay function.

- Control circuit: AC or DC operated with electronic coil interface
 - can withstand voltage drop-outs according to Low Voltage Ride Through requirements
 - equipped with low voltage inputs for direct control by a PLC
 - distinct closing and opening
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|------------|----------------------|--------------------|----------------------------------|---------------------------|-------------------|-----------------|-------------|
| Rated operational power | current | 3-phase motor rating | General use rating | | | | | Pkg (1 pce) |
| 400 V AC-3 | 690 V AC-1 | 480 V | 600 V AC | V 50/60 Hz | | | | kg |
| kW | A | hp | A | | | | | |
| 475 | 1350 | 800 | 1350 | 220 ... 240 | 1 1 | AF1350T-30-11 (1) | 1SFL657001R9101 | 34.000 |
| 560 | 1650 | 900 | 1650 | 220 ... 240 | 1 1 | AF1650T-30-11 (1) | 1SFL677001R9101 | 35.000 |
| - | 2050 | - | 2100 | 220 ... 240 | 1 1 | AF2050T-30-11 (1) | 1SFL707001R9101 | 35.000 |
| - | 2650 | - | 2700 | 220 ... 240 | 1 1 | AF2650T-30-11 (1) | 1SFL667001R9101 | 45.000 |
| - | 2850 | - | 2850 | 220 ... 240 | 1 1 | AF2850T-30-11 (1) | 1SFL687001R9101 | 45.000 |

(1) Types -00 and -22 on request.

Control inputs



AF1350T-30-11, AF1650T-30-11, AF2050T-30-11, AF2650T-30-11, AF2850T-30-10-11

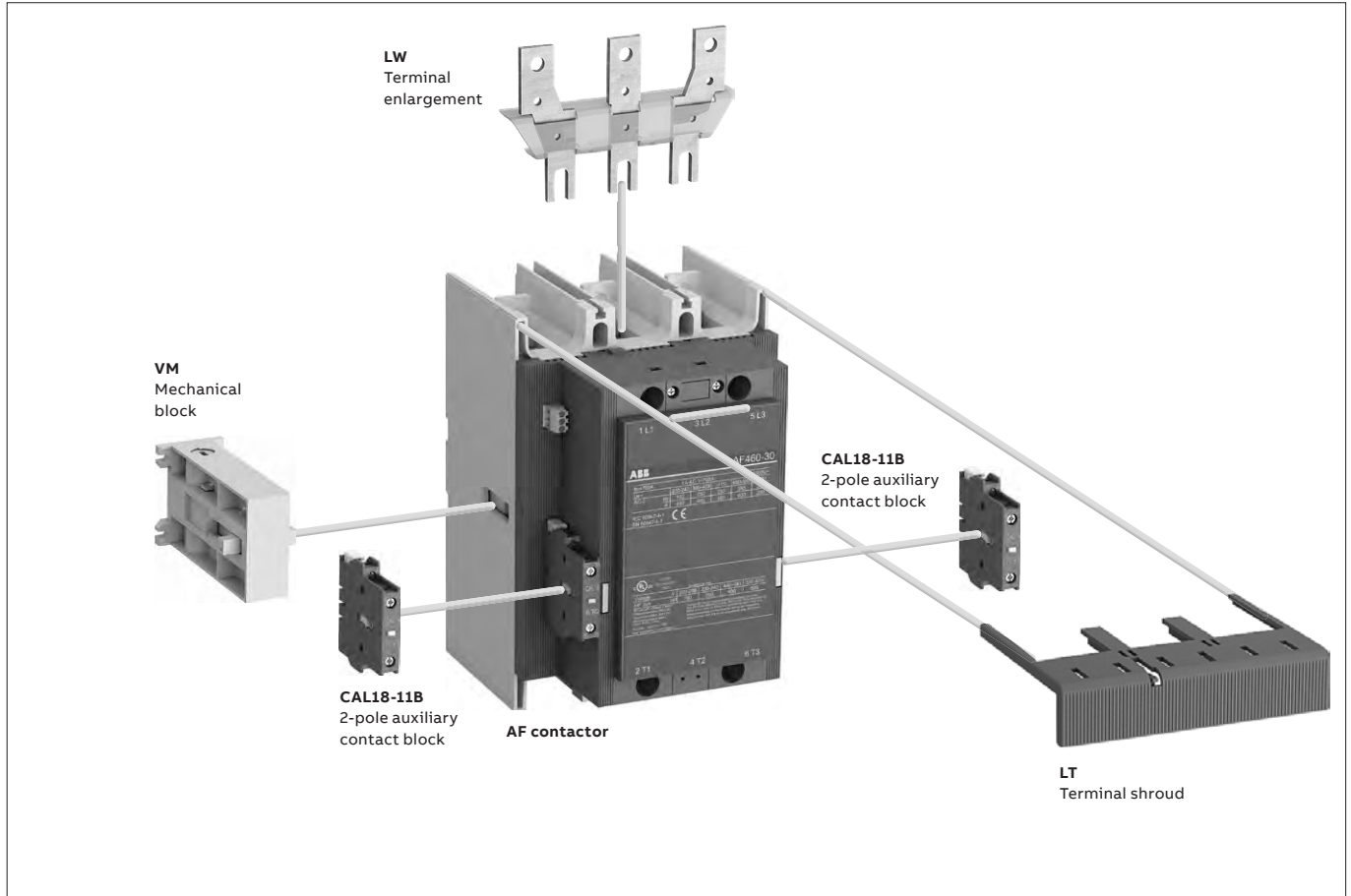
Main dimensions mm, inches

| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|---|------------------------|-----------------|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.09" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |

AF400 ... AF2850 3-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories

Main accessories (other accessories available)



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories Auxiliary contact blocks | Mechanical interlock units (between two contactors) |
|---|------------|------------------------------|--|--|
| | | | CAL18-11 CAL18-11B (3) | |
| Contactors + auxiliary contact blocks | | | | |
| AF400 ... AF2850 | 3 0 | 1 1 | 1 x CAL18-11 + 2 x CAL18-11B | - |
| Contactors with mechanical interlocking + auxiliary contact blocks | | | | |
| AF400 ... AF2850 | 3 0 | 1 1 | 2 x CAL18-11 (1) + 4 x CAL18-11B (1) | + VM...H (2) |

(1) Total number of auxiliary contact blocks for the two contactors. (2) Interlock type, according to the contactor ratings (see "Accessories").
 (3) The CEL18... auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-..

Overload relays fitting details

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|-----------------------------|
| AF400, AF460 | - | EF460 (150...500 A) (1) |
| AF580, AF750 | - | EF750 (250...800 A) (1) |
| AF1350, AF1650 | - | EF1250DU (375...1250 A) (1) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
 (1) Mounting kit required (see "Motor protection").

AF09 ... AF38 3-pole contactors

4 to 18.5 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF09-30-22

1SBC101002V0014



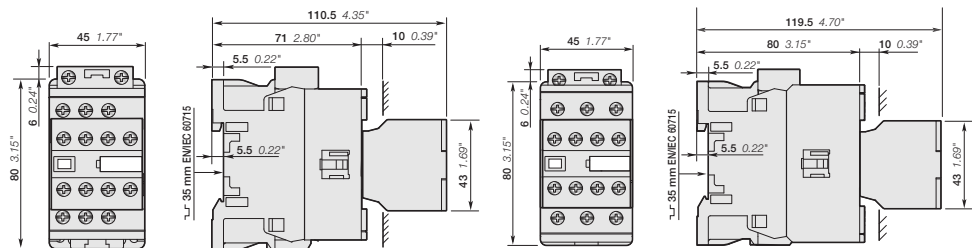
AF26-30-22

1SBC101004V0014

- AF09 ... AF38 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
 - control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
 - built-in surge suppression
 - add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | | |
|---------------|--|----------------------|--|---------------------------|-------------|------------|---------------|--------------------|-------------|
| | Rated operational power | 3-phase motor rating | | | | | | General use rating | Pkg (1 pce) |
| 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ | 480 V | 600 V AC | | | | kg | | |
| | AC-1 A | hp | A | V 50/60 Hz | V DC | | | | |
| 4 | 25 | 5 | 25 | 24...60 | 20...60 (1) | 2 2 | AF09-30-22-11 | 1SBL137001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF09-30-22-12 | 1SBL137001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF09-30-22-13 | 1SBL137001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF09-30-22-14 | 1SBL137001R1422 | 0.360 |
| 5.5 | 28 | 7.5 | 28 | 24...60 | 20...60 (1) | 2 2 | AF12-30-22-11 | 1SBL157001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF12-30-22-12 | 1SBL157001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF12-30-22-13 | 1SBL157001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF12-30-22-14 | 1SBL157001R1422 | 0.360 |
| 7.5 | 30 | 10 | 30 | 24...60 | 20...60 (1) | 2 2 | AF16-30-22-11 | 1SBL177001R1122 | 0.320 |
| | | | | 48...130 | 48...130 | 2 2 | AF16-30-22-12 | 1SBL177001R1222 | 0.320 |
| | | | | 100...250 | 100...250 | 2 2 | AF16-30-22-13 | 1SBL177001R1322 | 0.320 |
| | | | | 250...500 | 250...500 | 2 2 | AF16-30-22-14 | 1SBL177001R1422 | 0.360 |
| 11 | 45 | 15 | 45 | 24...60 | 20...60 (1) | 2 2 | AF26-30-22-11 | 1SBL237001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF26-30-22-12 | 1SBL237001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF26-30-22-13 | 1SBL237001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF26-30-22-14 | 1SBL237001R1422 | 0.400 |
| 15 | 50 | 20 | 50 | 24...60 | 20...60 (1) | 2 2 | AF30-30-22-11 | 1SBL277001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF30-30-22-12 | 1SBL277001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF30-30-22-13 | 1SBL277001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF30-30-22-14 | 1SBL277001R1422 | 0.400 |
| 18.5 | 50 | 25 | 50 | 24...60 | 20...60 (1) | 2 2 | AF38-30-22-11 | 1SBL297001R1122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF38-30-22-12 | 1SBL297001R1222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF38-30-22-13 | 1SBL297001R1322 | 0.360 |
| | | | | 250...500 | 250...500 | 2 2 | AF38-30-22-14 | 1SBL297001R1422 | 0.400 |

(1) AF...-30-...-11 not suitable for direct control by PLC-output.



AF09, AF12, AF16

AF26, AF30, AF38

Main dimensions mm, inches

AF09Z ... AF38Z 3-pole contactors

4 to 18.5 kW

AC / DC operated for specific applications with 2 N.O. + 2 N.C. auxiliary contacts



AF09Z-30-22



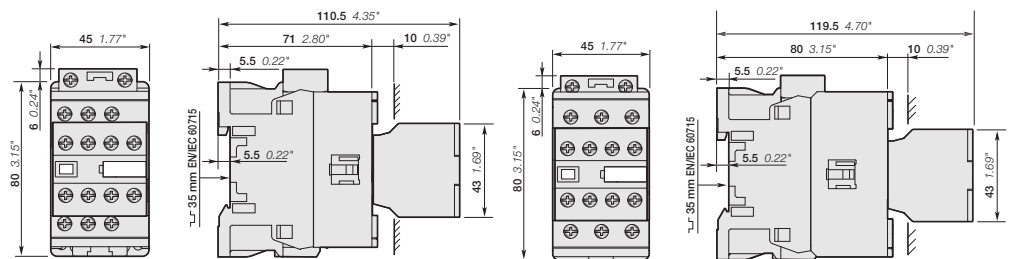
AF26Z-30-22

AF09Z ... AF38Z contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - can manage large control voltage variations,
 - allow direct control by PLC-output ≥ 24 V DC 500 mA,
 - reduced panel energy consumption,
 - very distinct closing and opening,
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power | UL/CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|---|--------------------------------------|---|-----------|---------------------------------|------|----------------|--------------------------------|-------|
| | | | V 50/60 Hz | V DC | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | - | 12...20 | 2 2 | AF09Z-30-22-20 | 1SBL136001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF09Z-30-22-21 | 1SBL136001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF09Z-30-22-22 | 1SBL136001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF09Z-30-22-23 | 1SBL136001R2322 | 0.360 |
| 5.5 | 28 | 7.5 | 28 | - | 12...20 | 2 2 | AF12Z-30-22-20 | 1SBL156001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF12Z-30-22-21 | 1SBL156001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF12Z-30-22-22 | 1SBL156001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF12Z-30-22-23 | 1SBL156001R2322 | 0.360 |
| 7.5 | 30 | 10 | 30 | - | 12...20 | 2 2 | AF16Z-30-22-20 | 1SBL176001R2022 | 0.360 |
| | | | | 24...60 | 20...60 | 2 2 | AF16Z-30-22-21 | 1SBL176001R2122 | 0.360 |
| | | | | 48...130 | 48...130 | 2 2 | AF16Z-30-22-22 | 1SBL176001R2222 | 0.360 |
| | | | | 100...250 | 100...250 | 2 2 | AF16Z-30-22-23 | 1SBL176001R2322 | 0.360 |
| 11 | 45 | 15 | 45 | - | 12...20 | 2 2 | AF26Z-30-22-20 | 1SBL236001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF26Z-30-22-21 | 1SBL236001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF26Z-30-22-22 | 1SBL236001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF26Z-30-22-23 | 1SBL236001R2322 | 0.400 |
| 15 | 50 | 20 | 50 | - | 12...20 | 2 2 | AF30Z-30-22-20 | 1SBL276001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF30Z-30-22-21 | 1SBL276001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF30Z-30-22-22 | 1SBL276001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF30Z-30-22-23 | 1SBL276001R2322 | 0.400 |
| 18.5 | 50 | 25 | 50 | - | 12...20 | 2 2 | AF38Z-30-22-20 | 1SBL296001R2022 | 0.400 |
| | | | | 24...60 | 20...60 | 2 2 | AF38Z-30-22-21 | 1SBL296001R2122 | 0.400 |
| | | | | 48...130 | 48...130 | 2 2 | AF38Z-30-22-22 | 1SBL296001R2222 | 0.400 |
| | | | | 100...250 | 100...250 | 2 2 | AF38Z-30-22-23 | 1SBL296001R2322 | 0.400 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole



AF09Z, AF12Z, AF16Z
Main dimensions mm, inches

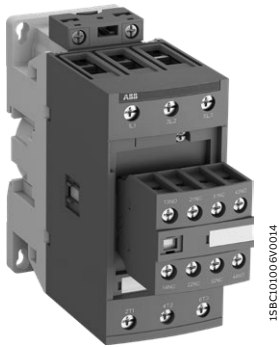
AF26Z, AF30Z, AF38Z

03

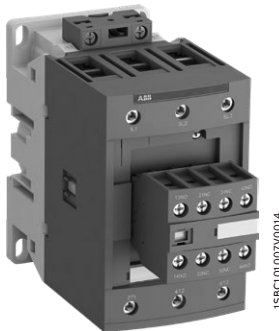
AF40 ... AF96 3-pole contactors

18.5 to 30 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF40-30-22



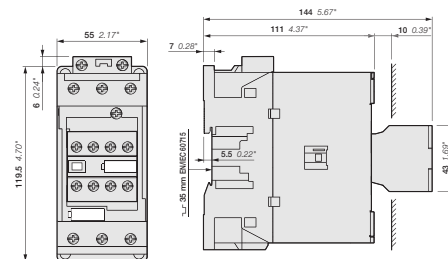
AF80-30-22

AF40 ... AF96 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and 220 V DC. These contactors are of the block type design with 3 main poles (1st stack):

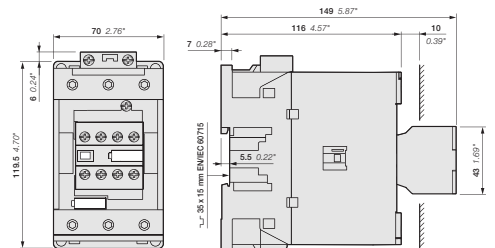
- 2nd stack with permanently fixed auxiliary contact block. The built-in auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | | |
|---------------|-------------------------|---|--|---------------------------|-------------|------------|---------------|-------------------------------|--------------------------------|
| | Rated operational power | Rated current $\theta \leq 40^\circ\text{C}$ | | | | | | 3-phase motor rating 480 V | General use rating 600 V AC |
| 400 V AC-3 kW | AC-1 A | hp | A | V 50/60 Hz | V DC | | kg | | |
| 18.5 | 70 | 30 | 60 | 24...60 | 20...60 (1) | 2 2 | AF40-30-22-11 | 1SBL347001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF40-30-22-12 | 1SBL347001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF40-30-22-13 | 1SBL347001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF40-30-22-14 | 1SBL347001R1422 | 1.000 |
| 22 | 100 | 40 | 80 | 24...60 | 20...60 (1) | 2 2 | AF52-30-22-11 | 1SBL367001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF52-30-22-12 | 1SBL367001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF52-30-22-13 | 1SBL367001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF52-30-22-14 | 1SBL367001R1422 | 1.000 |
| 30 | 105 | 50 | 90 | 24...60 | 20...60 (1) | 2 2 | AF65-30-22-11 | 1SBL387001R1122 | 1.020 |
| | | | | 48...130 | 48...130 | 2 2 | AF65-30-22-12 | 1SBL387001R1222 | 1.020 |
| | | | | 100...250 | 100...250 | 2 2 | AF65-30-22-13 | 1SBL387001R1322 | 1.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF65-30-22-14 | 1SBL387001R1422 | 1.000 |
| 37 | 125 | 60 | 105 | 24...60 | 20...60 (1) | 2 2 | AF80-30-22-11 | 1SBL397001R1122 | 1.270 |
| | | | | 48...130 | 48...130 | 2 2 | AF80-30-22-12 | 1SBL397001R1222 | 1.270 |
| | | | | 100...250 | 100...250 | 2 2 | AF80-30-22-13 | 1SBL397001R1322 | 1.220 |
| | | | | 250...500 | 250...500 | 2 2 | AF80-30-22-14 | 1SBL397001R1422 | 1.220 |
| 45 | 130 | 60 | 115 | 24...60 | 20...60 (1) | 2 2 | AF96-30-22-11 | 1SBL407001R1122 | 1.270 |
| | | | | 48...130 | 48...130 | 2 2 | AF96-30-22-12 | 1SBL407001R1222 | 1.270 |
| | | | | 100...250 | 100...250 | 2 2 | AF96-30-22-13 | 1SBL407001R1322 | 1.220 |
| | | | | 250...500 | 250...500 | 2 2 | AF96-30-22-14 | 1SBL407001R1422 | 1.220 |

(1) For control by PLC-output, use RA4 interface relay.



AF40, AF52, AF65-30-22-..

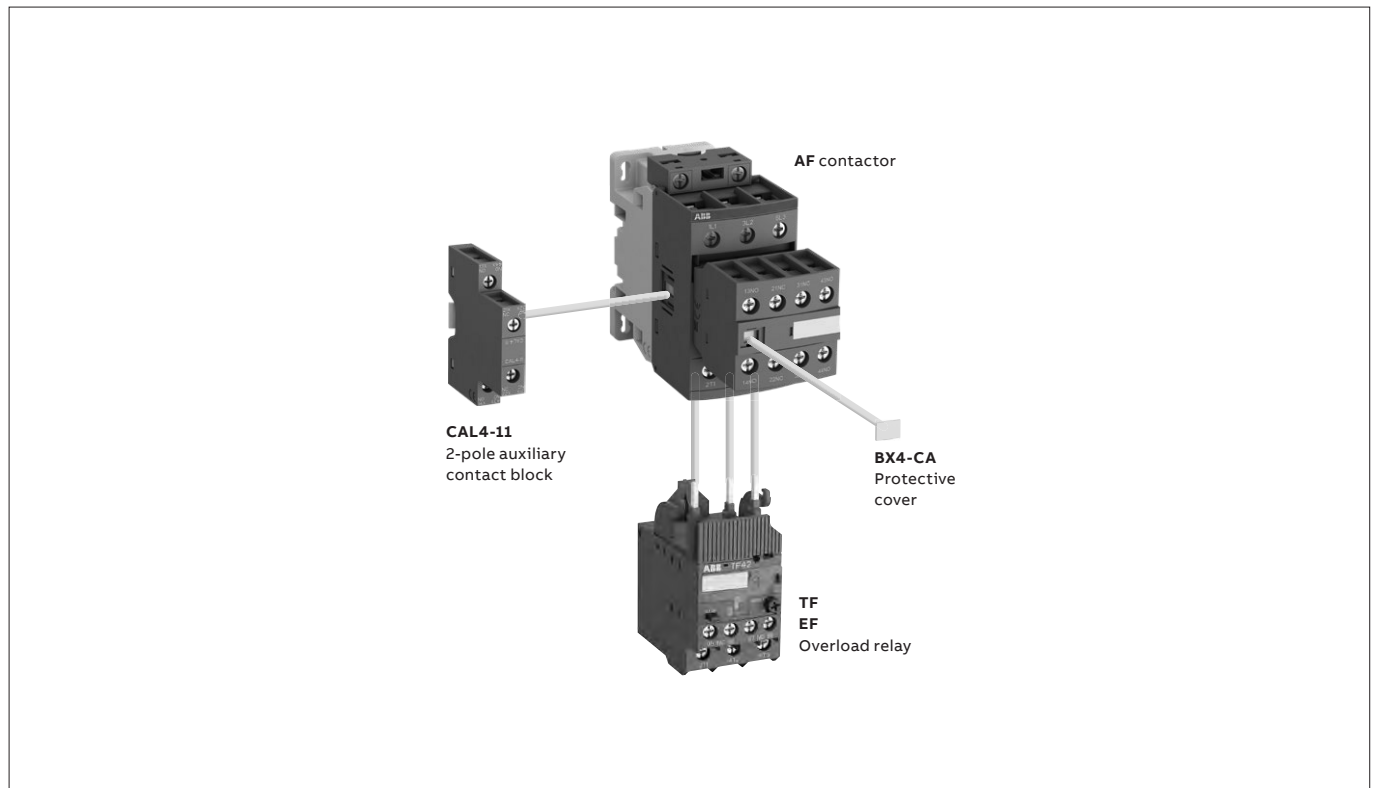


AF80, AF96-30-22-..

Main dimensions mm, inches

AF09 ... AF96 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Side-mounted accessories | | Auxiliary contact blocks | |
|-----------------|------------|-----------------------------|--|------|--------------------------|------------|
| | | | Mechanical interlock unit (between 2 contactors) | | 2-pole CAL4-11 | |
| | | | | | Left side | Right side |
| AF09 ... AF38 | 3 0 | 2 2 | ▶ | VM.. | + 1 | or 1 |
| AF40 ... AF96 | 3 0 | 2 2 | ▶ | 1 | + 1 | or 1 |
| | | | ▶ | - | + 1 | + 1 |

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF09 ... AF38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AF26 ... AF38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AF40 ... AF65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AF80, AF96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

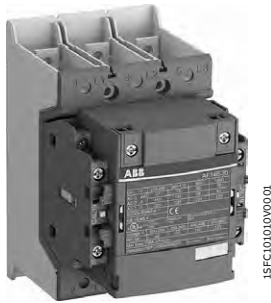
AF116 ... AF146 3-pole contactors

55 to 75 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF146-30-22



AF146-30-22B

AF116 ... AF140 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|------|---------------------------|----------|------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V AC-3 kW | A | 480 V hp | 600 V AC A | V 50/60 Hz | V DC | | | | kg |

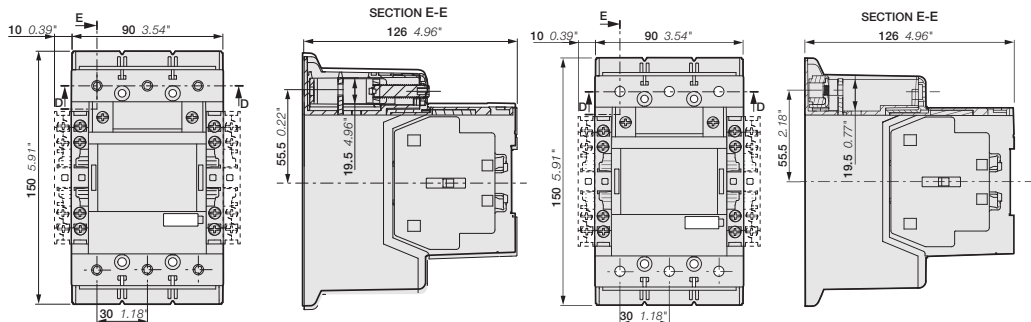
For connection with built-in cable clamps

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | NO | NC | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|----|----|----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 | 2 | AF116-30-22-11 | 1SFL427001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF116-30-22-12 | 1SFL427001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF116-30-22-13 | 1SFL427001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF116-30-22-14 | 1SFL427001R1422 | 1.750 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 | 2 | AF140-30-22-11 | 1SFL447001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF140-30-22-12 | 1SFL447001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF140-30-22-13 | 1SFL447001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF140-30-22-13 | 1SFL447001R1422 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 | 2 | AF146-30-22-11 | 1SFL467001R1122 | 1.750 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF146-30-22-12 | 1SFL467001R1222 | 1.750 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF146-30-22-13 | 1SFL467001R1322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF146-30-22-14 | 1SFL467001R1422 | 1.750 |

With bar connections

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | NO | NC | Type | Order code | Weight (kg) |
|------------------|-------------------|---------------------------|------------------------|-------------|-------------|----|----|-----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 2 | 2 | AF116-30-22B-11 | 1SFL427002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF116-30-22B-12 | 1SFL427002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF116-30-22B-13 | 1SFL427002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF116-30-22B-14 | 1SFL427002R1422 | 1.500 |
| 75 | 200 | 100 | 200 | 24...60 | 20...60 | 2 | 2 | AF140-30-22B-11 | 1SFL447002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF140-30-22B-12 | 1SFL447002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF140-30-22B-13 | 1SFL447002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF140-30-22B-14 | 1SFL447002R1422 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 2 | 2 | AF146-30-22B-11 | 1SFL467002R1122 | 1.500 |
| | | | | 48...130 | 48...130 | 2 | 2 | AF146-30-22B-12 | 1SFL467002R1222 | 1.500 |
| | | | | 100...250 | 100...250 | 2 | 2 | AF146-30-22B-13 | 1SFL467002R1322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF146-30-22B-14 | 1SFL467002R1422 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF116, AF140, AF146-30-22

AF116, AF140, AF146-30-22B

Main dimensions mm, inches

AF116 ... AF146 3-pole contactors with built-in PLC interface

55 to 75 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts for faster opening utilization



AF146-30-22



AF146-30-22B

AF116 ... AF146 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC, AF146 up to 1000 V AC and AF116 ... AF146 up to 260 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|------|---------------------------|----------|------------|-------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V | AC-1 | 480 V | 600 V AC | V 50/60 Hz | V DC | | | | Pkg (1 pce) |
| kW | A | hp | A | | | | kg | | |

For connection with built-in cable clamps

| Rated power (kW) | Rated current (A) | Motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | NO | NC | Type | Order code | Weight (kg) |
|------------------|-------------------|-------------------|------------------------|-------------|-------------|----|----|----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 2 | 2 | AF116-30-22-33 | 1SFL427001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF116-30-22-34 | 1SFL427001R3422 | 1.750 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 2 | 2 | AF140-30-22-33 | 1SFL447001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF140-30-22-34 | 1SFL447001R3422 | 1.750 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 2 | 2 | AF146-30-22-33 | 1SFL467001R3322 | 1.750 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF146-30-22-34 | 1SFL467001R3422 | 1.750 |

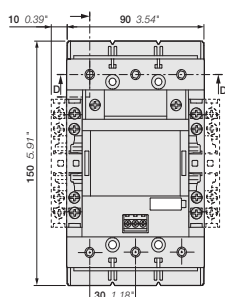
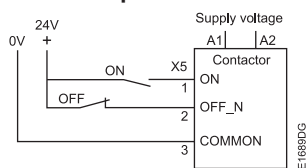
With bar connections

| Rated power (kW) | Rated current (A) | Motor rating (hp) | General use rating (A) | Uc min. (V) | Uc max. (V) | NO | NC | Type | Order code | Weight (kg) |
|------------------|-------------------|-------------------|------------------------|-------------|-------------|----|----|-----------------|-----------------|-------------|
| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 2 | 2 | AF116-30-22B-33 | 1SFL427002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF116-30-22B-34 | 1SFL427002R3422 | 1.500 |
| 75 | 200 | 100 | 200 | 100...250 | 100...250 | 2 | 2 | AF140-30-22B-33 | 1SFL447002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF140-30-22B-34 | 1SFL447002R3422 | 1.500 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 2 | 2 | AF146-30-22B-33 | 1SFL467002R3322 | 1.500 |
| | | | | 250...500 | 250...500 | 2 | 2 | AF146-30-22B-34 | 1SFL467002R3422 | 1.500 |

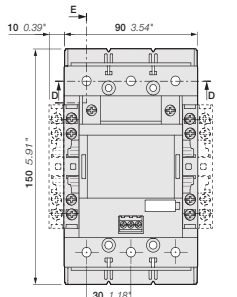
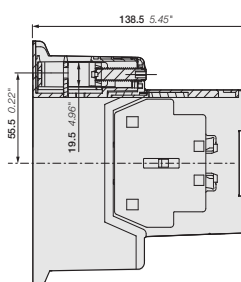
For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF116 ... AF146 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF116, AF140, AF146-30-22



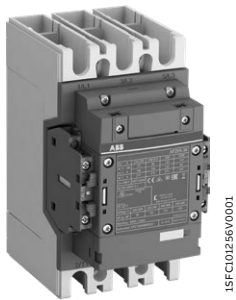
AF116, AF140, AF146-30-22B

Main dimensions mm, inches

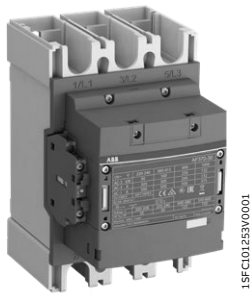
AF190 ... AF370 3-pole contactors

90 to 200 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF205-30-22



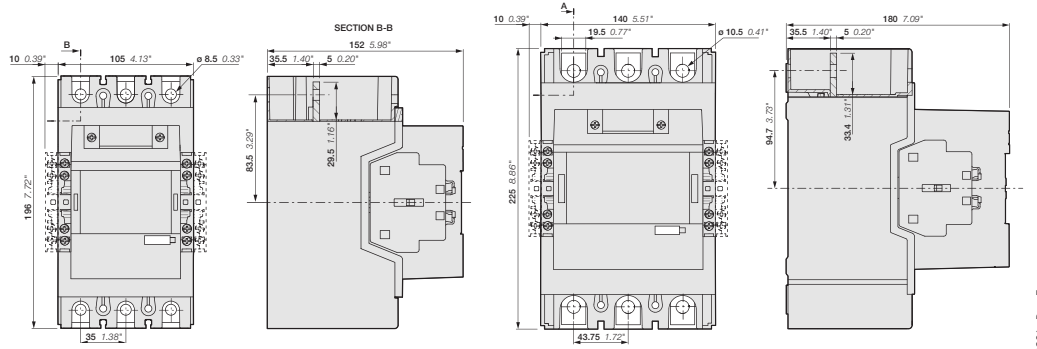
AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power 400 V AC-3 kW | UL / CSA 3-phase motor rating 480 V AC-1 A | General use rating 600 V AC hp | General use rating A | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg |
|--|--|--|-------------------------------|--|-----------|-------------------------------------|----------------|-----------------|--------------------------------|
| | | | | V 50/60 Hz | V DC | | | | |
| 90 | 275 | 125 | 250 | 24...60 | 20...60 | 2 2 | AF190-30-22-11 | 1SFL487002R1122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF190-30-22-12 | 1SFL487002R1222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF190-30-22-13 | 1SFL487002R1322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF190-30-22-14 | 1SFL487002R1422 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 2 2 | AF205-30-22-11 | 1SFL527002R1122 | 3.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF205-30-22-12 | 1SFL527002R1222 | 3.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF205-30-22-13 | 1SFL527002R1322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF205-30-22-14 | 1SFL527002R1422 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 2 2 | AF265-30-22-11 | 1SFL547002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF265-30-22-12 | 1SFL547002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF265-30-22-13 | 1SFL547002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF265-30-22-14 | 1SFL547002R1422 | 4.675 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 2 2 | AF305-30-22-11 | 1SFL587002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF305-30-22-12 | 1SFL587002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF305-30-22-13 | 1SFL587002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF305-30-22-14 | 1SFL587002R1422 | 4.675 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 2 2 | AF370-30-22-11 | 1SFL607002R1122 | 4.675 |
| | | | | 48...130 | 48...130 | 2 2 | AF370-30-22-12 | 1SFL607002R1222 | 4.675 |
| | | | | 100...250 | 100...250 | 2 2 | AF370-30-22-13 | 1SFL607002R1322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF370-30-22-14 | 1SFL607002R1422 | 4.675 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



AF190, AF205

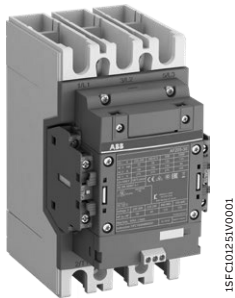
AF265, AF305, AF370

Main dimensions mm, inches

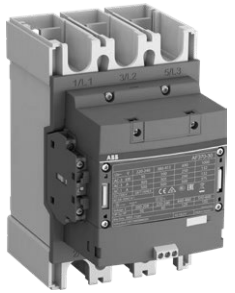
AF190 ... AF370 3-pole contactors with built-in PLC interface

90 to 200 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts for faster opening utilization



AF205-30-22



AF370-30-22

AF190 ... AF370 contactors are mainly used for controlling 3-phase motors and power circuits up to 1000 V AC and up to 340 V DC. These contactors are of the block type design with 3 main poles.

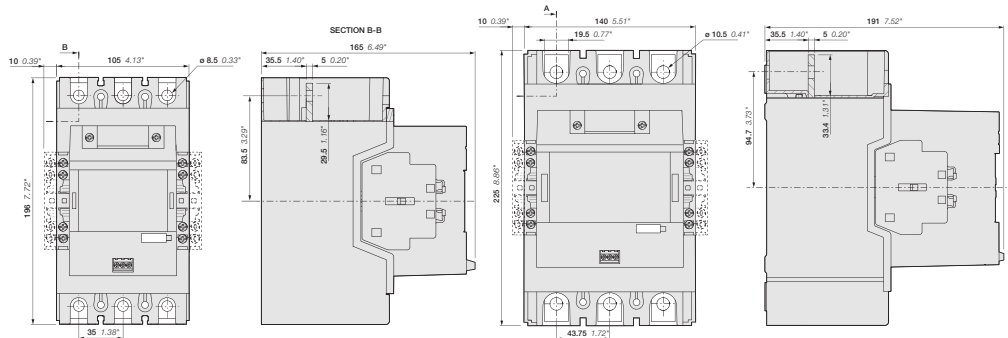
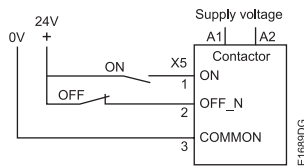
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request)
 - opening time below 20 ms.
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight | | |
|---------------|--|----------------------|--|---------------------------|-----------|------------|----------------|--------------------|-------------|
| | Rated operational power | 3-phase motor rating | | | | | | General use rating | Pkg (1 pce) |
| 400 V AC-3 kW | current $\theta \leq 40^\circ\text{C}$ | 480 V | 600 V AC | | | | kg | | |
| 90 | 275 | 125 | 250 | 100...250 | 100...250 | 2 2 | AF190-30-22-33 | 1SFL487002R3322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF190-30-22-34 | 1SFL487002R3422 | 3.000 |
| 110 | 350 | 150 | 300 | 100...250 | 100...250 | 2 2 | AF205-30-22-33 | 1SFL527002R3322 | 3.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF205-30-22-34 | 1SFL527002R3422 | 3.000 |
| 132 | 400 | 200 | 350 | 100...250 | 100...250 | 2 2 | AF265-30-22-33 | 1SFL547002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF265-30-22-34 | 1SFL547002R3422 | 4.675 |
| 160 | 500 | 250 | 400 | 100...250 | 100...250 | 2 2 | AF305-30-22-33 | 1SFL587002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF305-30-22-34 | 1SFL587002R3422 | 4.675 |
| 200 | 600 | 300 | 520 | 100...250 | 100...250 | 2 2 | AF370-30-22-33 | 1SFL607002R3322 | 4.675 |
| | | | | 250...500 | 250...500 | 2 2 | AF370-30-22-34 | 1SFL607002R3422 | 4.675 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AF190 ... AF370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF190, AF205

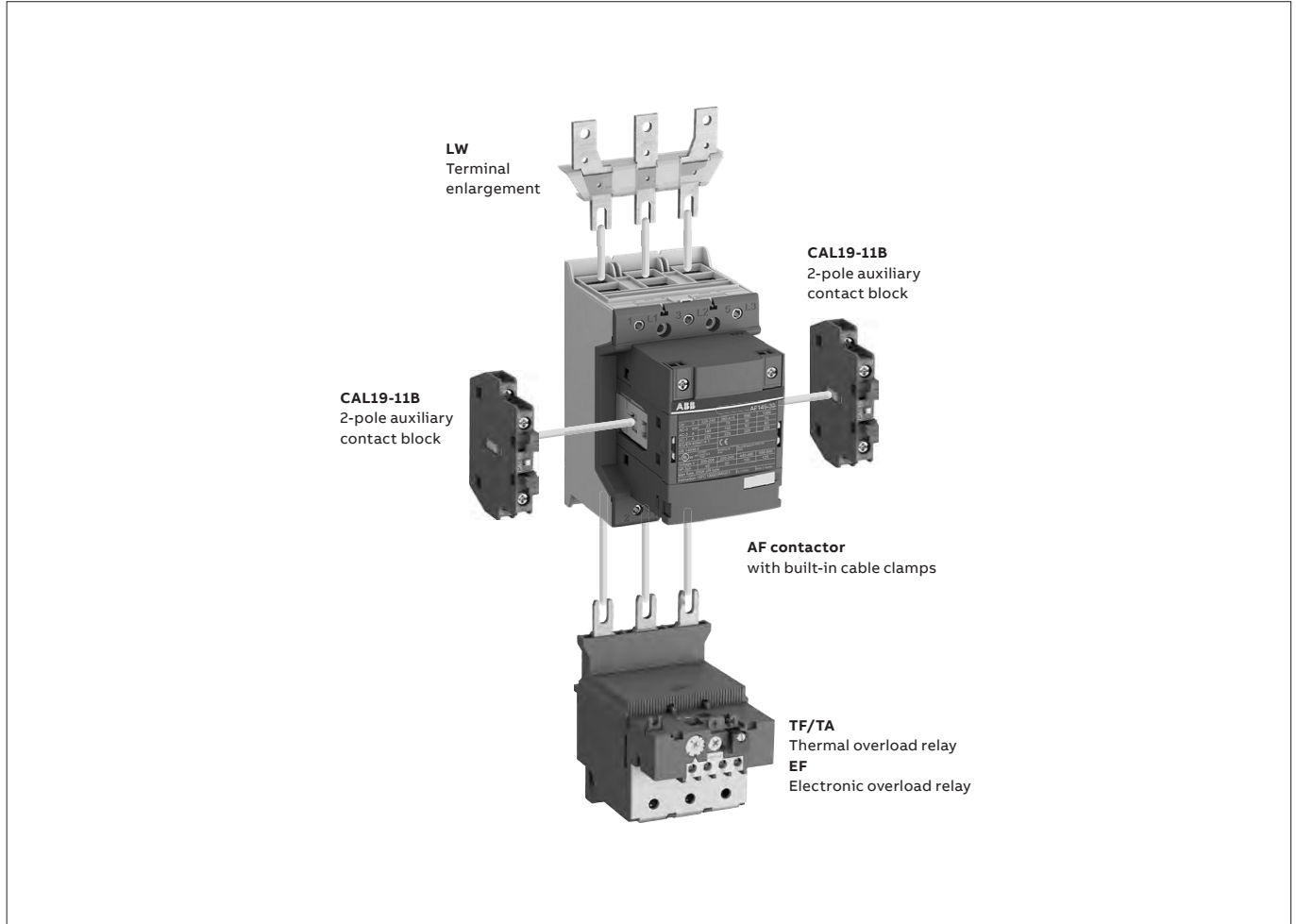
AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories

Main accessories (other accessories available)



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | Mechanical interlock units (between two contactors) |
|-----------------|------------|------------------------------|--------------------------|-----------------|---|
| | | | Auxiliary contact blocks | | |
| | | | CAL19-11 (2) | CAL19-11B (2) | |
| AF116 ... AF370 | 3 0 | 2 2 | 2 x CAL19-11 included | + 2 x CAL19-11B | - |

(2) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF116 ... AF140 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AF146 | - | EF146 (54...150 A) |
| AF190, AF205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AF265 ... AF370 | - | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.

(1) Direct mounting - No kit required.

AF400 ... AF750 3-pole contactors

200 to 400 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF460-30-22



AF750-30-22

AF400 ... AF750 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC or 600 V DC (2). These contactors are of the block type design with 3 main poles.

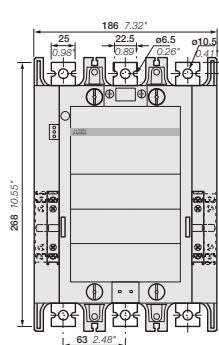
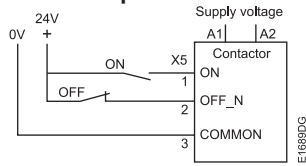
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational power | UL/CSA 3-phase motor rating | General use rating | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|--------------------------------------|--------------------------|--|-----------|---------------------------------|------|-------------|--|--------|
| | | | V 50/60 Hz | V DC | | | | | |
| 400 V AC-3 kW | 690 V AC-1 A | 480 V hp | 550 A | - | 24...60 | 2 2 | AF400-30-22 | 1SFL577001R6822 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF400-30-22 | 1SFL577001R6922 | 12.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF400-30-22 | 1SFL577001R7022 | 12.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF400-30-22 | 1SFL577001R7122 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 2 2 | AF460-30-22 | 1SFL597001R6822 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF460-30-22 | 1SFL597001R6922 | 12.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF460-30-22 | 1SFL597001R7022 | 12.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF460-30-22 | 1SFL597001R7122 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 2 2 | AF580-30-22 | 1SFL617001R6822 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF580-30-22 | 1SFL617001R6922 | 15.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF580-30-22 | 1SFL617001R7022 | 15.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF580-30-22 | 1SFL617001R7122 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 2 2 | AF750-30-22 | 1SFL637001R6822 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF750-30-22 | 1SFL637001R6922 | 15.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF750-30-22 | 1SFL637001R7022 | 15.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF750-30-22 | 1SFL637001R7122 | 15.000 |

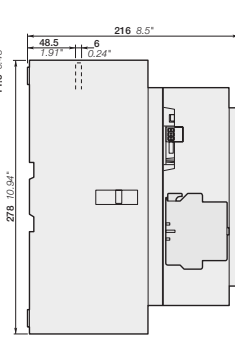
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.
 (2) Up to 850 V DC for AF580, AF750.

AF400...AF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AF400, AF460



AF580, AF750

Main dimensions mm, inches

AF1250 ... AF2850 3-pole contactors

475 to 560 kW and 1260 to 2850 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF1250-30-22



AF2650-30-22

AF1250 ... AF2050 contactors are mainly used for controlling power circuits up to 1000 V AC or 850 V DC, AF2650 and AF2850 for controlling power up to 1000 V AC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
- only 4 coils for AF1250 to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
- only 1 coil for AF1350 ... AF2850 to cover control voltages between 100...250 V 50/60 Hz and 100...250 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltages sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

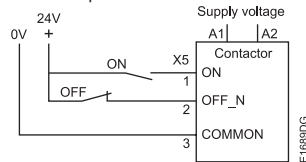
| IEC Rated operational power 400 V AC-3 | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | | |
|--|--|---|---|---------------------------------|-----------|------------|--------------------------------|---------------------|--------|
| | 3-phase motor rating 480 V | General use rating 600 V AC (2) | | | | | | | |
| kW | current θ ≤ 40 °C 690 V AC-1 A | hp | A | V 50/60 Hz | V DC | | | | |
| - | 1260 | - | 1210 | - | 24...60 | 2 2 | AF1250-30-22 | 1SFL647001R6822 (1) | 16.000 |
| | | | | 48...130 | 48...130 | 2 2 | AF1250-30-22 | 1SFL647001R6922 | 16.000 |
| | | | | 100...250 | 100...250 | 2 2 | AF1250-30-22 | 1SFL647001R7022 | 16.000 |
| | | | | 250...500 | 250...500 | 2 2 | AF1250-30-22 | 1SFL647001R7122 | 16.000 |
| 475 | 1350 | 800 | 1350 | 100...250 | 100...250 | 2 2 | AF1350-30-22 | 1SFL657001R7022 | 34.000 |
| 560 | 1650 | 900 | 1650 | 100...250 | 100...250 | 2 2 | AF1650-30-22 | 1SFL677001R7022 | 35.000 |
| - | 2050 | - | 2100 | 100...250 | 100...250 | 2 2 | AF2050-30-22 | 1SFL707001R7022 | 35.000 |
| - | 2650 | - | 2700 | 100...250 | 100...250 | 2 2 | AF2650-30-22 | 1SFL667001R7022 | 45.000 |
| - | 2850 | - | 2850 | 100...250 | 100...250 | 2 2 | AF2850-30-22 | 1SFL687001R7022 | 45.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

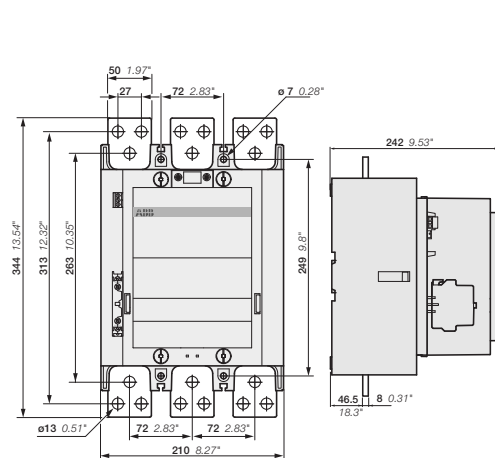
(2) AF2650 : Maximum operational voltage = 1000 V according to UL / CSA.

AF1250 ... AF2850 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs

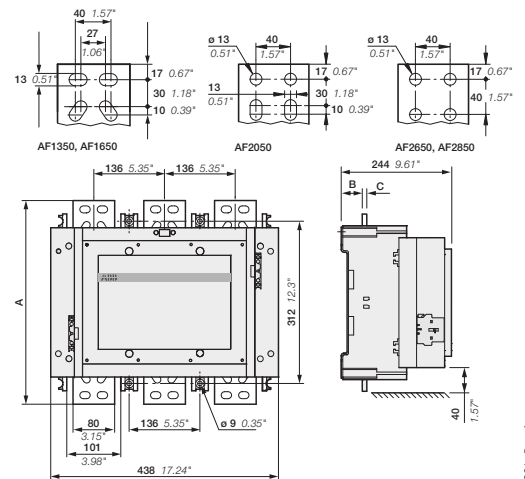


| | AF1350, AF1650, AF2050 | AF2650, AF2850 |
|---|------------------------|-----------------|
| A | 392 mm / 15.43" | 422 mm / 16.61" |
| B | 47 mm / 1.85" | 53 mm / 2.11" |
| C | 10 mm / 0.39" | 25 mm / 0.98" |



AF1250

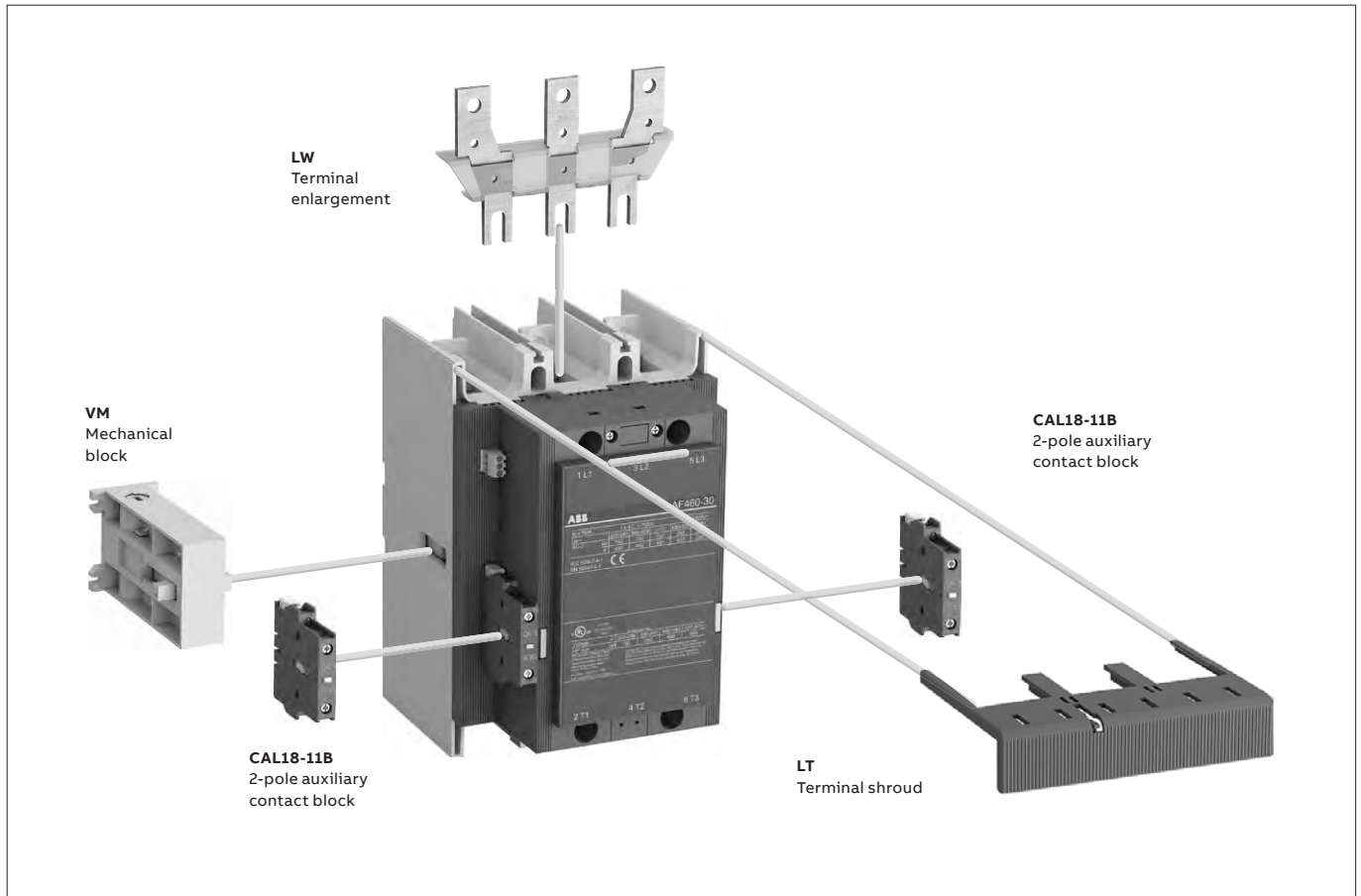
Main dimensions mm, inches





AF1350, AF1650, AF2050, AF2650, AF2850

AF400... AF2850 3-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories Auxiliary contact blocks | Mechanical interlock units (between two contactors) |
|-----------------|---|---|--|--|
| |  |  | CAL18-11 CAL18-11B (2) | |

Contactors + auxiliary contact blocks

| | | | | | | | | |
|-----------------|---|---|---|---|---|-----------------------|---------------|---|
| AF145... AF2850 | 3 | 0 | 2 | 2 | ▶ | 2 x CAL18-11 included | 2 x CAL18-11B | - |
|-----------------|---|---|---|---|---|-----------------------|---------------|---|

Contactors with mechanical interlocking + auxiliary contact blocks

| | | | | | | | | |
|-----------------|---|---|---|---|---|-----------------------|---------------|--------------|
| AF400... AF2850 | 3 | 0 | 2 | 2 | ▶ | 2 x CAL18-11 included | 4 x CAL18-11B | + VM...H (1) |
|-----------------|---|---|---|---|---|-----------------------|---------------|--------------|

- (1) Interlock type, according to the contactor ratings (see "Accessories").
- (2) The CEL18-... auxiliary contact blocks can replace the CAL18-11 and CAL18-11B. Though, no auxiliary contact block can be mounted outside the CEL18-...

Overload relays fitting details



| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AF400, AF460 | - | EF460 (150...500 A) (3) |
| AF580, AF750 | - | EF750 (250...800 A) (3) |
| AF1350, AF1650 | - | E1250DU (375...1250 A) (3) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
 (3) Mounting kit required (see "Motor protection").

AF09 ... AF38 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactors types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|---|---|---|-------------------|--------------------|--------------------|--------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| Rated operational voltage U_e max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| With conductor cross-sectional area | | 6 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| U_e max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 60^\circ\text{C}$ | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A |
| | $\theta \leq 70^\circ\text{C}$ | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A |
| With conductor cross-sectional area | | 4 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-3, AC-3e Utilization category | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | |
| I_e / Max. rated operational current AC-3, AC-3e (1) | | | | | | | |
|  3-phase motors | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| | Rated operational power AC-3, AC-3e (1) | | | | | | |
|  1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW |
| | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW |
| | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | Rated making capacity AC-3, AC-3e | | 10 x I_e AC-3, 12 x I_e AC-3e acc. to IEC 60947-4-1 | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x I_e AC-3, 8.5 x I_e AC-3e acc. to IEC 60947-4-1 | | | | | |
| AC-8a Utilization category | | | | | | | |
| (without thermal overload relay - $U_e 400\text{ V}$ 50/60 Hz - $\theta \leq 40^\circ\text{C}$) | | | | | | | |
| I_e / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) | | | | | | | |
| $U_e \leq 500\text{ V}$ AC - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| Rated short-time withstand current I_{cw} | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A |
| at 40°C ambient temperature, in free air from a cold state | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A |
| | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| Maximum breaking capacity $\cos \phi = 0.45$ | | | | | | | |
| at 440 V | | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A |
| at 690 V | | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A |
| Power dissipation per pole | | | | | | | |
| I_e / AC-1 | | 0.8 W | 1 W | 1.2 W | 1.8 W | 2.4 W | 2.4 W |
| I_e / AC-3, AC-3e | | 0.1 W | 0.2 W | 0.35 W | 0.6 W | 0.9 W | 1.3 W |
| Max. electrical switching frequency | | | | | | | |
| AC-1 | | 600 cycles/h | | | | | |
| AC-3, AC-3e | | 1200 cycles/h | | | | | |
| AC-2, AC-4 | | 300 cycles/h | | | | 150 cycles/h | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AF40 ... AF96 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|--|---|---|---|---|---|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | |
| Rated operational voltage U_e max. | | 690 V | | | | 1000 V |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ With conductor cross-sectional area | | 105 A 35 mm ² | 105 A 35 mm ² | 105 A 35 mm ² | 130 A 50 mm ² | 130 A 50 mm ² |
| AC-1 Utilization category For air temperature close to contactor I_e / Rated operational current AC-1 U_e max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 40^\circ\text{C}$ $\theta \leq 60^\circ\text{C}$ $\theta \leq 70^\circ\text{C}$ | 70 A 60 A 50 A | 100 A 80 A 70 A | 105 A 90 A 80 A | 125 A 100 A 85 A | 130 A 105 A 90 A |
| With conductor cross-sectional area | | 25 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | 50 mm ² |
| AC-3, AC-3e Utilization category For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ I_e / Max. rated operational current AC-3, AC-3e (1) AC-3e $U_e \leq 690\text{ V}$ | 220-230-240 V 380-400 V 415 V 440 V 500 V 690 V 1000 V | 40 A 40 A 40 A 40 A 35 A 25 A - | 53 A 53 A 53 A 53 A 45 A 35 A - | 65 A 65 A 65 A 65 A 55 A 39 A - | 80 A 80 A 80 A 80 A 65 A 49 A 25 A | 96 A 96 A 96 A 96 A 80 A 57 A 30 A |
| Rated operational power AC-3, AC-3e (1) AC-3e $U_e \leq 690\text{ V}$ | 220-230-240 V 380-400 V 415 V 440 V 500 V 690 V 1000 V | 11 kW 18.5 kW 22 kW 22 kW 22 kW 22 kW - | 15 kW 22 kW 30 kW 30 kW 30 kW 30 kW - | 18.5 kW 30 kW 37 kW 37 kW 37 kW 37 kW - | 22 kW 37 kW 45 kW 45 kW 45 kW 45 kW 35 kW | 25 kW 45 kW 55 kW 55 kW 55 kW 55 kW 40 kW |
| Rated making capacity AC-3, AC-3e | | 10 x I_e AC-3, 12 x I_e AC-3e acc. to IEC 60947-4-1 | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x I_e AC-3, 8.5 x I_e AC-3e acc. to IEC 60947-4-1 | | | | |
| AC-8a Utilization category (without thermal overload relay $U_e 400\text{ V}$ 50/60 Hz - $\theta \leq 40^\circ\text{C}$) I_e / Rated operational current AC-8a | | 53 A | 70 A | 85 A | 105 A | 120 A |
| Rated operational power AC-8a | | 25 kW | 37 kW | 45 kW | 55 kW | 65 kW |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) $U_e \leq 500\text{ V}$ AC - gG type fuse | | 100 A | 125 A | 160 A | 160 A | 200 A |
| Rated short-time withstand current I_{cw} at 40°C ambient temperature, in free air from a cold state | 1 s 10 s 30 s 1 min 15 min | 1000 A 600 A 350 A 250 A 110 A | 1000 A 600 A 350 A 250 A 110 A | 1000 A 600 A 350 A 250 A 110 A | 1200 A 780 A 450 A 300 A 140 A | 1200 A 780 A 450 A 300 A 140 A |
| Maximum breaking capacity $\cos \phi = 0.45$ | at 440 V at 690 V | 950 A 600 A | 950 A 600 A | 950 A 600 A | 1150 A 750 A | 1150 A 750 A |
| Power dissipation per pole | I_e / AC-1 I_e / AC-3, AC-3e | 3 W 1 W | 6.3 W 1.7 W | 7 W 2.7 W | 7.6 W 3 W | 8.2 W 4.5 W |
| Max. electrical switching frequency | AC-1 AC-3, AC-3e AC-2, AC-4 | 600 cycles/h 1200 cycles/h 150 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AF116 ... AF370 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|--|--------------------------------|--|--------------------|--------------------|---------------------|-------------------------|---------------------|-------------------------|-----------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | |
| Rated operational voltage U _e max. | | 690 V | 690 V | 1000 V | 1000 V | 1000 V | 1000 V | 1000 V | 1000 V |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | |
| Conventional free-air thermal current I _{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2 x 185 mm ² (4) |
| AC-1 Utilization category | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| le / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| U _e max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 60^\circ\text{C}$ | 145 A | 175 A | 200 A | 250 A | 300 A | 350 A | 400 A | 500 A |
| | $\theta \leq 70^\circ\text{C}$ | 130 A | 160 A | 175 A | 200 A | 240 A | 290 A | 325 A | 400 A |
| le / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | – | – | 225 A | 250 A | 275 A | 350 A | 375 A | 400 A |
| U _e max. $\leq 1000\text{ V}$, 50/60 Hz | $\theta \leq 60^\circ\text{C}$ | – | – | 200 A | 225 A | 250 A | 300 A | 325 A | 350 A |
| | $\theta \leq 70^\circ\text{C}$ | – | – | 175 A | 185 A | 200 A | 240 A | 260 A | 290 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2 x 185 mm ² (4) |
| AC-3 Utilization category | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | | | |
| le / Max. rated operational current AC-3 (1) | | | | | | | | | |
| | 220-230-240 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 380-400 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 415 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 440 V | 116 A | 140 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 500 V | 110 A | 130 A | 130 A | 156 A | 186 A | 250 A | 290 A | 350 A |
| | 690 V | 65 A | 80 A | 93 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 1000 V | – | – | 60 A | 85 A | 100 A | 113 A | 131 A | 141 A |
| Rated operational power AC-3 (1) | | | | | | | | | |
| | 220-230-240 V | 30 kW | 37 kW | 45 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW |
| | 380-400 V | 55 kW | 75 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| | 415 V | 55 kW | 75 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| | 440 V | 75 kW | 90 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW |
| | 500 V | 75 kW | 90 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 250 kW |
| | 690 V | 55 kW | 75 kW | 90 kW | 132 kW | 160 kW | 200 kW | 250 kW | 315 kW |
| | 1000 V | – | – | 75 kW | 110 kW | 132 kW | 160 kW | 185 kW | 200 kW |
| Rated making capacity AC-3 | | 10 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| Rated breaking capacity AC-3 | | 8 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) | | | | | | | | | |
| U _e $\leq 500\text{ V}$ AC - gG type fuse | | 250 A | 315 A | 315 A | 355 A | 400 A | 500 A | 500 A | 630 A |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 1300 A | 1460 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A |
| | 10 s | 928 A | 1168 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A |
| | 30 s | 536 A | 674 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A |
| | 1 min | 379 A | 477 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A |
| | 15 min | 160 A | 200 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Maximum breaking capacity cos $\phi = 0.45$ | | | | | | | | | |
| (cos $\phi = 0.35$ for I _e > 100 A) | at 440 V | 2000 A | 3000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A |
| | at 690 V | 1000 A | 1500 A | 1500 A | 2200 A | 2500 A | 3300 A | 3800 A | 4000 A |
| Power dissipation per pole | le / AC-1 | 12 W | 18 W | 23 W | 15 W | 25 W | 32 W | 50 W | 72 W |
| | le / AC-3 | 6 W | 9 W | 10 W | 7 W | 8 W | 14 W | 19 W | 27 W |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

For AC-3e utilization category, please consult your ABB local sales organization.

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) For currents above 275A use terminal enlargements or terminal extensions.

(4) For currents above 450A use terminal enlargements or terminal extensions.

AF400 ... AF750 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactors types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|--------------------------------|--|-----------------------|-----------------------|-------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | |
| Rated operational voltage U_e max. | | 1000 V | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 600 A | 700 A | 800 A | 1050 A |
| With conductor cross-sectional area (3) | | 2x185 mm ² | 2x240 mm ² | 2x240 mm ² | 800 mm ² (4) |
| AC-1 Utilization category | | | | | |
| For air temperature close to contactor | | | | | |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 600 A | 700 A | 800 A | 1050 A |
| U_e max. ≤ 690 V, 50/60 Hz | $\theta \leq 55^\circ\text{C}$ | 500 A | 600 A | 700 A | 875 A |
| | $\theta \leq 70^\circ\text{C}$ | 400 A | 480 A | 580 A | 720 A |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 600 A | 700 A | 800 A | 1000 A |
| U_e max. ≤ 1000 V, 50/60 Hz | $\theta \leq 55^\circ\text{C}$ | 500 A | 600 A | 700 A | 875 A |
| | $\theta \leq 70^\circ\text{C}$ | 400 A | 480 A | 580 A | 720 A |
| With conductor cross-sectional area | | 2x185 mm ² | 2x240 mm ² | 2x240 mm ² | 800 mm ² (4) |
| AC-3 Utilization category | | | | | |
| For air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | | | |
| I_e / Max. rated operational current AC-3 (1) | | | | | |
| | 220-230-240 V | 400 A | 460 A | 580 A | 750 A |
| | 380-400 V | 400 A | 460 A | 580 A | 750 A |
| | 415 V | 400 A | 460 A | 580 A | 750 A |
| | 440 V | 400 A | 460 A | 580 A | 750 A |
| | 500 V | 400 A | 460 A | 580 A | 750 A |
| | 690 V | 350 A | 400 A | 500 A | 650 A |
| | 1000 V | 155 A | 200 A | 250 A | 300 A |
| Rated operational power AC-3 (1) | | | | | |
| | 220-230-240 V | 110 kW | 132 kW | 160 kW | 220 kW |
| | 380-400 V | 200 kW | 250 kW | 315 kW | 400 kW |
| | 415 V | 220 kW | 250 kW | 355 kW | 425 kW |
| | 440 V | 220 kW | 250 kW | 355 kW | 450 kW |
| | 500 V | 250 kW | 315 kW | 400 kW | 520 kW |
| | 690 V | 315 kW | 355 kW | 500 kW | 600 kW |
| | 1000 V | 220 kW | 280 kW | 355 kW | 400 kW |
| Rated making capacity AC-3 | | 10 x I_e AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | | 8 x I_e AC-3 acc. to IEC 60947-4-1 | | | |
| Short-circuit protection device for contactors without thermal overload relay | | | | | |
| Motor protection excluded (2) | | | | | |
| $U_e \leq 500$ V AC - gG type fuse | | 630 A | 800 A | 1000 A | 1000 A |
| Rated short-time withstand current I_{cw} at 40°C ambient temperature, in free air from a cold state | 1 s | 4600 A | 4600 A | 7000 A | 7000 A |
| | 10 s | 4400 A | 4400 A | 6400 A | 6400 A |
| | 30 s | 3100 A | 3100 A | 4500 A | 4500 A |
| | 1 min | 2500 A | 2500 A | 3500 A | 3500 A |
| | 15 min | 840 A | 840 A | 1300 A | 1300 A |
| Maximum breaking capacity | | | | | |
| $\cos \phi = 0.45$ | at 440 V | 4000 A | 5000 A | 6000 A | 7500 A |
| ($\cos \phi = 0.35$ for $I_e > 100$ A) | at 690 V | 3500 A | 4500 A | 5000 A | 7000 A |
| Power dissipation per pole | I_e / AC-1 | 30 W | 42 W | 32 W | 50 W |
| | I_e / AC-3 | 16 W | 21 W | 17 W | 28 W |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | | 300 cycles/h | |
| | AC-3 | 300 cycles/h | | 300 cycles/h | |
| | AC-2, AC-4 | 60 cycles/h | | 60 cycles/h | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

For AC-3e utilization category, please consult your ABB local sales organization.

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Max. connection bar width 50 mm.

(5) Max. connection bar width 100 mm.

AF1250 ... AF2850 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactors types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|--------------------------------|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| Rated operational voltage U_e max. | | 1000 V | | | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| With conductor cross-sectional area (3) | | 1000 mm ² (4) | 1000 mm ² (5) | 1500 mm ² (5) | 2000 mm ² (5) | 3000 mm ² (5) | 3000 mm ² (5) |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| U_e max. ≤ 690 V, 50/60 Hz | $\theta \leq 55^\circ\text{C}$ | 1040 A | 1150 A | 1450 A | 1750 A | 2350 A | 2600 A |
| | $\theta \leq 70^\circ\text{C}$ | 875 A | 1000 A | 1270 A | 1500 A | 2120 A | 2300 A |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 1260 A | 1350 A | 1650 A | 2050 A | 2650 A | 2850 A |
| U_e max. ≤ 1000 V, 50/60 Hz | $\theta \leq 55^\circ\text{C}$ | 1040 A | 1150 A | 1450 A | 1750 A | 2350 A | 2600 A |
| | $\theta \leq 70^\circ\text{C}$ | 875 A | 1000 A | 1270 A | 1500 A | 2120 A | 2300 A |
| With conductor cross-sectional area | | 1000 mm ² (4) | 1000 mm ² (5) | 1500 mm ² (5) | 2000 mm ² (5) | 3000 mm ² (5) | 3000 mm ² (5) |
| AC-3 Utilization category | | | | | | | |
| For air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | | | | | |
| I_e / Max. rated operational current AC-3 (1) | | | | | | | |
| | 220-230-240 V | - | 860 A | 1060 A | 1060 A | - | - |
| | 380-400 V | - | 860 A | 1060 A | 1060 A | - | - |
| | 415 V | - | 860 A | 1060 A | 1060 A | - | - |
| | 440 V | - | 860 A | 1060 A | 1060 A | - | - |
| | 500 V | - | 800 A | 970 A | 970 A | - | - |
| | 690 V | - | 800 A | 970 A | 970 A | - | - |
| | 1000 V | - | 375 A | 400 A | 425 A | - | - |
| Rated operational power AC-3 (1) | | | | | | | |
| | 220-230-240 V | - | 257 kW | 315 kW | - | - | - |
| | 380-400 V | - | 475 kW | 560 kW | - | - | - |
| | 415 V | - | 500 kW | 630 kW | 630 kW | - | - |
| | 440 V | - | 560 kW | 710 kW | 710 kW | - | - |
| | 500 V | - | 560 kW | 710 kW | - | - | - |
| | 690 V | - | 800 kW | 1000 kW | 1000 kW | - | - |
| | 1000 V | - | 560 kW | 600 kW | 630 kW | - | - |
| Rated making capacity AC-3 | | 10 x I_e AC-3 acc. to IEC 60947-4-1 | | | | | |
| Rated breaking capacity AC-3 | | 8 x I_e AC-3 acc. to IEC 60947-4-1 | | | | | |
| Short-circuit protection device for contactors without thermal overload relay | | | | | | | |
| Motor protection excluded (2) | | | | | | | |
| $U_e \leq 500$ V AC - gG type fuse | | Please consult us for coordination with circuit-breaker | | | | | |
| Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 8000 A | 10000 A | 12000 A | 12000 A | 12000 A | 12000 A |
| | 10 s | 7200 A | 8000 A | 10000 A | 10000 A | 10000 A | 10000 A |
| | 30 s | 5200 A | 6000 A | 7500 A | 7500 A | 7500 A | 7500 A |
| | 1 min | 4000 A | 4500 A | 5500 A | 5500 A | 5500 A | 5500 A |
| | 15 min | 1500 A | 1600 A | 2200 A | 2200 A | 2800 A | 3000 A |
| Maximum breaking capacity | | | | | | | |
| $\cos \phi = 0.45$ | at 440 V | 7500 A | 10000 A | 12000 A | 8400 A | 8400 A | 8400 A |
| ($\cos \phi = 0.35$ for $I_e > 100$ A) | at 690 V | 7000 A | - | - | - | - | - |
| Power dissipation per pole | I_e / AC-1 | 80 W | 80 W | 80 W | 125 W | 200 W | 200 W |
| | I_e / AC-3 | - | 50 W | 50 W | - | - | - |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | 60 cycles/h | | 60 cycles/h | 15 cycles/h | 15 cycles/h |
| | AC-3 | - | 60 cycles/h | | - | - | - |
| | AC-2, AC-4 | - | 60 cycles/h | | - | - | - |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

For AC-3e utilization category, please consult your ABB local sales organization.

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Max. connection bar width 50 mm.

(5) Max. connection bar width 100 mm.

AF09 ... AF38 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactors types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | | |
|---|--|-------------------------------|----------|----------|----------|----------|-----------|-----------|------|
| Standards | | UL 508, CSA C22.2 N°60947-4-1 | | | | | | | |
| Maximum operational voltage | | 600 V | | | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - | | |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | | 27 A | | | | |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | | 2 hp | | | | |
| | 230 V AC | 1 hp | 2 hp | | 3 hp | | | | |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | | | |
| | 230 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | | | |
| | 460 V AC | 2 hp | 5 hp | | 10 hp | | | | |
| | 575 V AC | 2 hp | 5 hp | | 10 hp | | | | |
| UL / CSA general use rating | 600 V AC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | | |
| | With conductor cross-sectional area | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | | |
| | 1 pole | 80 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | |
| | 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | |
| | 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | |
| | With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | |
| | UL / CSA maximum 1-phase motor rating | | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A | | |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A | | |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp | | |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp | | |
| UL / CSA maximum 3-phase motor rating | Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A | |
| | | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A | |
| | | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A (3) | |
| | | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A (2) | 32 A (3) | |
| | Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | |
| | | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | |
| | | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp (3) | |
| | | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp (2) | 30 hp (3) | |
| | UL / CSA - DC motor starting - 3 poles in series | Full Load Amps (FLA) | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A |
| | | | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A |
| Horse power rating | | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp | |
| | | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp | |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | | |
| High fault current | | 100 kA | | | | | | | |
| Fuse rating | | 30 A | 30 A | 60 A | 60 A | 100 A | 100 A | | |
| Fuse type, 600 V | | J | | | | | | | |
| Max. electrical switching frequency | | | | | | | | | |
| For general use | | 600 cycles/h | | | | | | | |
| For motor use | | 1200 cycles/h | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For contactors produced since week 49-2011.

(3) For contactors produced since week 36-2014.

AF40 ... AF96 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|------------------|-------------------------------------|----------|--------|----------|----------|
| Standards | | UL 60947-4-1, CSA C22.2 N°60947-4-1 | | | | |
| Maximum operational voltage | | 600 V | | | | |
| NEMA size | | 2 | - | - | 3 | - |
| NEMA continuous amp rating | Thermal current | 45 A | - | - | 90 A | - |
| NEMA maximum horse power ratings | | | | | | |
| 1-phase, 60 Hz | 115 V AC | 3 hp | - | - | - | - |
| | 230 V AC | 7.5 hp | - | - | - | - |
| NEMA maximum horse power ratings | | | | | | |
| 3-phase, 60 Hz | 200 V AC | 10 hp | - | - | 25 hp | - |
| | 230 V AC | 15 hp | - | - | 30 hp | - |
| | 460 V AC | 25 hp | - | - | 50 hp | - |
| | 575 V AC | 25 hp | - | - | 50 hp | - |
| UL / CSA general use rating | | | | | | |
| | 600 V AC | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| 1 pole | 80 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| 2 poles in serie | 160 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| 3 poles in serie | 240 V DC | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| UL / CSA maximum 1-phase motor rating | | | | | | |
| Full load current | 120 V AC | 34 A | 34 A | 56 A | 80 A | 80 A |
| | 240 V AC | 40 A | 50 A | 68 A | 68 A | 88 A |
| Horse power rating | 120 V AC | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 240 V AC | 7-1/2 hp | 10 hp | 15 hp | 15 hp | 20 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | |
| Full load current (1) | 200-208 V AC | 32.2 A | 48.3 A | 62.1 A | 78.2 A | 92 A |
| | 220-240 V AC | 42 A | 54 A | 68 A | 80 A | 80 A |
| | 440-480 V AC | 40 A | 52 A | 65 A | 77 A | 77 A |
| | 550-600 V AC | 41 A | 52 A | 62 A | 77 A | 77 A |
| Horse power rating (1) | 200-208 V AC | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp |
| | 440-480 V AC | 30 hp | 40 hp | 50 hp | 60 hp | 60 hp |
| | 550-600 V AC | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 40 A | 58 A | 76 A | 76 A | 110 A |
| | 250 V DC | 38 A | 55 A | 72 A | 89 A | 106 A |
| Horse power rating | 125 V DC | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp |
| | 250 V DC | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | |
| High fault current | | 100 kA | | | | |
| Fuse rating | | 150 A | 150 A | 150 A | 200 A | 200 A |
| Fuse type, 600 V | | J | | | | |
| Maximum electrical switching frequency | | | | | | |
| For general use | | 600 cycles/h | | | | |
| For motor use | | 1200 cycles/h | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF116 ... AF370 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|--|------------------|--|---------|---------|---------|-------------|---------|------------|------------|
| Standards | | UL 60947-1 / 60947-4-1A and CSA 60947-1 / 60947-4-1A | | | | | | | |
| Maximum operational voltage | | 600V | | | | | | | |
| NEMA size | | - | 4 | - | - | - | 5 | - | - |
| NEMA continuous amp rating | Thermal current | - | 135 A | - | - | - | 270 A | - | - |
| NEMA maximum horse power ratings | | | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | - | - | - | - | - | - | - | - |
| | 230 V AC | - | - | - | - | - | - | - | - |
| NEMA maximum horse power ratings | | | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | - | 40 hp | - | - | - | 75 hp | - | - |
| | 230 V AC | - | 50hp | - | - | - | 100 hp | - | - |
| | 460 V AC | - | 100 hp | - | - | - | 200 hp | - | - |
| | 575 V AC | - | 100 hp | - | - | - | 200 hp | - | - |
| UL / CSA general use rating | | | | | | | | | |
| 600 V AC | | 160 A | 200 A | 200 A | 250 A | 300 A | 350 A | 400 A | 520 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | | |
| Full load current | 120 V AC | - | - | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - | - | - |
| Horse power rating | 120 V AC | - | - | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - | - | - |
| UL / CSA maximum 3-phase motor rating | | | | | | | | | |
| Full load current (1) | 200-208 V AC | 92 A | 120 A | 120 A | 150 A | 177 A | 221 A | 285 A | 359 A |
| | 220-240 V AC | 104 A | 130 A | 130 A | 154 A | 192 A | 248 A | 312 A | 360 A |
| | 440-480 V AC | 96 A | 124 A | 124 A | 156 A | 180 A | 240 A | 302 A | 361 A |
| | 550-600 V AC | 99 A | 125 A | 125 A | 144 A | 192 A | 242 A | 289 A | 336 A |
| Horse power rating (1) | 200-208 V AC | 30 hp | 40 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Short-circuit protection device for contactors | | | | | | | | | |
| without thermal overload relay - Motor protection excluded | | | | | | | | | |
| High fault current | | 100 kA | | | | | | | |
| Fuse rating | | 225 A | 250 A | 250 A | 450 A | 400 A | 500 A | 600 A | 800 A |
| Fuse type, 600 V | | J | | | | | | | |
| Maximum electrical switching frequency | | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | | |
| For motor use | | 300 cycles/h | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

AF400 ... AF750 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactors types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|--|------------------|---|--------|--------|---------|
| Standards | | UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1 | | | |
| Maximum operational voltage | | 1000 V | | | |
| NEMA size | | - | 6 | - | 7 |
| NEMA maximum horse power ratings | | | | | |
| 1-phase, 60 Hz | 115 V AC | - | | | |
| | 230 V AC | - | | | |
| NEMA maximum horse power ratings | | | | | |
| 3-phase, 60 Hz | 200 V AC | - | 150 hp | - | - |
| | 230 V AC | - | 200 hp | - | 300 hp |
| | 460 V AC | - | 400 hp | - | 600 hp |
| | 575 V AC | - | 400 hp | - | 600 hp |
| UL / CSA general use rating | | | | | |
| 1000 V AC | | 550 A | 650 A | 750 A | 900 A |
| 3 poles in serie | 600 V DC | 550 A | 650 A | 750 A | 900 A |
| UL / CSA maximum 1-phase motor rating | | | | | |
| Full load current | 120 V AC | - | - | - | - |
| | 240 V AC | - | - | - | - |
| Horse power rating | 120 V AC | - | - | - | - |
| | 240 V AC | - | - | - | - |
| UL / CSA maximum 3-phase motor rating | | | | | |
| Full load current (1) | 200-208 V AC | 358.8 A | 414 A | 552 A | 692.3 A |
| | 220-240 V AC | 360 A | 480 A | 604 A | 722 A |
| | 440-480 V AC | 414 A | 477 A | 590 A | 722 A |
| | 550-600 V AC | 382 A | 472 A | 578 A | 672 A |
| Horse power rating (1) | 200-208 V AC | 125 hp | 150 hp | 200 hp | 250 hp |
| | 220-240 V AC | 150 hp | 200 hp | 250 hp | 300 hp |
| | 440-480 V AC | 350 hp | 400 hp | 500 hp | 600 hp |
| | 550-600 V AC | 400 hp | 500 hp | 600 hp | 700 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | |
| Fuse rating | | 1000 A | | 1200 A | |
| Fuse type, 600 V | | L | | | |
| Maximum electrical switching frequency | | | | | |
| For general use | | 300 cycles/h | | | |
| For motor use | | 300 cycles/h | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF1250 ... AF2850 3-pole contactors

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|--|------------------|---|------------------------------------|---------|--------|-------------|-------------|
| Standards | | UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1 | | | | | |
| Maximum operational voltage | | 1000 V | | | | | |
| NEMA size | | - | - | 8 | - | - | - |
| NEMA maximum horse power ratings | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | - | | | | | |
| | 230 V AC | - | | | | | |
| NEMA maximum horse power ratings | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | - | - | - | - | - | - |
| | 230 V AC | 300 hp | - | 450 hp | - | - | - |
| | 460 V AC | 600 hp | - | 900 hp | - | - | - |
| | 575 V AC | 600 hp | - | 900 hp | - | - | - |
| UL / CSA general use rating | | | | | | | |
| 1000 V AC | | 1210 A | 1350 A | 1650 A | 2100 A | 2700 A | 2850 A |
| 3 poles in serie | 600 V DC | 1210 A | - | - | - | - | - |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - |
| Horse power rating | 120 V AC | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | - | 954 A | 1030 A | - | - | - |
| | 220-240 V AC | - | 954 A | 1030 A | - | - | - |
| | 440-480 V AC | - | 954 A | 1030 A | - | - | - |
| | 550-600 V AC | - | 944 A | 1050 A | - | - | - |
| Horse power rating (1) | 200-208 V AC | - | - | - | - | - | - |
| | 220-240 V AC | - | 400 hp | 450 hp | - | - | - |
| | 440-480 V AC | - | 800 hp | 900 hp | - | - | - |
| | 550-600 V AC | - | 1000 hp | 1150 hp | - | - | - |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | |
| Fuse rating | | 1200 A | Please consult us for coordination | | | | |
| Fuse type, 600 V | | L | with circuit-breaker | | | | |
| Maximum electrical switching frequency | | | | | | | |
| For general use | | 300 cycles/h | 60 cycles/h | | | 15 cycles/h | 15 cycles/h |
| For motor use | | 300 cycles/h | 60 cycles/h | | | - | - |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF09 ... AF96 3-pole contactors

Technical data

Main pole utilization characteristics - 3 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|------------------|----------|----------|----------|----------|----------|----------|----------|----------|-------|----------|----------|
| HVAC application - UL / CSA | | | | | | | | | | | | |
| Definite purpose heating rating - 3-phase | | | | | | | | | | | | |
| Full Load Amps (FLA) | | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 220-240 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 440-480 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 550-600 V AC | 80 A | 100 A | 120 A | 180 A | 200 A | 200 A | 240 A | 320 A | 360 A | 420 A | 460 A |
| Definite purpose air conditioning rating - 3-phase | | | | | | | | | | | | |
| Full Load Amps (FLA) | | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 220-240 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 440-480 V AC | 120 A | 150 A | 180 A | 270 A | 300 A | 300 A | 360 A | 480 A | 540 A | 630 A | 690 A |
| | 550-600 V AC | 80 A | 100 A | 120 A | 180 A | 200 A | 200 A | 240 A | 320 A | 360 A | 420 A | 460 A |
| AC Resistance air heating | | | | | | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | | | | | |
| 1-phase | | | | | | | | | | | | |
| Horse power rating | 110-120 V AC | 1/4 hp | 1/3 hp | (1) | 1-1/2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| | 220-240 V AC | 1/2 hp | 3/4 hp | (1) | 3 hp | 3 hp | 5 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp |
| 3-phase | | | | | | | | | | | | |
| Horse power rating | 200-208 V AC | 1 hp | 2 hp | (1) | 5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 15 hp | 15 hp |
| | 220-240 V AC | 1 hp | 2 hp | (1) | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 20 hp | 20 hp |
| | 440-480 V AC | 3 hp | 5 hp | (1) | 15 hp | 20 hp | 20 hp | 25 hp | 30 hp | 40 hp | 40 hp | 40 hp |
| | 550-600 V AC | 3 hp | 5 hp | (1) | 15 hp | 20 hp | 20 hp | 30 hp | 40 hp | 40 hp | 50 hp | 50 hp |
| Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2 | | | | | | | | | | | | |
| 1-phase | | | | | | | | | | | | |
| Horse power rating | 110-120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 220-240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7.5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp |
| 3-phase | | | | | | | | | | | | |
| Horse power rating | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 60 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| Lighting application - UL / CSA | | | | | | | | | | | | |
| Tungsten lamps | | | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| Electrical discharge lamps (ballast) | | | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 45 A | 50 A | 50 A | 65 A | 80 A | 90 A | 105 A | 115 A |

(1) 3-pole AF16 cannot be used. Select 4-pole non-reversing contactor AF16...40...

AF116 ... AF370 3-pole contactors

Technical data

Main pole utilization characteristics - 3 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| HVAC application - UL / CSA | | | | | | | | | |
| Definite purpose heating rating - 3-phase | | | | | | | | | |
| Full Load Amps (FLA) | | 116 A | 125 A | 160 A | 200 A | 250 A | 300 A | 350 A | 520 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 220-240 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 440-480 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 550-600 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| Definite purpose air conditioning rating - 3-phase | | | | | | | | | |
| Full Load Amps (FLA) | | 116 A | 125 A | 160 A | 200 A | 250 A | 300 A | 350 A | 520 A |
| Locked Rotor Amps (LRA) | 200-208 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 220-240 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 440-480 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| | 550-600 V AC | 800 A | 875 A | 1050 A | 1400 A | 1500 A | 2100 A | 2450 A | 3120 A |
| AC Resistance air heating | | | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | | |
| 3-phase | | | | | | | | | |
| Horse power rating | 200-208 V AC | 15 hp | 15 hp | 15 hp | 20 hp | 30 hp | 40 hp | 40 hp | 50 hp |
| | 220-240 V AC | 20 hp | 20 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp |
| | 440-480 V AC | 40 hp | 40 hp | 40 hp | 60 hp | 75 hp | 100 hp | 100 hp | 125 hp |
| | 550-600 V AC | 50 hp | 50 hp | 50 hp | 75 hp | 100 hp | 125 hp | 150 hp | 150 hp |
| Elevator control, 500 000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2 | | | | | | | | | |
| 3-phase | | | | | | | | | |
| Horse power rating | 200-208 V AC | 30 hp | 40 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Lighting application - UL / CSA | | | | | | | | | |
| Tungsten lamps | | | | | | | | | |
| 1-phase per pole | 347 V AC | - | - | - | - | - | - | - | - |
| 3-phase break all lines | 600 V AC | - | - | - | - | - | - | - | - |
| Electrical discharge lamps (ballast) | | | | | | | | | |
| 1-phase per pole | 347 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |
| 3-phase break all lines | 600 V AC | 160 A | 200 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A |

AF09 ... AF38 3-pole contactors

Technical data

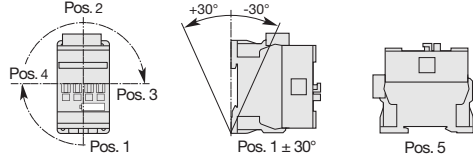
General technical data

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|------------------------------------|--|------|------|------|------|------|
| Rated insulation voltage U_i | | | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| Rated impulse withstand voltage U_{imp} . | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | -25...+60 °C | | | | | |
| | Without thermal overload relay | -40...+70 °C | | | | | |
| Storage | | -60...+80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
| | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | | | | | | |
| acc. to IEC 60068-2-6 | | 5...300 Hz | | | | | |
| | | 4 g closed position / 2 g open position | | | | | |

(1) Environment B: all AF09...AF38 produced since week 08.2013.

AF09...AF38-...-12 (48 ...130 V 50 / 60 Hz - DC) compliant to environment A only: for environment B, select AF09...AF38Z-...-22.

Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|--|------------------|--|------|------|------|------|------|
| Mounting positions | |  | | | | | |
| | | Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38 | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

AF09 ... AF38 3-pole contactors

Technical data

Magnet system characteristics for AF09 ... AF38 contactors - AC / DC operated

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|--|-----------------------|--|------|------|------|------|------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | | |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | | | |
| AC control voltage 50/60 Hz | | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | | |
| Rated control circuit voltage U_c | | 24...500 V AC | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | 20...500 V DC | | | | | |
| Rated control circuit voltage U_c | | 20...500 V DC | | | | | |
| Coil consumption | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | Not suitable for direct control by PLC output | | | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | - | | | | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | - | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | | |
| | N.C. contact opening | 38...90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | | |
| | N.C. contact closing | 13...98 ms | | | | | |

Magnet system characteristics for AF09Z ... AF38Z 24 DC operated - designed for PLC - coil 30

| Contactor types | DC operated | AF09Z | AF12Z | AF16Z | AF26Z | AF30Z | AF38Z |
|--|-----------------------|--|-------|-------|-------|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ | | | | | |
| | | At $\theta \leq 70^\circ\text{C}$ U_c | | | | | |
| DC control voltage | | 24 V DC | | | | | |
| Rated control circuit voltage U_c | | 24 V DC | | | | | |
| | | 24 V DC | | | | | |
| Coil consumption | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | $\geq 250 \text{ mA}$ 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 27...53 ms | | | | | |
| | N.C. contact opening | 20...35 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 17...29 ms | | | | | |
| | N.C. contact closing | 22...57 ms | | | | | |

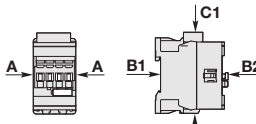
Magnet system characteristics for AF09Z ... AF38Z for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z | AF12Z | AF16Z | AF26Z | AF30Z | AF38Z |
|--|-----------------------|--|-------|-------|-------|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | | |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | | | |
| AC control voltage | | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | | |
| Rated control circuit voltage U_c | | 24...250 V AC | | | | | |
| Coil consumption | Average pull-in value | 16 VA | | | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | | | |
| DC control voltage | | 12...250 V DC | | | | | |
| Rated control circuit voltage U_c | | 12...250 V DC | | | | | |
| Coil consumption | Average pull-in value | 12...16 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | (AF..Z coil 21) $\geq 500 \text{ mA}$ 24 V DC for PLCs - not suitable for safety PLCs | | | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | (AF..Z coil 21, 22, 23) 20 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | | |
| | N.C. contact opening | 38...90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | | |
| | N.C. contact closing | 13...98 ms | | | | | |

AF40 ... AF96 3-pole contactors

Technical data

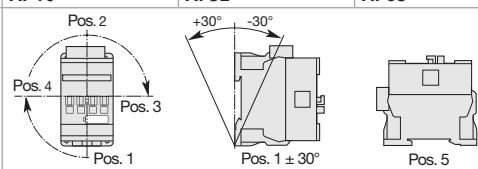
General technical data

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|--|--|------|------|--------|------|
| Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA | | 690 V 600 V | | | 1000 V | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | 8 kV | |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation | Fitted with thermal overload relay Without thermal overload relay | -40...+70 °C -40...+70 °C | | | | |
| Storage | | -60...+80 °C | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | |
| Mounting position 1 | | | | | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | |
| | A | 25 g | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | |
| | B2 | 15 g | | | | |
| | C1 | 25 g | | | | |
| C2 | 25 g | | | | | |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 3 g closed position / 3 g open position | | | | |

Magnet system characteristics

| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|--|--|------|------|-------|------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply DC supply | At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | |
| AC control voltage 50/60 Hz | | | | | | |
| Rated control circuit voltage U_c | | 24...500 V AC | | | | |
| Coil consumption | Average pull-in value Average holding value | 25 VA 4 VA / 2 W | | | 40 VA | |
| DC control voltage | | | | | | |
| Rated control circuit voltage U_c | | 20...500 V AC | | | | |
| Coil consumption | Average pull-in value Average holding value | 25 W 2 W | | | 40 W | |
| PLC-output control | | - | | | | |
| Drop-out voltage | | ≤ 60 % of $U_c \text{ min}$. | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | conditions of use on request | | | | |
| Dips withstand -20 °C $\leq \theta \leq +60$ °C | | 20 ms average | | | | |
| Operating time | | | | | | |
| Between coil energization and: | N.O. contact closing N.C. contact opening | 42...100 ms 38...95 ms | | | | |
| Between coil de-energization and: | N.O. contact opening N.C. contact closing | 17...100 ms 19...105 ms | | | | |

Mounting characteristics and conditions

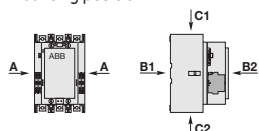
| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|------------------|--|------|------|------------|------|
| Mounting positions | |  | | | | |
| Mounting distances | | Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF40 ... AF96 | | | | |
| Fixing | | The contactors can be assembled side by side | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 or 2 x M6 screws placed diagonally | | | | |

AF116 ... AF370 3-pole contactors

Technical data

General technical data

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|------------------------------------|--|-------|-------|-------|--------------------------------|-------|-------|-------|
| Rated insulation voltage U_i | | 1000 V | | | | | | | |
| acc. to IEC 60947-4-1 | | 600 V | | | | | | | |
| acc. to UL / CSA | | 8 kV | | | | | | | |
| Rated impulse withstand voltage U_{imp} | | AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | | |
| Electromagnetic compatibility | | AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | | |
| Ambient air temperature close to contactor | | -25 to +55 °C | | | | | | | |
| Operation | Fitted with thermal overload relay | -40 to +70 °C | | | | | | | |
| | Without thermal overload relay | -40 to +70 °C | | | | | | | |
| Storage | | -40 to +70 °C | | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | | |
| Mechanical durability | | 5 million operating cycles | | | | | | | |
| Number of operating cycles | | 300 cycles/h | | | | | | | |
| Maximum switching frequency | | No change in contact position, closed or open position | | | | | | | |
| Shock withstand | | Shock direction | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | 1/2 sinusoidal shock for 11 ms | | | | 1/2 sinusoidal shock for 30 ms | | | |
| Mounting position 1 | | A | | | | | | | |
| | | B1 | | | | | | | |
| | | B2 | | | | | | | |
| | | C1 | | | | | | | |
| | | C2 | | | | | | | |
| Vibration withstand | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | | | |
| acc. to IEC 60068-2-6 | | | | | | | | | |



Magnet system characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|-----------------------|--|-------|-------|------------|-------|------------|-------|-------|
| Coil operating limits | AC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | | | | |
| Rated control circuit voltage U_c (1) | | 24...500 V AC, 20...500 V DC | | | | | | | |
| Coil consumption | | | | | | | | | |
| AC control voltage 50/60 Hz | | 24...60 V AC | | | | | | | |
| | Average pull-in value | 225 VA | | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA | | | 6 VA | | 8.5 VA | | |
| 48...130 V AC | | 48...130 V AC | | | | | | | |
| | Average pull-in value | 170 VA | | | 175 VA | | 340 VA | | |
| | Average holding value | 4 VA | | | 4 VA | | 17 VA | | |
| 100...250 V AC | | 100...250 V AC | | | | | | | |
| | Average pull-in value | 130 VA | | | 220 VA | | 385 VA | | |
| | Average holding value | 6 VA | | | 7 VA | | 17.5 VA | | |
| 250...500 V AC | | 250...500 V AC | | | | | | | |
| | Average pull-in value | 205 VA | | | 185 VA | | 420 VA | | |
| | Average holding value | 16 VA | | | 16 VA | | 21 VA | | |
| DC control voltage | | 20...60 V DC | | | | | | | |
| | Average pull-in value | 210 W | | | 205 W | | 400 W | | |
| | Average holding value | 2.5 W | | | 2.5 W | | 3.5 W | | |
| 48...130 V DC | | 48...130 V DC | | | | | | | |
| | Average pull-in value | 130 W | | | 130 W | | 360 W | | |
| | Average holding value | 2.5 W | | | 2.5 W | | 2.5 W | | |
| 100...250 V DC | | 100...250 V DC | | | | | | | |
| | Average pull-in value | 135 W | | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | | 2.5 W | | 4.5 W | | |
| 250...500 V DC | | 250...500 V DC | | | | | | | |
| | Average pull-in value | 205 W | | | 190 W | | 600 W | | |
| | Average holding value | 4 W | | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$ | | | | | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | | | | | |
| Dips withstand | | $\geq 20 \text{ ms}$ | | | | | | | |
| Operating time | | | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and (2): | N.O. contact opening | 40...70 ms | | | 45...80 ms | | 45...80 ms | | |

(1) For more detailed data, please consult your ABB local sales organization

(2) Less than 20ms when using coil code -33 and -34

Mounting characteristics and conditions for use

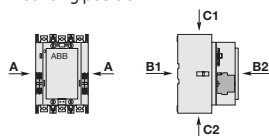
| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|-------------------------------------|------------------|---|-------|-------|-------|--------|-------|-------|-------|
| Mounting positions | | | | | | | | | |
| Mounting distances | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF116 ... AF370 | | | | | | | |
| Fixing | | The contactors can be assembled side by side | | | | | | | |
| On rail acc. to IEC 60715, EN 60715 | | - | | | | | | | |
| By screws | | 4 x M4 | | | | 4 x M5 | | | |

AF400 ... AF750 3-pole contactors

Technical data

General technical data

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|---------------------------------------|--|-------|-------|-------|
| Rated insulation voltage U_i | | 1000 V | | | |
| acc. to IEC 60947-4-1 | | 600 V | | | |
| acc. to UL / CSA | | 8 kV | | | |
| Rated impulse withstand voltage U_{imp} | | AF contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | |
| Electromagnetic compatibility | | | | | |
| Ambient air temperature close to contactor | | | | | |
| Operation | Fitted with electronic overload relay | -25 to +70 °C | | | |
| | Without electronic overload relay | -40 to +70 °C | | | |
| Storage | | -40 to +70 °C | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | |
| Mechanical durability | | | | | |
| Number of operating cycles | | 3 millions operating cycles (contacts needs to be replaced every 0,75 millions operating cycles) | | | |
| Max. switching frequency | | 300 cycles/h | | | |
| Shock withstand | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | |
| Mounting position 1 | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | |
| | A | 5 g | | | |
| | B1 | 5 g | | | |
| | B2 | 5 g | | | |
| | C1 | 5 g | | | |
| | C2 | 5 g | | | |
| Vibration withstand | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | |



Magnet system characteristics

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|-----------------------|---|-------|------------|-------|
| Coil operating limits | AC supply | At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | |
| acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 70$ °C $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | |
| Rated control circuit voltage U_c (1) | | 48...500 V AC, 24...500 V DC | | | |
| Coil consumption | | | | | |
| AC control voltage 50/60 Hz | | | | | |
| 48...130 V AC | Average pull-in value | 1215 VA | | 1100 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 100...250 V AC | Average pull-in value | 955 VA | | 880 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 250 ... 500 V AC | Average pull-in value | 950 VA | | 985 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| DC control voltage | | | | | |
| 24...60 V DC | Average pull-in value | 900 W | | 785 W | |
| | Average holding value | 5 W | | 5.5 W | |
| 48...130 V DC | Average pull-in value | 1150 W | | 1020 W | |
| | Average holding value | 5 W | | 5 W | |
| 100...250 V DC | Average pull-in value | 895 W | | 880 W | |
| | Average holding value | 5 W | | 5 W | |
| 250 ... 500 V DC | Average pull-in value | 885 W | | 910 W | |
| | Average holding value | 7.5 W | | 7.5 W | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$. | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | |
| Dips withstand | | ≥ 20 ms | | | |
| Operating time | | | | | |
| Coil supply between A1 - A2 | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | | | |
| Control input for PLC's | | | | | |
| Between coil energization and: | Main contact closing | 40...60 ms | | 40...90 ms | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | | | |

(1) For more detailed data, please consult your ABB local sales organization

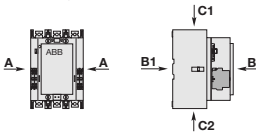
Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|--|------------------|--|-------|--------|-------|
| Mounting positions | | | | | |
| Mounting distances | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650 | | | |
| Fixing | | The contactors can be assembled side by side | | | |
| On rail according to IEC 60715, EN 60715 | | - | | | |
| By screws | | 4 x M5 | | 4 x M6 | |

AF1250 ... AF2850 3-pole contactors

Technical data

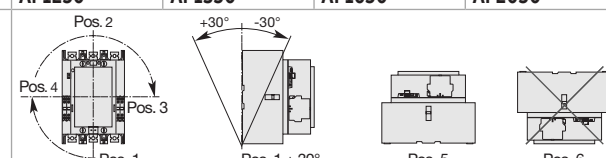
General technical data

| Contactors types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|---|---|-------------|--------|--------|------------------------------|--------|
| Rated insulation voltage U_i | | | | | | | |
| acc. to IEC 60947-4-1 | | | | | | | |
| acc. to UL / CSA | | | 1000 V | | | | |
| Rated impulse withstand voltage U_{imp} | | | | | | | |
| Electromagnetic compatibility | | | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation | Fitted with electronic overload relay | -25 to +70 °C | | | | | |
| | Without electronic overload relay | -40 to +70 °C | | | | | |
| Storage | | -40 to +70 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 0.5 million operating cycles | | | | 0.3 million operating cycles | |
| Max. switching frequency | | 300 cycles/h | 60 cycles/h | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | | | | | | | |
| |  | Shock direction | | | | | |
| | | A | 5 g | - | | | |
| | | B1 | 5 g | - | | | |
| | | B2 | 5 g | - | | | |
| | | C1 | 5 g | - | | | |
| | | C2 | 5 g | - | | | |
| Vibration withstand | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | |
| acc to IEC 60068-2-6 | | | | | | | |

Magnet system characteristics

| Contactors types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|-------------------------------------|-----------------------|------------------------------|----------------------|--------|--------|--------|--------|
| Coil operating limits | AC supply | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | | | | | | |
| Rated control circuit voltage U_c | | | 100...250 V AC or DC | | | | |
| Coil consumption | | | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| 48...130 V AC | Average pull-in value | 1100 VA | - | | | | |
| | Average holding value | 12 VA | - | | | | |
| 100...250 V AC | Average pull-in value | 880 VA | 2450 VA | | | | |
| | Average holding value | 12 VA | 48 VA | | | | |
| 250 ... 500 V AC | Average pull-in value | 985 VA | - | | | | |
| | Average holding value | 12 VA | - | | | | |
| DC control voltage | | | | | | | |
| 24...60 V DC | Average pull-in value | 785 W | - | | | | |
| | Average holding value | 5.5 W | - | | | | |
| 48...130 V DC | Average pull-in value | 1020 W | - | | | | |
| | Average holding value | 5 W | - | | | | |
| 100...250 V DC | Average pull-in value | 880 W | 2290 W | | | | |
| | Average holding value | 5 W | 20.5 W | | | | |
| 250 ... 500 V DC | Average pull-in value | 910 W | - | | | | |
| | Average holding value | 7.5 W | - | | | | |
| Drop-out voltage | | 55 % of U_c min. | | | | | |
| Voltage sag immunity | | Conditions of use on request | | | | | |
| acc. to SEMI F47 | | ≥ 20 ms | | | | | |
| Dips withstand | | | | | | | |
| Operating time | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | 50...80 ms | | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | 35...55 ms | | | | |
| Control input for PLC's | | | | | | | |
| Between coil energization and: | Main contact closing | 40...90 ms | 40...65 ms | | | | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | 10...30 ms | | | | |
















Mounting characteristics and conditions for use

| Contactors types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|--|------------------|--|--------|--------|--------|--------|--------|
| Mounting positions | |  | | | | | |
| Mounting distances | | Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 3-pole contactor AF400 ... AF2650 | | | | | |
| Fixing | | The contactors can be assembled side by side | | | | | |
| On rail according to IEC 60715, EN 60715 | | - | | | | | |
| By screws | | 4 x M6 | 4 x M8 | | | | |

AF09 ... AF38 3-pole contactors

Technical data

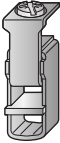
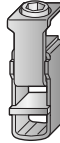












Connecting characteristics

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 |
|---|------------------|---|------|------|------|--------------------------|------|
| Main terminals | |  Screw terminals with cable clamp | | | | | |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Rigid Solid ($\leq 4 \text{ mm}^2$) | } 1 x | 1...6 mm ² | | | | 2.5...10 mm ² | |
|  Stranded ($\geq 6 \text{ mm}^2$) | | 2 x 1...6 mm ² | | | | 2.5...10 mm ² | |
|  Flexible with non insulated ferrule | } 1 x | 0.75...6 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | | 2 x 0.75...6 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | } 1 x | 0.75...4 mm ² | | | | 1.5...10 mm ² | |
|  Flexible with insulated ferrule | | 2 x 0.75...2.5 mm ² | | | | 1.5...4 mm ² | |
|  Bars or lugs | L < | 9.6 mm | | | | 12.5 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 16...10 | | | | AWG 14...8 | |
| Stripping length | | 10 mm | | | | 14 mm | |
| Tightening torque | | 1.5 Nm / 13 lb.in | | | | 2.5 Nm / 22 lb.in | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | |
|  Rigid solid | } 1 x | 1...2.5 mm ² | | | | | |
|  Rigid solid | | 2 x 1...2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | } 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | | 2 x 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | } 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | | 2 x 0.75...1.5 mm ² | | | | | |
|  Lugs | L < | 8 mm | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | | |
| Stripping length | | 10 mm | | | | | |
| Tightening torque | | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | IP20 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | | |
| Main terminals | | M3.5 | | | | M4 | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | Flat Ø 6.5 / Pozidriv 2 | |
| Coil terminals | | M3.5 | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | |

AF40 ... AF96 3-pole contactors

Technical data

Connecting characteristics

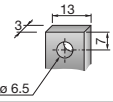
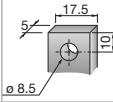
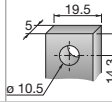

















| Contactor types | AC / DC operated | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|-------------------------------------|---|----------------------------|------|---|------------------------|
| Main terminals | |  | | |  | |
| | | Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | | | Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) | |
| Connection capacity (min. ... max.) | | | | | | |
| Main conductors (poles) | | | | | | |
|  Rigid | Stranded ($\geq 6 \text{ mm}^2$) | 1 x | 6...35 mm ² | | | 6...70 mm ² |
|  | | 2 x | 6...35 mm ² | | | 6...50 mm ² |
|  | Flexible with non insulated ferrule | 1 x | 4...35 mm ² | | | 6...50 mm ² |
|  | Flexible with insulated ferrule | 1 x | 4...35 mm ² | | | 6...50 mm ² |
|  | | 2 x | 4...35 mm ² | | | 6...50 mm ² |
|  | Bars or lugs | L < | 9.2 mm | | | 12.2 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 10...2 | | | | AWG 6...1 |
| Stripping length | | 16 mm | | | | 17 mm |
| Tightening torque | | 4 Nm / 35 lb.in | | | | 6 Nm / 53 lb.in |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | |
|  | Rigid solid | 1 x | 1...2.5 mm ² | | | |
|  | | 2 x | 1...2.5 mm ² | | | |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | |
|  | | 2 x | 0.75...1.5 mm ² | | | |
|  | Lugs | L < | 8 mm | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | |
| Stripping length | | 10 mm | | | | |
| Tightening torque | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | |
| Main terminals | | IP10 * | | | | |
| Coil terminals | | IP20 | | | | |
| Built-in auxiliary terminals | | IP20 | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| Main terminals | Screwdriver type | M6 Flat Ø 6.5 / Pozidriv 2 | | | M8 Hexagon socket (s = 4 mm) | |
| Coil terminals | Screwdriver type | M3.5 Flat Ø 5.5 / Pozidriv 2 | | | | |
| Built-in auxiliary terminals | Screwdriver type | M3.5 Flat Ø 5.5 / Pozidriv 2 | | | | |

* For IP20 degree of protection, use LT terminal shroud accessory.

AF116 ... AF370 3-pole contactors

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|-------------------------------------|---|----------------------------|-------|--|-------|---|-------|-------|
| Main terminals | | | | | | | | | |
| Flat type | |  | | |  | |  | | |
| Connection capacity (min. ... max.) | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | |
|  | Cu cable - Stranded | 1 x | 10...95 mm ² | | 6...150 mm ² | | 16...300 mm ² | | |
| | Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| | Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  | Cu cable - Stranded | 2 x | 10...95 mm ² | | 50...120 mm ² | | 70...185 mm ² | | |
|  | Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| | Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  | Al cable - Stranded | 1 x | - | | 95...185 mm ² | | 185...240 mm ² | | |
| | Clamp type | | - | | 1SDA054988R1 | | 1SDA055020R1 | | |
| | Tightening torque | | - | | 31 Nm | | 43 Nm | | |
|  | Cu cable - Flexible | 1 x | 10...70 mm ² | | 6...120 mm ² | | 16...240 mm ² | | |
| | Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| | Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  | Cu cable - Flexible | 2 x | 10...70 mm ² | | 50...95 mm ² | | 70...185 mm ² | | |
|  | Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| | Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  | Lugs | L ≤ | 22 mm (.866 in) | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | | Ø > | 6 mm (.236 in) | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| | Socket type | | LL... included | | LL... included | | LL... included | | |
| | Tightening torque | | 9 Nm / 80 lb.in | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | | 1 x | AWG 6...3/0 | | 6...300 MCM | | 4...400 MCM | | |
| | Clamp type | | LD... included (1) | | ATK185 (2) | | ATK300 (2) | | |
| | Tightening torque | | 8 Nm / 71 lb.in | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | | 2 x | AWG 6...3/0 | | - | | 4...500 MCM | | |
| | Clamp type | | LD... included (1) | | - | | ATK300/2 (2) | | |
| | Tightening torque | | 8 Nm / 71 lb.in | | - | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | | | | | |
|  | Solid / stranded | 1 x | 1...4 mm ² | | | | | | |
|  | | 2 x | 1...4 mm ² | | | | | | |
|  | Flexible | 1 x | 0.75...2.5 mm ² | | | | | | |
|  | | 2 x | 0.75...2.5 mm ² | | | | | | |
|  | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
|  | | 2 x | 0.75...2.5 mm ² | | | | | | |
|  | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
|  | | 2 x | 0.75...2.5 mm ² | | | | | | |
|  | Lugs | L < | 8 mm | | | | | | |
| | | l > | 3.5 mm | | | | | | |
| Connection capacity acc. to UL / CSA | | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | | 9 mm | | | | | | |
| Tightening torque | | | 1.00 Nm / 9 lb.in | | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | | |
| Main terminals | | | IP00 | | | | | | |
| Coil terminals | | | IP20 | | | | | | |
| Screw terminals | | | | | | | | | |
| Main terminals | | | M6 | | M8 | | M10 | | |
| Screwdriver type | | | Screws and bolts | | | | | | |
| Coil terminals (delivered in open position) | | | M3.5 | | | | | | |
| Screwdriver type | | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

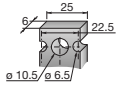
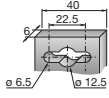
























(1) LD... not included for AF116 ... AF146-30...B.

(2) Available in North America only.

AF400 ... AF750 3-pole contactors

Technical data

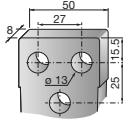
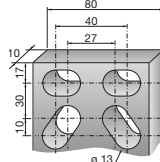
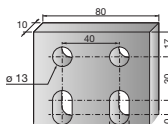
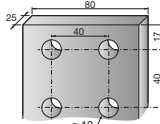






















Connecting characteristics

| Contactor types | AC / DC operated | AF400 | AF460 | AF580 | AF750 |
|---|------------------|---|---------------------|---|-------|
| Main terminals Flat type | |  | |  | |
| Connection capacity (min. ... max.) | | | | | |
| Main conductors (poles) | | | | | |
|  Cu cable - Stranded | 2 x | 240 mm ² | | - | |
|  Clamp type | | 1SDA013922R1 | | - | |
|  Tightening torque | | 35 Nm | | - | |
|  Cu cable - Stranded | 3 x | - | 185 mm ² | | |
|  Clamp type | | - | 1SDA013956R1 | | |
|  Tightening torque | | 35 Nm | 45 Nm | | |
|  Al cable - Stranded | 2 x | 240 mm ² | | - | |
|  Clamp type | | 1SDA013922R1 | | - | |
|  Tightening torque | | 35 Nm | | - | |
|  Al cable - Stranded | 3 x | - | 185 mm ² | | |
|  Clamp type | | - | 1SDA013956R1 | | |
|  Tightening torque | | 35 Nm | 45 Nm | | |
|  Lugs | L ≤ | 47 mm | 50 mm | | |
| | Ø > | 10 mm | 12 mm | | |
|  Tightening torque | | 35 Nm / 310 lb.in | 45 Nm / 398 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | 250-500 MCM alt. 2/0 AWG-500 MCM | - | | |
|  Clamp type | | K6TH alt. ATK580 | - | | |
|  Tightening torque | | 275 lb.in | - | | |
| Connection capacity acc. to UL / CSA | 3 x | 2/0 AWG-400 MCM | 2/0 AWG-500 MCM | | |
|  Clamp type | | K6TJ | ATK750/3 | | |
|  Tightening torque | | 275 lb.in | 375 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | |
|  Solid / stranded | 1 x | 1...4 mm ² | | | |
| | 2 x | 1...4 mm ² | | | |
|  Flexible | 1 x | 0.75...2.5 mm ² | | | |
| | 2 x | 0.75...2.5 mm ² | | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | |
| | 2 x | 0.75...2.5 mm ² | | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | |
| | 2 x | 0.75...2.5 mm ² | | | |
|  Lugs | L ≤ | 8 mm | | | |
| | l > | 3.7 mm | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | |
|  Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | |
| | Max. | 1.20 Nm | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | |
| Main terminals | | IP00 | | | |
| Coil terminals | | IP20 | | | |
| Screw terminals | | | | | |
| Main terminals | | M10 | M12 | | |
| | | Screws and bolts | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | |

AF1250 ... AF2850 3-pole contactors

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 | AF2850 |
|---|-------------------|---|---|---|---|--------|---|
| Main terminals Flat type | |  |  | |  | |  |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Cu cable - Stranded | 2 x | - | | | | | |
|  Clamp type | | - | | | | | |
|  Tightening torque | | - | | | | | |
|  Cu cable - Stranded | 3 x | - | | | | | |
|  Clamp type | | - | | | | | |
|  Tightening torque | | - | | | | | |
|  Al cable - Stranded | 2 x | - | | | | | |
|  Clamp type | | - | | | | | |
|  Tightening torque | | - | | | | | |
|  | 3 x | - | | | | | |
|  Clamp type | | - | | | | | |
|  Tightening torque | | - | | | | | |
|  Lugs | L ≤ | 50 mm | 100 mm | | | | |
| | Ø > | 12 mm | | | | | |
| | Tightening torque | 45 Nm / 398 lb.in | | | | | |
| Connection capacity acc. to UL / CSA | 2 x | 2// 3 x 0.25 in | 4/0 AWG - 500 MCM | | 4//4 x 0.25 in | | |
| Clamp type | | bars, use LW1250 | K7TK ATK1350/4 | K7TK | bars | | |
| Tightening torque | | | 375 lb.in | | - | | |
| Connection capacity acc. to UL / CSA | 3 x | 2/0 AWG-500 MCM | 1/0-750 MCM | | - | | |
| Clamp type | | - | K8TL, K8TM, ATK1650/4 | K8TL, K8TM, ATK1650/4, ATK1650/6 | - | | |
| Tightening torque | | 375 lb.in | 500 lb.in | | - | | |
| Auxiliary conductors (coil terminals) | | | | | | | |
|  Solid / stranded | 1 x | 1...4 mm ² | | | | | |
|  | 2 x | 1...4 mm ² | | | | | |
|  Flexible | 1 x | 0.75...2.5 mm ² | | | | | |
|  | 2 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | |
|  | 2 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | |
|  | 2 x | 0.75...2.5 mm ² | | | | | |
|  Lugs | L ≤ | 8 mm | | | | | |
| | l > | 3.7 mm | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | | | |
| | Max. | 1.20 Nm | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | IP00 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Screw terminals | | | | | | | |
| Main terminals | | M12 | | | | | |
| | | Screws and bolts | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | |

AF09 ... AF96 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|---|--------------------|---|------|------|------|------|------|------|------|------|------|------|
| Rated operational voltage U _e max. | | 690 V | | | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free air thermal current I _{th} - θ ≤ 40 °C | | 16 A | | | | | | | | | | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | | | | | | |
| Making capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | |
| Conditional short-circuit current | | 1 kA | | | | | | | | | | |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A | | | | | | | | | | |
| | for 0.1 s | 140 A | | | | | | | | | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA | | | | | | | | | | |
| | | 10 ⁻⁷ | | | | | | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | | | | | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | | | | | | | | | |
| | DC-13 | 900 cycles/h | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mechanically linked contacts. | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4, CAT4 aux. contact blocks) are mirror contacts. | | | | | | | | | | |

Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC / DC operated | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|------------------|--------------------|------|------|------|------|------|------|------|------|------|------|
| Max. operational voltage | | 600 V AC, 600 V DC | | | | | | | | | | |
| Pilot duty | | A600, Q600 | | | | | | | | | | |
| AC thermal rated current | | 10 A | | | | | | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | | | | | | |
| DC thermal rated current | | 2.5 A | | | | | | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | | | | | | |

3-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3: $I_c = I_e$
- Category AC-2: $I_c = 2.5 \times I_e$
- Category AC-4: $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

- Note the characteristics of the load to be controlled:
 - Operational voltage U_e
 - Current normally drawn I_e ($U_e / I_e / \text{kW}$ relation for motors, see "Motor rated operational powers and currents").
 - Utilization category AC-1, AC-2, AC-3 or AC-4
 - Breaking current $I_c = I_e$ for AC-1 and for AC-3; $I_c = 2.5 \times I_e$ for AC-2; $I_c = 6 \times I_e$ for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point ($I_c ; N$).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
 - Operational voltage U_e
 - Current normally drawn while "motor running" I_e ($U_e / I_e / \text{kW}$ relation for motors, see "Motor rated operational powers and currents")
 - Breaking current for AC-3 $I_c = I_e$
 - Breaking current for AC-4 while "motor accelerating" $I_c = 6 \times I_e$
 - Percentage of AC-4 operating cycles K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on Main pole utilization characteristic table (see "Technical data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - The number of operating cycles A for $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

$$N' = \frac{A}{1 + 0.01 K (A/B - 1)}$$

- If N' is too low in relation to the target N , calculate the estimated number of cycles for a higher contactor rating.

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

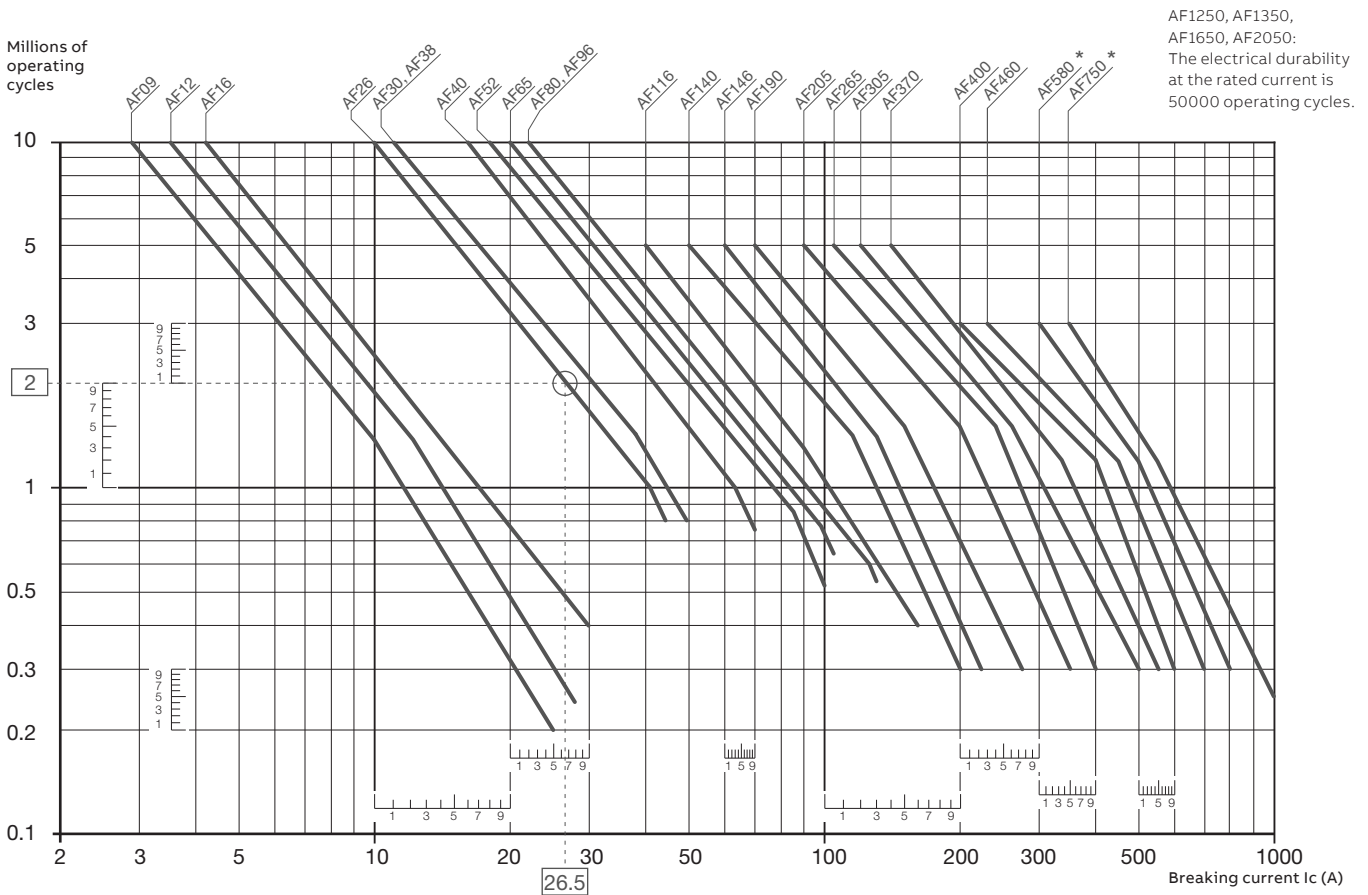
3-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

Example:

$I_c / AC-1 = 26.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "O" (26.5 A / 2 millions operating cycles).

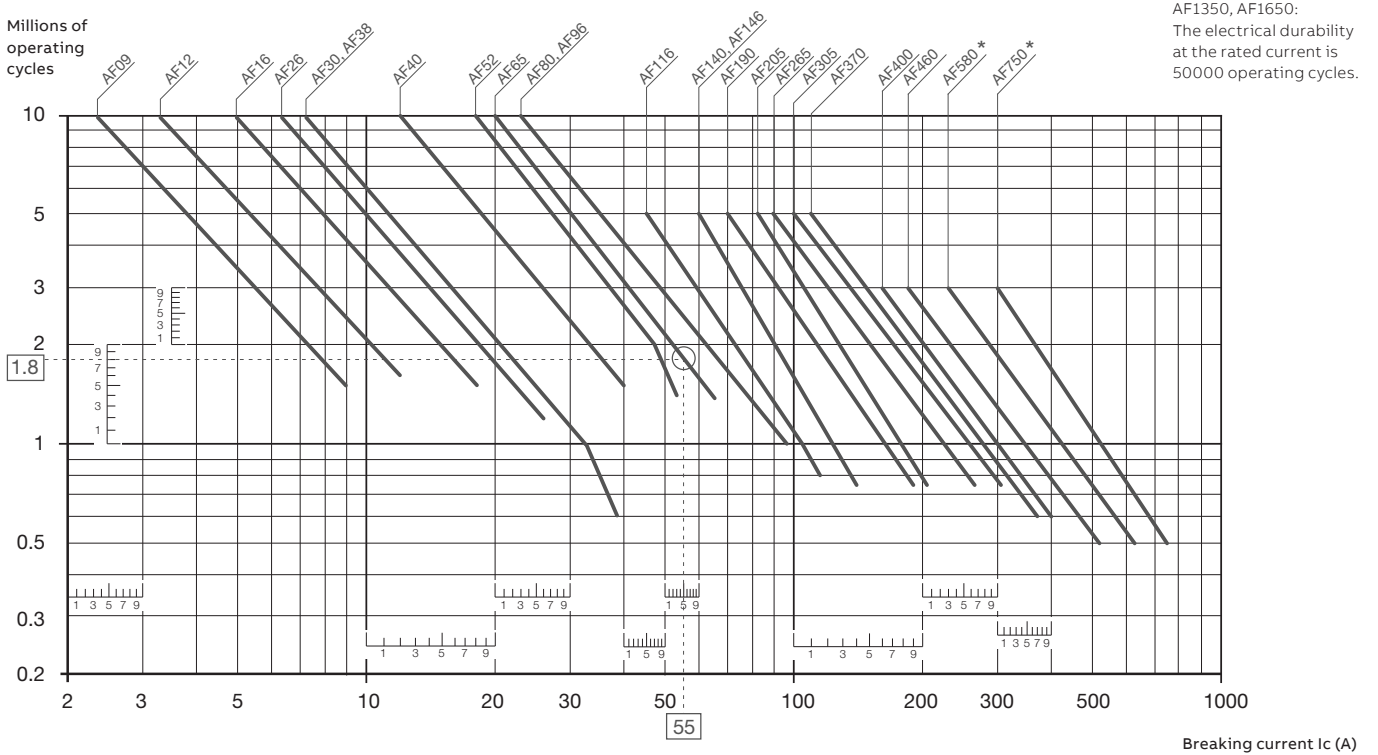
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440$ V.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

Example:

Motor power 30 kW for AC-3 - $U_e = 400$ V and $I_e = 55$ A utilization – Electrical durability required = 1.8 million operating cycles. For AC-3: $I_c = I_e$. Select the AF65 contactor at intersection "O" (55 A / 1.8 million operating cycles) on the curves (AC-3 - $U_e \leq 440$ V).

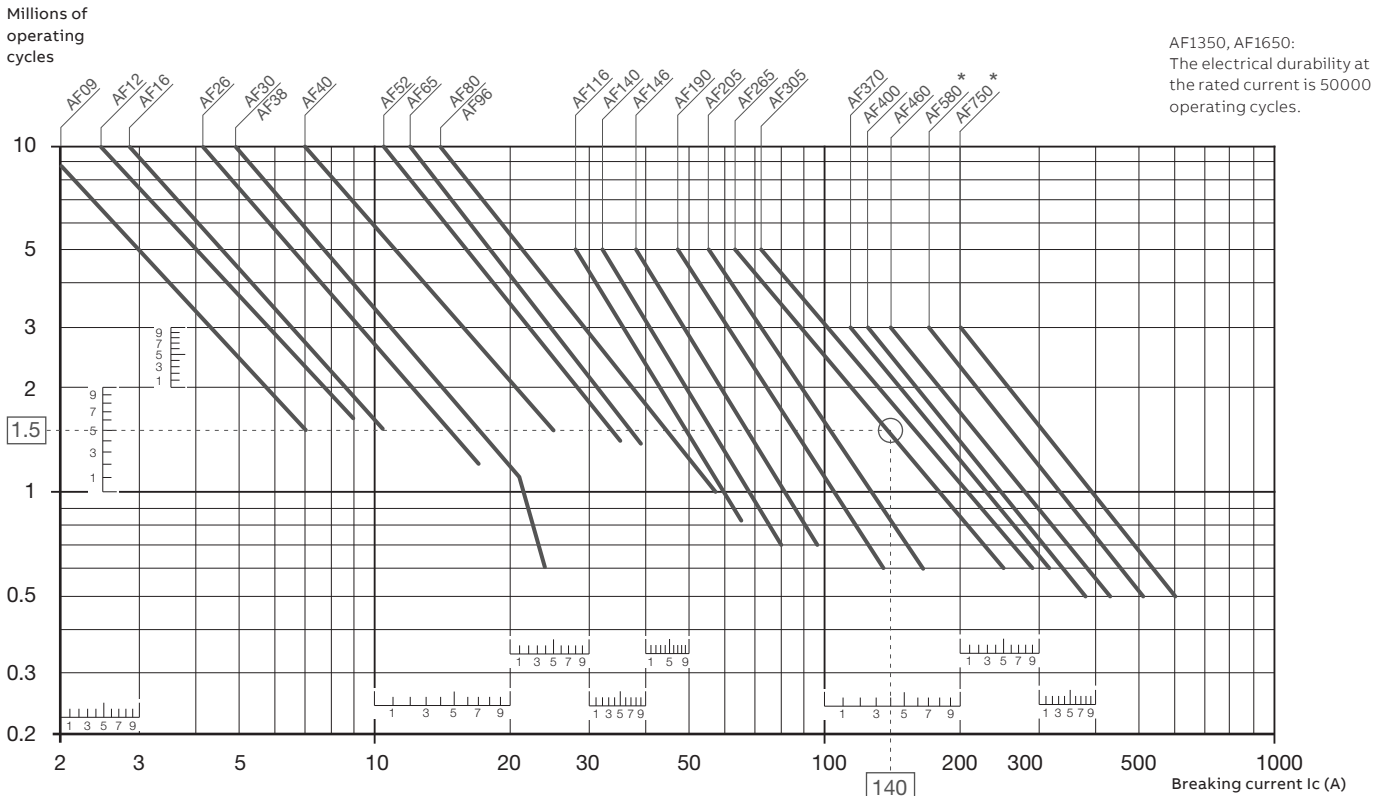
3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

Example:

Motor power 132 kW for AC-3 - $U_e = 660\text{ V}$ and $I_e = 140\text{ A}$ utilization – Electrical durability required = 1.5 million operating cycles. For AC-3: $I_c = I_e$. Select the AF265 contactor at intersection "O" (140 A / 1.5 million operating cycles) on the curves (AC-3 - $440\text{ V} < U_e \leq 690\text{ V}$).

3-pole contactors

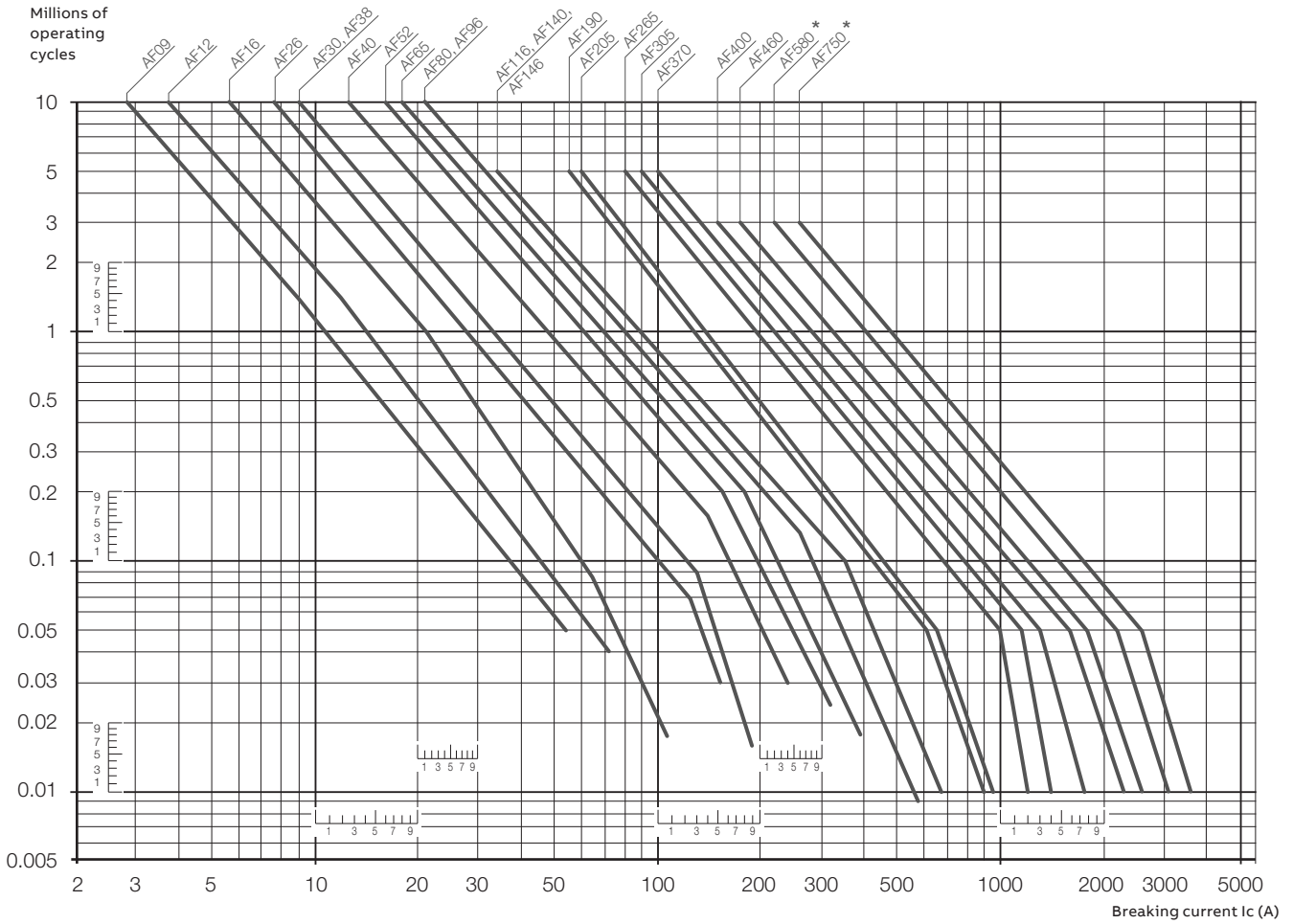
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $U_e \leq 440\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09 ... AF370, $\leq 55\text{ }^\circ\text{C}$ for AF400 ... AF1650

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full-load current).

Maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.

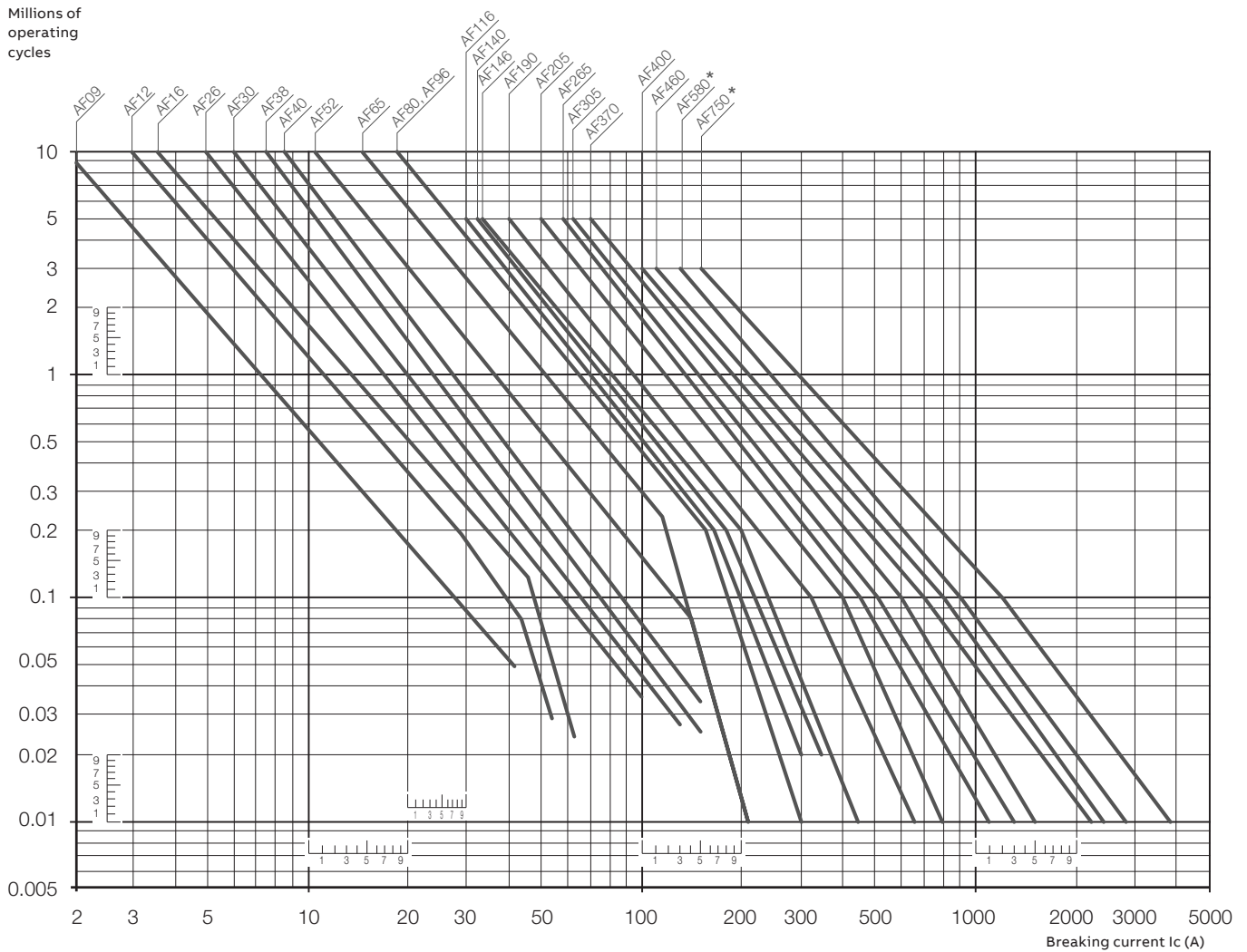
3-pole contactors

Electrical durability

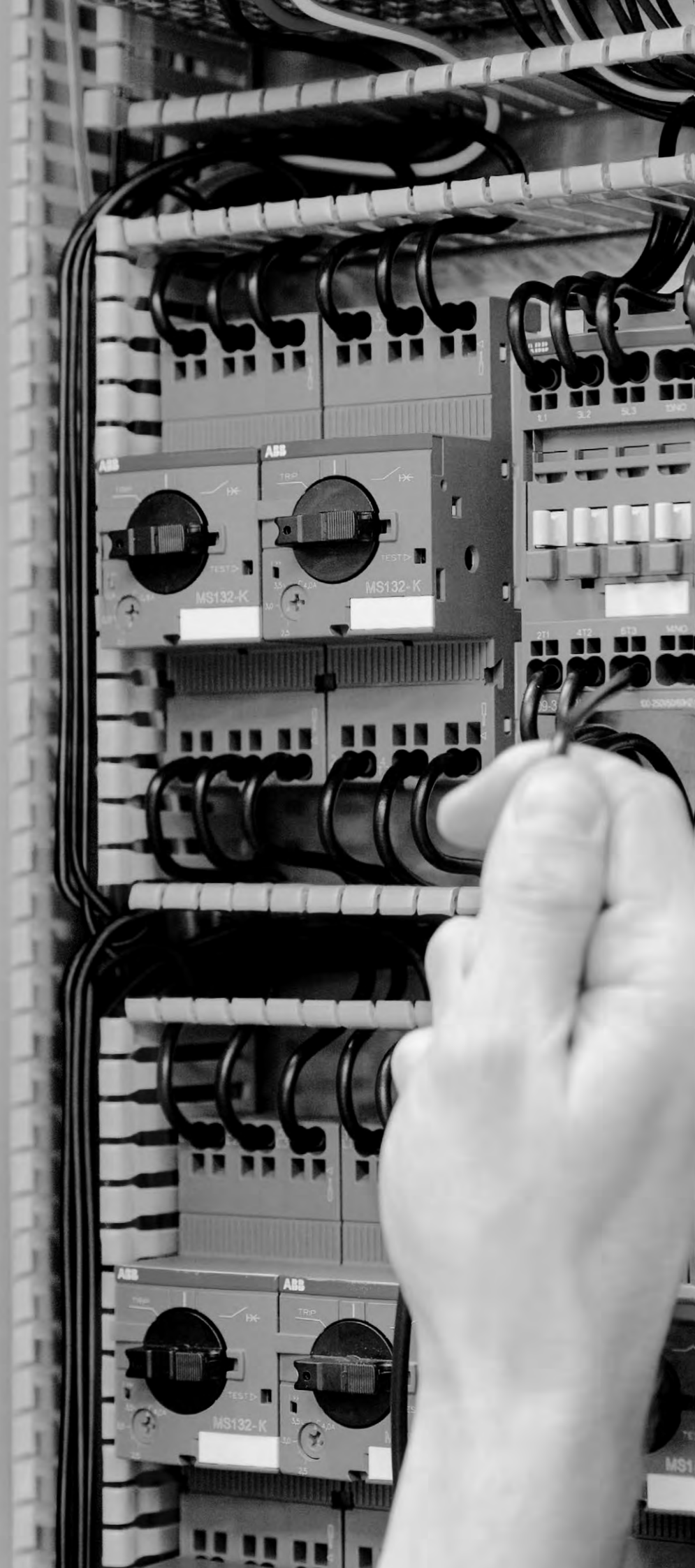
Electrical durability for AC-2 or AC-4 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AF09 ... AF370, $\leq 55\text{ }^\circ\text{C}$ for AF400 ... AF750

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full load current). Maximum electrical switching frequency: see "Technical data".



Note: * For AF580 and AF750 contacts needs to be replaced after 750k operations.



Push-in Spring motor starting solution

3/83 Presentation

3/89 Overview

Ordering details

4 to 18.5 kW

3/90 AF09..K ... AF38..K AC / DC operated

3/91 AF09Z..K ... AF38Z..K 24 V DC designed for PLC

3/92 AF09Z..K ... AF38Z..K AC / DC operated for specific applications

3/93 Main accessories

3/94 Technical data

3/101 Electrical durability

3/434 Voltage code table



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Just push it

Push-in Spring motor starting solution



With the new Push-in Spring motor starting solution, one push is all you need for extremely fast wiring. No tool is required, so you can save up to 50% wiring time with Push-in Spring compared to conventional spring solutions. And the connections are just as reliable. So for speed, ease and reliability, just push it.



Speed up your projects

Faster than ever installation

Imagine a motor starting solution that's twice as fast to install. With Push-in Spring, you no longer need to imagine – it's a reality. Push-in mode allows you to insert both ferruled and rigid cables without the need to use any tools, boosting your productivity like never before.



Easy to install

Easier than ever wiring

Push-in Spring technology opens up new possibilities. With its unmatched ease of use, wiring becomes far more intuitive. This eliminates the need for special training and reduces the chance of wiring error. What possibilities will it open up for you?



Continuous operation

Reliable as ever connections

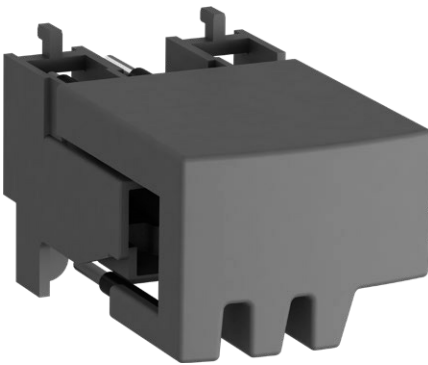
The speed and ease of Push-in Spring comes with the added reassurance of connections that are as reliable as ever. This gives you complete peace of mind when using the Push-in Spring motor starting solution.

Faster than ever installation



2-in-1 connection

For the very first time, ABB's 2-in-1 connection allows you to use ferruled and rigid cables (Push-in mode) or cables without ferrules (Spring mode) in the same terminal. In Push-in mode, cables can be inserted by just simply pushing them in by hand.



Smart accessories

100% tool-free connecting kits significantly reduce installation time.



Complete solution

High connection capacities are optimized for motor starting solutions up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A general use). This includes short-circuit fuseless protection up to 100 kA. Push-in Spring accessories can be mounted on the standard screw range of manual motor starters and contactors.

Easier than ever wiring



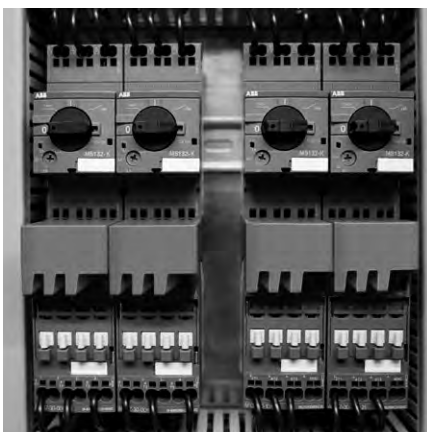
Intuitive wiring

With Push-in Spring, all cables and connecting links use the same round shape entry, whilst the square terminals above are clearly marked with screwdriver symbols. The result? Wiring and de-wiring that's intuitive and easily repeatable without cabling error, with little to no training required.



Just one screwdriver required

For de-wiring, only one screwdriver size is needed for the entire range. No twisting or turning is required either, so there's less chance of damage to the terminals and to your installation as a whole.



Automated wiring

The Push-in Spring motor starting solution features 90° cable insertion for all terminals. Front access to terminals aids smooth, robust insertion of cables and makes automated robot wiring possible.

Reliable as ever connections



Robust electrical contact

The special spring design guarantees excellent electrical contact. The design provides strict control of contact strength, independent from operator, giving you complete assurance.



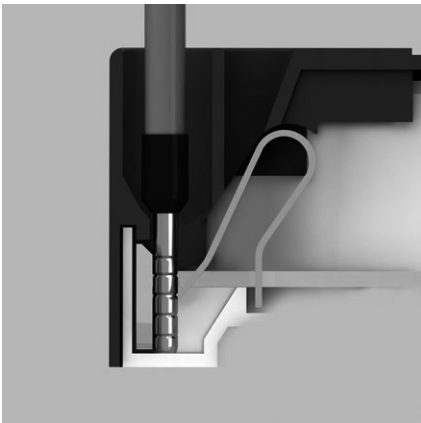
Vibration-proof

You can count on Push-in Spring connections, even in harsh environments. Push-in Spring technology has been shock and vibration tested according to IEC 60068-2-27 and IEC 60068-2-6 standards.



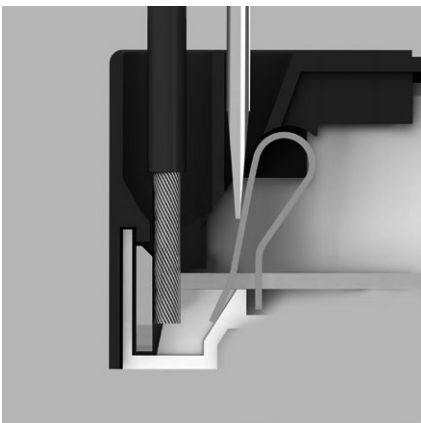
No need to re-tighten

With self-tightening terminals, there's no need to re-tighten after transportation or during the life cycle of the product. High connection strength is guaranteed throughout the whole lifetime of the device.



Push-in mode

Connect rigid cables or ferruled cables simply by pushing them into the cable holes – no need to use any tools. Push-in mode saves up to 50% wiring time compared to conventional spring solutions and makes installation a breeze. Benefit from intuitive wiring, self-tightening terminals and less chance of wiring error.



Spring Mode

This mode is used for small cable cross-sections or for cables without ferrules. It is also used for de-wiring the solution. Before inserting the cable, simply push a screwdriver into the clearly marked holes to open the terminal. ABB's Spring mode is easier to use than conventional spring technology, with less chance of damage to terminals as no twisting or turning is required.

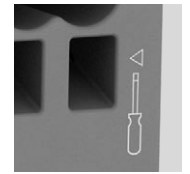
Push-in Spring solution Complete range, complete efficiency

The Push-in Spring motor starting solution products provide you with a range of benefits.



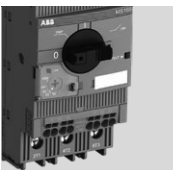
2-in-1

Benefit from both Push-in mode and Spring mode and use ferruled cables or cables without ferrules in the same terminal.



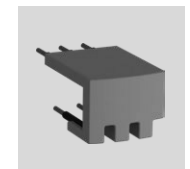
Just one tool for everything

You only need a 3 mm screwdriver in Spring mode as well as for de-wiring the complete solution.



Compatible with screw range

Mount accessories for control circuits on the screw range up to 30 kW AC-3 400 V on manual motor starters and up to 45 kW AC-3 400 V, 130 A AC-1 on contactors.



Tool-less connecting links

100% tool-less mounting connecting links.



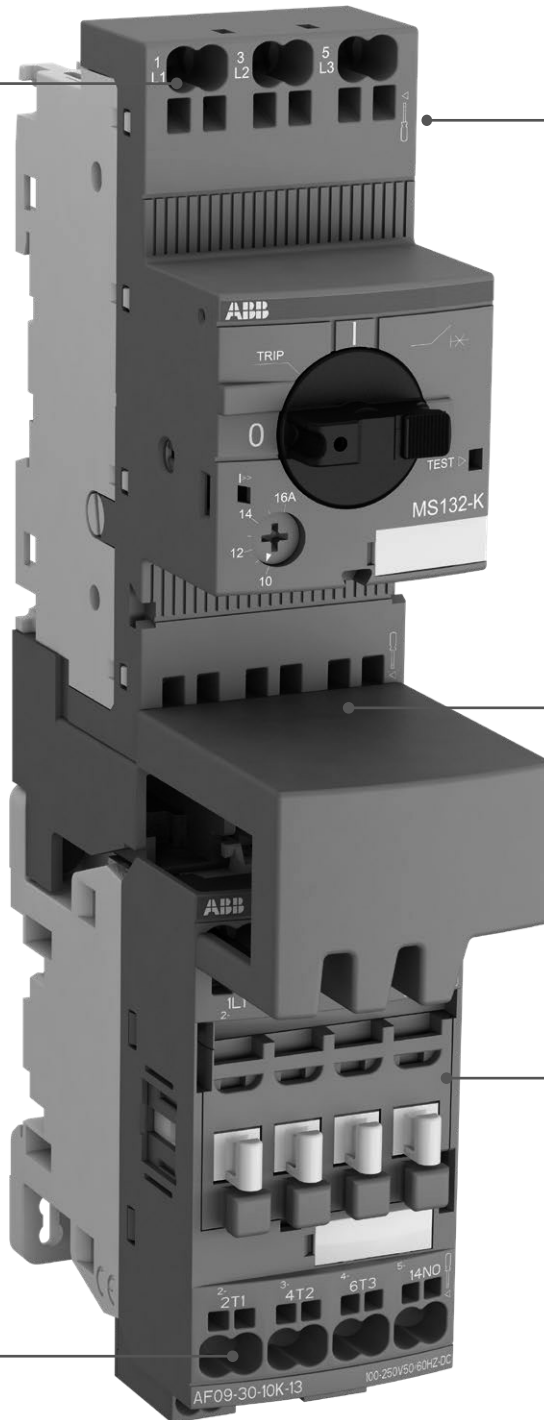
Robust by design

Contact robustness by design, independent from operator.




Higher connecting capacity

The solution ranges up to 18.5 kW 400 V AC-3 and 50 A AC-1 (25 hp 480 V and 45 A 600 V general use).



3-pole contactors and motor protection



| AC / DC Control supply | |  | Type | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|------------------------|--------------------------------|---|------|---------|---------|---------|---------|---------|---------|
| IEC | AC-3 Rated operational power | $\theta \leq 60\text{ }^\circ\text{C}$, 380 - 400 V | kW | 4 | 5.5 | 7.5 | 11 | 15 | 18.5 |
| | Rated operational current | 380 - 400 V | A | 9 | 12 | 18 | 26 | 32 | 38 |
| | AC-1 Rated operational current | $\theta \leq 40\text{ }^\circ\text{C}$, 690 V | A | 25 | 28 | 30 | 45 | 50 | 50 |
| UL/CSA | 3-phase Motor Rating | 440 - 480 V | hp | 5 | 7.5 | 10 | 15 | 20 | 25 |
| | General Use Rating | 600 V | A | 25 | 28 | 30 | 42 | 45 | 45 |
| NEMA | NEMA size | | | 00 | 0 | - | 1 | - | - |

Main accessories for contactors

| | | |
|--------------------------|-------------------------|--------------------------------------|
| Auxiliary contact blocks | Front mounting | CA4-10K (1 N.O.) CA4-01K (1 N.C.) |
| | Side mounting | CAL4-11K |
| Interlocking units | Mechanical | VM4 |
| | Mechanical / Electrical | VEM4K* |
| Surge protection | | Built-in surge protection |

* For product availability, please consult your ABB local sales organization.

Accessories

| | | | |
|--|----------------|--|-----------|
| Connecting link for contactor mounting | | BEA16-4K1 | BEA38-4K1 |
| Auxiliary contact blocks | Front mounting | HKF1-..K (1 N.O. + 1N.C.) (2 N.O.) | |
| | Side mounting | HK1-..K (1 N.O. + 1N.C.) (2 N.O.) (2 N.C.) | |
| Signaling contact | For trip alarm | SK1-..K (1 N.O. + 1N.C.) (2 N.O.) (2 N.C.) | |

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

4 to 18.5 kW

AC / DC operated



AF09-30-10K

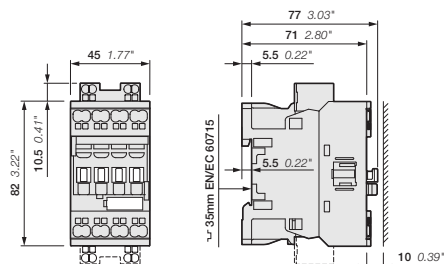


AF26-30-00K

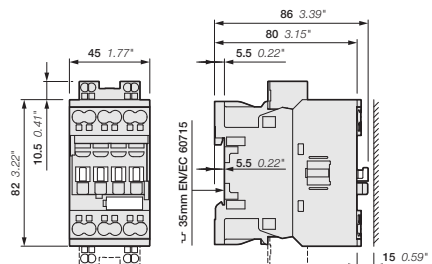
AF09..K ... AF38..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
- can manage large control voltage variations
- reduced panel energy consumption
- very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type (1) | Order code | Weight | | | | | |
|-------------|--------------------------------|----------------------|-------------------------------|---------------------|---------------------------|----------|----------------|-----------------|-------------|-----|----------------|-----------------|-------|
| | Rated operational power | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | Pkg (1 pce) | | | | |
| | $\theta \leq 40^\circ\text{C}$ | | | | | | | kg | | | | | |
| 400 V | AC-1 | 480 V | 600 V AC | V 50/60 Hz | V DC | | | | | | | | |
| AC-3 | A | hp | A | | | | | | | | | | |
| 4 | 25 | 5 | 25 | 24 ... 60 | 20 ... 60 | 1 0 | AF09-30-10K-11 | 1SBL137005R1110 | 0.285 | | | | |
| | | | | | | 0 1 | AF09-30-01K-11 | 1SBL137005R1101 | 0.285 | | | | |
| | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF09-30-10K-12 | 1SBL137005R1210 | 0.285 | | | | |
| | | | | | | 0 1 | AF09-30-01K-12 | 1SBL137005R1201 | 0.285 | | | | |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF09-30-10K-13 | 1SBL137005R1310 | 0.285 | | | | |
| | | | | | | 0 1 | AF09-30-01K-13 | 1SBL137005R1301 | 0.285 | | | | |
| | | | | 250 ... 500 | 250 ... 500 | 1 0 | AF09-30-10K-14 | 1SBL137005R1410 | 0.325 | | | | |
| | | | | | | 0 1 | AF09-30-01K-14 | 1SBL137005R1401 | 0.325 | | | | |
| | | | | 5.5 | 28 | 7.5 | 28 | 24 ... 60 | 20 ... 60 | 1 0 | AF12-30-10K-11 | 1SBL157005R1110 | 0.285 |
| | | | | | | | | | | 0 1 | AF12-30-01K-11 | 1SBL157005R1101 | 0.285 |
| | | | | | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF12-30-10K-12 | 1SBL157005R1210 | 0.285 |
| | | | | | | | | | | 0 1 | AF12-30-01K-12 | 1SBL157005R1201 | 0.285 |
| 100 ... 250 | 100 ... 250 | 1 0 | AF12-30-10K-13 | | | | | 1SBL157005R1310 | 0.285 | | | | |
| | | 0 1 | AF12-30-01K-13 | | | | | 1SBL157005R1301 | 0.285 | | | | |
| 250 ... 500 | 250 ... 500 | 1 0 | AF12-30-10K-14 | | | | | 1SBL157005R1410 | 0.325 | | | | |
| | | 0 1 | AF12-30-01K-14 | | | | | 1SBL157005R1401 | 0.325 | | | | |
| 7.5 | 30 | 10 | 30 | | | | | 24 ... 60 | 20 ... 60 | 1 0 | AF16-30-10K-11 | 1SBL177005R1110 | 0.285 |
| | | | | | | | | | | 0 1 | AF16-30-01K-11 | 1SBL177005R1101 | 0.285 |
| | | | | | | | | 48 ... 130 | 48 ... 130 | 1 0 | AF16-30-10K-12 | 1SBL177005R1210 | 0.285 |
| | | | | | | | | | | 0 1 | AF16-30-01K-12 | 1SBL177005R1201 | 0.285 |
| | | | | 100 ... 250 | 100 ... 250 | 1 0 | AF16-30-10K-13 | 1SBL177005R1310 | 0.285 | | | | |
| | | | | | | 0 1 | AF16-30-01K-13 | 1SBL177005R1301 | 0.285 | | | | |
| | | | | 250 ... 500 | 250 ... 500 | 1 0 | AF16-30-10K-14 | 1SBL177005R1410 | 0.325 | | | | |
| | | | | | | 0 1 | AF16-30-01K-14 | 1SBL177005R1401 | 0.325 | | | | |
| | | | | 11 | 45 | 15 | 42 | 24 ... 60 | 20 ... 60 | 0 0 | AF26-30-00K-11 | 1SBL237005R1100 | 0.325 |
| | | | | | | | | | | 0 0 | AF26-30-00K-12 | 1SBL237005R1200 | 0.325 |
| | | | | | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF26-30-00K-13 | 1SBL237005R1300 | 0.325 |
| | | | | | | | | | | 0 0 | AF26-30-00K-14 | 1SBL237005R1400 | 0.365 |
| 15 | 50 | 20 | 45 | 24 ... 60 | 20 ... 60 | 0 0 | AF30-30-00K-11 | 1SBL277005R1100 | 0.330 | | | | |
| | | | | | | 0 0 | AF30-30-00K-12 | 1SBL277005R1200 | 0.330 | | | | |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF30-30-00K-13 | 1SBL277005R1300 | 0.330 | | | | |
| | | | | | | 0 0 | AF30-30-00K-14 | 1SBL277005R1400 | 0.370 | | | | |
| 18.5 | 50 | 25 | 45 | 24 ... 60 | 20 ... 60 | 0 0 | AF38-30-00K-11 | 1SBL297005R1100 | 0.330 | | | | |
| | | | | | | 0 0 | AF38-30-00K-12 | 1SBL297005R1200 | 0.330 | | | | |
| | | | | 100 ... 250 | 100 ... 250 | 0 0 | AF38-30-00K-13 | 1SBL297005R1300 | 0.330 | | | | |
| | | | | | | 0 0 | AF38-30-00K-14 | 1SBL297005R1400 | 0.370 | | | | |



AF09..K, AF12..K, AF16..K



AF26..K, AF30..K, AF38..K

Main dimensions mm, inches

AF09Z..K ... AF38Z..K 3-pole contactors - with Push-in Spring terminals

4 to 18.5 kW

24 V DC operated - designed for PLC



AF09Z-30-10K

1SBC101597V0014



AF26Z-30-00K

1SBC101599V0014

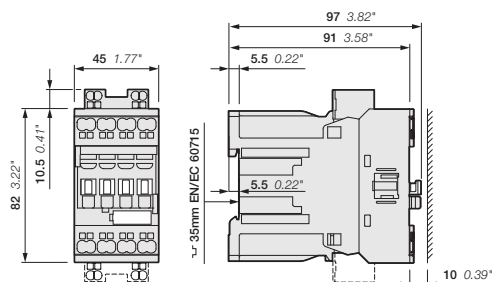
AF09Z..K ... AF38Z..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

- control circuit: DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

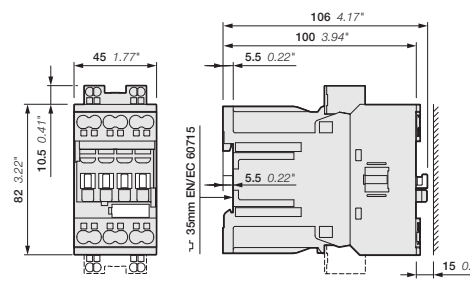
| IEC | UL/CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight | |
|------------|-------------------------|----------------------|--|---------------------------|------|-----------------|-----------------|--------------------|
| | Rated operational power | 3-phase motor rating | | | | | | General use rating |
| 400 V AC-3 | AC-1 | 480 V | 600 V AC | | | | kg | |
| kW | A | hp | A | V DC | | | | |
| 4 | 25 | 5 | 25 | 24 | 1 0 | AF09Z-30-10K-30 | 1SBL136005R3010 | 0.435 |
| | | | | | 0 1 | AF09Z-30-01K-30 | 1SBL136005R3001 | 0.435 |
| 5.5 | 28 | 7.5 | 28 | 24 | 1 0 | AF12Z-30-10K-30 | 1SBL156005R3010 | 0.435 |
| | | | | | 0 1 | AF12Z-30-01K-30 | 1SBL156005R3001 | 0.435 |
| 7.5 | 30 | 10 | 30 | 24 | 1 0 | AF16Z-30-10K-30 | 1SBL176005R3010 | 0.435 |
| | | | | | 0 1 | AF16Z-30-01K-30 | 1SBL176005R3001 | 0.435 |
| 11 | 45 | 15 | 42 | 24 | 0 0 | AF26Z-30-00K-30 | 1SBL236005R3000 | 0.440 |
| 15 | 50 | 20 | 45 | 24 | 0 0 | AF30Z-30-00K-30 | 1SBL276005R3000 | 0.440 |
| 18.5 | 50 | 25 | 45 | 24 | 0 0 | AF38Z-30-00K-30 | 1SBL296005R3000 | 0.440 |

Note: AF..Z contactors with 24V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

For product availability, please consult your ABB local sales organization.



AF09Z..K, AF12Z..K, AF16Z..K



AF26Z..K, AF30Z..K, AF38Z..K

Main dimensions mm, inches

AF09Z..K ... AF38Z..K 3-pole contactors - with Push-in Spring terminals

4 to 18.5 kW

AC / DC operated - for specific applications



AF09Z-30-10K



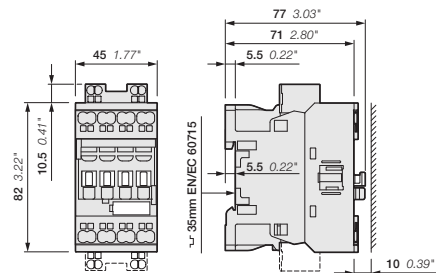
AF26Z-30-00K

AF09Z..K ... AF38Z..K contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC. These contactors are of the block type design with 3 main poles.

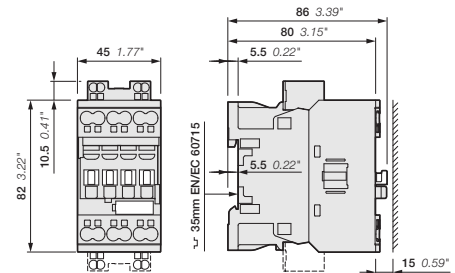
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - can manage large control voltage variations
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request)
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|-----------|---------------------------|-----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V 50/60 Hz | V DC | | | | |
| kW | A | hp | A | | | | | kg | |
| 4 | 25 | 5 | 25 | - | 12 ... 20 | 1 0 | AF09Z-30-10K-20 | 1SBL136005R2010 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-20 | 1SBL136005R2001 | 0.315 |
| | | | | | | 1 0 | AF09Z-30-10K-21 | 1SBL136005R2110 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-21 | 1SBL136005R2101 | 0.315 |
| | | | | | | 1 0 | AF09Z-30-10K-22 | 1SBL136005R2210 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-22 | 1SBL136005R2201 | 0.315 |
| | | | | | | 1 0 | AF09Z-30-10K-23 | 1SBL136005R2310 | 0.315 |
| | | | | | | 0 1 | AF09Z-30-01K-23 | 1SBL136005R2301 | 0.315 |
| | | | | | | 1 0 | AF12Z-30-10K-20 | 1SBL156005R2010 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-20 | 1SBL156005R2001 | 0.315 |
| | | | | | | 1 0 | AF12Z-30-10K-21 | 1SBL156005R2110 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-21 | 1SBL156005R2101 | 0.315 |
| 5.5 | 28 | 7.5 | 28 | - | 12 ... 20 | 1 0 | AF12Z-30-10K-20 | 1SBL156005R2010 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-20 | 1SBL156005R2001 | 0.315 |
| | | | | | | 1 0 | AF12Z-30-10K-21 | 1SBL156005R2110 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-21 | 1SBL156005R2101 | 0.315 |
| | | | | | | 1 0 | AF12Z-30-10K-22 | 1SBL156005R2210 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-22 | 1SBL156005R2201 | 0.315 |
| | | | | | | 1 0 | AF12Z-30-10K-23 | 1SBL156005R2310 | 0.315 |
| | | | | | | 0 1 | AF12Z-30-01K-23 | 1SBL156005R2301 | 0.315 |
| | | | | | | 1 0 | AF16Z-30-10K-20 | 1SBL176005R2010 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-20 | 1SBL176005R2001 | 0.315 |
| | | | | | | 1 0 | AF16Z-30-10K-21 | 1SBL176005R2110 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-21 | 1SBL176005R2101 | 0.315 |
| 7.5 | 30 | 10 | 30 | - | 12 ... 20 | 1 0 | AF16Z-30-10K-20 | 1SBL176005R2010 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-20 | 1SBL176005R2001 | 0.315 |
| | | | | | | 1 0 | AF16Z-30-10K-21 | 1SBL176005R2110 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-21 | 1SBL176005R2101 | 0.315 |
| | | | | | | 1 0 | AF16Z-30-10K-22 | 1SBL176005R2210 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-22 | 1SBL176005R2201 | 0.315 |
| | | | | | | 1 0 | AF16Z-30-10K-23 | 1SBL176005R2310 | 0.315 |
| | | | | | | 0 1 | AF16Z-30-01K-23 | 1SBL176005R2301 | 0.315 |
| | | | | | | 0 0 | AF26Z-30-00K-20 | 1SBL236005R2000 | 0.355 |
| | | | | | | 0 0 | AF26Z-30-00K-21 | 1SBL236005R2100 | 0.355 |
| | | | | | | 0 0 | AF26Z-30-00K-22 | 1SBL236005R2200 | 0.355 |
| | | | | | | 0 0 | AF26Z-30-00K-23 | 1SBL236005R2300 | 0.355 |
| 15 | 50 | 20 | 45 | - | 12 ... 20 | 0 0 | AF30Z-30-00K-20 | 1SBL276005R2000 | 0.360 |
| | | | | | | 0 0 | AF30Z-30-00K-21 | 1SBL276005R2100 | 0.360 |
| | | | | | | 0 0 | AF30Z-30-00K-22 | 1SBL276005R2200 | 0.360 |
| | | | | | | 0 0 | AF30Z-30-00K-23 | 1SBL276005R2300 | 0.360 |
| | | | | | | 0 0 | AF38Z-30-00K-20 | 1SBL296005R2000 | 0.360 |
| | | | | | | 0 0 | AF38Z-30-00K-21 | 1SBL296005R2100 | 0.360 |
| 18.5 | 50 | 25 | 45 | - | 12 ... 20 | 0 0 | AF38Z-30-00K-20 | 1SBL296005R2000 | 0.360 |
| | | | | | | 0 0 | AF38Z-30-00K-21 | 1SBL296005R2100 | 0.360 |
| | | | | | | 0 0 | AF38Z-30-00K-22 | 1SBL296005R2200 | 0.360 |
| | | | | | | 0 0 | AF38Z-30-00K-23 | 1SBL296005R2300 | 0.360 |

Note: Only AF..Z contactors with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z..K, AF12Z..K, AF16Z..K



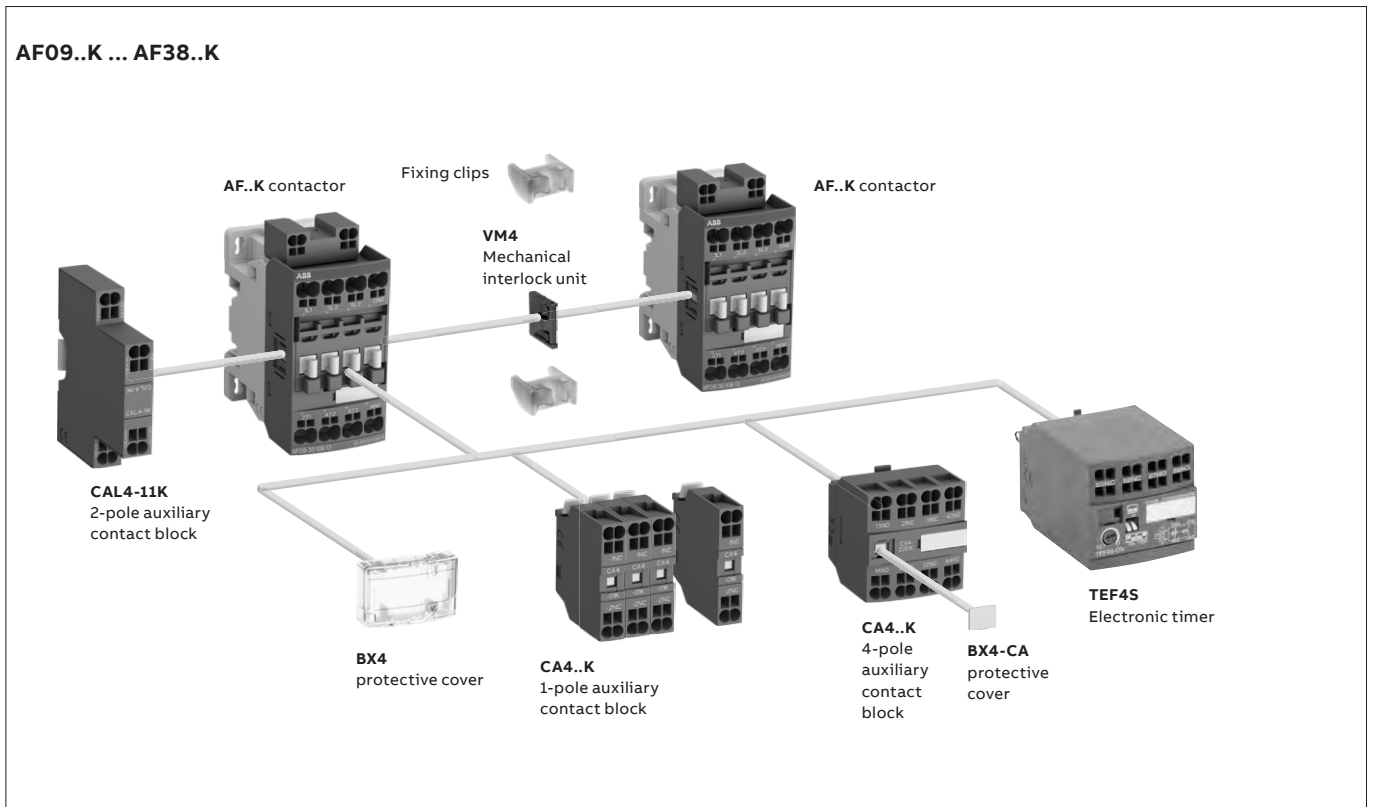
AF26Z..K, AF30Z..K, AF38Z..K

Main dimensions mm, inches

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Side-mounted accessories | |
|---|------------|-----------------------------|---------------------------|---------------|------------------|--|--------------------------|------------|
| | | | Auxiliary contact blocks | | Electronic timer | Mechanical interlock unit (between 2 contactors) | Auxiliary contact blocks | |
| | | | 1-pole CA4..K | 4-pole CA4..K | TEF4S | VM4 | Left side | Right side |
| AF09(Z)..K ... AF38(Z)..K (1) | | | | | | | | |
| AF09..K ... AF16..K | 3 0 | 0 1 | 4 max. | or 1 | or 1 | - | + 1 | - |
| AF09..K ... AF16..K | 3 0 | 1 0 | 2 max. | - | or 1 | - | + 1 | + 1 |
| AF26..K ... AF38..K | 3 0 | 0 0 | 4 max. | or 1 | or 1 | + 1 | + 1 | or 1 |
| AF09Z..K ... AF38Z..K 24 V DC designed for PLC - coil 30 (1) | | | | | | | | |
| AF09Z..K ... AF16Z..K | 3 0 | 0 1 | 4 max. | or 1 | or 1 | + 1 | or 1 | + 1 |
| AF09Z..K ... AF16Z..K | 3 0 | 1 0 | 2 max. | - | or 1 | + 1 | + 1 | or 1 |
| AF26Z..K ... AF38Z..K | 3 0 | 0 0 | | | 1 | - | + 1 | + 1 |

(1) Including add-on and built-in contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|--------------------------------|--|-------------------|-------------------|--------------------|--------------------|--------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | |
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free-air thermal current Ith acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| With conductor cross-sectional area | | 6 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-1 Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| le / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A |
| Ue max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 60^\circ\text{C}$ | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A |
| | $\theta \leq 70^\circ\text{C}$ | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A |
| With conductor cross-sectional area | | 4 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² |
| AC-3, AC-3e Utilization category | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | |
| le / Max. rated operational current AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A |
| | 1000 V | - | | | | | |
| Rated operational power AC-3, AC-3e (1) | | | | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW |
| | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW |
| | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW |
| | 1000 V | - | | | | | |
| Rated making capacity AC-3, AC-3e | | 10 x Ie AC-3, 12 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x Ie AC-3, 8.5 x Ie AC-3e acc. to IEC 60947-4-1 | | | | | |
| AC-8a Utilization category (without thermal overload relay Ue 400 V 50/60 Hz $\theta \leq 40^\circ\text{C}$) | | | | | | | |
| le / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW |
| Short-circuit protection device for contactors without thermal overload relay in free air Motor protection excluded (2) | | | | | | | |
| Ue $\leq 500\text{ V AC}$ - gG type fuse | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A |
| Rated short-time withstand current Icw at 40 °C ambient temperature, in free air from a cold state | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A |
| | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A |
| | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A |
| Maximum breaking capacity $\cos \phi = 0.45$ | | | | | | | |
| | at 440 V | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A |
| | at 690 V | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A |
| Power dissipation per pole | | | | | | | |
| | le / AC-1 | 1.14 W | 1.43 W | 1.64 W | 2 W | 2.44 W | 2.44 W |
| | le / AC-3, AC-3e | 0.15 W | 0.26 W | 0.6 W | 0.66 W | 1 W | 1.41 W |
| Max. electrical switching frequency | | | | | | | |
| | AC-1 | 600 cycles/h | | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | | 150 cycles/h | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|------------------|---------------------------------------|----------|----------|----------|----------|----------|
| Standards | | UL 60947-4-1, CSA-C22.2 No. 60947-4-1 | | | | | |
| Maximum operational voltage | | 600 V | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | | 27 A | | |
| NEMA maximum horse power ratings | | | | | | | |
| 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | | 2 hp | | |
| | 230 V AC | 1 hp | 2 hp | | 3 hp | | |
| NEMA maximum horse power ratings | | | | | | | |
| 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 230 V AC | 1-1/2 hp | 3 hp | | 7-1/2 hp | | |
| | 460 V AC | 2 hp | 5 hp | | 10 hp | | |
| | 575 V AC | 2 hp | 5 hp | | 10 hp | | |
| UL / CSA general use rating | | | | | | | |
| 600 V AC | | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 42 A | 45 A | 45 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 |
| UL / CSA maximum 1-phase motor rating | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A | 32 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | |
| Full Load Amps (FLA) | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| Short-circuit protection device for contactors without thermal overload relay | | | | | | | |
| Motor protection excluded | | | | | | | |
| Fuse rating | | 30 A | | 60 A | | 100 A | |
| Fuse type, 600 V | | RK5 | | | | | |
| Maximum electrical switching frequency | | | | | | | |
| For general use | | 600 cycles/h | | | | | |
| For motor use | | 1200 cycles/h | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Main pole - Utilization characteristics - 3 N.O. non reversing contactors

| Contactors types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|------------------|----------|----------|----------|----------|----------|----------|
| AC Resistance air heating | | | | | | | |
| Full Load Amps (FLA) | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| Elevator control, load switching, 500,000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | |
| 1-phase | | | | | | | |
| Horse power rating | 110-120 V AC | 1/4 hp | 1/3 hp | – | 1-1/2 hp | 2 hp | 2 hp |
| | 220-240 V AC | 1/2 hp | 3/4 hp | – | 3 hp | 3 hp | 5 hp |
| 3-phase | | | | | | | |
| Horse power rating | 200-208 V AC | 1 hp | 2 hp | – | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 220-240 V AC | 1 hp | 2 hp | – | 5 hp | 7-1/2 hp | 10 hp |
| | 440-480 V AC | 3 hp | 5 hp | – | 15 hp | 20 hp | 20 hp |
| | 550-600 V AC | 3 hp | 5 hp | – | 15 hp | 20 hp | 20 hp |
| Elevator control, 500,000 mechanical operating cycles, 5 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.2 | | | | | | | |
| 1-phase | | | | | | | |
| Horse power rating | 110-120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 3 hp |
| | 220-240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp |
| 3-phase | | | | | | | |
| Horse power rating | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Lighting application - UL/CSA | | | | | | | |
| Tungsten lamps | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| Electrical discharge lamps (ballast) | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |
| 3-phase break all lines | 600 V AC | 20 A | 25 A | 30 A | 42 A | 45 A | 45 A |

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

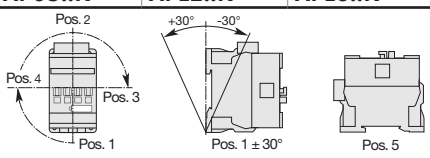
Technical data

General technical data

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|---|------------------|--|---------|---------|---------|---------|---------|
| Rated insulation voltage U_i | | 690 V | | | | | |
| acc. to IEC 60947-4-1 | | 600 V | | | | | |
| acc. to UL / CSA | | 6 kV | | | | | |
| Rated impulse withstand voltage U_{imp} . | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation Without thermal overload relay | | -40 ... +70 °C | | | | | |
| Storage | | -60 ... +80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
| | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | 5 ... 300 Hz | | | | | |
| acc. to IEC 60068-2-6 | | 4 g Closed position / 2 g Open position | | | | | |

(1) AF09 ... AF38...-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select AF09 ... AF38Z...-22.

Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|--|------------------|---|---------|---------|---------|---------|---------|
| Mounting positions | |  <p>Max. N.C. built-in and add-on N.C. auxiliary contacts: see accessory fitting details for a 3-pole contactor AF09 ... AF38</p> | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Magnet System Characteristics for AF09..K ... AF38..K contactors - AC / DC operated

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|--|-----------------------|---|---------|---------|---------|---------|---------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | | |
| | DC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | | | |
| AC control voltage 50/60 Hz | | 24 ... 500 V AC | | | | | |
| Rated control circuit voltage U_c | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | 20 ... 500 V DC | | | | | |
| Rated control circuit voltage U_c | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | Not suitable for direct control by PLC-output | | | | | |
| Drop-out voltage | | $\leq 60\%$ $U_c \text{ min}$. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 11 ... 95 ms | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors 24V DC operated - designed for PLC - coil 30

| Contactor types | AC / DC operated | AF09Z..K | AF12Z..K | AF16Z..K | AF26Z..K | AF30Z..K | AF38Z..K |
|--|-----------------------|--|----------|----------|----------|----------|----------|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ At $\theta \leq 70^\circ\text{C}$ U_c | | | | | |
| | DC control voltage | 24 V DC | | | | | |
| Rated control circuit voltage U_c | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | $\geq 250 \text{ mA}$ 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 27 ... 53 ms | | | | | |
| | N.C. contact opening | 20 ... 35 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 17 ... 29 ms | | | | | |
| | N.C. contact closing | 22 ... 57 ms | | | | | |


















Magnet System Characteristics for AF09Z..K ... AF38Z..K contactors - for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z..K | AF12Z..K | AF16Z..K | AF26Z..K | AF30Z..K | AF38Z..K |
|--|-----------------------|---|----------|----------|----------|----------|----------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ | | | | | |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | | |
| AC control voltage 50/60 Hz | | 24 ... 250 V AC | | | | | |
| Rated control circuit voltage U_c | Average pull-in value | 16 VA | | | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | | | |
| DC control voltage | | 12 ... 250 V DC | | | | | |
| Rated control circuit voltage U_c | Average pull-in value | 12 ... 16 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | (AF..Z coil 21) $\geq 500 \text{ mA}$ 24 V DC for PLCs - Not suitable for safety PLCs | | | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | (AF..Z coil 21, 22, 23) 20 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | | | | | | | |
| | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | | | | | | | |
| | N.O. contact opening | 11 ... 95 ms | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|--|------------------|---|---------|---------|---------|----------------------------------|---------|
| Main terminals | |  Push-in Spring terminals | | | | | |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Rigid Solid ($\leq 2.5 \text{ mm}^2$) | 1 x | 1 ... 6 mm ² | | | | 1 ... 10 mm ² | |
|  Rigid Stranded ($\geq 4 \text{ mm}^2$) | 2 x | 1 ... 6 mm ² | | | | 1 ... 10 mm ² | |
|  Flexible with non insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | | 1 ... 6 mm ² | |
|  Flexible with non insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | | 1 ... 6 mm ² | |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 4 mm ² | | | | 1 ... 6 mm ² | |
|  Flexible with insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | | 1 ... 6 mm ² | |
|  Flexible without ferrule | 1 x | (spring) 0.5 ... 4 mm ² | | | | (spring) 1 ... 6 mm ² | |
|  Flexible without ferrule | 2 x | (spring) 0.5 ... 4 mm ² | | | | (spring) 1 ... 6 mm ² | |
| Connection capacity acc. to UL/CSA (Solid \leq AWG 14) | 1 or 2 x | AWG 18 ... 10 | | | | AWG 18 ... 8 | |
| Stripping length | | 12 mm | | | | 14 mm | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | |
|  Rigid solid | 1 x | 1 ... 2.5 mm ² | | | | | |
|  Rigid solid | 2 x | 1 ... 2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² | | | | | |
|  Flexible with insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² | | | | | |
|  Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm ² | | | | | |
|  Flexible without ferrule | 2 x | (spring) 0.5 ... 2.5 mm ² | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 | | | | | |
| Stripping length | | 10 mm | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | | IP20 | | | | | |
| Coil terminals | | IP20 | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | |
| Screwdriver type | All terminals | Flat \varnothing 3 mm x 0.5 mm | | | | | |

AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|--|--------------------|---|---------|---------|---------|---------|---------|
| Rated operational voltage Ue max. | | 690 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | |
| Conventional free air thermal current Ith - $\theta \leq 40$ °C | | 16 A | | | | | |
| le / Rated operational current AC-15 acc. to IEC 60947-5-1 | | 6 A | | | | | |
| | 24-127 V 50/60 Hz | 4 A | | | | | |
| | 220-240 V 50/60 Hz | 3 A | | | | | |
| | 400-440 V 50/60 Hz | 2 A | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | |
| Making capacity AC-15 | | 10 x le AC-15 acc. to IEC 60947-5-1 | | | | | |
| Breaking capacity AC-15 | | 10 x le AC-15 acc. to IEC 60947-5-1 | | | | | |
| le / Rated operational current DC-13 acc. to IEC 60947-5-1 | | 6 A / 144 W | | | | | |
| | 24 V DC | 2.8 A / 134 W | | | | | |
| | 48 V DC | 1 A / 72 W | | | | | |
| | 72 V DC | 0.55 A / 60 W | | | | | |
| | 110 V DC | 0.55 A / 69 W | | | | | |
| | 125 V DC | 0.27 A / 60 W | | | | | |
| | 220 V DC | 0.27 A / 68 W | | | | | |
| | 250 V DC | 0.15 A / 60 W | | | | | |
| | 400 V DC | 0.13 A / 65 W | | | | | |
| | 500 V DC | 0.1 A / 60 W | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | |
| Rated short-time withstand current Icw | for 1.0 s | 100 A | | | | | |
| | for 0.1 s | 140 A | | | | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h | | | | | |
| | DC-13 | 900 cycles/h | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts. | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mirror contacts. | | | | | |

Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC / DC operated | AF09..K | AF12..K | AF16..K | AF26..K | AF30..K | AF38..K |
|--|------------------|--------------------|---------|---------|---------|---------|---------|
| Maximum operational voltage | | 600 V AC, 600 V DC | | | | | |
| Pilot duty | | A600, Q600 | | | | | |
| AC thermal rated current | | 10 A | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | |
| DC thermal rated current | | 2.5 A | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | |

AF09..K ... AF38..K 3-pole contactors with Push-in Spring terminals

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3 $I_c = I_e$
- Category AC-2 $I_c = 2.5 \times I_e$
- Category AC-4 $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c . Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

| Characteristics | Load to be controlled |
|------------------------|---|
| Operational voltage | U_e |
| Current normally drawn | I_e ($U_e / I_e / kW$ relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-1, AC-2, AC-3 or AC-4 |
| Breaking current | $I_c = I_e$ for AC-1 and for AC-3 ; $I_c = 2.5 \times I_e$ for AC-2 ; $I_c = 6 \times I_e$ for AC-4 |

- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point ($I_c ; N$).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating"

| Characteristics | Load to be controlled |
|--|--|
| Operational voltage | U_e |
| Current normally drawn while "motor running" | I_e ($U_e / I_e / kW$ relation for motors, see "Motor rated operational powers and currents") |
| Utilization category | AC-1, AC-2, AC-3 or AC-4 |
| Breaking current for AC-3 | $I_c = I_e$ |
| Breaking current for AC-4 while "motor accelerating" | $I_c = 6 \times I_e$ |
| Percentage of AC-4 operating cycles | K (on the basis of the total number of operating cycles) |

- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on Main pole utilization characteristic table (see "Technical data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - The number of operating cycles A for $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

$$N' = \frac{A}{1 + 0.01 K (A/B - 1)}$$

- If N' is too low in relation to the target N , calculate the estimated number of cycles for a higher contactor rating.

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

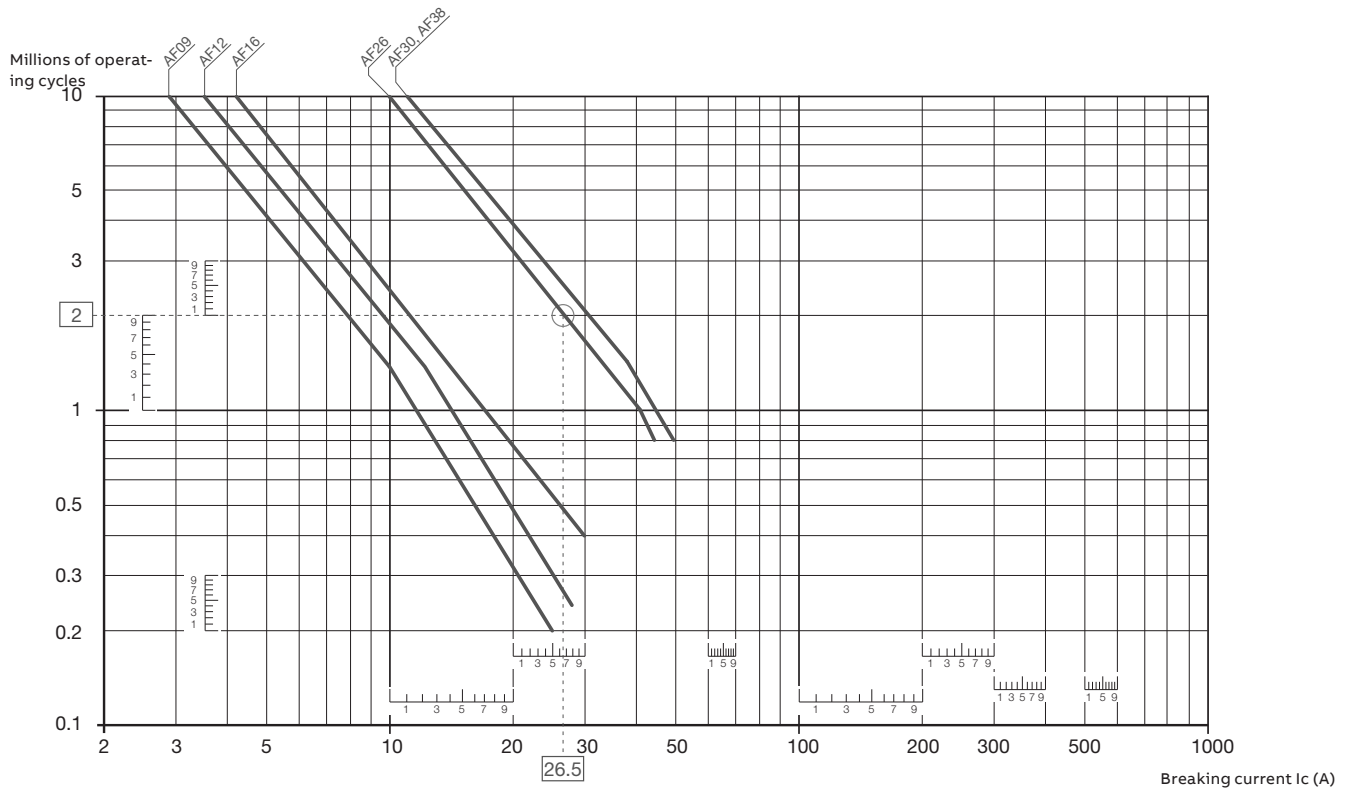
AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Electrical durability

Electrical Durability for AC-1 Utilization Category - $U_e \leq 690$ V.

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical Data".



Example:

$I_c / AC-1 = 26.5$ A – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AF26 contactor at intersection "O" (26.5 A / 2 millions operating cycles).

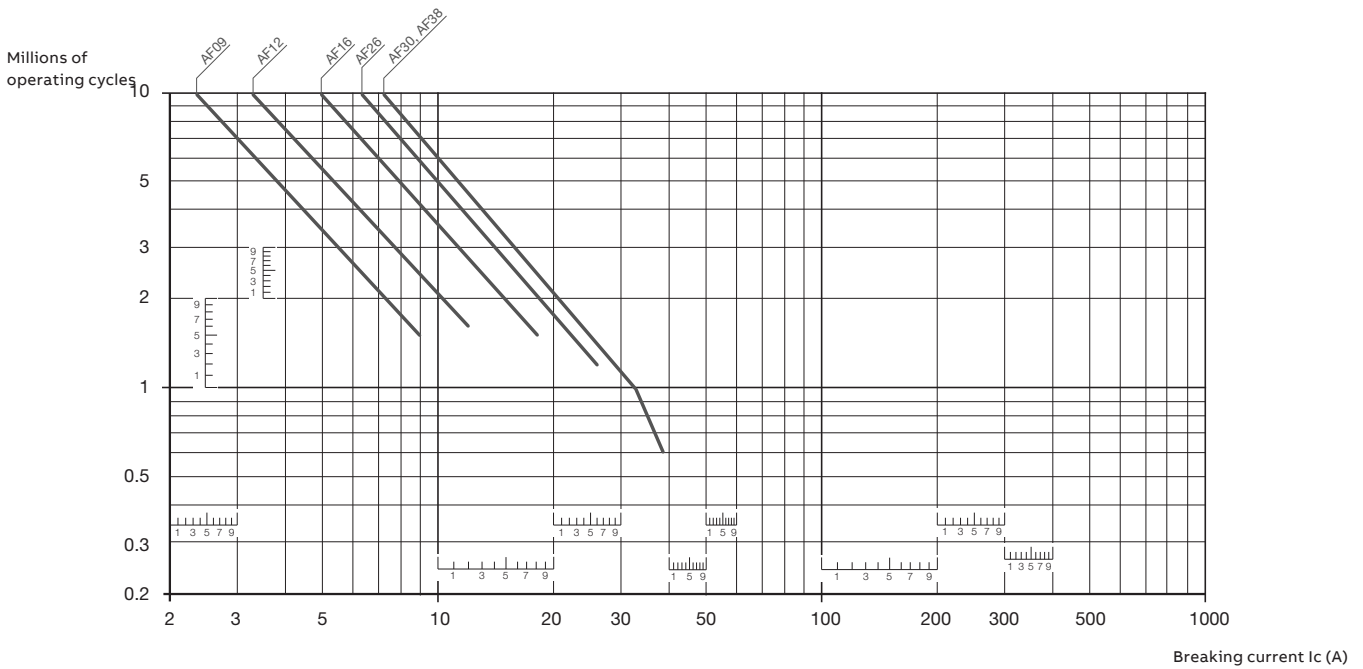
AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

Electrical durability

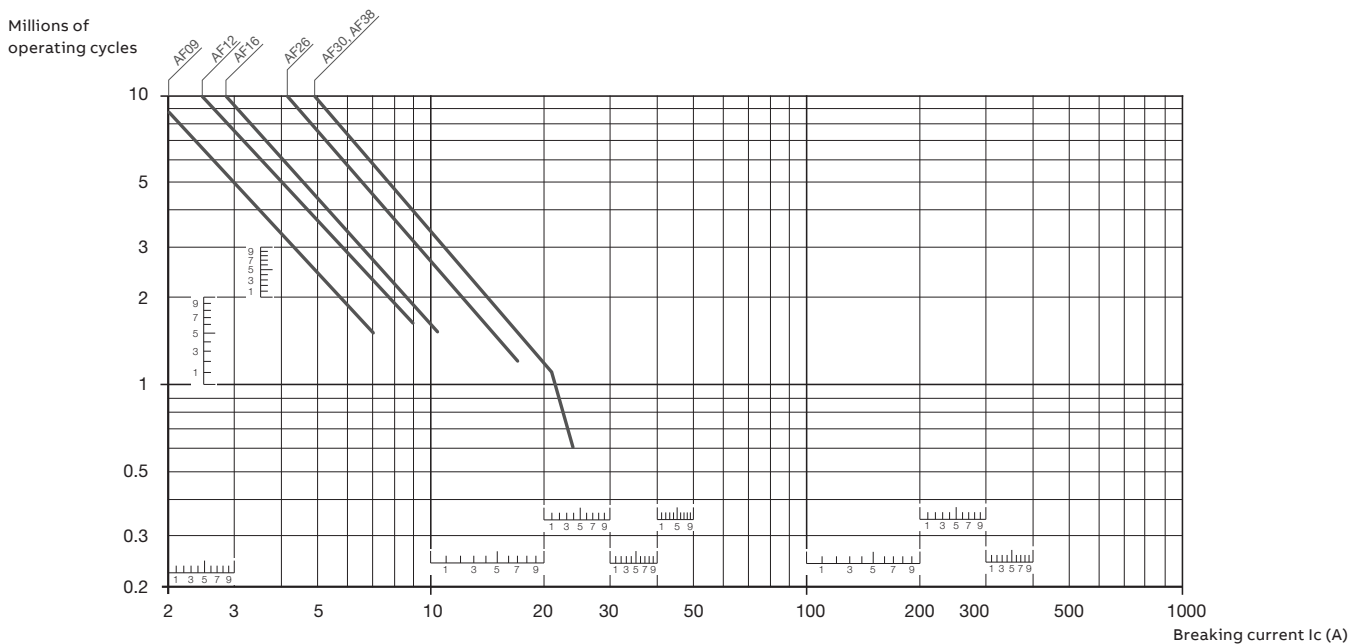
Electrical Durability for AC-3 Utilization Category

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current). Ambient temperature and maximum electrical switching frequency: see "Technical Data".

AC-3 - $U_e \leq 440$ V



AC-3 - 440 V < $U_e \leq 690$ V



AF09..K ... AF38..K 3-pole contactors - with Push-in Spring terminals

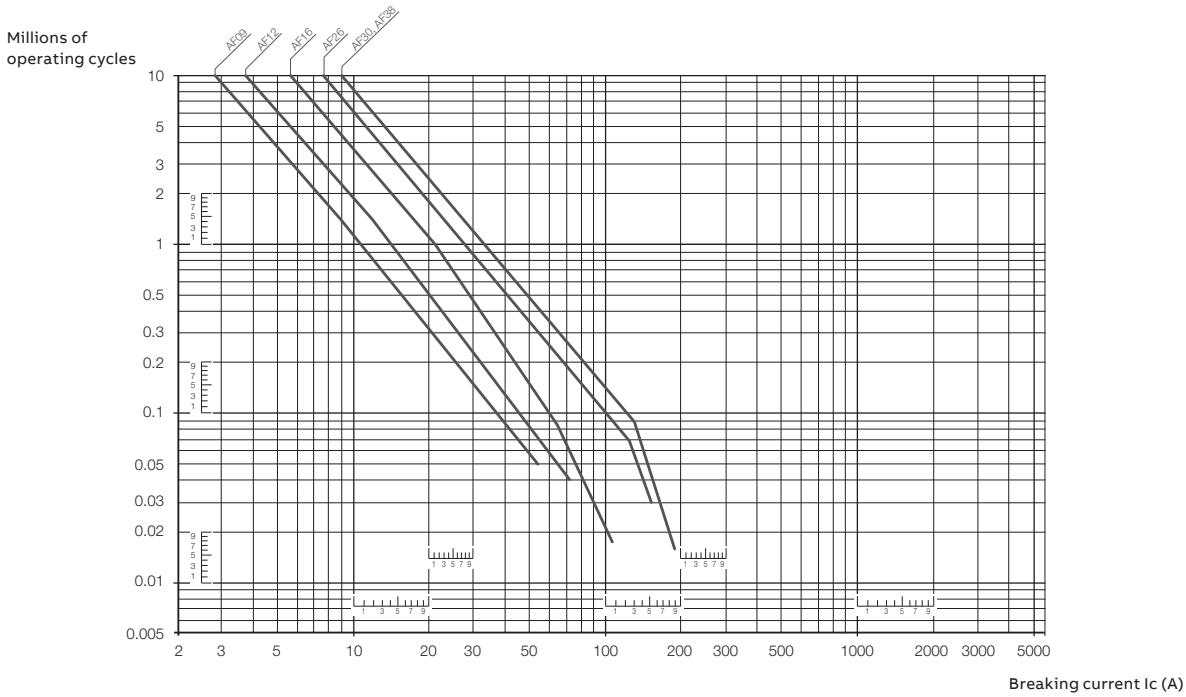
Electrical durability

Electrical Durability for AC-2 or AC-4 Utilization Category

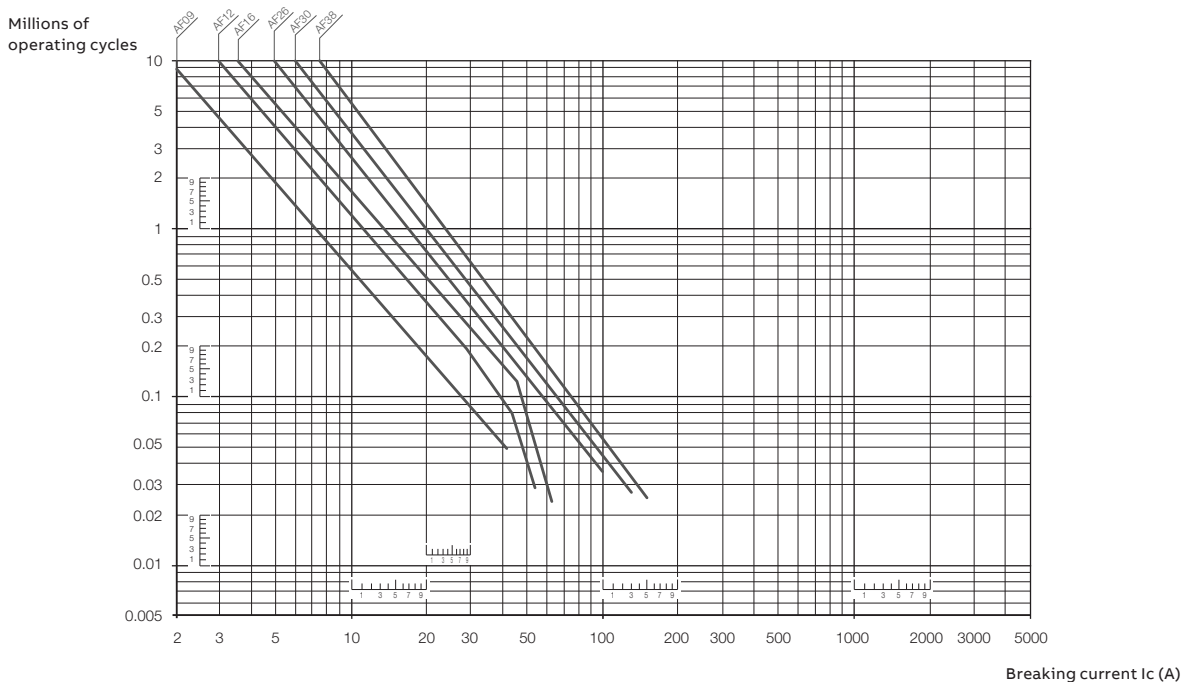
Switching cage motors: starting reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full load current).

Ambient temperature $\leq 60^\circ\text{C}$. Maximum electrical switching frequency: see "Technical Data".

AC-2 or AC-4 - $U_e \leq 440\text{ V}$



AC-2 or AC-4 - $440\text{ V} < U_e \leq 690\text{ V}$



Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.



AFS 3-pole contactors dedicated for safety applications

3/109 Overview

Ordering details

4 to 45 kW

| | | |
|-------|-----------------|---------------------------------------|
| 3/114 | AFS09 ... AFS38 | AC / DC operated with 2 N.O. + 2 N.C. |
| 3/115 | AFS40 ... AFS96 | AC / DC operated with 2 N.O. + 2 N.C. |
| 3/116 | AFS09 ... AFS96 | Main accessories |

55 to 200 kW

| | | |
|-------|-------------------|--|
| 3/117 | AFS116 ... AFS146 | AC / DC operated with 1 N.O. + 2 N.C. |
| 3/118 | AFS116 ... AFS146 | AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface |
| 3/119 | AFS190 ... AFS370 | AC / DC operated with 1 N.O. + 2 N.C. |
| 3/120 | AFS190 ... AFS370 | AC / DC operated with 1 N.O. + 2 N.C. with built-in PLC interface |
| 3/121 | AFS09 ... AFS370 | Main accessories |

200 to 400 kW

| | | |
|-------|-------------------|---------------------------------------|
| 3/122 | AFS400 ... AFS750 | AC / DC operated with 1 N.O. + 2 N.C. |
| 3/123 | AFS400 ... AFS750 | Main accessories |

3/124 Technical data

3/139 Terminal marking and positioning

3/140 Electrical durability

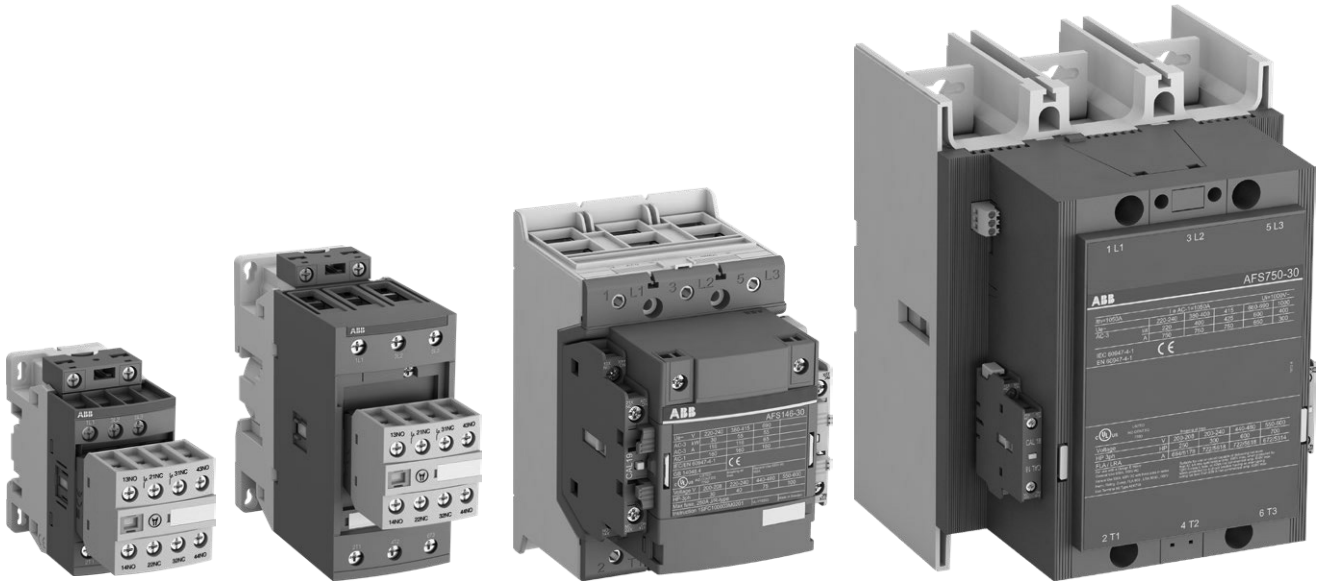


For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

AFS 3-pole contactors

Dedicated for safety applications



Designed for machine safety applications, AFS contactors now complete ABB's safety component portfolio.

With a range stretching from 9 A up to 750 A for motor starting applications and with a design complying with the latest safety standard, the AFS range of contactors is the given choice for any application that puts the users safety first.



Safety and protection

ABB's AFS contactors can be easily integrated in machine manufacturer's systems complying with main standards EN ISO 13849 and EN 62061 - guaranteeing the safe use of your machinery and equipment. An easily identifiable yellow low energy auxiliary contact block ensures the status feedback circuits required in machine safety applications.



Continuous operation

The AFS contactor secures system uptime. Featuring ABB's tested and proven AF technology, AFS contactors are reliable in any network. Direct control by safety PLCs or safety relays ensures the required safety performance.



Speed up your projects

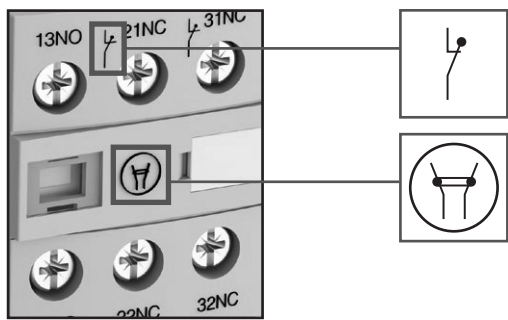
AFS design makes integration easier. With energy efficient coils smaller transformers can be used and panel space more efficiently used. Wide voltage range coils and easily available safety data simplifies product selection. In addition, all the safety data for the AFS contactors is available using common safety design tools.

AFS 3-pole contactors

Dedicated for safety applications

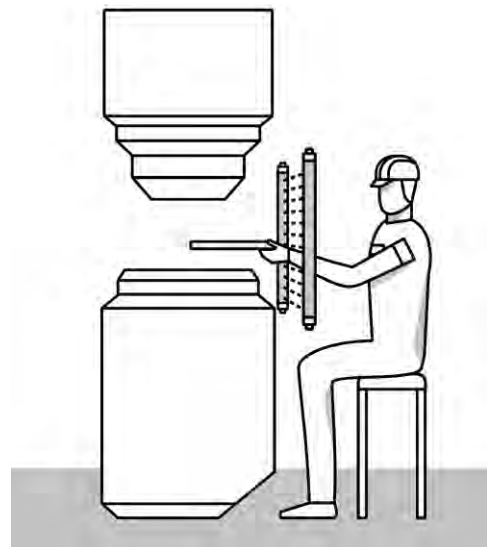
Guaranteed contactor status

ABB's permanently fixed auxiliary contact blocks guarantee the correct contactor status at all times. Mechanically linked and mirror contacts provide the performance required in feedback circuits. This prevents any unexpected state changes of auxiliary contact if main contacts become welded or stuck and ensures an accurate depiction of the safety system status displayed at all times. Mechanically linked and mirror contact symbols are marked on the yellow auxiliary block.



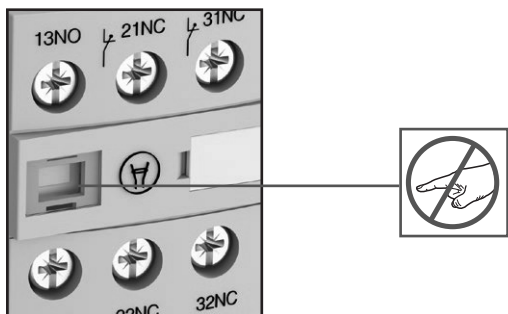
Fast response for increased safety

In safety applications speed is essential to protect operators. AFS contactors feature fast opening times, down to 20 ms for certain PLC controlled contactors, ensuring that when a dangerous failure is detected the operator is kept out of harms way.



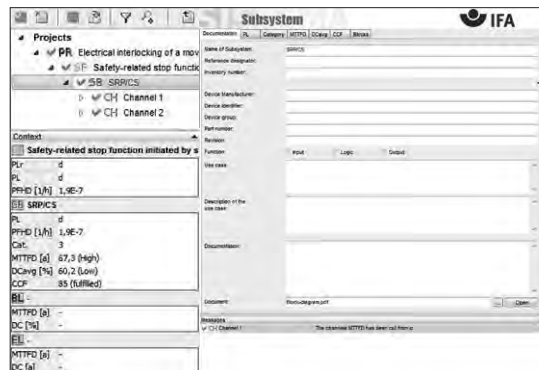
Prevent unexpected operations

Factory fitted auxiliary contact blocks that are permanently fixed protects devices against accidental operation and misuse. A factory-fitted transparent cover on contactors up to 96 A shields the contactor status indicator, providing additional protection from misuse.



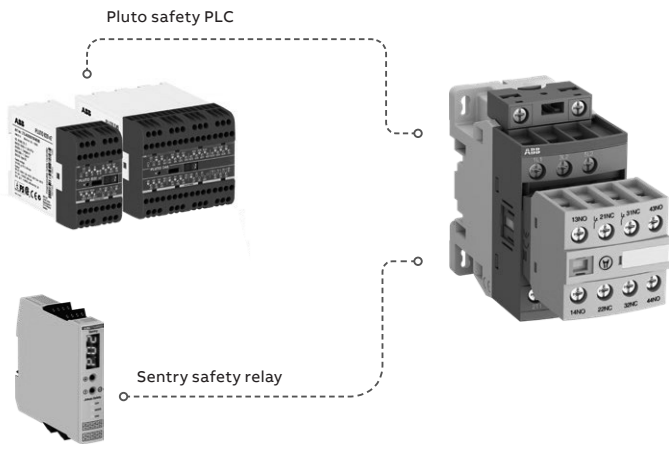
Simplify calculation of your installation safety level

AFS contactor safety data is available in safety design tools Sistema and FSDT, dedicated software for determining the Performance Level (PL) and Safety Integrity Level (SIL) of safety functions and generating technical documentations.



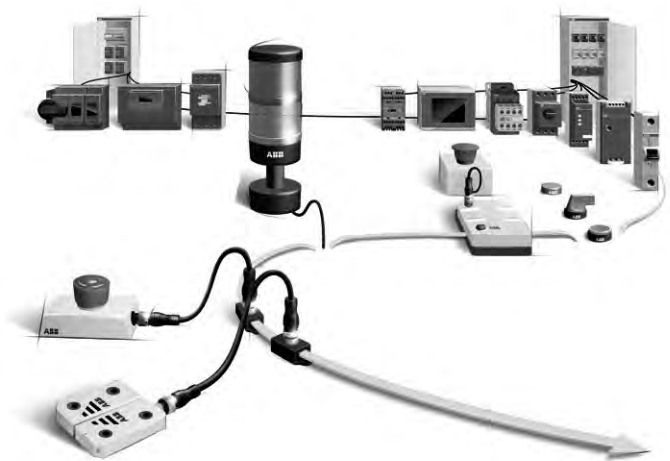
Control by safety PLCs or safety relays

ABB's AFS contactors can be controlled directly by safety PLCs or safety relays, or by a power relay depending on size. AFS contactors is part of the ABB safety family, and selected sizes are tested together with ABB's Pluto safety PLC and the Sentry safety relay. For full coordination please advise ABB. The auxiliary contacts only require a minimum switching capacity of 3 V / 1 mA. They guarantee system status feedback, making the system safe and reliable.



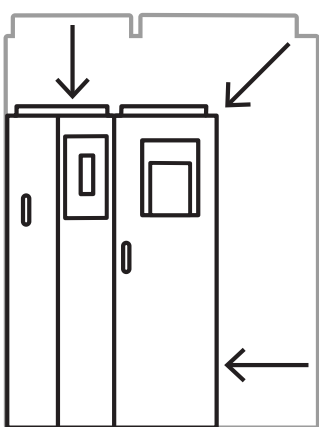
Easy safety chain identification

The yellow housing of ABB's AFS contactors makes identifying the safety product in your panel quicker. During routine maintenance work, ABB's intuitive design saves valuable time.



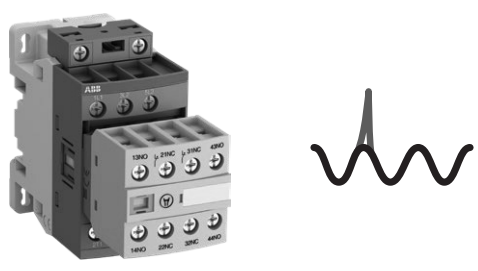
Panel size reduction

Utilizing AF technology, AFS coils need up to 60% less energy than conventional contactor coils. This allows for smaller transformers to be used for contactor control, which in turn allows for more efficient use of panel space. Using AFS contactors saves money and precious space.



Built-in surge suppression

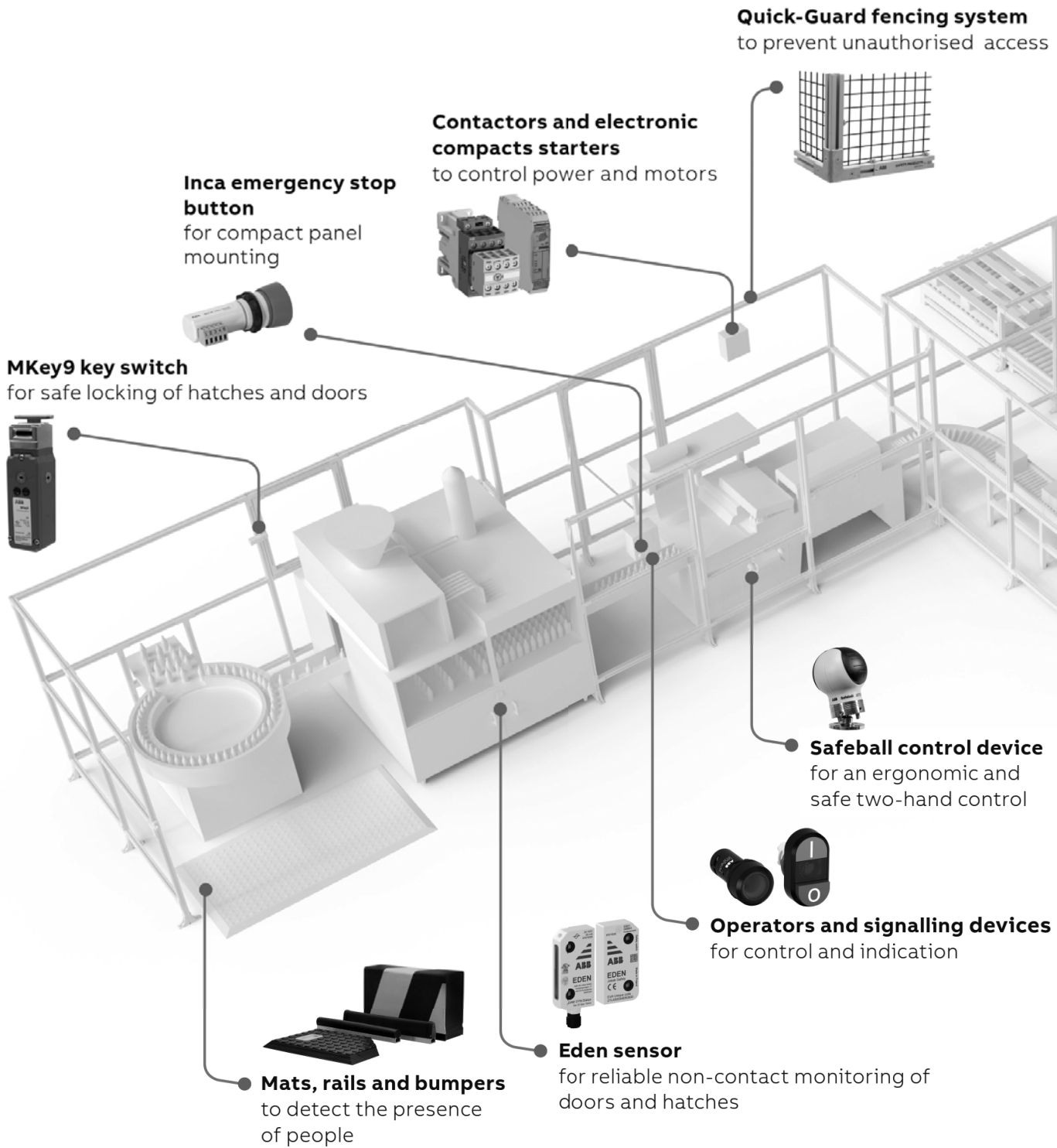
Unlike conventional contactors, ABB's AFS contactors have built-in surge suppression, preventing surges from ever reaching the control circuit. With no need for the usual external surge suppressor add-ons, ABB's solution means one less device to install and one less complication to manage.



AFS 3-pole contactors

A part of ABB's complete safety solutions

03



Magne magnetic lock
to keep doors and hatches
locked during a process



**Pluto programmable safety controller,
Vital safety controller and Sentry safety relays**
for flexible monitoring of safety devices



Smile emergency stop button
to safely stop machinery in hazardous
situations



Orion light guards
for a production friendly
safety detection



Knox safety lock
for safe locking of doors



JSDH4 three-position device
for safe and ergonomic
inspection and troubleshooting



**LineStrong pull wire
emergency stop switch**
for easy access of emergency stop
function



AFS09 ... AFS38 3-pole contactors for safety applications

4 to 18.5 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AFS16-30-22

1SBC101536V0014



AFS38-30-22

1SBC101539V0014

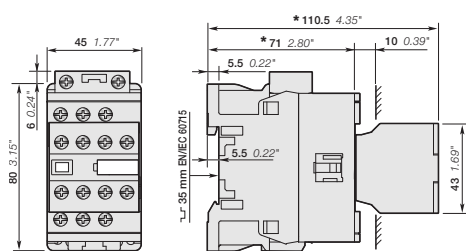
AFS09 ... AFS38 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked and mirror contacts make your system safer.

- control circuit with electronic coil interface:
 - dedicated 24 V DC for direct control by PLC-output ≥ 250 mA, low holding consumption up to 1.7 W
 - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
 - permanently fixed
 - protective cover to prevent manual operation
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

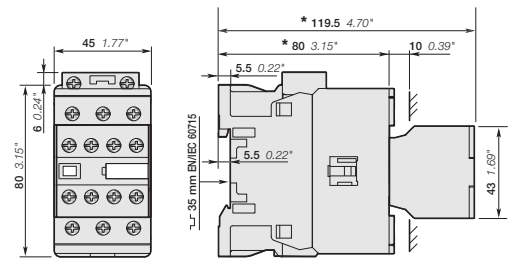
| IEC Rated operational power 400 V AC-3, AC3-e kW | UL/CSA 3-phase motor rating 480 V hp | General use rating 600 V AC A | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) kg | |
|--|---|---|---|-------------|---------------------------------|-------------|-----------------|--------------------------------|-------|
| | | | V 50/60 Hz | V DC | | | | | |
| 4 | 25 | 5 | 25 | - | 24 | 2 2 | AFS09Z-30-22-30 | 1SBL136082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS09-30-22-11 | 1SBL137082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS09-30-22-13 | 1SBL137082R1322 | 0.320 |
| 5.5 | 28 | 7-1/2 | 28 | - | 24 | 2 2 | AFS12Z-30-22-30 | 1SBL156082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS12-30-22-11 | 1SBL157082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS12-30-22-13 | 1SBL157082R1322 | 0.320 |
| 7.5 | 30 | 10 | 30 | - | 24 | 2 2 | AFS16Z-30-22-30 | 1SBL176082R3022 | 0.490 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS16-30-22-11 | 1SBL177082R1122 | 0.320 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS16-30-22-13 | 1SBL177082R1322 | 0.320 |
| 11 | 45 | 15 | 45 | - | 24 | 2 2 | AFS26Z-30-22-30 | 1SBL236082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS26-30-22-11 | 1SBL237082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS26-30-22-13 | 1SBL237082R1322 | 0.360 |
| 15 | 50 | 20 | 50 | - | 24 | 2 2 | AFS30Z-30-22-30 | 1SBL276082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 | 2 2 | AFS30-30-22-11 | 1SBL277082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 (1) | 2 2 | AFS30-30-22-13 | 1SBL277082R1322 | 0.360 |
| 18.5 | 50 | 25 | 50 | - | 24 | 2 2 | AFS38Z-30-22-30 | 1SBL296082R3022 | 0.540 |
| | | | | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS38-30-22-11 | 1SBL297082R1122 | 0.360 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS38-30-22-13 | 1SBL297082R1322 | 0.360 |

(1) AFS...-30...-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.



AFS09, AFS12, AFS16

* For AFS09Z, AFS12Z, AFS16Z-30-22-30:
depth + 20 mm (+ 0.79")



AFS26, AFS30, AFS38

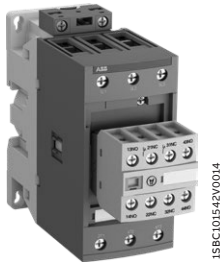
* For AFS26Z, AFS30Z, AFS38Z-30-22-30:
depth + 20 mm (+ 0.79")

Main dimensions mm, inches

AFS40 ... AFS96 3-pole contactors for safety applications

18.5 to 45 kW

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AFS65-30-22

1SBC101542V0014



AFS96-30-22

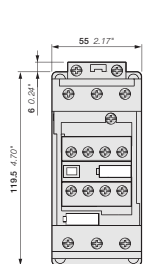
1SBC101544V0014

AFS40 ... AFS96 contactors are designed for machine safety applications. They are delivered with fixed front-mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked and mirror contacts make your system safer.

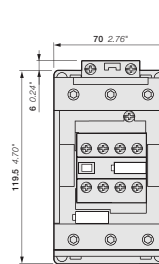
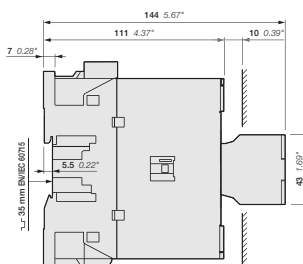
- control circuit with electronic coil interface:
 - 24...60 V AC, 20...60 V DC and 100...250 V AC / DC operated accepting a wide control voltage range
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- front-mounted auxiliary contact block:
 - permanently fixed
 - protective cover to prevent manual operation
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

| IEC Rated operational power | UL/CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight Pkg (1 pce) | |
|-----------------------------------|---|--------------------------------------|---|-------------|---------------------------------|-------------|----------------|--------------------------|-------|
| | | | V 50/60 Hz | V DC | | | | | |
| 400 V AC-3, AC3-e | AC-1 | | | | | | | kg | |
| kW | A | hp | A | | | | | | |
| 18.5 | 70 | 30 | 60 | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS40-30-22-11 | 1SBL347082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS40-30-22-13 | 1SBL347082R1322 | 1.000 |
| 22 | 100 | 40 | 80 | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS52-30-22-11 | 1SBL367082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS52-30-22-13 | 1SBL367082R1322 | 1.000 |
| 30 | 105 | 50 | 90 | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS65-30-22-11 | 1SBL387082R1122 | 1.020 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS65-30-22-13 | 1SBL387082R1322 | 1.000 |
| 37 | 125 | 60 | 105 | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS80-30-22-11 | 1SBL397082R1122 | 1.270 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS80-30-22-13 | 1SBL397082R1322 | 1.220 |
| 45 | 130 | 60 | 115 | 24 ... 60 | 20 ... 60 (1) | 2 2 | AFS96-30-22-11 | 1SBL407082R1122 | 1.270 |
| | | | | 100 ... 250 | 100 ... 250 | 2 2 | AFS96-30-22-13 | 1SBL407082R1322 | 1.220 |

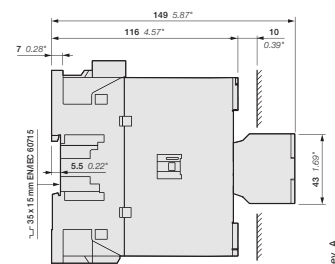
(1) AFS...-30...-11 for control by transistor outputs of safety PLCs and safety relays use interface relay RA4 1SBN060100R1000.



AFS40, AFS52, AFS65



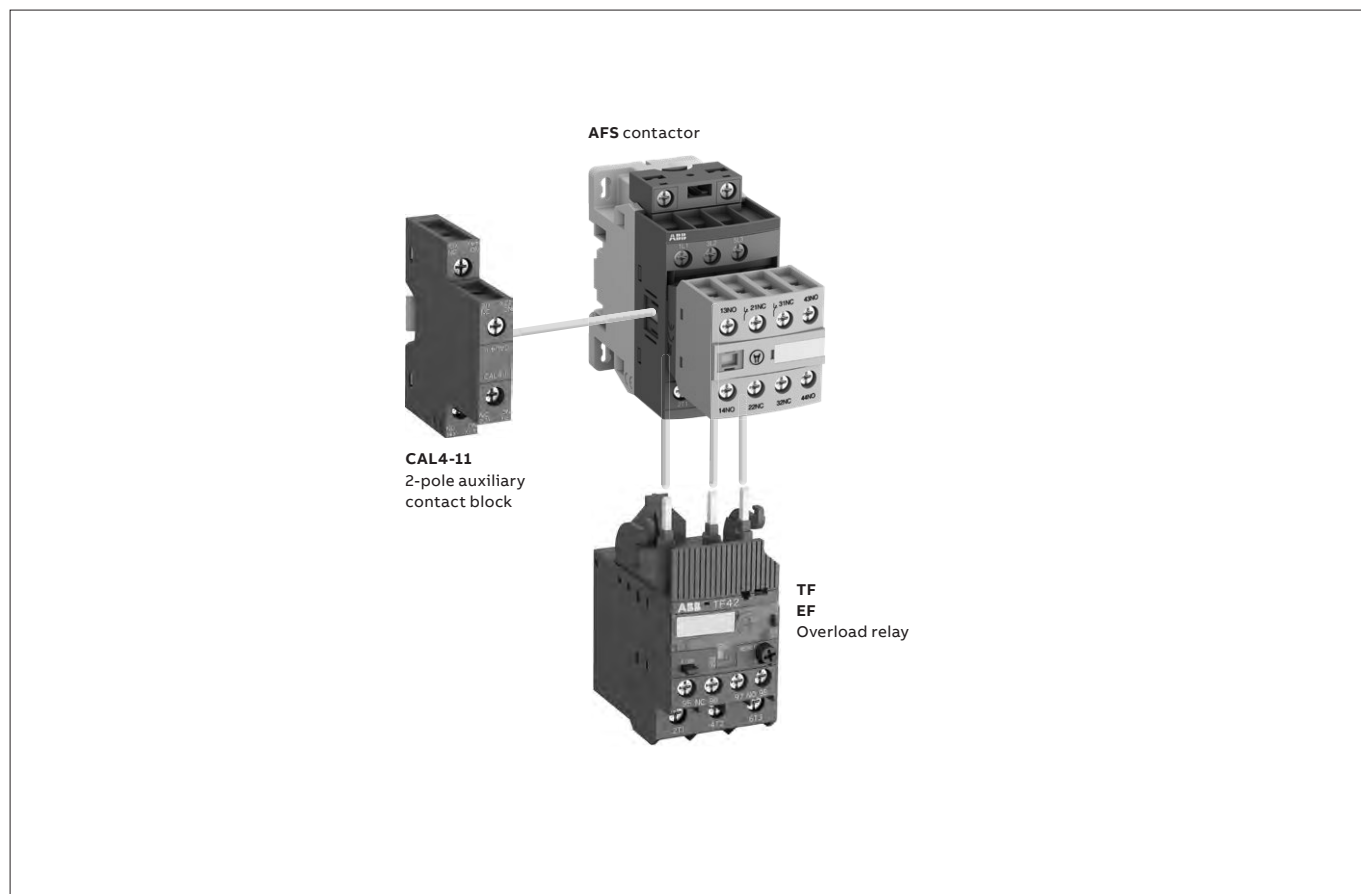
AFS80, AFS96



Main dimensions mm, inches

AFS09 ... AFS96 3-pole contactors for safety applications

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | | Mechanical interlock unit (between 2 contactors) | Side-mounted accessories | |
|-------------------|------------|-----------------------------|---------------------------|----------------|------------|------------------|--|-----------------------------|------------|
| | | | Auxiliary contact blocks | | | Electronic timer | | Auxiliary contact blocks | |
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | VM.. | 2-pole CAL4-11 Left side | Right side |
| AFS09 ... AFS38 | 3 0 | 2 2 | - | - | - | - | 1 | + 1 | or 1 |
| AFS09Z ... AFS38Z | 3 0 | 2 2 | - | - | - | - | 1 | - | - |
| AFS40 ... AFS96 | 3 0 | 2 2 | - | - | - | - | - | + 1 | + 1 |
| | | | - | - | - | - | 1 | + 1 | or 1 |

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AFS09 ... AFS38 | TF42 (0.10...38 A) | EF19 (0.10...19 A) |
| AFS26 ... AFS38 | TF42 (0.10...38 A) | EF45 (9...45 A) |
| AFS40 ... AFS65 | TF65 (22...67 A) | EF65 (20...70 A) |
| AFS80, AFS96 | TF96 (40...96 A) | EF96 (36...100 A) |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.
 (1) Direct mounting - No kit required.

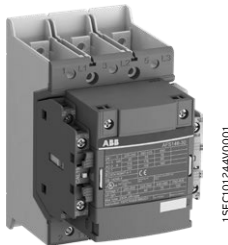
AFS116 ... AFS146 3-pole contactors for safety applications

55 to 75 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS146-30-12



AFS146-30-12B

AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O. + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
 - permanently fixed
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|---|-------------------------------|--------------------------------|--|---------------------------|------|------------|-----------------------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V | AC-3 | AC-1 | A | V 50/60 Hz V DC | | | | |
| kW | A | hp | A | | | | | |

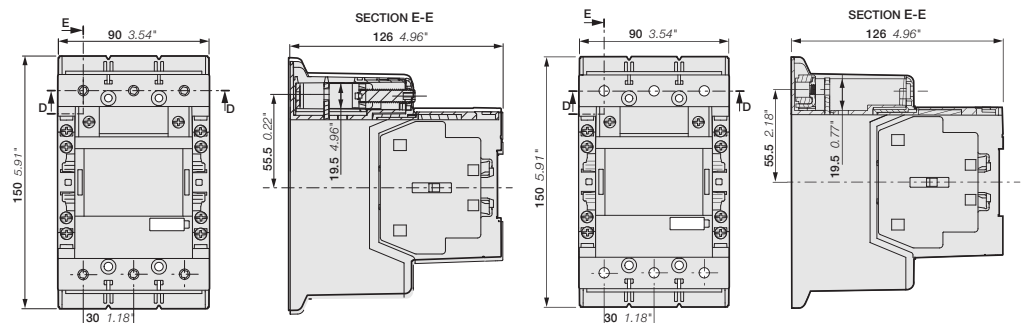
For connection with built-in cable clamps

| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 2 | AFS116-30-12-11 | 1SFL427081R1112 | 1.750 |
|----|-----|-----|-----|-----------|-----------|-----|-----------------|-----------------|-------|
| | | | | 48...130 | 48...130 | 1 2 | AFS116-30-12-12 | 1SFL427081R1212 | 1.750 |
| | | | | 100...250 | 100...250 | 1 2 | AFS116-30-12-13 | 1SFL427081R1312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12-14 | 1SFL427081R1412 | 1.750 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 2 | AFS146-30-12-11 | 1SFL467081R1112 | 1.750 |
| | | | | 48...130 | 48...130 | 1 2 | AFS146-30-12-12 | 1SFL467081R1212 | 1.750 |
| | | | | 100...250 | 100...250 | 1 2 | AFS146-30-12-13 | 1SFL467081R1312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12-14 | 1SFL467081R1412 | 1.750 |

With bar connections

| 55 | 160 | 75 | 160 | 24...60 | 20...60 | 1 2 | AFS116-30-12B-11 | 1SFL427082R1112 | 1.500 |
|----|-----|-----|-----|-----------|-----------|-----|------------------|-----------------|-------|
| | | | | 48...130 | 48...130 | 1 2 | AFS116-30-12B-12 | 1SFL427082R1212 | 1.500 |
| | | | | 100...250 | 100...250 | 1 2 | AFS116-30-12B-13 | 1SFL427082R1312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12B-14 | 1SFL427082R1412 | 1.500 |
| 75 | 225 | 100 | 200 | 24...60 | 20...60 | 1 2 | AFS146-30-12B-11 | 1SFL467082R1112 | 1.500 |
| | | | | 48...130 | 48...130 | 1 2 | AFS146-30-12B-12 | 1SFL467082R1212 | 1.500 |
| | | | | 100...250 | 100...250 | 1 2 | AFS146-30-12B-13 | 1SFL467082R1312 | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12B-14 | 1SFL467082R1412 | 1.500 |

(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.



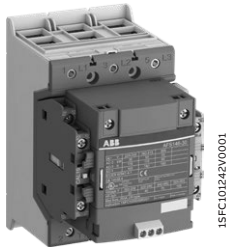
AFS116, AFS146-30-12

AFS116, AFS146-30-12B

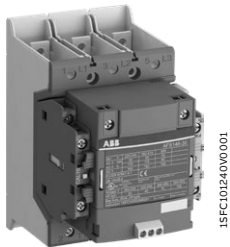
Main dimensions mm, inches

AFS116 ... AFS146 3-pole contactors for safety applications with built-in PLC interface - 55 to 75 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS146-30-12



AFS116-30-12B

AFS116 ... AFS146 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
 - permanently fixed
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

| IEC | | UL / CSA | | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|---|----------------------|--------------------|--|---------------------------|------|------------|-----------------------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V 50/60 Hz V DC | | | | |

For connection with built-in cable clamps

| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 2 | AFS116-30-12-33 | 1SFL427081R3312 | 1.750 |
|----|-----|-----|-----|-----------|-----------|-----|-----------------|-----------------|-------|
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12-34 | 1SFL427081R3412 | 1.750 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 2 | AFS146-30-12-33 | 1SFL467081R3312 | 1.750 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12-34 | 1SFL467081R3412 | 1.750 |

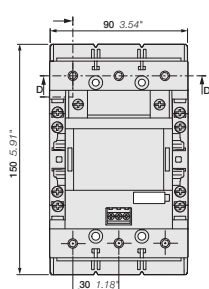
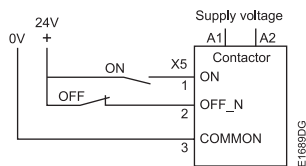
With bar connections

| 55 | 160 | 75 | 160 | 100...250 | 100...250 | 1 2 | AFS116-30-12B-33 | 1SFL427082R3312 | 1.500 |
|----|-----|-----|-----|-----------|-----------|-----|---|--------------------------------|-------|
| | | | | 250...500 | 250...500 | 1 2 | AFS116-30-12B-34 <td>1SFL427082R3412 <td>1.500</td> </td> | 1SFL427082R3412 <td>1.500</td> | 1.500 |
| 75 | 225 | 100 | 200 | 100...250 | 100...250 | 1 2 | AFS146-30-12B-33 <td>1SFL467082R3312 <td>1.500</td> </td> | 1SFL467082R3312 <td>1.500</td> | 1.500 |
| | | | | 250...500 | 250...500 | 1 2 | AFS146-30-12B-34 <td>1SFL467082R3412 <td>1.500</td> </td> | 1SFL467082R3412 <td>1.500</td> | 1.500 |

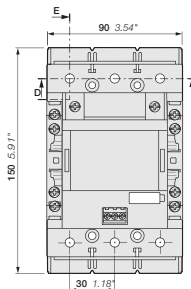
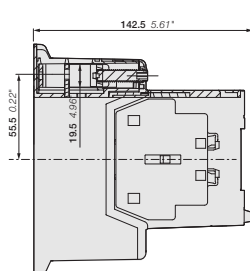
(1) For other auxiliary contacts arrangements, please contact your ABB local sales organization.

AFS116 ... AFS146 are equipped with low voltage inputs for control, for example by a PLC.

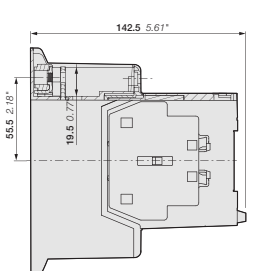
Control inputs



AFS116, AFS146-30-12



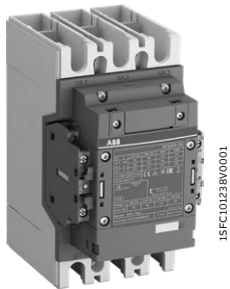
AFS116, AFS146-30-12B



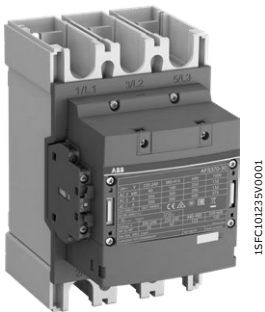
Main dimensions mm, inches

AFS190 ... AFS370 3-pole contactors for safety applications 90 to 200 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS205-30-12



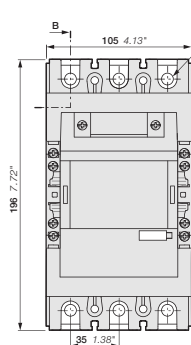
AFS370-30-12

AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O. + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

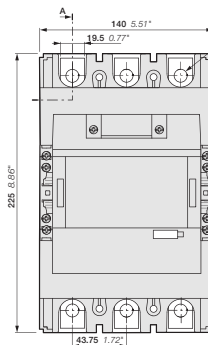
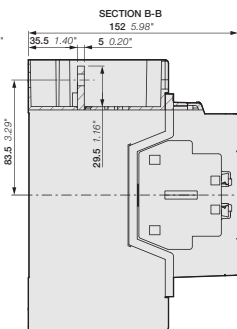
Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
 - permanently fixed
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

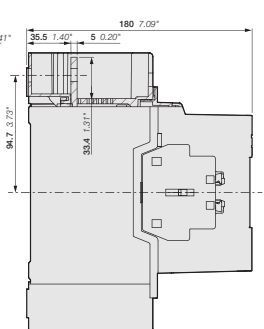
| IEC | | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------|--------------------|-------------------------------|-----------|---------------------------|-----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | Uc min. ... Uc max. | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | V 50/60 Hz | V DC | | | kg | |
| 90 | 275 | 125 | 250 | 24...60 | 20...60 | 1 2 | AFS190-30-12-11 | 1SFL487082R1112 | 3.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS190-30-12-12 | 1SFL487082R1212 | 3.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS190-30-12-13 | 1SFL487082R1312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS190-30-12-14 | 1SFL487082R1412 | 3.000 |
| 110 | 350 | 150 | 300 | 24...60 | 20...60 | 1 2 | AFS205-30-12-11 | 1SFL527082R1112 | 3.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS205-30-12-12 | 1SFL527082R1212 | 3.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS205-30-12-13 | 1SFL527082R1312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS205-30-12-14 | 1SFL527082R1412 | 3.000 |
| 132 | 400 | 200 | 350 | 24...60 | 20...60 | 1 2 | AFS265-30-12-11 | 1SFL547082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS265-30-12-12 | 1SFL547082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS265-30-12-13 | 1SFL547082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS265-30-12-14 | 1SFL547082R1412 | 4.675 |
| 160 | 500 | 250 | 400 | 24...60 | 20...60 | 1 2 | AFS305-30-12-11 | 1SFL587082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS305-30-12-12 | 1SFL587082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS305-30-12-13 | 1SFL587082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS305-30-12-14 | 1SFL587082R1412 | 4.675 |
| 200 | 600 | 300 | 520 | 24...60 | 20...60 | 1 2 | AFS370-30-12-11 | 1SFL607082R1112 | 4.675 |
| | | | | 48...130 | 48...130 | 1 2 | AFS370-30-12-12 | 1SFL607082R1212 | 4.675 |
| | | | | 100...250 | 100...250 | 1 2 | AFS370-30-12-13 | 1SFL607082R1312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS370-30-12-14 | 1SFL607082R1412 | 4.675 |



AFS190, AFS205



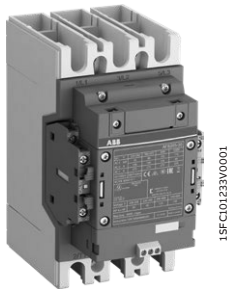
AFS265, AFS305, AFS370



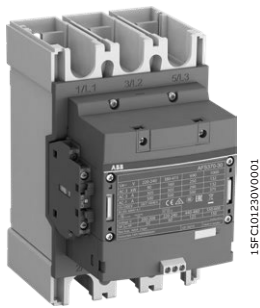
Main dimensions mm, inches

AFS190 ... AFS370 3-pole contactors for safety applications with built-in PLC interface - 90 to 200 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts




AFS205-30-12



AFS370-30-12

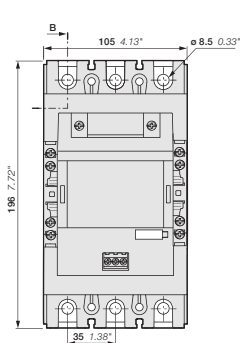
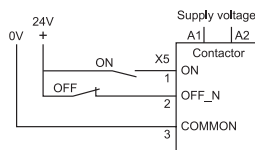
AFS190 ... AFS370 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O. + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits. Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 2 coils to cover control voltages between 100...500 V 50/60 Hz and 100...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
 - permanently fixed
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

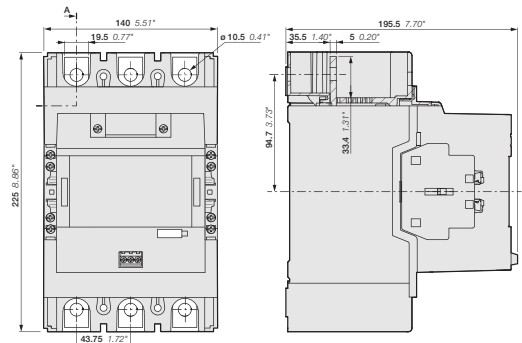
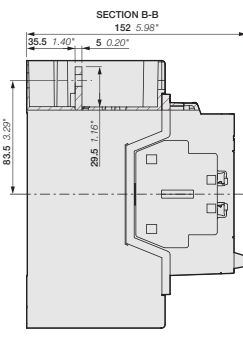
| IEC | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type (1) | Order code | Weight | |
|-------------------------|----------------------|--------------------|-------------------------------|-----------|--|----------|-----------------|-----------------|-------|
| Rated operational power | 3-phase motor rating | General use rating | Uc min. ... Uc max. | |  | | | Pkg (1 pce) | |
| 400 V AC-3 kW | 480 V hp | 600 V AC A | V 50/60 Hz | V DC | | | | kg | |
| 90 | 275 | 125 | 250 | 100...250 | 100...250 | 1 2 | AFS190-30-12-33 | 1SFL487082R3312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS190-30-12-34 | 1SFL487082R3412 | 3.000 |
| 110 | 350 | 150 | 300 | 100...250 | 100...250 | 1 2 | AFS205-30-12-33 | 1SFL527082R3312 | 3.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS205-30-12-34 | 1SFL527082R3412 | 3.000 |
| 132 | 400 | 200 | 350 | 100...250 | 100...250 | 1 2 | AFS265-30-12-33 | 1SFL547082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS265-30-12-34 | 1SFL547082R3412 | 4.675 |
| 160 | 500 | 250 | 400 | 100...250 | 100...250 | 1 2 | AFS305-30-12-33 | 1SFL587082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS305-30-12-34 | 1SFL587082R3412 | 4.675 |
| 200 | 600 | 300 | 520 | 100...250 | 100...250 | 1 2 | AFS370-30-12-33 | 1SFL607082R3312 | 4.675 |
| | | | | 250...500 | 250...500 | 1 2 | AFS370-30-12-34 | 1SFL607082R3412 | 4.675 |

AFS190 ... AFS370 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AFS190, AFS205

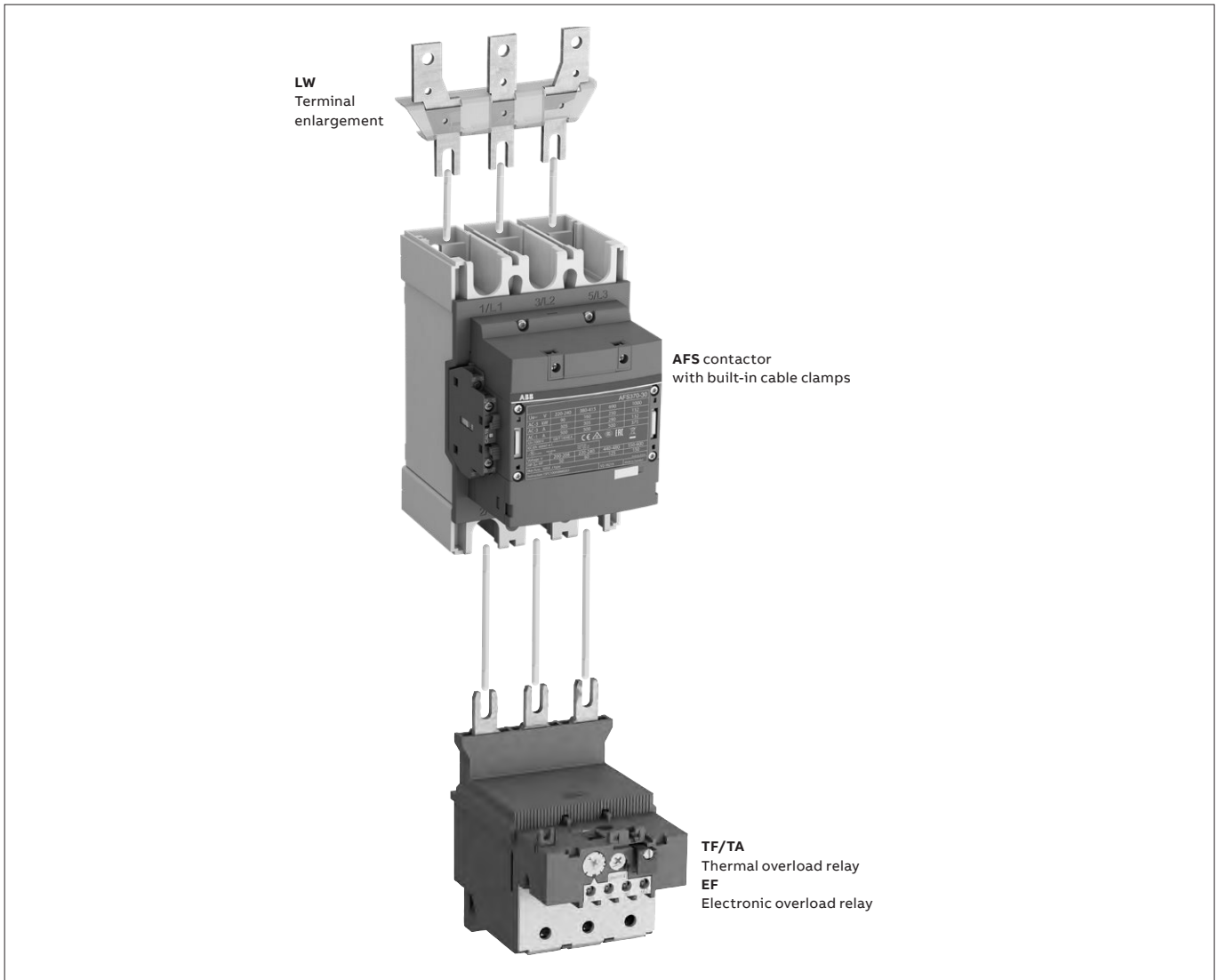


AFS265, AFS305, AFS370

Main dimensions mm, inches

AFS116 ... AFS370 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Overload relays fitting details (1)

| Contactor types | Thermal overload relays | Electronic overload relays |
|-------------------|-------------------------|----------------------------|
| AFS116 | TF140DU (66...142 A) | EF146 (54...150 A) |
| AFS146 | - | EF146 (54...150 A) |
| AFS190, AFS205 | TA200DU (66...200 A) | EF205 (63...210 A) |
| AFS265 ... AFS370 | - | EF370 (115...380 A) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.

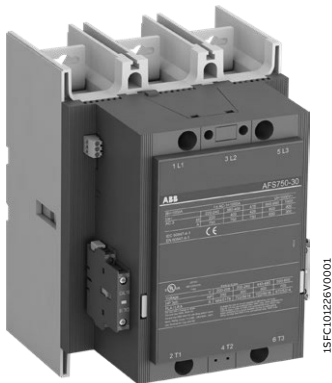
(1) Direct mounting - No kit required.

AFS400 ... AFS750 3-pole contactors for safety applications 200 to 400 kW

AC / DC operated with 1 N.O. + 2 N.C. auxiliary contacts



AFS460-30-12



AFS750-30-12

AFS400 ... AFS750 contactors are designed for machine safety applications. They are delivered with fixed 1 left (1 N.O + 1 N.C.) and 1 right (1 N.C.) side mounted auxiliary contact blocks making them ideal for monitoring and controlling circuits.

Mechanically linked contacts make your system safer.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
- mirror and mechanically linked contacts, with front marked symbol acc. to IEC60947-5-1, always guaranteeing the right contactor status
- side-mounted auxiliary contact blocks:
 - permanently fixed
 - yellow housing for easy identification
 - minimum switching capacity 12 V / 3 mA, with a failure rate 10^{-7} acc. to IEC 60947-5-4
- built-in surge suppression

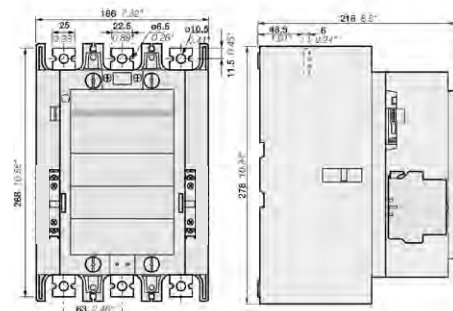
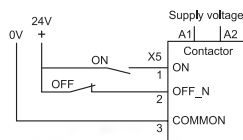
| IEC Rated operational power 400 V AC-3 | UL/CSA 3-phase motor rating 480 V AC-1 | | General use rating 600 V AC | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--|---|-----|--------------------------------------|--|-----------|---------------------------------|-----------------|---------------------|--|
| | kW | A | | hp | A | | | | |
| 200 | 600 | 350 | 550 | - | 24...60 | 1 2 | AFS400-30-12-68 | 1SFL577081R6812 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS400-30-12-69 | 1SFL577081R6912 | 12.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS400-30-12-70 | 1SFL577081R7012 | 12.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS400-30-12-71 | 1SFL577081R7112 | 12.000 |
| 250 | 700 | 400 | 650 | - | 24...60 | 1 2 | AFS460-30-12-68 | 1SFL597081R6812 (1) | 12.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS460-30-12-69 | 1SFL597081R6912 | 12.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS460-30-12-70 | 1SFL597081R7012 | 12.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS460-30-12-71 | 1SFL597081R7112 | 12.000 |
| 315 | 800 | 500 | 750 | - | 24...60 | 1 2 | AFS580-30-12-68 | 1SFL617081R6812 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS580-30-12-69 | 1SFL617081R6912 | 15.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS580-30-12-70 | 1SFL617081R7012 | 15.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS580-30-12-71 | 1SFL617081R7112 | 15.000 |
| 400 | 1050 | 600 | 900 | - | 24...60 | 1 2 | AFS750-30-12-68 | 1SFL637081R6812 (1) | 15.000 |
| | | | | 48...130 | 48...130 | 1 2 | AFS750-30-12-69 | 1SFL637081R6912 | 15.000 |
| | | | | 100...250 | 100...250 | 1 2 | AFS750-30-12-70 | 1SFL637081R7012 | 15.000 |
| | | | | 250...500 | 250...500 | 1 2 | AFS750-30-12-71 | 1SFL637081R7112 | 15.000 |

(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

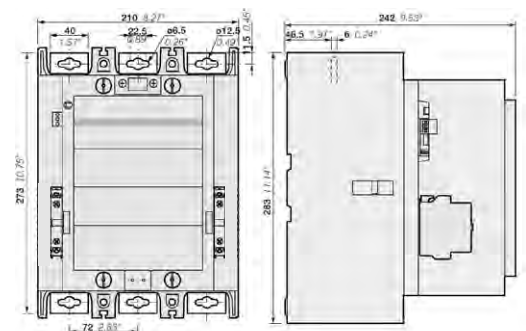
(2) Up to 850 V DC for AFS580, AFS750.

AFS400...AFS750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



AFS400, AFS460

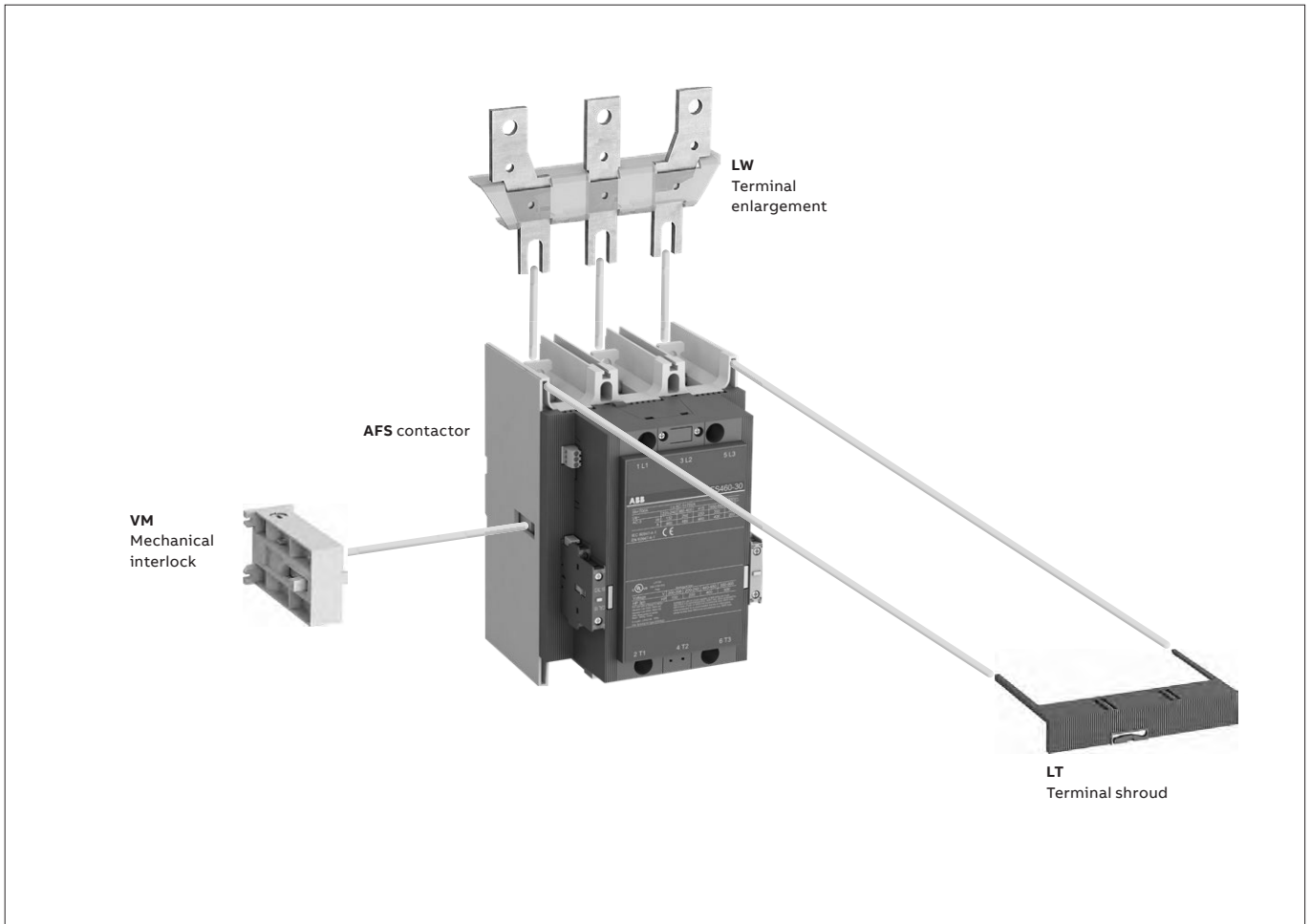


AFS580, AFS750

Main dimensions mm, inches

AFS400 ... AFS750 3-pole contactors for safety applications with 1 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Overload relays fitting details

| Contactor types | Thermal overload relays | Electronic overload relays |
|-----------------|-------------------------|----------------------------|
| AFS400, AFS460 | - | EF460 (150...500 A) (3) |
| AFS580, AFS750 | - | EF750 (250...800 A) (3) |

The addition of a thermal or electronic overload relay on the contactor does not prevent fitting of many other accessories as shown in "Main accessory fitting details" table.
 (3) Mounting kit required (see "Motor protection").

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|--|--------------------------------|---|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | | | |
| Rated operational voltage U _e max. | | 690 V | | | | | | | | | | 1000 V |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free-air thermal current I _{th} | | | | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A | 105 A | 105 A | 105 A | 130 A | 130 A |
| With conductor cross-sectional area | | 6 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² | 35 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | 50 mm ² |
| AC-1 Utilization category | | | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | | | |
| I _e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| U _e max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 60^\circ\text{C}$ | 25 A | 28 A | 30 A | 40 A | 42 A | 42 A | 60 A | 80 A | 90 A | 100 A | 105 A |
| | $\theta \leq 70^\circ\text{C}$ | 22 A | 24 A | 26 A | 32 A | 37 A | 37 A | 50 A | 70 A | 80 A | 85 A | 90 A |
| With conductor cross-sectional area | | 4 mm ² | 6 mm ² | 6 mm ² | 10 mm ² | 10 mm ² | 10 mm ² | 25 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | 50 mm ² |
| AC-3, AC-3e Utilization category | | | | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | | | | | | |
| I _e / Max. rated operational current AC-3, AC-3e (1) | | | | | | | | | | | | |
| AC-3e U _e $\leq 690\text{ V}$ | 220-230-240 V | 9 A | 12 A | 18 A | 26 A | 33 A | 40 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 380-400 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 415 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 440 V | 9 A | 12 A | 18 A | 26 A | 32 A | 38 A | 40 A | 53 A | 65 A | 80 A | 96 A |
| | 500 V | 9.5 A | 12.5 A | 15 A | 23 A | 28 A | 33 A | 35 A | 45 A | 55 A | 65 A | 80 A |
| | 690 V | 7 A | 9 A | 10.5 A | 17 A | 21 A | 24 A | 25 A | 35 A | 39 A | 49 A | 57 A |
| | 1000 V | | | | | | | | | | 25 A | 30 A |
| Rated operational power AC-3, AC-3e (1) | | | | | | | | | | | | |
| AC-3e U _e $\leq 690\text{ V}$ | 220-230-240 V | 2.2 kW | 3 kW | 4 kW | 6.5 kW | 9 kW | 11 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 25 kW |
| | 380-400 V | 4 kW | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 18.5 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW |
| | 415 V | 4 kW | 5.5 kW | 9 kW | 11 kW | 15 kW | 18.5 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 440 V | 4 kW | 5.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 500 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 690 V | 5.5 kW | 7.5 kW | 9 kW | 15 kW | 18.5 kW | 22 kW | 22 kW | 30 kW | 37 kW | 45 kW | 55 kW |
| | 1000 V | | | | | | | | | | 35 kW | 40 kW |
| Rated making capacity AC-3, AC-3e | | 10 x I _e AC-3, 12 x I _e AC-3e acc. to IEC 60947-4-1 | | | | | | | | | | |
| Rated breaking capacity AC-3, AC-3e | | 8 x I _e AC-3, 8.5 x I _e AC-3e acc. to IEC 60947-4-1 | | | | | | | | | | |
| AC-8a Utilization category | | | | | | | | | | | | |
| (without thermal overload relay | | | | | | | | | | | | |
| U _e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$) | | | | | | | | | | | | |
| I _e / Rated operational current AC-8a | | 12 A | 16 A | 22 A | 30 A | 40 A | 50 A | 53 A | 70 A | 85 A | 105 A | 120 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW | 15 kW | 20 kW | 25 kW | 25 kW | 37 kW | 45 kW | 55 kW | 65 kW |
| Short-circuit protection device for contactors | | | | | | | | | | | | |
| without thermal overload relay | | | | | | | | | | | | |
| Motor protection excluded (2) | | | | | | | | | | | | |
| U _e $\leq 500\text{ V AC - gG type fuse}$ | | 25 A | 32 A | 32 A | 50 A | 63 A | 63 A | 100 A | 125 A | 160 A | 160 A | 200 A |
| Rated short-time withstand current I _{cw} | 1 s | 300 A | 300 A | 300 A | 700 A | 700 A | 700 A | 1000 A | 1000 A | 1000 A | 1200 A | 1200 A |
| at 40 °C ambient temperature, | 10 s | 150 A | 150 A | 150 A | 350 A | 350 A | 350 A | 600 A | 600 A | 600 A | 780 A | 780 A |
| in free air from a cold state | 30 s | 80 A | 80 A | 80 A | 225 A | 225 A | 225 A | 350 A | 350 A | 350 A | 450 A | 450 A |
| | 1 min | 60 A | 60 A | 60 A | 150 A | 150 A | 150 A | 250 A | 250 A | 250 A | 300 A | 300 A |
| | 15 min | 35 A | 35 A | 35 A | 50 A | 50 A | 50 A | 110 A | 110 A | 110 A | 140 A | 140 A |
| Maximum breaking capacity | | | | | | | | | | | | |
| cos $\phi = 0.45$ | | | | | | | | | | | | |
| | at 440 V | 250 A | 250 A | 250 A | 500 A | 500 A | 500 A | 950 A | 950 A | 950 A | 1150 A | 1150 A |
| | at 690 V | 106 A | 106 A | 106 A | 200 A | 200 A | 200 A | 600 A | 600 A | 600 A | 750 A | 750 A |
| Power dissipation per pole | I _e / AC-1 | 0.8 W | 1 W | 1.2 W | 1.8 W | 2.4 W | 2.4 W | 3 W | 6.3 W | 7 W | 7.6 W | 8.2 W |
| | I _e / AC-3, AC-3e | 0.1 W | 0.2 W | 0.35 W | 0.6 W | 0.9 W | 1.3 W | 1 W | 1.7 W | 2.7 W | 3 W | 4.5 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | | | | | | |
| | AC-3, AC-3e | 1200 cycles/h | | | | | | | | | | |
| | AC-2, AC-4 | 300 cycles/h | | | | | 150 cycles/h | | | | | |
| B10d - Calculated for 50% of the rated current value I _e | | 1.3 million operating cycles | | | | | | | | | | |
| at AC-3 / 400 V | | | | | | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

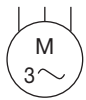
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AFS116 ... AFS370 3-pole contactors for safety applications

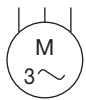
Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|--|-----------------------|--|--------------------|---------------------|-------------------------|---------------------|-------------------------|-----------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | |
| Rated operational voltage U _e max. | | 690 V | 1000 V | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | |
| Conventional free-air thermal current I _{th} acc. to IEC 60947-4-1, open contactors, θ ≤ 40 °C | | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2 x 185 mm ² (4) |
| AC-1 Utilization category | | | | | | | | |
| For air temperature close to contactor | | | | | | | | |
| le / Rated operational current AC-1 U _e max. ≤ 690 V, 50/60 Hz | θ ≤ 40 °C | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| | θ ≤ 60 °C | 145 A | 200 A | 250 A | 300 A | 350 A | 400 A | 500 A |
| | θ ≤ 70 °C | 130 A | 175 A | 200 A | 240 A | 290 A | 325 A | 400 A |
| le / Rated operational current AC-1 U _e max. ≤ 1000 V, 50/60 Hz | θ ≤ 40 °C | - | 225 A | 250 A | 275 A | 350 A | 375 A | 400 A |
| | θ ≤ 60 °C | - | 200 A | 225 A | 250 A | 300 A | 325 A | 350 A |
| | θ ≤ 70 °C | - | 175 A | 185 A | 200 A | 240 A | 260 A | 290 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2 x 185 mm ² (4) |
| AC-3 Utilization category | | | | | | | | |
| For air temperature close to contactor θ ≤ 60 °C | | | | | | | | |
| le / Max. rated operational current AC-3 (1) | | | | | | | | |
| | 220-230-240 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 380-400 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 415 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 440 V | 116 A | 146 A | 190 A | 205 A | 265 A | 305 A | 370 A |
| | 500 V | 110 A | 130 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 690 V | 65 A | 93 A | 135 A | 165 A | 250 A | 290 A | 315 A |
| | 1000 V | - | 60 A | 85 A | 100 A | 113 A | 131 A | 141 A |
| Rated operational power AC-3 (1) | | | | | | | | |
| | 220-230-240 V | 30 kW | 45 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW |
| | 380-400 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| | 415 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW |
| | 440 V | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW |
| | 500 V | 75 kW | 90 kW | 90 kW | 110 kW | 200 kW | 200 kW | 250 kW |
| | 690 V | 55 kW | 90 kW | 132 kW | 160 kW | 200 kW | 250 kW | 315 kW |
| | 1000 V | - | 75 kW | 110 kW | 132 kW | 160 kW | 185 kW | 200 kW |
| Rated making capacity AC-3 | | 10 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | |
| Rated breaking capacity AC-3 | | 8 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) | | | | | | | | |
| U _e ≤ 500 V AC - gG type fuse | | 250 A | 315 A | 355 A | 400 A | 500 A | 500 A | 630 A |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 1300 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A |
| | 10 s | 928 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A |
| | 30 s | 536 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A |
| | 1 min | 379 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A |
| | 15 min | 160 A | 225 A | 275 A | 350 A | 400 A | 500 A | 600 A |
| Maximum breaking capacity cos φ = 0.45 (cos φ = 0.35 for I _e > 100 A) | at 440 V | 2000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A |
| | at 690 V | 1000 A | 1500 A | 2200 A | 2500 A | 3300 A | 3800 A | 4000 A |
| Power dissipation per pole | I _e / AC-1 | 12 W | 23 W | 15 W | 25 W | 32 W | 50 W | 72 W |
| | I _e / AC-3 | 6 W | 10 W | 7 W | 8 W | 14 W | 19 W | 27 W |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | |
| | AC-2, AC-4 | 150 cycles/h | | | | | | |
| B10d - Calculated for 50% of the rated current value I _e at AC-3 / 400 V | | 1.3 million operating cycles | | | | | | |



3-phase motors



1500 r.p.m. 50 Hz
1800 r.p.m. 60 Hz
3-phase motors

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".
For AC-3e utilization category, please consult your ABB local sales organization.
(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".
(3) For currents above 275 A use terminal enlargements or terminal extensions.
(4) For currents above 450 A use terminal enlargements or terminal extensions.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to IEC

| Contactors types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|--------------------------------|--|-----------------------|-----------------------|-------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | |
| Rated operational voltage U _e max. | | 1000 V | | | |
| Rated frequency (without derating) | | 50/60 Hz | | | |
| Conventional free-air thermal current I _{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 600 A | 700 A | 800 A | 1050 A |
| With conductor cross-sectional area (3) | | 2x185 mm ² | 2x240 mm ² | 2x240 mm ² | 800 mm ² (4) |
| AC-1 Utilization category | | | | | |
| For air temperature close to contactor | | | | | |
| I _e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 600 A | 700 A | 800 A | 1050 A |
| U _e max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 55^\circ\text{C}$ | 500 A | 600 A | 700 A | 875 A |
| | $\theta \leq 70^\circ\text{C}$ | 400 A | 480 A | 580 A | 720 A |
| I _e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 600 A | 700 A | 800 A | 1000 A |
| U _e max. $\leq 1000\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 55^\circ\text{C}$ | 500 A | 600 A | 700 A | 875 A |
| | $\theta \leq 70^\circ\text{C}$ | 400 A | 480 A | 580 A | 720 A |
| With conductor cross-sectional area | | 2x185 mm ² | 2x240 mm ² | 2x240 mm ² | 800 mm ² (4) |
| AC-3 Utilization category | | | | | |
| For air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | | | |
| I _e / Max. rated operational current AC-3 (1) | | | | | |
| | 220-230-240 V | 400 A | 460 A | 580 A | 750 A |
| | 380-400 V | 400 A | 460 A | 580 A | 750 A |
| | 415 V | 400 A | 460 A | 580 A | 750 A |
| | 440 V | 400 A | 460 A | 580 A | 750 A |
| | 500 V | 400 A | 460 A | 580 A | 750 A |
| | 690 V | 350 A | 400 A | 500 A | 650 A |
| | 1000 V | 155 A | 200 A | 250 A | 300 A |
| | | | | | |
| | 220-230-240 V | 110 kW | 132 kW | 160 kW | 220 kW |
| | 380-400 V | 200 kW | 250 kW | 315 kW | 400 kW |
| | 415 V | 220 kW | 250 kW | 355 kW | 425 kW |
| | 440 V | 220 kW | 250 kW | 355 kW | 450 kW |
| | 500 V | 250 kW | 315 kW | 400 kW | 520 kW |
| | 690 V | 315 kW | 355 kW | 500 kW | 600 kW |
| | 1000 V | 220 kW | 280 kW | 355 kW | 400 kW |
| Rated making capacity AC-3 | | 10 x I _e AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | | 8 x I _e AC-3 acc. to IEC 60947-4-1 | | | |
| Short-circuit protection device for contactors without thermal overload relay Motor protection excluded (2) | | | | | |
| U _e $\leq 500\text{ V AC - gG type fuse}$ | | 630 A | 800 A | 1000 A | 1000 A |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 4600 A | 4600 A | 7000 A | 7000 A |
| | 10 s | 4400 A | 4400 A | 6400 A | 6400 A |
| | 30 s | 3100 A | 3100 A | 4500 A | 4500 A |
| | 1 min | 2500 A | 2500 A | 3500 A | 3500 A |
| | 15 min | 840 A | 840 A | 1300 A | 1300 A |
| Maximum breaking capacity cos $\phi = 0.45$ | at 440 V | 4000 A | 5000 A | 6000 A | 7500 A |
| (cos $\phi = 0.35$ for I _e > 100 A) | at 690 V | 3500 A | 4500 A | 5000 A | 7000 A |
| Power dissipation per pole | I _e / AC-1 | 30 W | 42 W | 32 W | 50 W |
| | I _e / AC-3 | 16 W | 21 W | 17 W | 28 W |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | | 300 cycles/h | |
| | AC-3 | 300 cycles/h | | 300 cycles/h | |
| | AC-2, AC-4 | 60 cycles/h | | 60 cycles/h | |
| B10d - Calculated for 50% of the rated current value I _e at AC-3 / 400 V | | 0.68 million operating cycles | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m., 50 Hz or 1800 r.p.m., 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

(3) Conductors with preparation.

(4) Max. connection bar width 50 mm.

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactors types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|------------------|---------------------------------------|----------|----------|----------|----------|----------|----------|----------|--------|----------|----------|
| Standards | | UL 60947-4-1, CSA-C22.2 No. 60947-4-1 | | | | | | | | | | |
| Maximum operational voltage | | 600 V | | | | | | | | | | |
| NEMA size | | 00 | 0 | - | 1 | - | - | 2 | - | - | 3 | - |
| NEMA continuous amp rating | Thermal current | 9 A | 18 A | - | 27 A | - | - | 45 A | - | - | 90 A | - |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1 hp | - | 2 hp | - | - | 3 hp | - | - | - | - |
| | 230 V AC | 1 hp | 2 hp | - | 3 hp | - | - | 7.5 hp | - | - | - | - |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 3 hp | - | 7-1/2 hp | - | - | 10 hp | - | - | 25 hp | - |
| | 230 V AC | 1-1/2 hp | 3 hp | - | 7-1/2 hp | - | - | 15 hp | - | - | 30 hp | - |
| | 460 V AC | 2 hp | 5 hp | - | 10 hp | - | - | 25 hp | - | - | 50 hp | - |
| | 575 V AC | 2 hp | 5 hp | - | 10 hp | - | - | 25 hp | - | - | 50 hp | - |
| UL / CSA general use rating | | | | | | | | | | | | |
| 600 V AC | | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| 1 pole | 80 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| 2 poles in serie | 160 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| 3 poles in serie | 240 V DC | 25 A | 28 A | 30 A | 45 A | 50 A | 50 A | 60 A | 80 A | 90 A | 105 A | 115 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 3 | AWG 2 | AWG 2 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | | | | | |
| Full load current | 120 V AC | 13.8 A | 16 A | 20 A | 24 A | 24 A | 24 A | 34 A | 34 A | 56 A | 80 A | 80 A |
| | 240 V AC | 10 A | 12 A | 17 A | 17 A | 28 A | 28 A | 40 A | 50 A | 68 A | 68 A | 88 A |
| Horse power rating | 120 V AC | 3/4 hp | 1 hp | 1-1/2 hp | 2 hp | 2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp |
| | 240 V AC | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 5 hp | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 15 hp | 20 hp |
| UL / CSA maximum 3-phase motor rating | | | | | | | | | | | | |
| Full load current (1) | 200-208 V AC | 7.8 A | 11 A | 17.5 A | 25.3 A | 32.2 A | 32.2 A | 32.2 A | 48.3 A | 62.1 A | 78.2 A | 92 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A | 22 A | 28 A | 28 A | 42 A | 54 A | 68 A | 80 A | 80 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A | 21 A | 27 A | 34 A | 40 A | 52 A | 65 A | 77 A | 77 A |
| | 550-600 V AC | 9 A | 11 A | 17 A | 22 A | 27 A | 32 A | 41 A | 52 A | 62 A | 77 A | 77 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 30 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 60 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 75 hp |
| UL / CSA - DC motor starting - 3 poles in series | | | | | | | | | | | | |
| Full Load Amps | 125 V DC | 9.5 A | 13.2 A | 17 A | 25 A | 25 A | 25 A | 40 A | 58 A | 76 A | 76 A | 110 A |
| | 250 V DC | 8.5 A | 12.2 A | 12.2 A | 20 A | 29 A | 29 A | 38 A | 55 A | 72 A | 89 A | 106 A |
| Horse power rating | 125 V DC | 1 hp | 1-1/2 hp | 2 hp | 3 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 10 hp | 10 hp | 15 hp |
| | 250 V DC | 2 hp | 3 hp | 3 hp | 5 hp | 7-1/2 hp | 7-1/2 hp | 10 hp | 15 hp | 20 hp | 25 hp | 30 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | | | | | |
| High fault current | | 100 kA | | | | | | | | | | |
| Fuse rating | | 30 A | | 60 A | | | 100 A | | 150 A | | 200 A | |
| Fuse type, 600 V | | J | | | | | | | | | | |
| Maximum electrical switching frequency | | | | | | | | | | | | |
| For general use | | 600 cycles/h | | | | | | | | | | |
| For motor use | | 1200 cycles/h | | | | | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

AFS116 ... AFS370 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactors types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|------------------|---|---------|---------|-------------|---------|------------|------------|
| Standards | | UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1 | | | | | | |
| Maximum operational voltage | | 600 V | 1000 V | | | | | |
| NEMA size | | - | - | - | - | 5 | - | - |
| NEMA continuous amp rating | Thermal current | - | - | - | - | 270 A | - | - |
| NEMA maximum horse power ratings | 115 V AC | - | - | - | - | - | - | - |
| 1-phase, 60 Hz | 230 V AC | - | - | - | - | - | - | - |
| NEMA maximum horse power ratings | 200 V AC | - | - | - | - | 75 hp | - | - |
| 3-phase, 60 Hz | 230 V AC | - | - | - | - | 100 hp | - | - |
| | 460 V AC | - | - | - | - | 200 hp | - | - |
| | 575 V AC | - | - | - | - | 200 hp | - | - |
| UL / CSA general use rating | | | | | | | | |
| 600 V AC | | 160 A | 200 A | 250 A | 300 A | 350 A | 400 A | 520 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| 1000 V AC | | - | 200 A | 250 A | 275 A | 300 A | 350 A | 400 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| 1 pole | 90 V DC | 160 A | 200 A | - | - | - | - | - |
| | 100 V DC | - | - | 250 A | 350 A | - | - | - |
| | 110 V DC | - | - | - | - | 400 A | 500 A | 520 A |
| 2 poles in serie | 175 V DC | 160 A | 200 A | - | - | - | - | - |
| | 200 V DC | - | - | 250 A | 350 A | - | - | - |
| | 225 V DC | - | - | - | - | 400 A | 500 A | 520 A |
| 3 poles in serie | 260 V DC | 160 A | 200 A | - | - | - | - | - |
| | 300 V DC | - | - | 250 A | 350 A | - | - | - |
| | 340 V DC | - | - | - | - | 400 A | 500 A | 520 A |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 350 (2) | MCM 500 | 2//AWG 3/0 | 2//MCM 300 |
| UL / CSA maximum 1-phase motor rating | | | | | | | | |
| Full load current | 120 V AC | - | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - | - |
| Horse power rating | 120 V AC | - | - | - | - | - | - | - |
| | 240 V AC | - | - | - | - | - | - | - |
| UL / CSA maximum 3-phase motor rating | | | | | | | | |
| Full load current (1) | 200-208 V AC | 92 A | 120 A | 150 A | 177 A | 221 A | 285 A | 359 A |
| | 220-240 V AC | 104 A | 130 A | 154 A | 192 A | 248 A | 312 A | 360 A |
| | 440-480 V AC | 96 A | 124 A | 156 A | 180 A | 240 A | 302 A | 361 A |
| | 550-600 V AC | 99 A | 125 A | 144 A | 192 A | 242 A | 289 A | 336 A |
| Horse power rating (1) | 200-208 V AC | 30 hp | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp |
| | 220-240 V AC | 40 hp | 50 hp | 60 hp | 75 hp | 100 hp | 125 hp | 150 hp |
| | 440-480 V AC | 75 hp | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp |
| | 550-600 V AC | 100 hp | 125 hp | 150 hp | 200 hp | 250 hp | 300 hp | 350 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | | | | |
| High fault current | | 100 kA | | | | | | |
| Fuse rating | | 225 A | 250 A | 350 A | 400 A | 500 A | 600 A | 600 A |
| Fuse type, 600 V | | J | | | | | | |
| Maximum electrical switching frequency | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | |
| For motor use | | 300 cycles/h | | | | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For conductor cross-sectional area above MCM 300 use terminal enlargements LW205.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

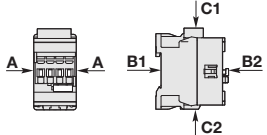
| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|---|------------------|---|--------|--------|---------|
| Standards | | UL 60947-1 / 60947-4-1 and CSA C 22.2 N°60947-1 / 60947-4-1 | | | |
| Maximum operational voltage | | 1000 V | | | |
| NEMA size | | - | 6 | - | 7 |
| NEMA maximum horse power ratings | | | | | |
| 1-phase, 60 Hz | 115 V AC | - | | | |
| | 230 V AC | - | | | |
| NEMA maximum horse power ratings | | | | | |
| 3-phase, 60 Hz | 200 V AC | - | 150 hp | - | - |
| | 230 V AC | - | 200 hp | - | 300 hp |
| | 460 V AC | - | 400 hp | - | 600 hp |
| | 575 V AC | - | 400 hp | - | 600 hp |
| UL / CSA general use rating | | | | | |
| 1000 V AC | | 550 A | 650 A | 750 A | 900 A |
| 3 poles in serie | 600 V DC | 550 A | 650 A | 750 A | 900 A |
| UL / CSA maximum 1-phase motor rating | | | | | |
| Full load current | 120 V AC | - | - | - | - |
| | 240 V AC | - | - | - | - |
| Horse power rating | 120 V AC | - | - | - | - |
| | 240 V AC | - | - | - | - |
| UL / CSA maximum 3-phase motor rating | | | | | |
| Full load current (1) | 200-208 V AC | 358.8 A | 414 A | 552 A | 692.3 A |
| | 220-240 V AC | 360 A | 480 A | 604 A | 722 A |
| | 440-480 V AC | 414 A | 477 A | 590 A | 722 A |
| | 550-600 V AC | 382 A | 472 A | 578 A | 672 A |
| Horse power rating (1) | 200-208 V AC | 125 hp | 150 hp | 200 hp | 250 hp |
| | 220-240 V AC | 150 hp | 200 hp | 250 hp | 300 hp |
| | 440-480 V AC | 350 hp | 400 hp | 500 hp | 600 hp |
| | 550-600 V AC | 400 hp | 500 hp | 600 hp | 700 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | | | | | |
| Fuse rating | | 1000 A | | 1200 A | |
| Fuse type, 600 V | | L | | | |
| Maximum electrical switching frequency | | | | | |
| For general use | | 300 cycles/h | | | |
| For motor use | | 300 cycles/h | | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

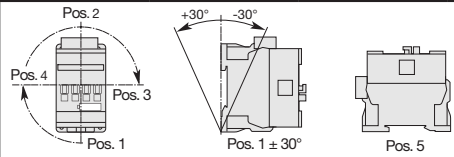
AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

General technical data

| Contactors types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|---|------------------------------------|--|-------|-------|-------|-------|-------|
| Rated insulation voltage U_i | | 690 V | | | | | |
| acc. to IEC 60947-4-1 | | 690 V | | | | | |
| acc. to UL / CSA | | 600 V | | | | | |
| Rated impulse withstand voltage U_{imp} . | | 6 kV | | | | | |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environments A and B | | | | | |
| Ambient air temperature close to contactor | | | | | | | |
| Operation | Fitted with thermal overload relay | -25 ... +60 °C | | | | | |
| | Without thermal overload relay | -40 ... +70 °C | | | | | |
| Storage | | -60 ... +80 °C | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | |
| Mechanical durability | | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | | |
| Shock withstand | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | |
|  | A | 30 g | | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | | |
| | B2 | 15 g | | | | | |
| | C1 | 25 g | | | | | |
| | C2 | 25 g | | | | | |
| Vibration withstand | | | | | | | |
| acc. to IEC 60068-2-6 | | 5 ... 300 Hz | | | | | |
| | | 4 g Closed position / 2 g Open position | | | | | |

Mounting characteristics and conditions for use

| Contactors types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|--|------------------|--|-------|-------|-------|-------|-------|
| Mounting positions | |  | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | | | |
| By screws (not supplied) | | 2 x M4 screws placed diagonally | | | | | |

AFS09 ... AFS38 3-pole contactors for safety applications

Technical data

Magnet system characteristics for AFS09 ... AFS38 contactors - AC / DC operated

| Contactors types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 |
|--|-----------------------|---|-------|-------|-------|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | | | |
| | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ | | | | | |
| AC control voltage 50/60 Hz | | | | | | | |
| Rated control circuit voltage U_c | | 24 ... 250 V AC | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | | |
| | Average holding value | 2.2 VA / 2 W | | | | | |
| DC control voltage | | | | | | | |
| Rated control circuit voltage U_c | | 20 ... 250 V DC | | | | | |
| Coil consumption | Average pull-in value | 50 W | | | | | |
| | Average holding value | 2 W | | | | | |
| PLC-output control | | AFS...30-22-11 not suitable for direct control by PLC-output. | | | | | |
| Drop-out voltage | | $\leq 60\% U_c \text{ min}$. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40 ... 95 ms | | | | | |
| | N.C. contact opening | 38 ... 90 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 11 ... 95 ms (1) | | | | | |
| | N.C. contact closing | 13 ... 98 ms | | | | | |

(1) AFS09 ... AFS38 ≤ 35 ms for $20^\circ\text{C} \leq \theta \leq 70^\circ\text{C}$

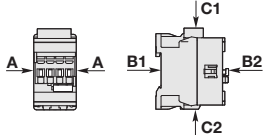
Magnet System Characteristics for AFS09Z ... AFS38Z contactors 24V DC operated - designed for PLC - coil 30

| Contactors types | DC operated | AFS09Z | AFS12Z | AFS16Z | AFS26Z | AFS30Z | AFS38Z |
|--|-----------------------|--|--------|--------|--------|--------|--------|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ at $\theta \leq 70^\circ\text{C}$ U_c | | | | | |
| | DC control voltage | | | | | | |
| Rated control circuit voltage U_c | | 24 V DC | | | | | |
| Coil consumption | Average pull-in value | 6 W | | | | | |
| | Average holding value | 1.7 W | | | | | |
| PLC-output control | | ≥ 250 mA 24 V DC for PLCs and safety PLCs using broken wire detection | | | | | |
| Drop-out voltage | | $\leq 60\% U_c \text{ min}$. | | | | | |
| Operating time | | | | | | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms | | | | | |
| | N.C. contact opening | 20 ... 35 ms | | | | | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms | | | | | |
| | N.C. contact closing | 22 ... 57 ms | | | | | |

AFS40 ... AFS96 3-pole contactors for safety applications

Technical data

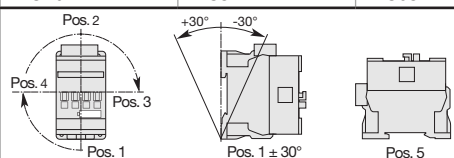
General technical data

| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|------------------------------------|--|-------|-------|--------|-------|
| Rated insulation voltage U_i acc. to IEC 60947-4-1 | | 690 V | | | 1000 V | |
| acc. to UL / CSA | | 600 V | | | | |
| Rated impulse withstand voltage U_{imp} . | | 6 kV | | | 8 kV | |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environments A and B | | | | |
| Ambient air temperature close to contactor | | | | | | |
| Operation | Fitted with thermal overload relay | -40 ... +70 °C | | | | |
| | Without thermal overload relay | -40 ... +70 °C | | | | |
| Storage | | -60 ... +80 °C | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | |
| Mechanical durability | | | | | | |
| Number of operating cycles | | 10 million operating cycles | | | | |
| Maximum switching frequency | | 3600 cycles/h | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | |
|  | A | 25 g | | | | |
| | B1 | 25 g closed position / 5 g open position | | | | |
| | B2 | 15 g | | | | |
| | C1 | 25 g | | | | |
| | C2 | 25 g | | | | |
| Vibration withstand acc. to IEC 60068-2-6 | | 5 ... 300 Hz 3 g Closed position / 3 g Open position | | | | |

Magnet system characteristics for AFS40 ... AFS96 contactors - AC / DC operated

| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|--|-----------------------|---|-------|-------|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | | | | |
| | DC supply | at $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | |
| AC control voltage 50/60 Hz | | | | | | |
| Rated control circuit voltage U_c | | 24 ... 250 V AC | | | | |
| Coil consumption | Average pull-in value | 25 VA | | | 40 VA | |
| | Average holding value | 4 VA / 2 W | | | | |
| DC control voltage | | | | | | |
| Rated control circuit voltage U_c | | 20 ... 250 V DC | | | | |
| Coil consumption | Average pull-in value | 25 W | | | 40 W | |
| | Average holding value | 2 W | | | | |
| PLC-output control | | AFS...-30-22-11 not suitable for direct control by PLC-output. | | | | |
| Drop-out voltage | | ≤ 60 % $U_c \text{ min}$. | | | | |
| Operating time | | | | | | |
| Between coil energization and: | N.O. contact closing | 42 ... 100 ms | | | | |
| | N.C. contact opening | 38 ... 95 ms | | | | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 100 ms | | | | |
| | N.C. contact closing | 19 ... 105 ms | | | | |

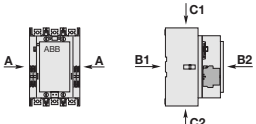
Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|--|------------------|--|-------|-------|------------|-------|
| Mounting positions | |  | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | |
| Fixing | | | | | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | | | 35 x 15 mm | |
| By screws (not supplied) | | 2 x M4 or 2 x M6 screws placed diagonally | | | | |

AFS116 ... AFS370 3-pole contactors for safety applications

Technical data

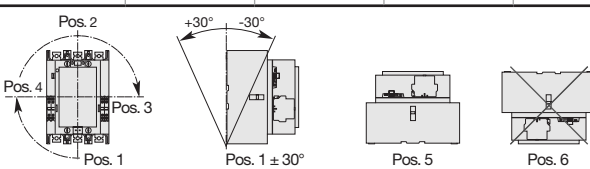
General technical data

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|------------------------------------|---|--------|--------|--|--------|--------|--------|
| Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA | | 1000 V 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | |
| Electromagnetic compatibility | | AFS contactors comply with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | Fitted with thermal overload relay | -25 ... +55 °C | | | | | | |
| | Without thermal overload relay | -40 ... +70 °C | | | | | | |
| Storage | | -40 ... +70 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 5 million operating cycles | | | | | | |
| Maximum switching frequency | | 300 cycles/h | | | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | No change in contact position, closed or open position | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms | | | 1/2 sinusoidal shock for 30 ms | | | |
|  | A | 20 g | | | 20 g | | | |
| | B1 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | B2 | 15 g closed position / 3 g open position | | | 15 g closed position / 3 g open position | | | |
| | C1 | 20 g | | | 20 g | | | |
| | C2 | 20 g | | | 20 g | | | |
| Vibration withstand acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | | |

Magnet system characteristics

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|--|-----------------------|--|--------|------------|--------|------------|--------|--------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_{c \text{ min}} \dots 1.1 \times U_{c \text{ max}}$ | | | | | | |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.80 \times U_{c \text{ min}} \dots 1.1 \times U_{c \text{ max}}$ | | | | | | |
| Rated control circuit voltage Uc | | 24...500 V AC, 20...500 V DC | | | | | | |
| Coil consumption | | | | | | | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| 24...60 V AC | Average pull-in value | 225 VA | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA | | 6 VA | | 8.5 VA | | |
| 48...130 V AC | Average pull-in value | 170 VA | | 175 VA | | 340 VA | | |
| | Average holding value | 4 VA | | 4 VA | | 17 VA | | |
| 100...250 V AC | Average pull-in value | 130 VA | | 220 VA | | 385 VA | | |
| | Average holding value | 6 VA | | 7 VA | | 17.5 VA | | |
| 250...500 V AC | Average pull-in value | 205 VA | | 185 VA | | 420 VA | | |
| | Average holding value | 16 VA | | 16 VA | | 21 VA | | |
| DC control voltage | | | | | | | | |
| 20...60 V DC | Average pull-in value | 210 W | | 205 W | | 400 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 3.5 W | | |
| 48...130 V DC | Average pull-in value | 130 W | | 130 W | | 360 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 2.5 W | | |
| 100...250 V DC | Average pull-in value | 135 W | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | 2.5 W | | 4.5 W | | |
| 250...500 V DC | Average pull-in value | 205 W | | 190 W | | 600 W | | |
| | Average holding value | 4 W | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of Uc min | | | | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | | | | |
| Dips withstand | | ≥ 20 ms | | | | | | |
| Operating time | | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and: | N.O. contact opening | 40...70 ms | | 45...80 ms | | 45...80 ms | | |

Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|-------------------------------------|------------------|--|--------|--------|--------|--------|--------|--------|
| Mounting positions | |  | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | | |
| On rail acc. to IEC 60715, EN 60715 | | - | | | | | | |
| By screws | | 4 x M4 | | | 4 x M5 | | | |

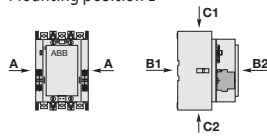
03

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

General technical data

| Contactors types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|--|---------------------------------------|--|--------|--------|--------|
| Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA | | 1000 V 600 V | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | |
| Electromagnetic compatibility | | AFS contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | | | |
| Ambient air temperature close to contactor | | | | | |
| Operation | Fitted with electronic overload relay | -25 ... +70 °C | | | |
| Storage | Without electronic overload relay | -40 ... +70 °C | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | |
| Mechanical durability | | | | | |
| Number of operating cycles | | 3 millions operating cycles | | | |
| Max. switching frequency | | 300 cycles/h | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | |
| Mounting position 1 | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | |
| | A | 5 g | | | |
| | B1 | 5 g | | | |
| | B2 | 5 g | | | |
| | C1 | 5 g | | | |
| | C2 | 5 g | | | |
| Vibration withstand acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | |



Magnet system characteristics

| Contactors types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|--|-----------------------|---|--------|------------|--------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 70$ °C $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | |
| | DC supply | At $\theta \leq 70$ °C $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | |
| Rated control circuit voltage Uc | | | | | |
| Coil consumption | | 48...500 V AC, 24...500 V DC | | | |
| AC control voltage 50/60 Hz | | | | | |
| 48...130 V AC | Average pull-in value | 1215 VA | | 1100 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 100...250 V AC | Average pull-in value | 955 VA | | 880 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| 250 ... 500 V AC | Average pull-in value | 950 VA | | 985 VA | |
| | Average holding value | 12 VA | | 12 VA | |
| DC control voltage | | | | | |
| 24...60 V DC | Average pull-in value | 900 W | | 785 W | |
| | Average holding value | 5 W | | 5.5 W | |
| 48...130 V DC | Average pull-in value | 1150 W | | 1020 W | |
| | Average holding value | 5 W | | 5 W | |
| 100...250 V DC | Average pull-in value | 895 W | | 880 W | |
| | Average holding value | 5 W | | 5 W | |
| 250 ... 500 V DC | Average pull-in value | 885 W | | 910 W | |
| | Average holding value | 7.5 W | | 7.5 W | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$. | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | |
| Dips withstand | | ≥ 20 ms | | | |
| Operating time | | | | | |
| Coil supply between A1 - A2 | | | | | |
| Between coil energization and: | Main contact closing | 50...120 ms | | | |
| Between coil de-energization and: | Main contact opening | 33...70 ms | | | |
| Control input for PLC's | | | | | |
| Between coil energization and: | Main contact closing | 40...60 ms | | 40...90 ms | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | | | |


















Mounting characteristics and conditions for use

| Contactors types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|--|------------------|--|--------|--------|--------|
| Mounting positions | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | |
| Fixing | | | | | |
| On rail according to IEC 60715, EN 60715 | | - | | | |
| By screws | | 4 x M5 | | 4 x M6 | |

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Connecting characteristics

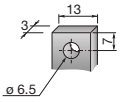
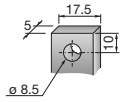
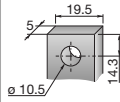











| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|---------------------------------|---|------------------------------|-------|-------------------------------------|----------------------------|-------|--|--------------------------|---|--------------------------|-------|
| Main terminals | |  Screw terminals with cable clamp | | | | | |  Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | |  Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) | | |
| Connection capacity (min. ... max.) | | | | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | | | | |
|  Rigid | Solid ($\leq 4 \text{ mm}^2$) | 1 x | 1 ... 6 mm ² | | | 2.5 ... 10 mm ² | | | 6 ... 35 mm ² | | 6 ... 70 mm ² | |
|  Stranded ($6 > 6 \text{ mm}^2$) | | 2 x | 1 ... 6 mm ² | | | 2.5 ... 10 mm ² | | | 6 ... 35 mm ² | | 6 ... 50 mm ² | |
|  Flexible with non insulated ferrule | | 1 x | 0.75 ... 6 mm ² | | | 1.5 ... 10 mm ² | | | 4 ... 35 mm ² | | 6 ... 50 mm ² | |
|  Flexible with non insulated ferrule | | 2 x | 0.75 ... 6 mm ² | | | 1.5 ... 10 mm ² | | | 4 ... 35 mm ² | | 6 ... 50 mm ² | |
|  Flexible with insulated ferrule | | 1 x | 0.75 ... 4 mm ² | | | 1.5 ... 10 mm ² | | | 4 ... 35 mm ² | | 6 ... 50 mm ² | |
|  Flexible with insulated ferrule | | 2 x | 0.75 ... 2.5 mm ² | | | 1.5 ... 4 mm ² | | | 4 ... 35 mm ² | | 6 ... 50 mm ² | |
|  Bars or lugs | | L < | 9.6 mm | | | 12.5 mm | | | 9.2 mm | | 12.2 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 16 ... 10 | | | AWG 14 ... 8 | | | AWG 10 ... 2 | | AWG 6 ... 1 | | |
| Stripping length | | 10 mm | | | 14 mm | | | 16 mm | | 17 mm | | |
| Tightening torque | | 1.5 Nm / 13 lb.in | | | 2.5 Nm / 22 lb.in | | | 4 Nm / 35 lb.in | | 6 Nm / 53 lb.in | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | | | | | |
|  Rigid solid | | 1 x | 1 ... 2.5 mm ² | | | | | | | | | |
|  Rigid solid | | 2 x | 1 ... 2.5 mm ² | | | | | | | | | |
|  Flexible with non insulated ferrule | | 1 x | 0.75 ... 2.5 mm ² | | | | | | | | | |
|  Flexible with non insulated ferrule | | 2 x | 0.75 ... 2.5 mm ² | | | | | | | | | |
|  Flexible with insulated ferrule | | 1 x | 0.75 ... 2.5 mm ² | | | | | | | | | |
|  Flexible with insulated ferrule | | 2 x | 0.75 ... 1.5 mm ² | | | | | | | | | |
|  Bars or lugs | | L < | 8 mm | | | | | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 | | | | | | | | | | |
| Stripping length | | 10 mm | | | | | | | | | | |
| Tightening torque | | | | | | | | | | | | |
| Coil terminals | | 1.2 Nm / 11 lb.in | | | | | | | | | | |
| Built-in auxiliary terminals | | 1.2 Nm / 11 lb.in | | | | | | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | | | | | |
| Main terminals | | IP20 | | | | | | IP10* | | | | |
| Coil terminals | | IP20 | | | | | | | | | | |
| Built-in auxiliary terminals | | IP20 | | | | | | | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | | | | | | | |
| Main terminals | | M3.5 | | | M4 | | | M6 | | M8 | | |
| | Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | | | Flat \varnothing 6.5 / Pozidriv 2 | | | hexagon socket (s = 4 mm) | | | | |
| Coil terminals | | M3.5 | | | | | | | | | | |
| | Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | | | | | | | | | | |
| Built-in auxiliary terminals | | M3.5 | | | | | | | | | | |
| | Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | | | | | | | | | | |

* For IP20 degree of protection, use LT terminal shroud accessory.

AFS116 ... AFS370 3-pole contactors for safety applications

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | AFS116 | AFS146 | AFS190 | AFS205 | AFS265 | AFS305 | AFS370 |
|---|------------------|---|--------|---|--------|---|--------|--------|
| Main terminals Flat type | |  | |  | |  | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
|  Cu cable - Stranded | 1 x | 10...95 mm ² | | 6...150 mm ² | | 16...300 mm ² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  Cu cable - Stranded | 2 x | 10...95 mm ² | | 50...120 mm ² | | 70...185 mm ² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  Al cable - Stranded | 1 x | - | | 95...185 mm ² | | 185...240 mm ² | | |
| Clamp type | | - | | 1SDA054988R1 | | 1SDA055020R1 | | |
| Tightening torque | | - | | 31 Nm | | 43 Nm | | |
|  Cu cable - Flexible | 1 x | 10...70 mm ² | | 6...120 mm ² | | 16...240 mm ² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  Cu cable - Flexible | 2 x | 10...70 mm ² | | 50...95 mm ² | | 70...185 mm ² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  Lugs | L ≤ | 22 mm (.866 in) | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | Ø > | 6 mm (.236 in) | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| Socket type | | LL... included | | LL... included | | LL... included | | |
| Tightening torque | | 9 Nm / 80 lb.in | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | 1 x | AWG 6...3/0 | | 6...300 MCM | | 4...400 MCM | | |
| Clamp type | | LD... included (1) | | ATK185 (2) | | ATK300 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | AWG 6...3/0 | | - | | 4...500 MCM | | |
| Clamp type | | LD... included (1) | | - | | ATK300/2 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | - | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | | | | |
|  Solid / stranded | 1 x | 1...4 mm ² | | | | | | |
| | 2 x | 1...4 mm ² | | | | | | |
|  Flexible | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Lugs | L < | 8 mm | | | | | | |
| | l > | 3.5 mm | | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | 9 mm | | | | | | |
| Tightening torque | | 1.00 Nm / 9 lb.in | | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | M6 | | M8 | | M10 | | |
| Screwdriver type | | Screws and bolts | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

(1) LD... not included for AFS116 ... AFS146-30...B.

(2) Available in North America only.

AFS400 ... AFS750 3-pole contactors for safety applications

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | AFS400 | AFS460 | AFS580 | AFS750 |
|--|-------------------------------------|-------------|----------------------------------|---------------------|--------|
| Main terminals | | | | | |
| Flat type | | | | | |
| | | | | | |
| Connection capacity (min. ... max.) | | | | | |
| Main conductors (poles) | | | | | |
| | Cu cable - Stranded | 2 x | 240 mm ² | | - |
| | Clamp type | | 1SDA013922R1 | | - |
| | Tightening torque | | 35 Nm | | - |
| | Cu cable - Stranded | 3 x | - | 185 mm ² | |
| | Clamp type | | - | 1SDA013956R1 | |
| | Tightening torque | | 35 Nm | 45 Nm | |
| | Al cable - Stranded | 2 x | 240 mm ² | | - |
| | Clamp type | | 1SDA013922R1 | | - |
| | Tightening torque | | 35 Nm | | - |
| | | 3 x | - | 185 mm ² | |
| | Clamp type | | - | 1SDA013956R1 | |
| | Tightening torque | | 35 Nm | 45 Nm | |
| | Lugs | L ≤ | 47 mm | 50 mm | |
| | | Ø > | 10 mm | 12 mm | |
| | Tightening torque | | 35 Nm / 310 lb.in | 45 Nm / 398 lb.in | |
| Connection capacity acc. to UL / CSA | | | | | |
| | | 2 x | 250-500 MCM alt. 2/0 AWG-500 MCM | | - |
| | Clamp type | | K6TH alt. ATK580 | | - |
| | Tightening torque | | 275 lb.in | | - |
| Connection capacity acc. to UL / CSA | | | | | |
| | | 3 x | 2/0 AWG-400 MCM | 2/0 AWG-500 MCM | |
| | Clamp type | | K6TJ | ATK750/3 | |
| | Tightening torque | | 275 lb.in | 375 lb.in | |
| Auxiliary conductors (coil terminals) | | | | | |
| | Solid / stranded | 1 x | 1...4 mm ² | | |
| | | 2 x | 1...4 mm ² | | |
| | Flexible | 1 x | 0.75...2.5 mm ² | | |
| | | 2 x | 0.75...2.5 mm ² | | |
| | Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
| | | 2 x | 0.75...2.5 mm ² | | |
| | Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
| | | 2 x | 0.75...2.5 mm ² | | |
| | Lugs | L ≤ | 8 mm | | |
| | | l > | 3.7 mm | | |
| Connection capacity acc. to UL / CSA | | | | | |
| | | 1 or 2 x | AWG 18...14 | | |
| Tightening torque | | Recommended | 1.00 Nm / 9 lb.in | | |
| | | Max. | 1.20 Nm | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | |
| Main terminals | | | IP00 | | |
| Coil terminals | | | IP20 | | |
| Screw terminals | | | | | |
| Main terminals | | | M10 | M12 | |
| | | | Screws and bolts | | |
| Coil terminals (delivered in open position) | | | M3.5 | | |
| Screwdriver type | | | Flat Ø 5.5 mm / Pozidriv 2 | | |

AFS09 ... AFS96 3-pole contactors for safety applications

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|---|--------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Rated operational voltage U _e max. | | 690 V | | | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | | | |
| Conventional free air thermal current I _{th} - θ ≤ 40 °C | | 16 A | | | | | | | | | | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | | | | | | | | | |
| | 220-240 V 50/60 Hz | 4 A | | | | | | | | | | |
| | 400-440 V 50/60 Hz | 3 A | | | | | | | | | | |
| | 500 V 50/60 Hz | 2 A | | | | | | | | | | |
| | 690 V 50/60 Hz | 2 A | | | | | | | | | | |
| Making capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| Breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | | | | | | | | | |
| | 48 V DC | 2.8 A / 134 W | | | | | | | | | | |
| | 72 V DC | 1 A / 72 W | | | | | | | | | | |
| | 110 V DC | 0.55 A / 60 W | | | | | | | | | | |
| | 125 V DC | 0.55 A / 69 W | | | | | | | | | | |
| | 220 V DC | 0.27 A / 60 W | | | | | | | | | | |
| | 250 V DC | 0.27 A / 68 W | | | | | | | | | | |
| | 400 V DC | 0.15 A / 60 W | | | | | | | | | | |
| | 500 V DC | 0.13 A / 65 W | | | | | | | | | | |
| | 600 V DC | 0.1 A / 60 W | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A | | | | | | | | | | |
| | for 0.1 s | 140 A | | | | | | | | | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA | | | | | | | | | | |
| | | 10 ⁻⁷ | | | | | | | | | | |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 w | | | | | | | | | | |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h | | | | | | | | | | |
| | DC-13 | 900 cycles/h | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CAL4 aux. contact blocks) are mechanically linked contacts. | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CAL4 aux. contact blocks) are mirror contacts. | | | | | | | | | | |

Built-in auxiliary contacts according to UL / CSA

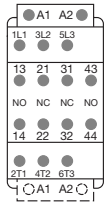
| Contactor types | AC / DC operated | AFS09 | AFS12 | AFS16 | AFS26 | AFS30 | AFS38 | AFS40 | AFS52 | AFS65 | AFS80 | AFS96 |
|--|------------------|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Maximum operational voltage | | 600 V AC, 600 V DC | | | | | | | | | | |
| Pilot duty | | A600, Q600 | | | | | | | | | | |
| AC thermal rated current | | 10 A | | | | | | | | | | |
| AC maximum volt-ampere making | | 7200 VA | | | | | | | | | | |
| AC maximum volt-ampere breaking | | 720 VA | | | | | | | | | | |
| DC thermal rated current | | 2.5 A | | | | | | | | | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | | | | | | | | | |

AFS09 ... AFS750 3-pole contactors for safety applications

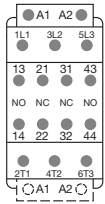
Terminal marking and positioning

AFS09 ... AFS96 contactors - AC / DC operated

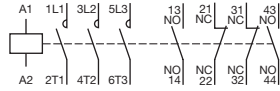
Standard devices



AFS09 ... AFS16...-30-22



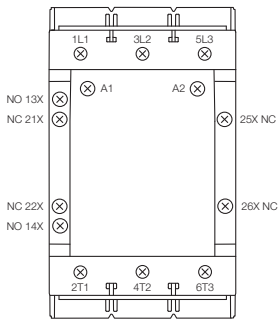
AFS26 ... AFS96...-30-22



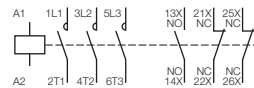
AFS09 ... AFS96...-30-22

AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



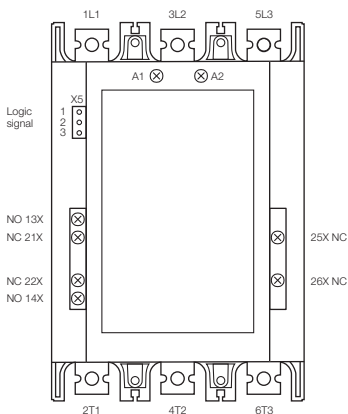
AFS116 ... AFS370-30-12



AFS116 ... AFS370-30-12

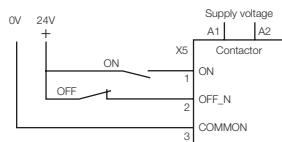
AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

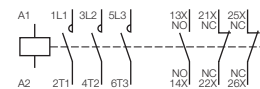


AFS400 ... AFS750-30-12

Control with logic signal



AFS400 ... AFS750-30-12



AFS400 ... AFS750-30-12

3-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1 and AC-3: $I_c = I_e$
- Category AC-2: $I_c = 2.5 \times I_e$
- Category AC-4: $I_c = 6 \times I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categories AC-1, AC-3 and AC-4 represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1, AC-2, AC-3 or AC-4

- Note the characteristics of the load to be controlled:
 - Operational voltage U_e
 - Current normally drawn I_e ($U_e / I_e / \text{kW}$ relation for motors, see "Motor rated operational powers and currents").
 - Utilization category AC-1, AC-2, AC-3 or AC-4
 - Breaking current $I_c = I_e$ for AC-1 and for AC-3; $I_c = 2.5 \times I_e$ for AC-2; $I_c = 6 \times I_e$ for AC-4
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point ($I_c ; N$).

Electrical durability forecast and contactor selection for mixed duty motor control: AC-3 ($I_c = I_e$) type switching off while "motor running" and, occasionally, AC-4 ($I_c = 6 \times I_e$) type switching off while "motor accelerating"

- Note the characteristics of the motor to be controlled:
 - Operational voltage U_e
 - Current normally drawn while "motor running" I_e ($U_e / I_e / \text{kW}$ relation for motors, see "Motor rated operational powers and currents")
 - Breaking current for AC-3 $I_c = I_e$
 - Breaking current for AC-4 while "motor accelerating" $I_c = 6 \times I_e$
 - Percentage of AC-4 operating cycles K (on the basis of the total number of operating cycles)
- Define the total number of operating cycles N required.
- Note the smallest contactor rating compatible for AC-3 (U_e / I_e) on Main pole utilization characteristic table (see "Technical data").
- For the selected contactor make a note of the following in relation to the voltage using diagram AC-3 in next pages:
 - The number of operating cycles A for $I_c = I_e$ (AC-3)
 - The number of operating cycles B for $I_c = 6 \times I_e$ (AC-4)
- Calculate the estimated number of cycles N' (N' is always below A)

$$N' = \frac{A}{1 + 0.01 K (A/B - 1)}$$

- If N' is too low in relation to the target N , calculate the estimated number of cycles for a higher contactor rating.

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

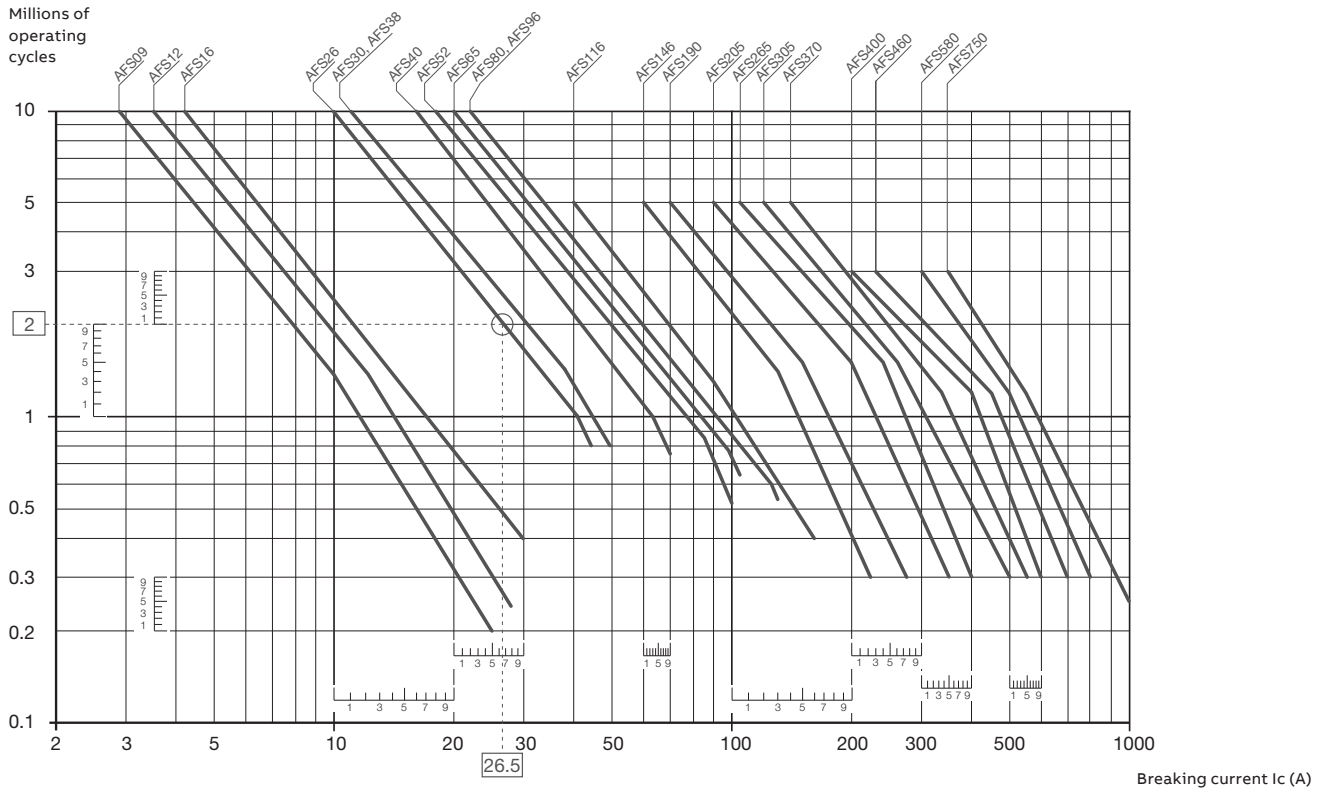
3-pole contactors for safety applications

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Example:

$I_c / AC-1 = 26.5\text{ A}$ – Electrical durability required = 2 millions operating cycles.

Using the AC-1 curves above select the AFS26 contactor at intersection "O" (26.5 A / 2 millions operating cycles).

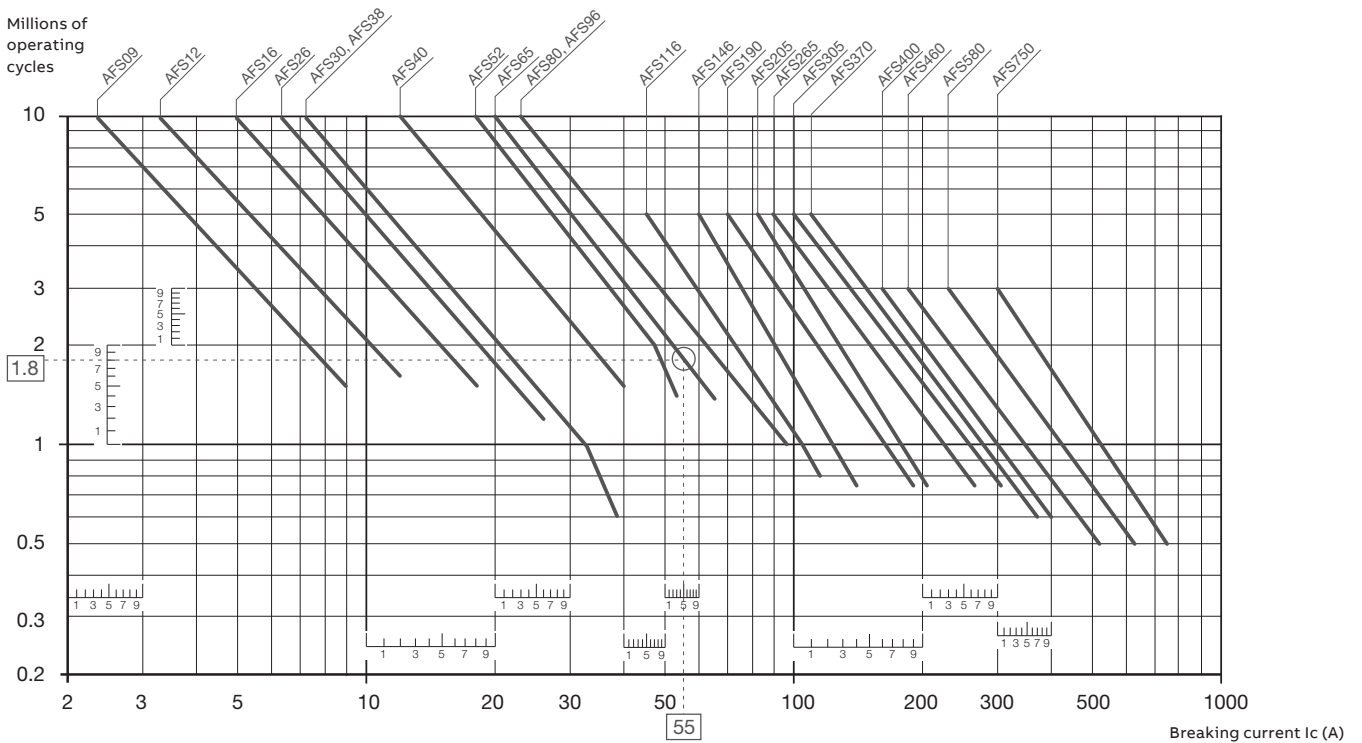
3-pole contactors for safety applications

Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440$ V.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Example:

Motor power 30 kW for AC-3 - $U_e = 400$ V and $I_e = 55$ A utilization – Electrical durability required = 1.8 million operating cycles. For AC-3: $I_c = I_e$. Select the AFS65 contactor at intersection "O" (55 A / 1.8 million operating cycles) on the curves (AC-3 - $U_e \leq 440$ V).

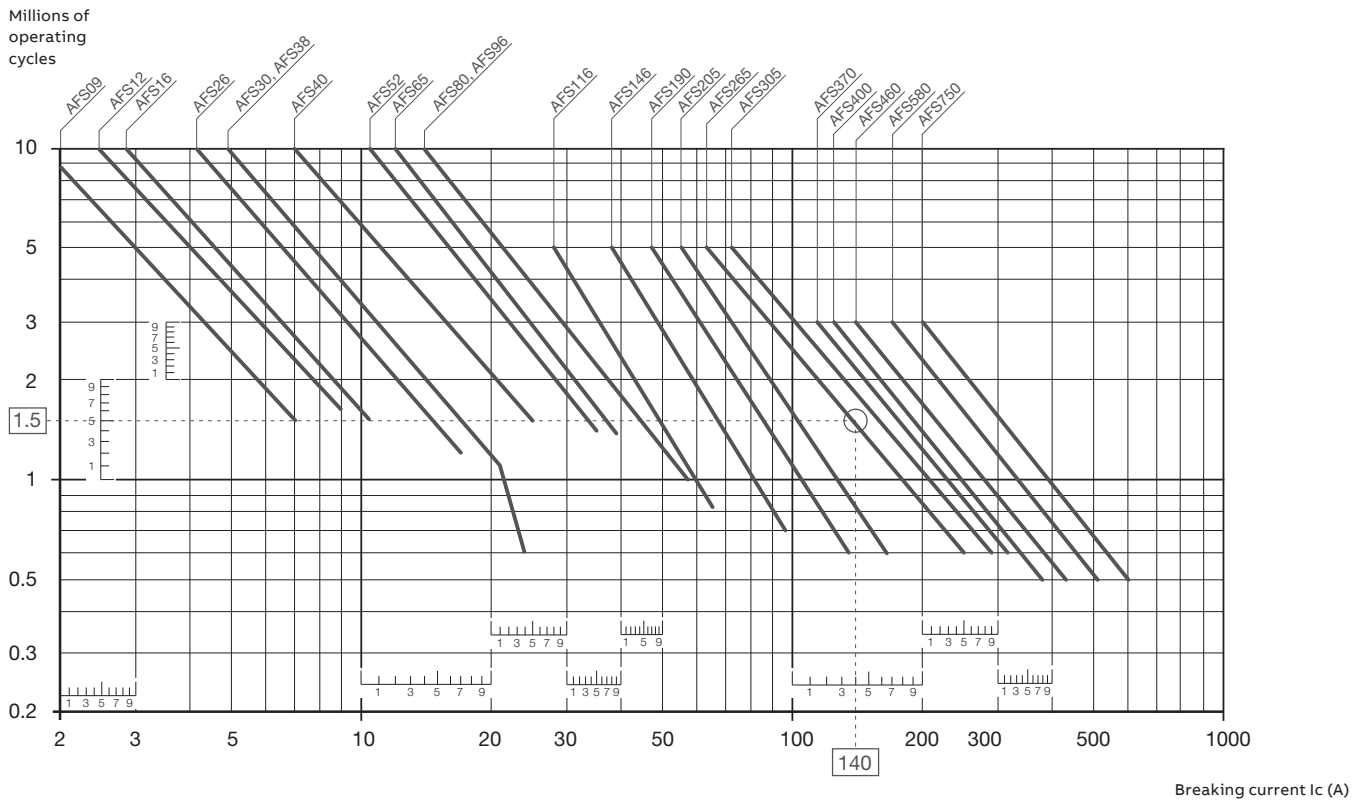
3-pole contactors for safety applications

Electrical durability

Electrical durability for AC-3 utilization category - 440 V < U_e ≤ 690 V.

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current).

Ambient temperature and maximum electrical switching frequency: see "Technical data".



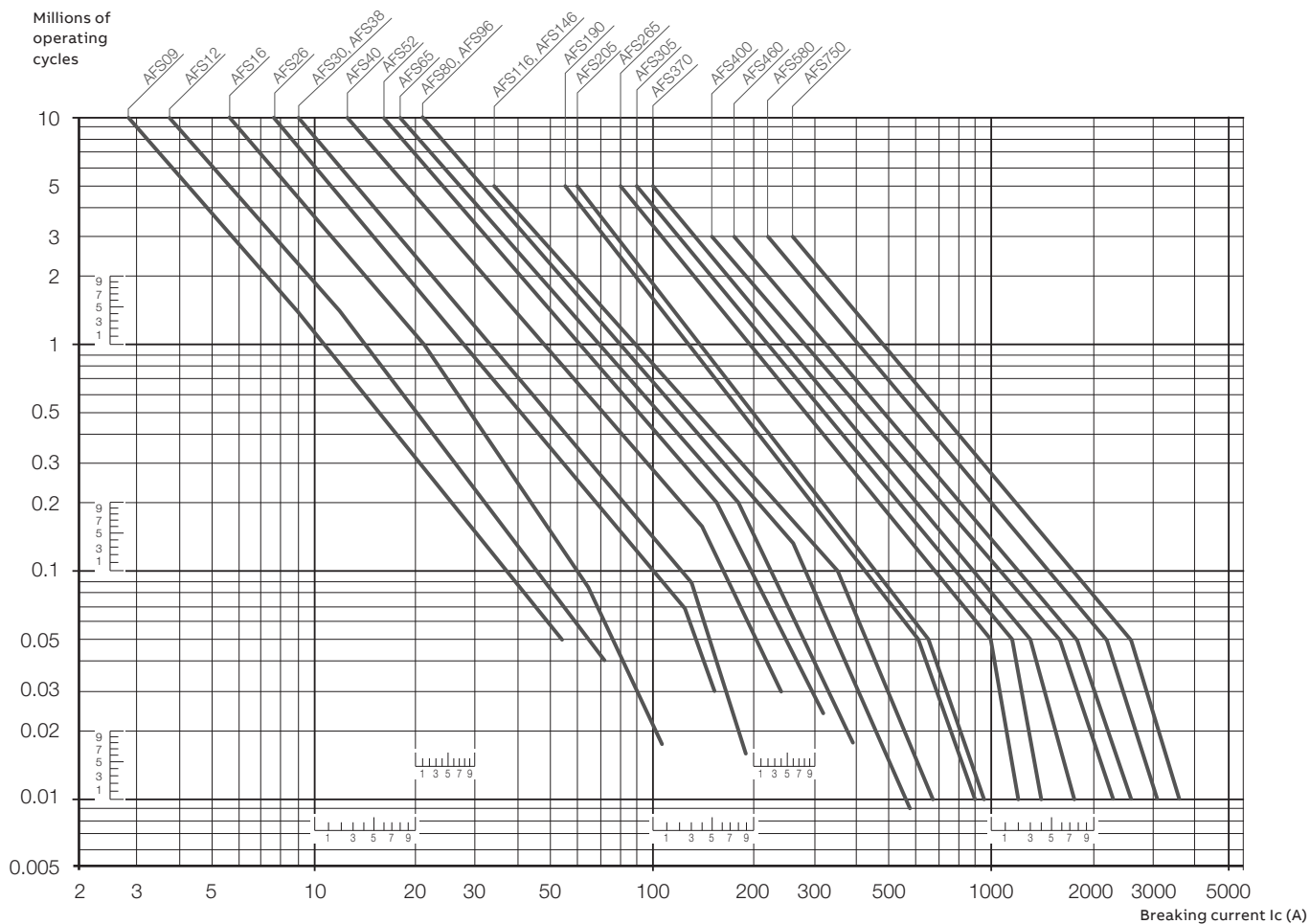
3-pole contactors for safety applications

Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $U_e \leq 440\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AFS09 ... AFS96

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full-load current). Maximum electrical switching frequency: see "Technical data".



3-pole contactors for safety applications

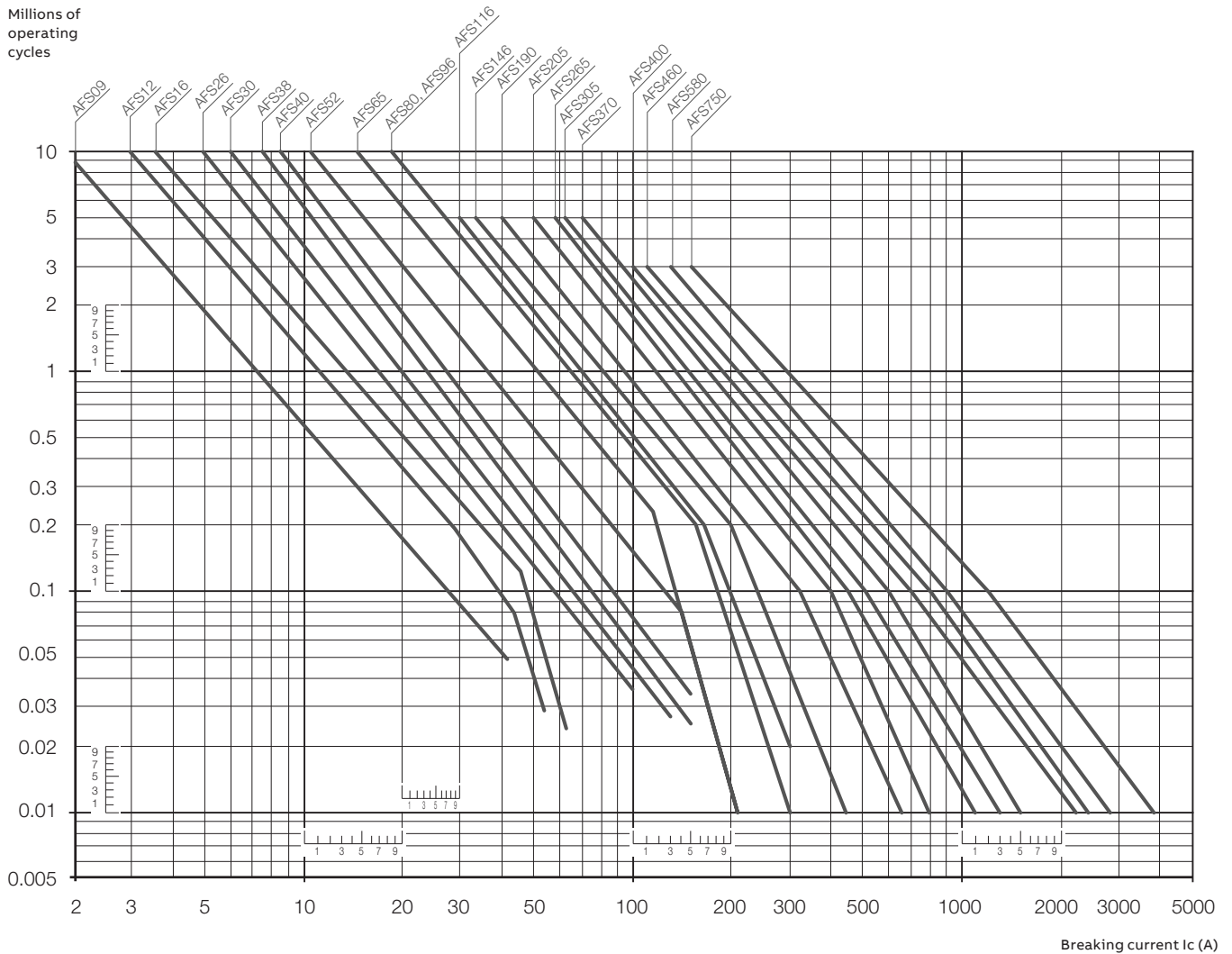
Electrical durability

Electrical durability for AC-2 or AC-4 utilization category - $440\text{ V} < U_e \leq 690\text{ V}$

Ambient temperature $\leq 60\text{ }^\circ\text{C}$ for AFS09 ... AFS96

Switching cage motors: starting, reverse operation and step-by-step operation. The breaking current I_c is equal to $2.5 \times I_e$ for AC-2 and $6 \times I_e$ for AC-4, keeping in mind that I_e is the motor rated operational current (I_e = motor full load current).

Maximum electrical switching frequency: see "Technical data".





AF and EK 4-pole contactors

3/148 Overview

Ordering details

25 to 125 A AC-1

| | | |
|-------|---------------------------------|--|
| 3/150 | AF09 ... AF38 | AC / DC operated |
| 3/151 | AF09Z ... AF16Z | 24 V DC operated designed for PLC |
| 3/152 | AF09Z ... AF38Z | AC / DC operated for specific applications |
| 3/153 | AF40 ... AF80 | AC / DC operated |
| 3/151 | Contactors and main accessories | |

160 to 525 A AC-1

| | | |
|-------|---------------------------------|---|
| 3/155 | AF116 ... AF140 | AC / DC operated |
| 3/156 | AF190 ... AF370 | AC / DC operated |
| 3/157 | Contactors and main accessories | |
| 3/158 | AF116 ... AF140 | AC / DC operated - with 1 N.O. + 1 N.C. |
| 3/159 | AF190 ... AF370 | AC / DC operated - with 1 N.O. + 1 N.C. |
| 3/160 | Contactors and main accessories | |
| 3/161 | AF116 ... AF140 | AC / DC operated - with 2 N.O. + 2 N.C. |
| 3/162 | AF190 ... AF370 | AC / DC operated - with 2 N.O. + 2 N.C. |
| 3/163 | Contactors and main accessories | |

800 to 1000 A AC-1

| | | |
|-------|------------------|------------------------------------|
| 3/164 | EK550, EK1000 | AC operated - with 1 N.O. + 1 N.C. |
| 3/165 | EK550, EK1000 | DC operated - with 2 N.O. + 1 N.C. |
| 3/166 | EK550, EK1000 | AC operated - with 2 N.O. + 2 N.C. |
| 3/167 | Main accessories | |

3/169 Technical data

3/181 Electrical durability

3/440 Voltage code table






For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

4-pole contactors



| | | | | | | | | | | |
|------------------------|-----------------------------------|---|------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|
| IEC | AC-1 Rated operational current | $\theta \leq 40\text{ }^{\circ}\text{C}$, 690 V | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| UL/CSA | General use rating | 600 V | A | 25 | 30 | 45 | 55 | 60 | 80 | 105 |
| AC / DC Control supply | |  | Type | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| AC Control supply | |  | Type | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| DC Control supply | |  | Type | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
| IEC | AC-1 Rated operational current | $\theta \leq 40\text{ }^{\circ}\text{C}$ | A | 25 | 30 | 45 | 55 | 70 | 100 | 125 |
| | | $\theta \leq 60\text{ }^{\circ}\text{C}$ (1) | A | 25 | 30 | 40 | 45 | 60 | 80 | 105 |
| | | $\theta \leq 70\text{ }^{\circ}\text{C}$ | A | 22 | 26 | 32 | 37 | 50 | 70 | 90 |
| | | With conductor cross sectional area | | mm ² | 4 | 6 | 10 | 16 | 35 | 35 |
| | Rated operational voltage Ue max. | | V | 690 | 690 | 690 | 690 | 690 | 690 | 690 |

(1) $\theta \leq 55\text{ }^{\circ}\text{C}$ for EK550, EK1000 contactors

Main accessories

| | |
|--------------------------|-------------------------|
| Auxiliary contact blocks | Front mounting |
| | Side mounting |
| Timers | Electronic |
| Interlocking units | Mechanical |
| | Mechanical / Electrical |
| Surge suppressors | Varistor + RC (AC / DC) |

| | |
|--|---------------|
| CA4-10 (1 x N.O.), CA4-01 (1 x N.C.) | |
| CAL4-11 (1 x N.O. + 1 x N.C.) | |
| TEF4-ON TEF4-OFF | |
| VM4 | VM96-4 |
| VEM4 | |
| Built-in surge protection | |



03

| | | | | | | | | |
|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 160 | 175 | 230 | 250 | 300 | 350 | 420 | 540 | — |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | — | — |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
| AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
| 160 | 200 | 275 | 350 | 400 | 500 | 525 | 800 | 1000 |
| 145 | 175 | 250 | 300 | 350 | 400 | 425 | 650 | 800 |
| 130 | 160 | 200 | 240 | 290 | 325 | 350 | 575 | 720 |
| 70 | 95 | 150 | 240 | 240 | 300 | 2 x 185 | 2 x 240 | 2 x 300 |
| 690 | 690 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 | 1000 |

| | | |
|--|--|---------------------------------------|
| | CAL19-11 (1 x N.O. + 1 x N.C.) | CAL16-11 (1 x N.O. + 1 x N.C.) |
| | VM19 (for same size contactors) | VH800 |
| | | RC-EH800 |

AF09 ... AF38 4-pole contactors

25 to 55 A AC-1

AC / DC operated



AF09-40-00



AF26-40-00

AF09 ... AF38 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) kg |
| A | A | V 50/60 Hz | V DC | | | | |

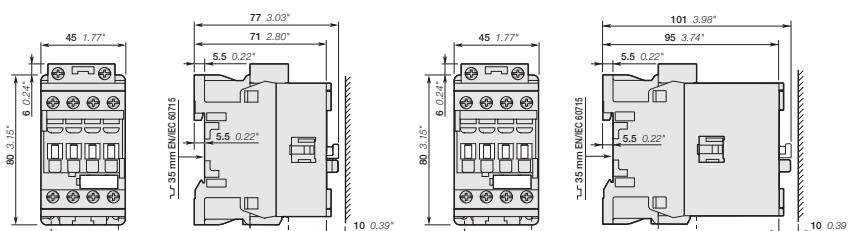
4 N.O. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | (1) | 0 | Type | Order code | Weight |
|---------------|--------|-----------|-----------|-----|-----|---------------|-----------------|--------|
| 25 | 25 | 24...60 | 20...60 | (1) | 0 0 | AF09-40-00-11 | 1SBL137201R1100 | 0.270 |
| | | 48...130 | 48...130 | | 0 0 | AF09-40-00-12 | 1SBL137201R1200 | 0.270 |
| | | 100...250 | 100...250 | | 0 0 | AF09-40-00-13 | 1SBL137201R1300 | 0.270 |
| | | 250...500 | 250...500 | | 0 0 | AF09-40-00-14 | 1SBL137201R1400 | 0.310 |
| 30 | 30 | 24...60 | 20...60 | (1) | 0 0 | AF16-40-00-11 | 1SBL177201R1100 | 0.270 |
| | | 48...130 | 48...130 | | 0 0 | AF16-40-00-12 | 1SBL177201R1200 | 0.270 |
| | | 100...250 | 100...250 | | 0 0 | AF16-40-00-13 | 1SBL177201R1300 | 0.270 |
| | | 250...500 | 250...500 | | 0 0 | AF16-40-00-14 | 1SBL177201R1400 | 0.310 |
| 45 | 45 | 24...60 | 20...60 | (1) | 0 0 | AF26-40-00-11 | 1SBL237201R1100 | 0.360 |
| | | 48...130 | 48...130 | | 0 0 | AF26-40-00-12 | 1SBL237201R1200 | 0.360 |
| | | 100...250 | 100...250 | | 0 0 | AF26-40-00-13 | 1SBL237201R1300 | 0.360 |
| | | 250...500 | 250...500 | | 0 0 | AF26-40-00-14 | 1SBL237201R1400 | 0.400 |
| 55 | 55 | 24...60 | 20...60 | (1) | 0 0 | AF38-40-00-11 | 1SBL297201R1100 | 0.360 |
| | | 48...130 | 48...130 | | 0 0 | AF38-40-00-12 | 1SBL297201R1200 | 0.360 |
| | | 100...250 | 100...250 | | 0 0 | AF38-40-00-13 | 1SBL297201R1300 | 0.360 |
| | | 250...500 | 250...500 | | 0 0 | AF38-40-00-14 | 1SBL297201R1400 | 0.400 |

2 N.O. + 2 N.C. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | (1) | 0 | Type | Order code | Weight |
|---------------|--------|-----------|-----------|-----|-----|---------------|-----------------|--------|
| 25 | 25 | 24...60 | 20...60 | (1) | 0 0 | AF09-22-00-11 | 1SBL137501R1100 | 0.270 |
| | | 48...130 | 48...130 | | 0 0 | AF09-22-00-12 | 1SBL137501R1200 | 0.270 |
| | | 100...250 | 100...250 | | 0 0 | AF09-22-00-13 | 1SBL137501R1300 | 0.270 |
| | | 250...500 | 250...500 | | 0 0 | AF09-22-00-14 | 1SBL137501R1400 | 0.310 |
| 30 | 30 | 24...60 | 20...60 | (1) | 0 0 | AF16-22-00-11 | 1SBL177501R1100 | 0.270 |
| | | 48...130 | 48...130 | | 0 0 | AF16-22-00-12 | 1SBL177501R1200 | 0.270 |
| | | 100...250 | 100...250 | | 0 0 | AF16-22-00-13 | 1SBL177501R1300 | 0.270 |
| | | 250...500 | 250...500 | | 0 0 | AF16-22-00-14 | 1SBL177501R1400 | 0.310 |
| 45 | 45 | 24...60 | 20...60 | (1) | 0 0 | AF26-22-00-11 | 1SBL237501R1100 | 0.360 |
| | | 48...130 | 48...130 | | 0 0 | AF26-22-00-12 | 1SBL237501R1200 | 0.360 |
| | | 100...250 | 100...250 | | 0 0 | AF26-22-00-13 | 1SBL237501R1300 | 0.360 |
| | | 250...500 | 250...500 | | 0 0 | AF26-22-00-14 | 1SBL237501R1400 | 0.400 |
| 55 | 55 | 24...60 | 20...60 | (1) | 0 0 | AF38-22-00-11 | 1SBL297501R1100 | 0.360 |
| | | 48...130 | 48...130 | | 0 0 | AF38-22-00-12 | 1SBL297501R1200 | 0.360 |
| | | 100...250 | 100...250 | | 0 0 | AF38-22-00-13 | 1SBL297501R1300 | 0.360 |
| | | 250...500 | 250...500 | | 0 0 | AF38-22-00-14 | 1SBL297501R1400 | 0.400 |

(1) AF...-40-...-11 and AF...-22-...-11 not suitable for direct control by PLC-output.



AF09, AF16

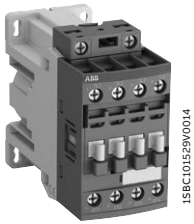
AF26, AF38

Main dimensions mm, inches

AF09Z ... AF16Z 4-pole contactors

25 to 30 A AC-1

24 V DC operated designed for PLC



AF09Z-40-00

AF09Z ... AF16Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|--|-------------------------------------|-------------------------------------|---------------------------|------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 A | General use rating 600 V AC A | V DC | | | | Pkg (1 pce) kg |

4 N.O. main poles

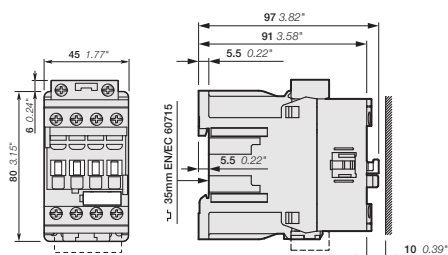
| | | | | | | |
|----|----|----|-----|----------------|-----------------|-------|
| 25 | 25 | 24 | 0 0 | AF09Z-40-00-30 | 1SBL136201R3000 | 0.430 |
| 30 | 30 | 24 | 0 0 | AF16Z-40-00-30 | 1SBL176201R3000 | 0.430 |

2 N.O. + 2 N.C. main poles

| | | | | | | |
|----|----|----|-----|----------------|-----------------|-------|
| 25 | 25 | 24 | 0 0 | AF09Z-22-00-30 | 1SBL136501R3000 | 0.430 |
| 30 | 30 | 24 | 0 0 | AF16Z-22-00-30 | 1SBL176501R3000 | 0.430 |

Note: AF..Z contactors with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

Main dimensions mm, inches



AF09Z, AF16Z

AF09Z ... AF38Z 4-pole contactors

25 to 55 A AC-1

AC / DC operated for specific applications



AF09Z-40-00



AF26Z-40-00

AF09Z ... AF38Z 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - can manage large control voltage variations
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) kg |
| A | A | V 50/60 Hz | V DC | | | | |

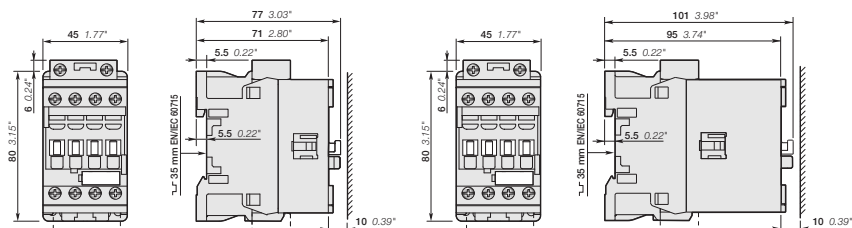
4 N.O. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | Uc | Type | Order code | Weight |
|---------------|--------|-----------|-----------|-----|----------------|-----------------|--------|
| 25 | 25 | - | 12...20 | 0 0 | AF09Z-40-00-20 | 1SBL136201R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF09Z-40-00-21 | 1SBL136201R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF09Z-40-00-22 | 1SBL136201R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF09Z-40-00-23 | 1SBL136201R2300 | 0.310 |
| 30 | 30 | - | 12...20 | 0 0 | AF16Z-40-00-20 | 1SBL176201R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF16Z-40-00-21 | 1SBL176201R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF16Z-40-00-22 | 1SBL176201R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF16Z-40-00-23 | 1SBL176201R2300 | 0.310 |
| 45 | 45 | - | 12...20 | 0 0 | AF26Z-40-00-20 | 1SBL236201R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF26Z-40-00-21 | 1SBL236201R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF26Z-40-00-22 | 1SBL236201R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF26Z-40-00-23 | 1SBL236201R2300 | 0.400 |
| 55 | 55 | - | 12...20 | 0 0 | AF38Z-40-00-20 | 1SBL296201R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF38Z-40-00-21 | 1SBL296201R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF38Z-40-00-22 | 1SBL296201R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF38Z-40-00-23 | 1SBL296201R2300 | 0.400 |

2 N.O. + 2 N.C. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | Uc | Type | Order code | Weight |
|---------------|--------|-----------|-----------|-----|----------------|-----------------|--------|
| 25 | 25 | - | 12...20 | 0 0 | AF09Z-22-00-20 | 1SBL136501R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF09Z-22-00-21 | 1SBL136501R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF09Z-22-00-22 | 1SBL136501R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF09Z-22-00-23 | 1SBL136501R2300 | 0.310 |
| 30 | 30 | - | 12...20 | 0 0 | AF16Z-22-00-20 | 1SBL176501R2000 | 0.310 |
| | | 24...60 | 20...60 | 0 0 | AF16Z-22-00-21 | 1SBL176501R2100 | 0.310 |
| | | 48...130 | 48...130 | 0 0 | AF16Z-22-00-22 | 1SBL176501R2200 | 0.310 |
| | | 100...250 | 100...250 | 0 0 | AF16Z-22-00-23 | 1SBL176501R2300 | 0.310 |
| 45 | 45 | - | 12...20 | 0 0 | AF26Z-22-00-20 | 1SBL236501R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF26Z-22-00-21 | 1SBL236501R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF26Z-22-00-22 | 1SBL236501R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF26Z-22-00-23 | 1SBL236501R2300 | 0.400 |
| 55 | 55 | - | 12...20 | 0 0 | AF38Z-22-00-20 | 1SBL296501R2000 | 0.400 |
| | | 24...60 | 20...60 | 0 0 | AF38Z-22-00-21 | 1SBL296501R2100 | 0.400 |
| | | 48...130 | 48...130 | 0 0 | AF38Z-22-00-22 | 1SBL296501R2200 | 0.400 |
| | | 100...250 | 100...250 | 0 0 | AF38Z-22-00-23 | 1SBL296501R2300 | 0.400 |

Note: Only AF..Z contactors with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



AF09Z, AF16Z

AF26Z, AF38Z

Main dimensions mm, inches

AF40 ... AF80 4-pole contactors

70 to 125 A AC-1
AC / DC operated



AF40-40-00



AF80-40-00

AF40 ... AF80 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 control voltages ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | V 50/60 Hz | V DC | | | | Pkg (1 pce) kg |
| | A | | | | | | |

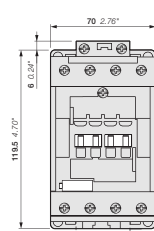
4 N.O. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | Control voltage | Order code | Weight |
|---------------|--------|-----------|-----------|-----------------|---------------|--------|
| 70 | 60 | 24...60 | 20...60 | 0 0 | AF40-40-00-11 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF40-40-00-12 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF40-40-00-13 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF40-40-00-14 | 1.160 |
| 100 | 80 | 24...60 | 20...60 | 0 0 | AF52-40-00-11 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF52-40-00-12 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF52-40-00-13 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF52-40-00-14 | 1.160 |
| 125 | 105 | 24...60 | 20...60 | 0 0 | AF80-40-00-11 | 1.490 |
| | | 48...130 | 48...130 | 0 0 | AF80-40-00-12 | 1.490 |
| | | 100...250 | 100...250 | 0 0 | AF80-40-00-13 | 1.440 |
| | | 250...500 | 250...500 | 0 0 | AF80-40-00-14 | 1.440 |

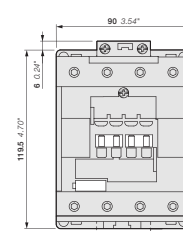
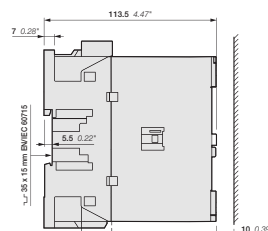
2 N.O. + 2 N.C. main poles

| Rated current | UL/CSA | Uc min. | Uc max. | Control voltage | Order code | Weight |
|---------------|--------|-----------|-----------|-----------------|---------------|--------|
| 70 | 60 | 24...60 | 20...60 | 0 0 | AF40-22-00-11 | 1.210 |
| | | 48...130 | 48...130 | 0 0 | AF40-22-00-12 | 1.210 |
| | | 100...250 | 100...250 | 0 0 | AF40-22-00-13 | 1.160 |
| | | 250...500 | 250...500 | 0 0 | AF40-22-00-14 | 1.160 |
| 125 | 105 | 24...60 | 20...60 | 0 0 | AF80-22-00-11 | 1.490 |
| | | 48...130 | 48...130 | 0 0 | AF80-22-00-12 | 1.490 |
| | | 100...250 | 100...250 | 0 0 | AF80-22-00-13 | 1.440 |
| | | 250...500 | 250...500 | 0 0 | AF80-22-00-14 | 1.440 |

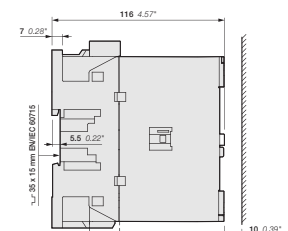
For control by PLC-output, use RA4 interface relay.



AF40, AF52



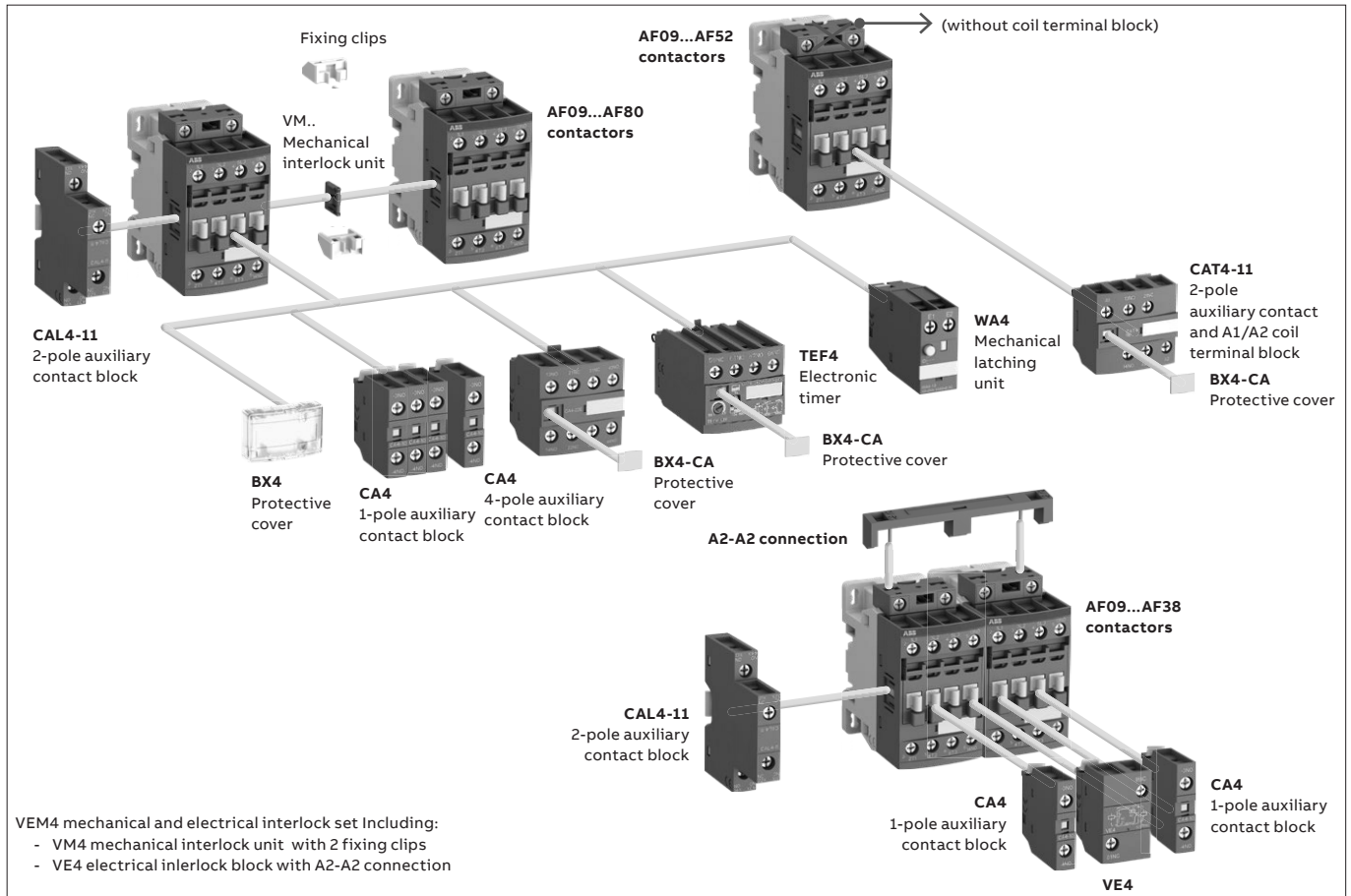
AF80



Main dimensions mm, inches

AF09 ... AF80 4-pole contactors

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
 Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | Electronic timer | Mechanical latching unit | Electrical and mechanical interlock set (between 2 contactors) | Side-mounted accessories | |
|---|------------|-----------------------------|---------------------------|----------------|------------|------------------|--------------------------|--|--------------------------|------------|
| | | | Auxiliary contact blocks | | | | | | Auxiliary contact blocks | |
| | | | 1-pole CA4 | 2-pole CAT4-11 | 4-pole CA4 | TEF4 | WA4 (4) | VEM4 | Left side | Right side |
| AF09(Z) ... AF38(Z) | | | | | | | | | | |
| AF09 ... AF16 | 4 0 | 0 0(1) | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | - |
| AF26 ... AF38 | 4 0 | 0 0(2) | 2 max. | or 1 | - | or 1 | or 1 | - | + 1 | + 1 |
| | | | 3 max. | - | - | - | - | + 1 (5) | + 1 | or 1 |
| AF09 ... AF38 | 2 2 | 0 0(2) | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | - |
| | | | 2 max. | or 1 | - | or 1 | or 1 | - | + 1 | + 1 |
| AF09Z ... AF16Z 24 V DC designed for PLC - coil 30 | | | | | | | | | | |
| AF09Z ... AF16Z | 4 0 | 0 0(1) | 4 max. | - | or 1 | or 1 | - | -(5) | or 1 | + 1 |
| | | | 2 max. | - | - | or 1 | - | -(5) | + 1 | or 1 |
| | | | - | - | - | 1 | - | - | + 1 | + 1 |
| AF09Z ... AF16Z | 2 2 | 0 0(2) | 4 max. | - | or 1 | or 1 | - | - | or 1 | + 1 |
| | | | 2 max. | - | - | or 1 | - | - | + 1 | or 1 |
| | | | - | - | - | 1 | - | - | + 1 | + 1 |
| AF40 ... AF80 | | | | | | | | | | |
| AF40 ... AF52 | 4 0 | 0 0 | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | + 1 |
| AF80 | 4 0 | 0 0 | 4 max. | - | or 1 | or 1 | or 1 | - | + 1 | + 1 |
| AF40 | 2 2 | 0 0(3) | 4 max. | or 1 | or 1 | or 1 | or 1 | - | + 1 | - |
| | | | 4 max. | - | or 1 | or 1 | or 1 | - | + 1 | + 1 |
| AF80 | 2 2 | 0 0(3) | 4 max. | - | or 1 | or 1 | or 1 | - | + 1 | + 1 |

(1) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
 (2) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. auxiliary contacts max. on positions 1 ±30°, 5.
 (3) Including add-on contacts: 2 N.C. auxiliary contacts max. on positions 1, 1 ±30°, 2, 3, 4, 5.
 (4) Use WA4 for AF09...AF65 and WA4-96 for AF80.
 Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of built-in or additional N.C. auxiliary contacts.
 For WA4 accessory use with contactors coil 30, please consult your ABB local sales organization.
 (5) VEM4 not suitable for AF..Z contactors with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30). Use VM4 side-mounted mechanical interlock unit.

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1
AC / DC operated



AF140-40-00

1SFL01158V0001



AF140-40-00B

1SFL01193Y0001

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|----------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) kg |
| A | A | V 50/60 Hz | V DC | | | | |

4 N.O. main poles

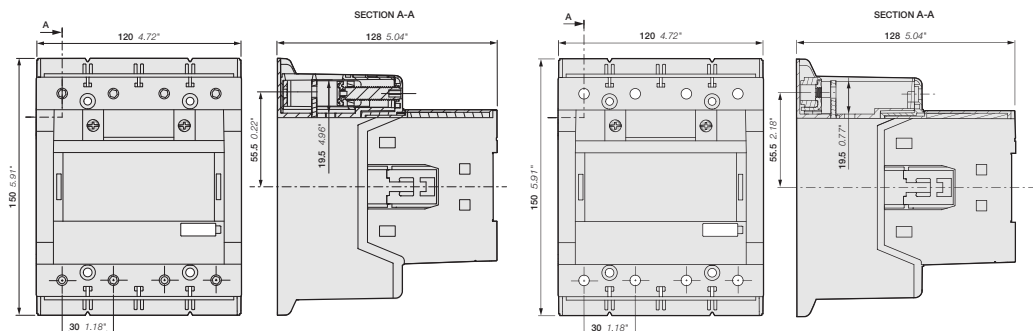
For connection with built-in cable clamps

| Rated current | UL / CSA | Uc min. | Uc max. | Control circuit | Type | Order code | Weight |
|---------------|----------|-----------|-----------|-----------------|----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 0 0 | AF116-40-00-11 | 1SFL427101R1100 | 2.250 |
| | | 48...130 | 48...130 | 0 0 | AF116-40-00-12 | 1SFL427101R1200 | 2.250 |
| | | 100...250 | 100...250 | 0 0 | AF116-40-00-13 | 1SFL427101R1300 | 2.250 |
| | | 250...500 | 250...500 | 0 0 | AF116-40-00-14 | 1SFL427101R1400 | 2.250 |
| 200 | 175 | 24...60 | 20...60 | 0 0 | AF140-40-00-11 | 1SFL447101R1100 | 2.250 |
| | | 48...130 | 48...130 | 0 0 | AF140-40-00-12 | 1SFL447101R1200 | 2.250 |
| | | 100...250 | 100...250 | 0 0 | AF140-40-00-13 | 1SFL447101R1300 | 2.250 |
| | | 250...500 | 250...500 | 0 0 | AF140-40-00-14 | 1SFL447101R1400 | 2.250 |

With bar connections

| Rated current | UL / CSA | Uc min. | Uc max. | Control circuit | Type | Order code | Weight |
|---------------|----------|-----------|-----------|-----------------|-----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 0 0 | AF116-40-00B-11 | 1SFL427102R1100 | 2.150 |
| | | 48...130 | 48...130 | 0 0 | AF116-40-00B-12 | 1SFL427102R1200 | 2.150 |
| | | 100...250 | 100...250 | 0 0 | AF116-40-00B-13 | 1SFL427102R1300 | 2.150 |
| | | 250...500 | 250...500 | 0 0 | AF116-40-00B-14 | 1SFL427102R1400 | 2.150 |
| 200 | 175 | 24...60 | 20...60 | 0 0 | AF140-40-00B-11 | 1SFL447102R1100 | 2.150 |
| | | 48...130 | 48...130 | 0 0 | AF140-40-00B-12 | 1SFL447102R1200 | 2.150 |
| | | 100...250 | 100...250 | 0 0 | AF140-40-00B-13 | 1SFL447102R1300 | 2.150 |
| | | 250...500 | 250...500 | 0 0 | AF140-40-00B-14 | 1SFL447102R1400 | 2.150 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



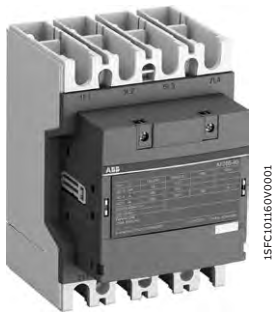
AF116, AF140-40-00

AF116, AF140-40-00B

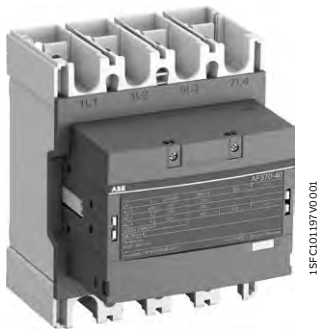
Main dimensions mm, inches

AF190 ... AF370 4-pole contactors

275 to 525 A AC-1
AC / DC operated



AF205-40-00



AF370-40-00

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

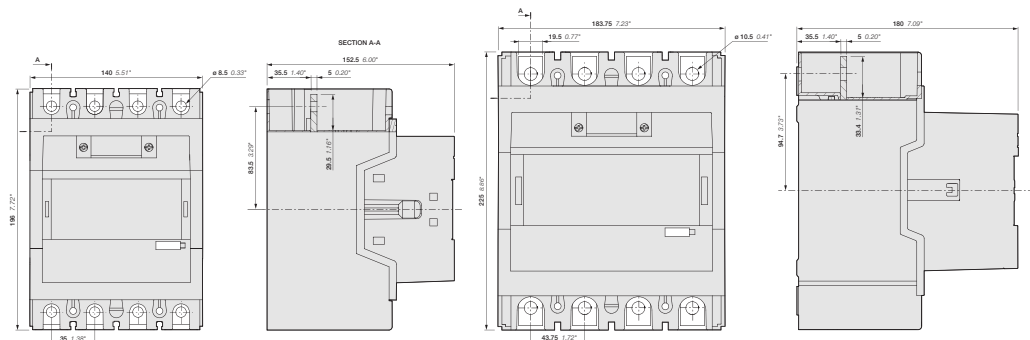
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|----------|------------|-------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |

4 N.O. main poles

| Rated current (A) | UL/CSA rating (A) | Uc min. (V) | Uc max. (V) | Control voltage (V) | Type | Order code | Weight (kg) |
|-------------------|-------------------|-------------|-------------|---------------------|----------------|-----------------|-------------|
| 275 | 230 | 24...60 | 20...60 | 0 0 | AF190-40-00-11 | 1SFL487102R1100 | 3.900 |
| | | 48...130 | 48...130 | 0 0 | AF190-40-00-12 | 1SFL487102R1200 | 3.900 |
| | | 100...250 | 100...250 | 0 0 | AF190-40-00-13 | 1SFL487102R1300 | 3.900 |
| | | 250...500 | 250...500 | 0 0 | AF190-40-00-14 | 1SFL487102R1400 | 3.900 |
| 350 | 250 | 24...60 | 20...60 | 0 0 | AF205-40-00-11 | 1SFL527102R1100 | 3.900 |
| | | 48...130 | 48...130 | 0 0 | AF205-40-00-12 | 1SFL527102R1200 | 3.900 |
| | | 100...250 | 100...250 | 0 0 | AF205-40-00-13 | 1SFL527102R1300 | 3.900 |
| | | 250...500 | 250...500 | 0 0 | AF205-40-00-14 | 1SFL527102R1400 | 3.900 |
| 400 | 300 | 24...60 | 20...60 | 0 0 | AF265-40-00-11 | 1SFL547102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF265-40-00-12 | 1SFL547102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF265-40-00-13 | 1SFL547102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF265-40-00-14 | 1SFL547102R1400 | 6.360 |
| 500 | 350 | 24...60 | 20...60 | 0 0 | AF305-40-00-11 | 1SFL587102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF305-40-00-12 | 1SFL587102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF305-40-00-13 | 1SFL587102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF305-40-00-14 | 1SFL587102R1400 | 6.360 |
| 525 | 420 | 24...60 | 20...60 | 0 0 | AF370-40-00-11 | 1SFL607102R1100 | 6.360 |
| | | 48...130 | 48...130 | 0 0 | AF370-40-00-12 | 1SFL607102R1200 | 6.360 |
| | | 100...250 | 100...250 | 0 0 | AF370-40-00-13 | 1SFL607102R1300 | 6.360 |
| | | 250...500 | 250...500 | 0 0 | AF370-40-00-14 | 1SFL607102R1400 | 6.360 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



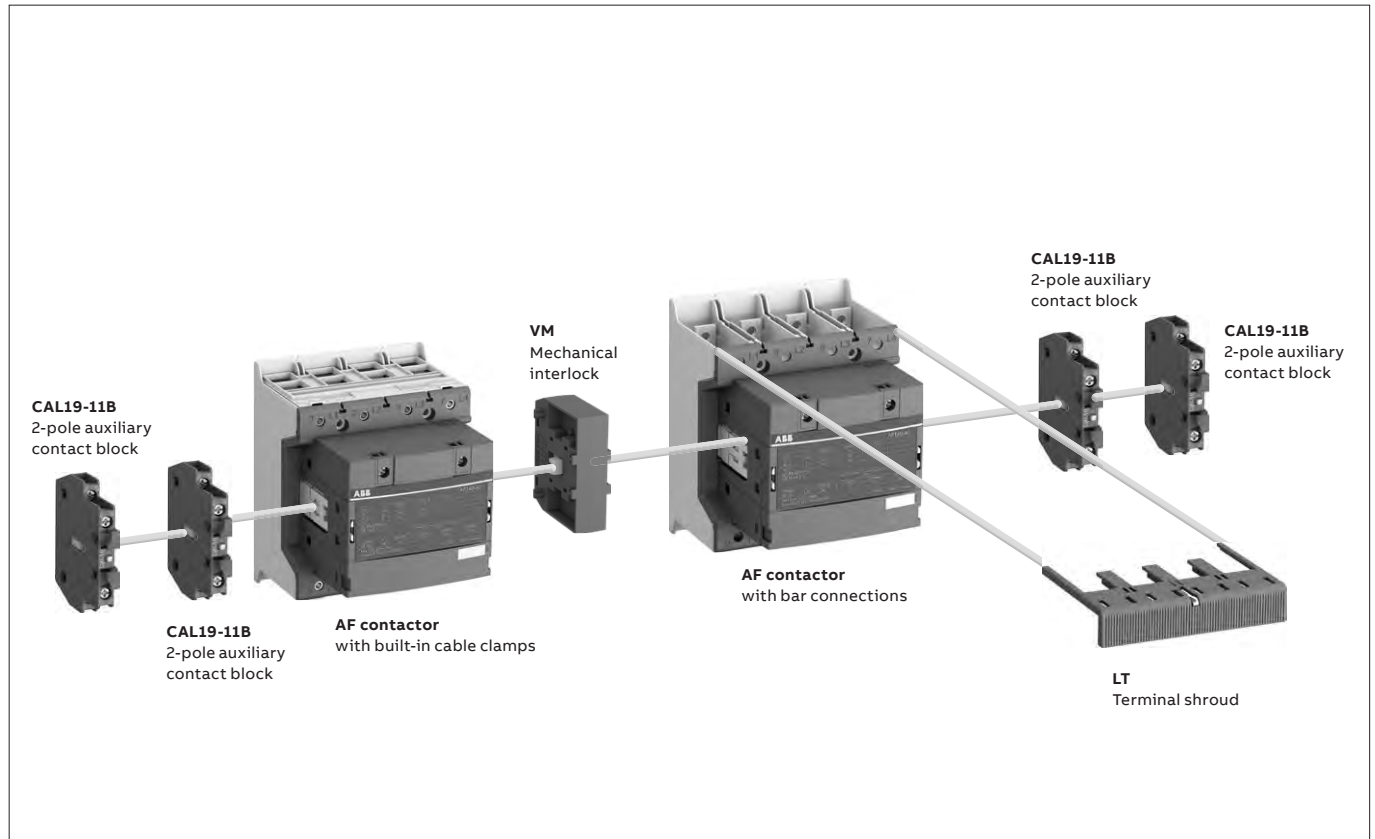
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-pole contactors

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | |
|-----------------|------------|------------------------------|--------------------------|----------------------|---|
| | | | Auxiliary contact blocks | | Mechanical interlock units (between two contactors) |
| | | | CAL19-11 (3) | CAL19-11B (3) | |
| AF116 ... AF370 | 4 0 | 0 0 | 2 x CAL19-11 | + 2 x CAL19-11B | - |
| AF116 ... AF370 | 4 0 | 0 0 | 2 x CAL19-11 (1) | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.

(2) Interlock type, according to the contactor ratings (see "Accessories").

(3) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF140-40-11

1SFC101154V0001



AF140-40-11B

1SFC101192V0001

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|------------------------------------|--|------|---------------------------|----------|------------|-------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) |
| A | A | V 50/60 Hz | V DC | | | | kg |

4 N.O. main poles

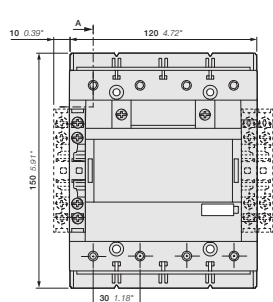
For connection with built-in cable clamps

| Rated current | UL / CSA | Uc min. | Uc max. | N.O. | N.C. | Type | Order code | Weight |
|---------------|----------|-----------|-----------|------|------|----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 1 | 1 | AF116-40-11-11 | 1SFL427101R1111 | 2.270 |
| | | 48...130 | 48...130 | 1 | 1 | AF116-40-11-12 | 1SFL427101R1211 | 2.270 |
| | | 100...250 | 100...250 | 1 | 1 | AF116-40-11-13 | 1SFL427101R1311 | 2.270 |
| | | 250...500 | 250...500 | 1 | 1 | AF116-40-11-14 | 1SFL427101R1411 | 2.270 |
| 200 | 175 | 24...60 | 20...60 | 1 | 1 | AF140-40-11-11 | 1SFL447101R1111 | 2.270 |
| | | 48...130 | 48...130 | 1 | 1 | AF140-40-11-12 | 1SFL447101R1211 | 2.270 |
| | | 100...250 | 100...250 | 1 | 1 | AF140-40-11-13 | 1SFL447101R1311 | 2.270 |
| | | 250...500 | 250...500 | 1 | 1 | AF140-40-11-14 | 1SFL447101R1411 | 2.270 |

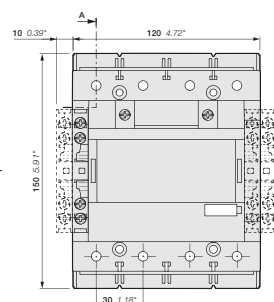
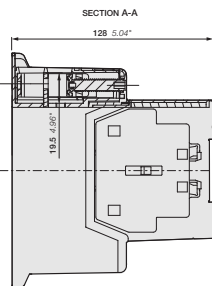
With bar connections

| Rated current | UL / CSA | Uc min. | Uc max. | N.O. | N.C. | Type | Order code | Weight |
|---------------|----------|-----------|-----------|------|------|-----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 1 | 1 | AF116-40-11B-11 | 1SFL427102R1111 | 2.170 |
| | | 48...130 | 48...130 | 1 | 1 | AF116-40-11B-12 | 1SFL427102R1211 | 2.170 |
| | | 100...250 | 100...250 | 1 | 1 | AF116-40-11B-13 | 1SFL427102R1311 | 2.170 |
| | | 250...500 | 250...500 | 1 | 1 | AF116-40-11B-14 | 1SFL427102R1411 | 2.170 |
| 200 | 175 | 24...60 | 20...60 | 1 | 1 | AF140-40-11B-11 | 1SFL447102R1111 | 2.170 |
| | | 48...130 | 48...130 | 1 | 1 | AF140-40-11B-12 | 1SFL447102R1211 | 2.170 |
| | | 100...250 | 100...250 | 1 | 1 | AF140-40-11B-13 | 1SFL447102R1311 | 2.170 |
| | | 250...500 | 250...500 | 1 | 1 | AF140-40-11B-14 | 1SFL447102R1411 | 2.170 |

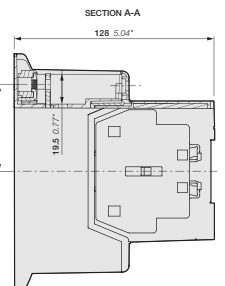
(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF116, AF140-40-11



AF116, AF140-40-11B

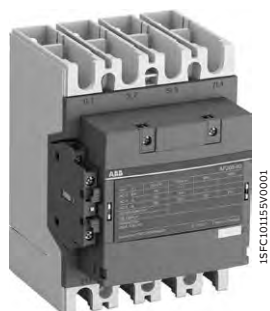


Main dimensions mm, inches

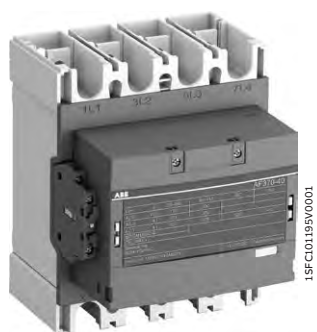
AF190 ... AF370 4-pole contactors

275 to 525 A AC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



AF205-40-11



AF370-40-11

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

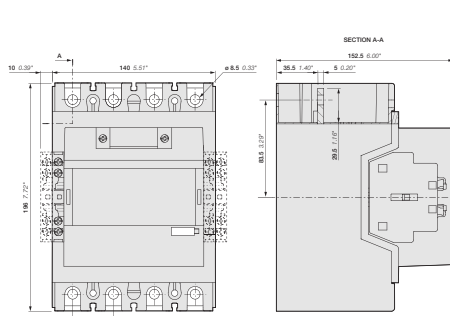
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|--------------------------------|--|------|---------------------------|----------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | | Pkg (1 pce) kg |
| A | A | V 50/60 Hz | V DC | | | | |

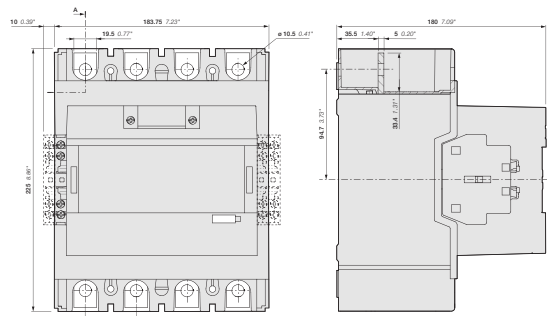
4 N.O. main poles

| Rated operational current | UL / CSA | Uc min. | Uc max. | Uc min. | Uc max. | Type (1) | Order code | Weight |
|---------------------------|----------|-----------|-----------|---------|---------|----------------|-----------------|--------|
| 275 | 230 | 24...60 | 20...60 | 1 | 1 | AF190-40-11-11 | 1SFL487102R1111 | 3.920 |
| | | 48...130 | 48...130 | 1 | 1 | AF190-40-11-12 | 1SFL487102R1211 | 3.920 |
| | | 100...250 | 100...250 | 1 | 1 | AF190-40-11-13 | 1SFL487102R1311 | 3.920 |
| | | 250...500 | 250...500 | 1 | 1 | AF190-40-11-14 | 1SFL487102R1411 | 3.920 |
| 350 | 250 | 24...60 | 20...60 | 1 | 1 | AF205-40-11-11 | 1SFL527102R1111 | 3.920 |
| | | 48...130 | 48...130 | 1 | 1 | AF205-40-11-12 | 1SFL527102R1211 | 3.920 |
| | | 100...250 | 100...250 | 1 | 1 | AF205-40-11-13 | 1SFL527102R1311 | 3.920 |
| | | 250...500 | 250...500 | 1 | 1 | AF205-40-11-14 | 1SFL527102R1411 | 3.920 |
| 400 | 300 | 24...60 | 20...60 | 1 | 1 | AF265-40-11-11 | 1SFL547102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 | 1 | AF265-40-11-12 | 1SFL547102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 | 1 | AF265-40-11-13 | 1SFL547102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 | 1 | AF265-40-11-14 | 1SFL547102R1411 | 6.380 |
| 500 | 350 | 24...60 | 20...60 | 1 | 1 | AF305-40-11-11 | 1SFL587102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 | 1 | AF305-40-11-12 | 1SFL587102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 | 1 | AF305-40-11-13 | 1SFL587102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 | 1 | AF305-40-11-14 | 1SFL587102R1411 | 6.380 |
| 525 | 420 | 24...60 | 20...60 | 1 | 1 | AF370-40-11-11 | 1SFL607102R1111 | 6.380 |
| | | 48...130 | 48...130 | 1 | 1 | AF370-40-11-12 | 1SFL607102R1211 | 6.380 |
| | | 100...250 | 100...250 | 1 | 1 | AF370-40-11-13 | 1SFL607102R1311 | 6.380 |
| | | 250...500 | 250...500 | 1 | 1 | AF370-40-11-14 | 1SFL607102R1411 | 6.380 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF190, AF205

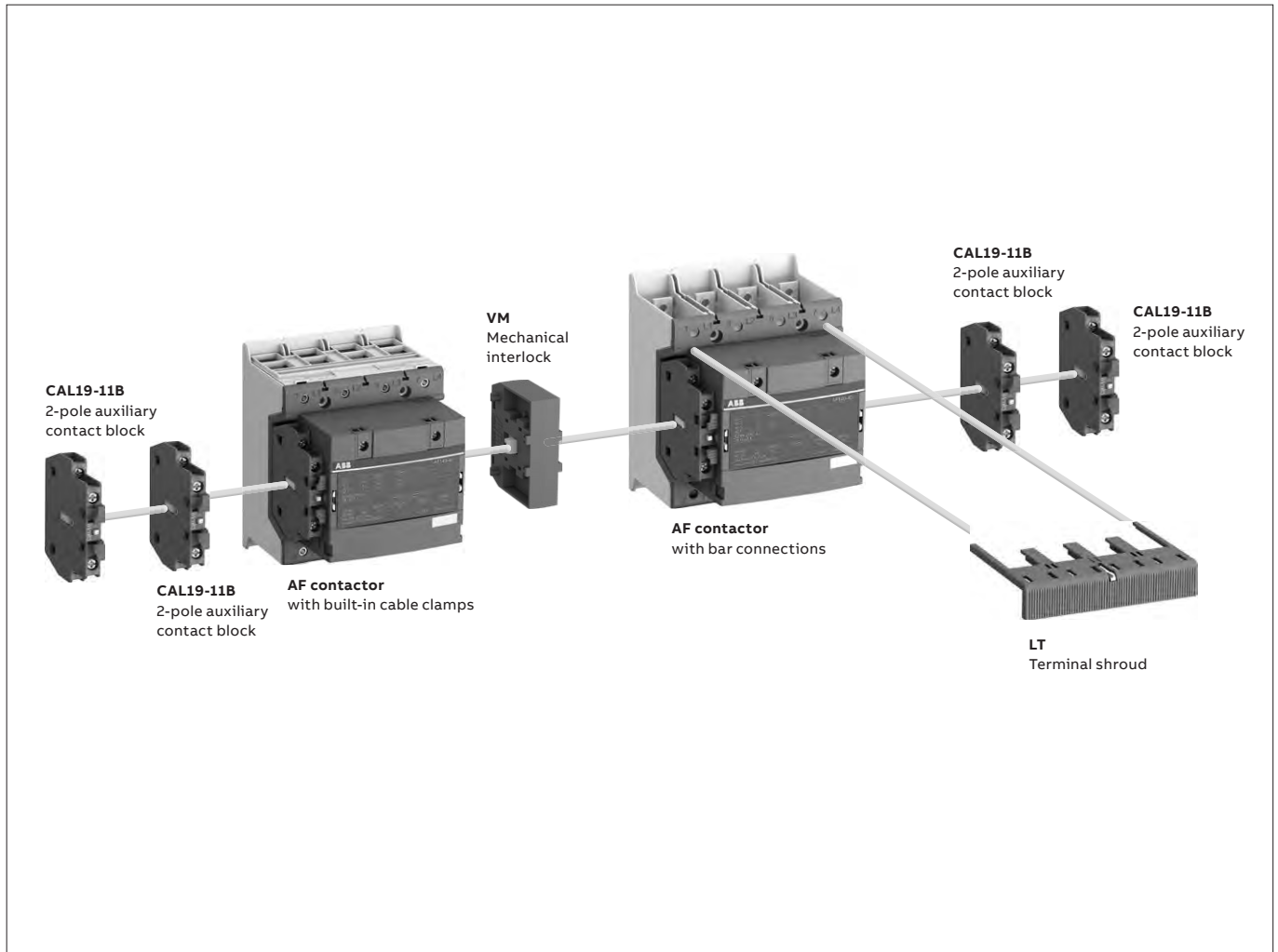


AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | |
|-----------------|------------|------------------------------|--------------------------|---------------------|---|
| | | | Auxiliary contact blocks | | Mechanical interlock units (between two contactors) |
| | | | CAL19-11 | CAL19-11B | |
| AF116 ... AF370 | 4 0 | 1 1 | 1 x CAL19-11 | + 2 x CAL19-11B | - |
| AF116 ... AF370 | 4 0 | 1 1 | - | + 2 x CAL19-11B (1) | + VM... (2) |

(1) Total number of auxiliary contact blocks for the two contactors.
 (2) Interlock type, according to the contactor ratings (see "Accessories").

AF116 ... AF140 4-pole contactors

160 to 200 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF140-40-22



AF140-40-22B

AF116 ... AF140 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 690 V AC and 350 V DC. These contactors are of the block type design with 4 main poles.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|--------------------------------|--|---------------------------|----------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | Pkg (1 pce) kg |
| A | A | V 50/60 Hz V DC | | | | |

4 N.O. main poles

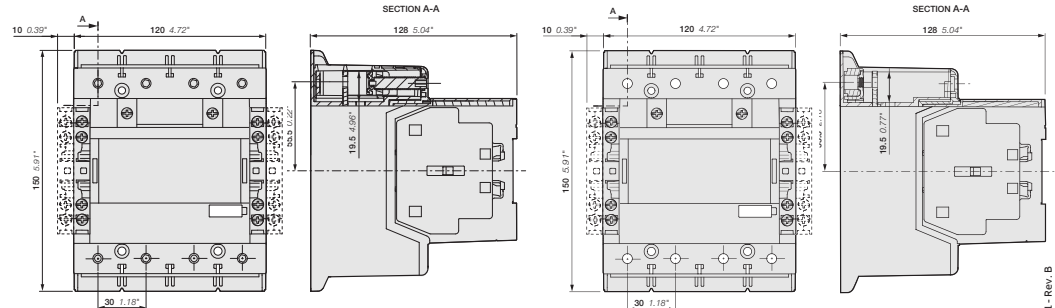
For connection with built-in cable clamps

| Rated current | UL / CSA | Uc min. | Uc max. | NO | NC | Type | Order code | Weight |
|---------------|----------|-----------|-----------|----|----|----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 2 | 2 | AF116-40-22-11 | 1SFL427101R1122 | 2.290 |
| | | 48...130 | 48...130 | 2 | 2 | AF116-40-22-12 | 1SFL427101R1222 | 2.290 |
| | | 100...250 | 100...250 | 2 | 2 | AF116-40-22-13 | 1SFL427101R1322 | 2.290 |
| | | 250...500 | 250...500 | 2 | 2 | AF116-40-22-14 | 1SFL427101R1422 | 2.290 |
| 200 | 175 | 24...60 | 20...60 | 2 | 2 | AF140-40-22-11 | 1SFL447101R1122 | 2.290 |
| | | 48...130 | 48...130 | 2 | 2 | AF140-40-22-12 | 1SFL447101R1222 | 2.290 |
| | | 100...250 | 100...250 | 2 | 2 | AF140-40-22-13 | 1SFL447101R1322 | 2.290 |
| | | 250...500 | 250...500 | 2 | 2 | AF140-40-22-14 | 1SFL447101R1422 | 2.290 |

With bar connections

| Rated current | UL / CSA | Uc min. | Uc max. | NO | NC | Type | Order code | Weight |
|---------------|----------|-----------|-----------|----|----|-----------------|-----------------|--------|
| 160 | 160 | 24...60 | 20...60 | 2 | 2 | AF116-40-22B-11 | 1SFL427102R1122 | 2.190 |
| | | 48...130 | 48...130 | 2 | 2 | AF116-40-22B-12 | 1SFL427102R1222 | 2.190 |
| | | 100...250 | 100...250 | 2 | 2 | AF116-40-22B-13 | 1SFL427102R1322 | 2.190 |
| | | 250...500 | 250...500 | 2 | 2 | AF116-40-22B-14 | 1SFL427102R1422 | 2.190 |
| 200 | 175 | 24...60 | 20...60 | 2 | 2 | AF140-40-22B-11 | 1SFL447102R1122 | 2.190 |
| | | 48...130 | 48...130 | 2 | 2 | AF140-40-22B-12 | 1SFL447102R1222 | 2.190 |
| | | 100...250 | 100...250 | 2 | 2 | AF140-40-22B-13 | 1SFL447102R1322 | 2.190 |
| | | 250...500 | 250...500 | 2 | 2 | AF140-40-22B-14 | 1SFL447102R1422 | 2.190 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



AF116, AF140-40-11

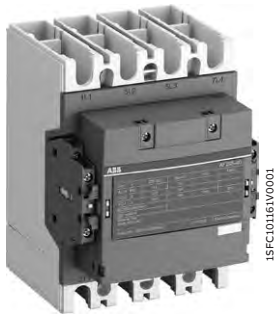
AF116, AF140-40-11B

Main dimensions mm, inches

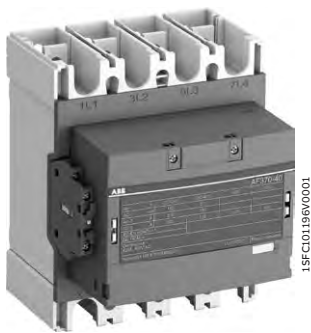
AF190 ... AF370 4-pole contactors

275 to 525 A AC-1

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts



AF205-40-22



AF370-40-22

AF190 ... AF370 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 440 V DC. These contactors are of the block type design with 4 main poles.

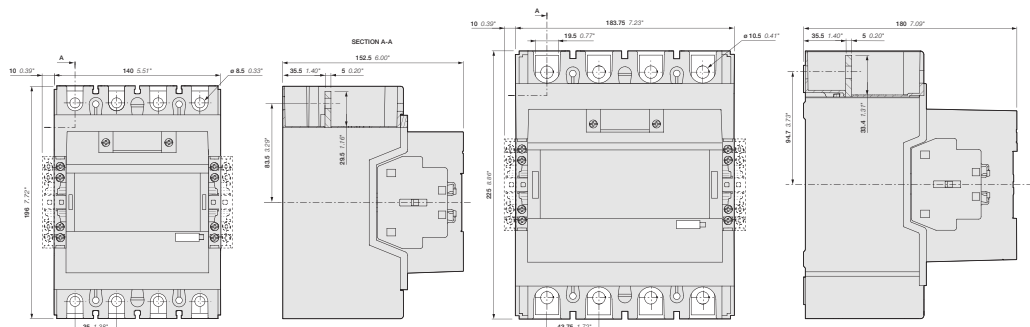
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc min. ... Uc max. | Auxiliary contacts fitted | Type (1) | Order code | Weight |
|---|--------------------------------|--|---------------------------|----------|------------|-------------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | V 50/60 Hz V DC | | | | Pkg (1 pce) kg |

4 N.O. main poles

| Rated current (A) | UL/CSA rating (A) | Uc min (V) | Uc max (V) | NO | NC | Type (1) | Order code | Weight (kg) |
|-------------------|-------------------|------------|------------|----|----|----------------|-----------------|-------------|
| 275 | 230 | 24...60 | 20...60 | 2 | 2 | AF190-40-22-11 | 1SFL487102R1122 | 3.940 |
| | | 48...130 | 48...130 | 2 | 2 | AF190-40-22-12 | 1SFL487102R1222 | 3.940 |
| | | 100...250 | 100...250 | 2 | 2 | AF190-40-22-13 | 1SFL487102R1322 | 3.940 |
| | | 250...500 | 250...500 | 2 | 2 | AF190-40-22-14 | 1SFL487102R1422 | 3.940 |
| 350 | 250 | 24...60 | 20...60 | 2 | 2 | AF205-40-22-11 | 1SFL527102R1122 | 3.940 |
| | | 48...130 | 48...130 | 2 | 2 | AF205-40-22-12 | 1SFL527102R1222 | 3.940 |
| | | 100...250 | 100...250 | 2 | 2 | AF205-40-22-13 | 1SFL527102R1322 | 3.940 |
| | | 250...500 | 250...500 | 2 | 2 | AF205-40-22-14 | 1SFL527102R1422 | 3.940 |
| 400 | 300 | 24...60 | 20...60 | 2 | 2 | AF265-40-22-11 | 1SFL547102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 | 2 | AF265-40-22-12 | 1SFL547102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 | 2 | AF265-40-22-13 | 1SFL547102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 | 2 | AF265-40-22-14 | 1SFL547102R1422 | 6.400 |
| 500 | 350 | 24...60 | 20...60 | 2 | 2 | AF305-40-22-11 | 1SFL587102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 | 2 | AF305-40-22-12 | 1SFL587102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 | 2 | AF305-40-22-13 | 1SFL587102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 | 2 | AF305-40-22-14 | 1SFL587102R1422 | 6.400 |
| 525 | 420 | 24...60 | 20...60 | 2 | 2 | AF370-40-22-11 | 1SFL607102R1122 | 6.400 |
| | | 48...130 | 48...130 | 2 | 2 | AF370-40-22-12 | 1SFL607102R1222 | 6.400 |
| | | 100...250 | 100...250 | 2 | 2 | AF370-40-22-13 | 1SFL607102R1322 | 6.400 |
| | | 250...500 | 250...500 | 2 | 2 | AF370-40-22-14 | 1SFL607102R1422 | 6.400 |

(1) For other auxiliary contacts arrangements, please contact your ABB local organization.



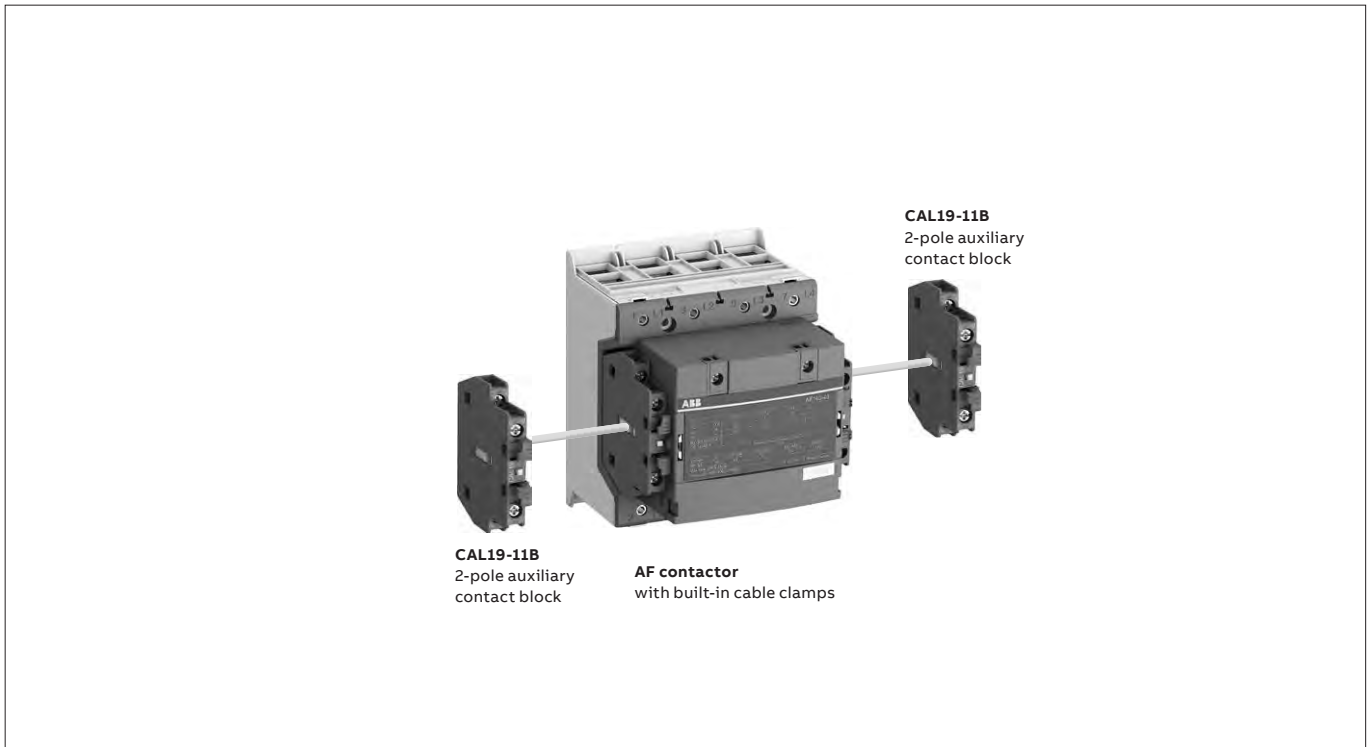
AF190, AF205

AF265, AF305, AF370

Main dimensions mm, inches

AF116 ... AF370 4-pole contactors with 2 N.O. + 2 N.C. auxiliary contacts

Contactors and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor types | Main poles | Available auxiliary contacts | Side-mounted accessories | | |
|-----------------|------------|------------------------------|--------------------------|----------------------|---|
| | | | Auxiliary contact blocks | | Mechanical interlock units (between two contactors) |
| | | | CAL19-11 (1) | CAL19-11B (1) | |
| AF116 ... AF370 | 4 0 | 2 2 | 2 x CAL19-11 included | + 2 x CAL19-11B | - |

(1) The CEL19 auxiliary contact blocks can replace the CAL19-11 and CAL19-11B. Though, no auxiliary contact block can be mounted outside the CEL19.

EK550, EK1000 4-pole contactors

800 to 1000 A AC-1

AC operated with 1 N.O. + 1 N.C. auxiliary contacts



EK1000-40-11

1SFC98099-069

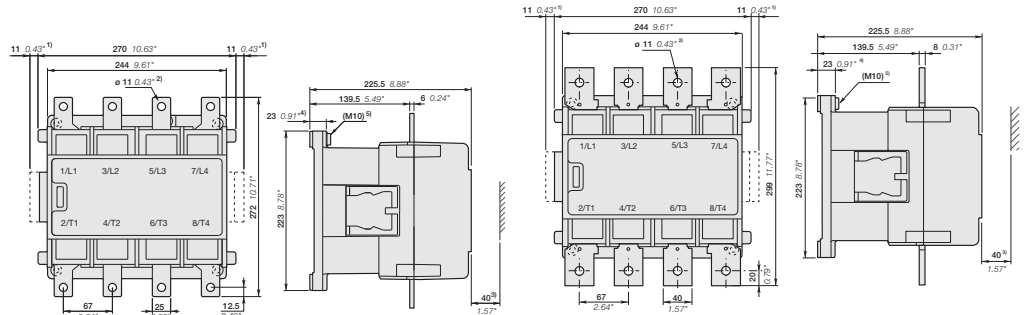
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 A | UL/CSA General use rating 600 V AC A | Rated control circuit voltage U_c (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--|--|--|-----------|-------------------------------------|--------------|-------------|--|
| | | V 50 Hz | V 60 Hz | | | | |
| 800 | 540 | 220 | 220...240 | 1 1 | EK550-40-11 | SK827041-EL | 17.200 |
| | | 220...230 | 230...255 | 1 1 | EK550-40-11 | SK827041-EM | 17.200 |
| | | 400...415 | - | 1 1 | EK550-40-11 | SK827041-AR | 17.200 |
| 1000 | - | 220 | 220...240 | 1 1 | EK1000-40-11 | SK827044-EL | 17.500 |
| | | 220...230 | 230...255 | 1 1 | EK1000-40-11 | SK827044-EM | 17.500 |
| | | 400...415 | - | 1 1 | EK1000-40-11 | SK827044-AR | 17.500 |

(1) Other control voltages see voltage code table.



EK550

EK1000

- 1) Dimension for extra auxiliary contact block.
- 2) Screw, nut and washer by-packed.
- 3) Min. distance to uninsulated wall.
- 4) Damping elements are included.
- 5) Earthing screw.

Main dimensions mm, inches

EK550, EK1000 4-pole contactors

800 to 1000 A AC-1

DC operated with 2 N.O. + 1 N.C. auxiliary contacts



EK1000-40-21

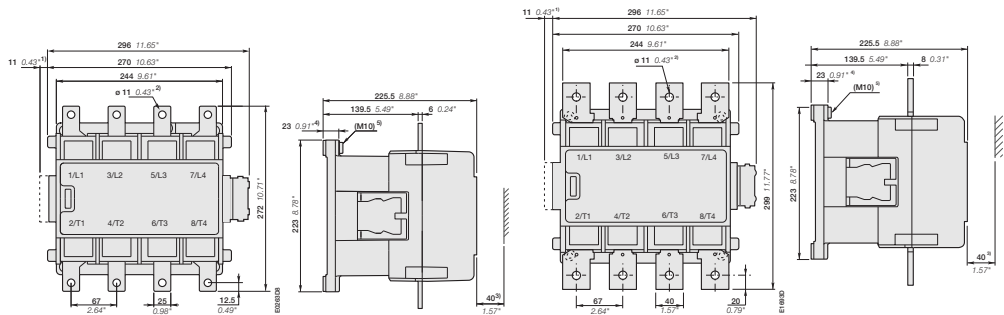
1SFC98099-009

EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and generally for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

- 4 main poles
- control circuit: DC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight |
|---|--------------------------------|----------------------------------|---------------------------|--------------|-------------|-------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | General use rating 600 V AC | | | | | Pkg (1 pce) |
| A | A | V DC | | | | kg |
| 800 | 540 | 48 | 2 1 | EK550-40-21 | SK827041-DD | 17.200 |
| | | 110 | 2 1 | EK550-40-21 | SK827041-DE | 17.200 |
| | | 125 | 2 1 | EK550-40-21 | SK827041-DU | 17.200 |
| | | 220 | 2 1 | EK550-40-21 | SK827041-DF | 17.200 |
| 1000 | - | 36 | 2 1 | EK1000-40-21 | SK827044-DC | 17.500 |
| | | 48 | 2 1 | EK1000-40-21 | SK827044-DD | 17.500 |
| | | 60 | 2 1 | EK1000-40-21 | SK827044-DT | 17.500 |
| | | 110 | 2 1 | EK1000-40-21 | SK827044-DE | 17.500 |
| | | 125 | 2 1 | EK1000-40-21 | SK827044-DU | 17.500 |
| | | 220 | 2 1 | EK1000-40-21 | SK827044-DF | 17.500 |



- EK550**
- 1) Dimension for extra auxiliary contact block.
 - 2) Screw, nut and washer by-packed.
 - 3) Min. distance to uninsulated wall.
 - 4) Damping elements are included.
 - 5) Earthing screw.

EK1000

EK550, EK1000 4-pole Contactors

800 to 1000 A AC-1

AC operated with 2 N.O. + 2 N.C. auxiliary contacts




EK1000-40-22

1SFC38099-069

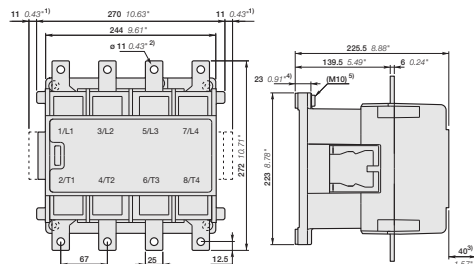
EK550 4-pole contactors are mainly used for controlling non-inductive or slightly inductive loads (i.e. resistance furnaces...) and for controlling power circuits up to 1000 V AC and 600 V DC, EK1000 up to 1000 V AC.

These contactors are of the block type design with:

- 4 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

| IEC Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 | UL/CSA General use rating 600 V AC A | Rated control circuit voltage U_c (1) | | Auxiliary contacts fitted  | Type | Order code | Weight Pkg (1 pce) kg |
|---|--|--|-----------|--|--------------|-------------|--|
| | | V 50 Hz | V 60 Hz | | | | |
| 800 | 540 | 220 | 220...240 | 2 2 | EK550-40-22 | SK827043-EL | 17.200 |
| | | 220...230 | 230...255 | 2 2 | EK550-40-22 | SK827043-EM | 17.200 |
| | | 400...415 | - | 2 2 | EK550-40-22 | SK827043-AR | 17.200 |
| 1000 | - | 220 | 220...240 | 2 2 | EK1000-40-22 | SK827045-EL | 17.500 |
| | | 220...230 | 230...255 | 2 2 | EK1000-40-22 | SK827045-EM | 17.500 |
| | | 380 | 380...415 | 2 2 | EK1000-40-22 | SK827045-EP | 17.500 |
| | | 380...400 | 400...440 | 2 2 | EK1000-40-22 | SK827045-ER | 17.500 |
| | | 400...415 | - | 2 2 | EK1000-40-22 | SK827045-AR | 17.500 |

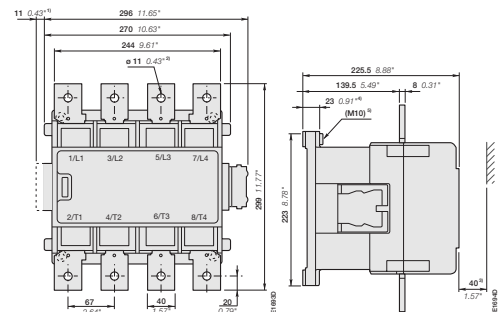
(1) Other control voltages see voltage code table.



EK550

- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw

Main dimensions mm, inches



EK1000

EK550, EK1000 4-pole contactors with 1 N.O. + 1 N.C. and 2 N.O. + 1 N.C. auxiliary contacts

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Mounting positions of the auxiliary contact

Auxiliary contact types and connecting diagrams

(1) Contact 35-36 used for some types of EK... contactors

EK 4-pole contactors

| Contactor types | Main poles | Available auxiliary contacts | Add-on auxiliary contact blocks | Mounting and positioning |
|-----------------|------------|------------------------------|---------------------------------|---|
| | | | 2-pole CAL16-11 ... | <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> </div> <div style="width: 40%;"> </div> </div> |

AC operated, 50 Hz, 60 Hz or 50/60 Hz

| | | | | |
|---------------|-----|-----|---|--|
| EK550, EK1000 | 4 0 | 1 1 | + 1 x CAL16-11B + 1 x CAL16-11C + 1 x CAL16-11D | |
|---------------|-----|-----|---|--|

DC operated

| | | | | |
|---------------|-----|-----|---------------------|--|
| EK550, EK1000 | 4 0 | 2 1 | + 1 x CAL16-11C | |
|---------------|-----|-----|---------------------|--|

EK 4-pole reversing contactors with VH800 mechanical and electrical interlock units

| "Left hand" contactors | Interlocking | "Right hand" contactors | Add-on auxiliary contact blocks | Mounting and positioning |
|------------------------|--------------|-------------------------|---------------------------------|---|
| | | | 2-pole CAL16-11 ... | <div style="display: flex; justify-content: space-between;"> <div style="width: 40%;"> </div> <div style="width: 40%;"> </div> </div> |

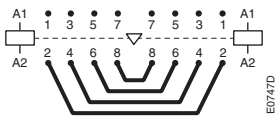
AC operated, 50 Hz, 60 Hz or 50/60 Hz

| | | | | |
|---------------|-------|---------------|------------------------------------|--|
| EK550, EK1000 | VH800 | EK550, EK1000 | + 1 x CAL16-11C + 1 x CAL16-11D | |
|---------------|-------|---------------|------------------------------------|--|

DC operated

| | | | | |
|---------------|-------|---------------|---|--|
| EK550, EK1000 | VH800 | EK550, EK1000 | - | |
|---------------|-------|---------------|---|--|

EK550, EK1000 4-pole contactors with 1 N.O. + 1 N.C. auxiliary contacts and 2 N.O. + 1 N.C. auxiliary contacts



BSS550 ... BSS1000

E0747D



RC-EH

A078

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Side-mounted auxiliary contact blocks

| EK | | | | | |
|----|---|---|---------------|------------|---------|
| | 1 | 1 | CAL16-11B | SK829002-B | 1 0.050 |
| | 1 | 1 | CAL16-11C | SK829002-C | 1 0.050 |
| | 1 | 1 | CAL16-11D | SK829002-D | 1 0.050 |
| | 1 | 1 | CCL16-11E (2) | SK829002-E | 1 0.050 |

Mechanical interlock unit for two horizontal mounted contactors

| EK550, EK1000 | | | | | |
|---------------|--|--|-------|------------|---------|
| | | | VH800 | SK829070-F | 1 6.000 |

Connecting sets

| EK550 | BSS550 | SK829090-E | 1 | 3.300 |
|--------|---------|------------|---|-------|
| EK1000 | BSS1000 | SK829090-H | 1 | 5.500 |

Surge suppressors

| For contactors | Rated control circuit voltage U _c | | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--|-------|--------------|------------|---------|----------------|
| | V | AC DC | | | | |
| EK550, EK1000 | 48...110 | ● - | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 24...125 | - ● | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 220...600 | ● - | RC-EH800/600 | SK829007-D | 1 | 0.015 |



See "Main accessory fitting details" table.

(2) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

AF09 ... AF80 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | |
|--|--------------------------------|--|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|-------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | |
| Rated operational voltage Ue max. | | 1000 V | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | |
| Conventional free-air thermal current Ith acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 35 A | 35 A | 55 A | 55 A | 105 A | 105 A | 125 A | |
| With conductor cross-sectional area | | 6 mm ² | 6 mm ² | 16 mm ² | 16 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | |
| AC-1 Utilization category | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| le / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 25 A | 30 A | 45 A | 55 A | 70 A | 100 A | 125 A | |
| Ue max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 60^\circ\text{C}$ | 25 A | 30 A | 40 A | 45 A | 60 A | 80 A | 105 A | |
| | $\theta \leq 70^\circ\text{C}$ | 22 A | 26 A | 32 A | 37 A | 50 A | 70 A | 90 A | |
| With conductor cross-sectional area | | 4 mm ² | 6 mm ² | 10 mm ² | 16 mm ² | 35 mm ² | 35 mm ² | 50 mm ² | |
| AC-3 Utilization category | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | | | | | | |
| le / Max. rated operational current AC-3 (1) | | | | | | | | | |
|  3-phase motors | 220-230-240 V | 9 A | 18 A | 23.2 A | 23.2 A | 40 A | 53 A | 80 A | |
| | 380-400 V | 9 A | 18 A | 22 A | 22 A | 40 A | 53 A | 80 A | |
| | 415 V | 9 A | 18 A | 21.2 A | 21.2 A | 40 A | 53 A | 80 A | |
| | 440 V | 9 A | 18 A | 20 A | 20 A | 40 A | 53 A | 80 A | |
| | 500 V | 9.5 A | 15 A | 17.6 A | 17.6 A | 35 A | 45 A | 65 A | |
| | 690 V | 7 A | 10.5 A | 10.5 A | 10.5 A | 25 A | 35 A | 49 A | |
| | 1000 V | | | | | | | 25 A | |
| | | | | | | | | | |
|  Rated operational power AC-3 (1) 1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 220-230-240 V | 2.2 kW | 4 kW | 5.5 kW | 5.5 kW | 11 kW | 15 kW | 22 kW | |
| | 380-400 V | 4 kW | 7.5 kW | 11 kW (3) | 11 kW (3) | 18.5 kW | 22 kW | 37 kW | |
| | 415 V | 4 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 440 V | 4 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 500 V | 5.5 kW | 9 kW | 11 kW | 11 kW | 22 kW | 30 kW | 45 kW | |
| | 690 V | 5.5 kW | 9 kW | 9 kW | 9 kW | 22 kW | 30 kW | 45 kW | |
| | 1000 V | | | | | | | 35 kW | |
| | | | | | | | | | |
| Rated making capacity AC-3 | | 10 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| Rated breaking capacity AC-3 | | 8 x Ie AC-3 acc. to IEC 60947-4-1 | | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | | | | | |
| Ue $\leq 500\text{ V AC}$ - gG type fuse | | 25 A | 32 A | 50 A | 63 A | 80 A | 110 A | 160 A | |
| Rated short-time withstand current Icw | 1 s | 300 A | 300 A | 450 A | 450 A | 1000 A | 1000 A | 1200 A | |
| | 10 s | 150 A | 150 A | 300 A | 300 A | 600 A | 600 A | 780 A | |
| | 30 s | 80 A | 80 A | 225 A | 225 A | 350 A | 350 A | 450 A | |
| | 1 min | 60 A | 60 A | 150 A | 150 A | 250 A | 250 A | 300 A | |
| | 15 min | 35 A | 35 A | 55 A | 55 A | 110 A | 110 A | 140 A | |
| Maximum breaking capacity N.O. main pole | at 440 V | 250 A | 250 A | - | - | 950 A | 950 A | 1100 A | |
| | at 690 V | 106 A | 106 A | - | - | 600 A | 600 A | 750 A | |
| | N.C. Main pole | at 440 V | - | - | - | - | 600 A | - | 900 A |
| | | at 690 V | - | - | - | - | 300 A | - | 750 A |
| Power dissipation per pole | Ie / AC-1 | 0.8 W | 1.2 W | 1.6 W | 2.3 W | 3 W | 6.3 W | 8 W | |
| | Ie / AC-3 | 0.1 W | 0.35 W | 0.42 W | 0.42 W | 1 W | 1.7 W | 3.2 W | |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | | | | | | |

(1) For the corresponding kW/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor Rated Operational Powers and Currents"



(2) For the protection of motor starters against short circuits, see "Coordination with Short-circuit Protection Devices".

(3) 400 V 3-phase motors only.

AF116 ... EK1000 4-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|--|------------------------------------|--|--------------------|---------------------|-------------------------|---------------------|-------------------------|----------------------------|------------------------|------------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | |
| Rated operational voltage U _e max. | | 690 V | | 1000 V | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | |
| Conventional free-air thermal current I _{th} | | | | | | | | | | |
| acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 800 A | 1000 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2x 185 mm ² (4) | 2x 240 mm ² | 2x 300 mm ² |
| AC-1 Utilization category | | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | | |
| I _e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 800 A | 1000 A |
| U _e max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 60^\circ\text{C}$ | 145 A | 175 A | 250 A | 300 A | 350 A | 400 A | 425 A | 650 A | 800 A |
| | $\theta \leq 70^\circ\text{C}$ | 130 A | 160 A | 200 A | 240 A | 290 A | 325 A | 350 A | 575 A | 720 A |
| U _e max. $\leq 1000\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 40^\circ\text{C}$ | - | - | 250 A | 275 A | 350 A | 375 A | 400 A | 800 A | 1000 A |
| | $\theta \leq 60^\circ\text{C} (2)$ | - | - | 225 A | 250 A | 300 A | 325 A | 350 A | 650 A | 800 A |
| | $\theta \leq 70^\circ\text{C}$ | - | - | 185 A | 200 A | 240 A | 260 A | 290 A | 575 A | 720 A |
| With conductor cross-sectional area | | 70 mm ² | 95 mm ² | 150 mm ² | 240 mm ² (3) | 240 mm ² | 300 mm ² (4) | 2x 185 mm ² (4) | 2x 240 mm ² | 2x 300 mm ² |
| AC-3 Utilization category | | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C} (2)$ | | | | | | | | | | |
| I _e / Max. rated operational current AC-3 (1) | | | | | | | | | | |
|  3-phase motors | 220-230-240 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 380-400 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 415 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 440 V | 116 A | 140 A | 190 A | 205 A | 265 A | 305 A | 370 A | 550 A | - |
| | 500 V | - | - | - | - | - | - | - | 550 A | - |
| | 690 V | - | - | - | - | - | - | - | 550 A | - |
| | 1000 V | - | - | - | - | - | - | - | 175 A | - |
| | | | | | | | | | | |
|  1500 r.p.m. 50 Hz 1800 r.p.m. 60 Hz 3-phase motors | 220-230-240 V | 30 kW | 37 kW | 55 kW | 55 kW | 75 kW | 90 kW | 110 kW | 160 kW | - |
| | 380-400 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 280 kW | - |
| | 415 V | 55 kW | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 200 kW | 315 kW | - |
| | 440 V | 75 kW | 90 kW | 110 kW | 132 kW | 160 kW | 160 kW | 200 kW | 315 kW | - |
| | 500 V | - | - | - | - | - | - | - | 400 kW | - |
| | 690 V | - | - | - | - | - | - | - | 500 kW | - |
| | 1000 V | - | - | - | - | - | - | - | 250 kW | - |
| | | | | | | | | | | |
| Rated making capacity AC-3 | | 10 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Rated breaking capacity AC-3 | | 8 x I _e AC-3 acc. to IEC 60947-4-1 | | | | | | | | |
| Short-circuit protection device for contactors | | | | | | | | | | |
| Without thermal overload relay - Motor protection excluded | | | | | | | | | | |
| U _e $\leq 500\text{ V AC}$ - gG type fuse | | 200 A | 250 A | 355 A | 400 A | 630 A | 630 A | 630 A | 800 A | 1000 A |
| Rated short-time withstand current I _{cw} | 1 s | 1300 A | 1460 A | 1900 A | 2050 A | 2650 A | 3050 A | 3700 A | 5500 A | 6800 A |
| At 40 °C ambient temperature, in free air from a cold state | 10 s | 928 A | 1168 A | 1520 A | 1640 A | 2120 A | 2440 A | 2960 A | 5300 A | 6400 A |
| | 30 s | 536 A | 674 A | 878 A | 947 A | 1224 A | 1409 A | 1709 A | 3700 A | 4400 A |
| | 1 min | 379 A | 477 A | 621 A | 670 A | 865 A | 996 A | 1208 A | 3000 A | 3400 A |
| | 15 min | 160 A | 200 A | 275 A | 350 A | 400 A | 500 A | 525 A | 1000 A | 1200 A |
| | | | | | | | | | | |
| Maximum breaking capacity | at 440 V | 2000 A | 3000 A | 3300 A | 3500 A | 3800 A | 4600 A | 5000 A | 5400 A | - |
| cos $\phi = 0.45$ | at 690 V | - | - | - | - | - | - | - | 5400 A | - |
| Power dissipation per pole | I _e / AC-1 | 12 W | 18 W | 15 W | 25 W | 32 W | 50 W | 72 W | 60 W | 80 W |
| | I _e / AC-3 | - | - | - | - | - | - | - | 25 W | - |
| Max. electrical switching frequency | AC-1 | 300 cycles/h | | | | | | | | |
| | AC-3 | 300 cycles/h | | | | | | | | |
| | AC-2, AC4 | - | | | | | | | | |
| | | | | | | | | | 120 cycles/h | - |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) $\theta \leq 55^\circ\text{C}$ for EK550, EK1000

(3) For currents above 275 A use terminal enlargements or terminal extensions.

(4) For currents above 450 A use terminal enlargements or terminal extensions.

AF09 ... AF80 4-pole contactors

Technical data

Main pole - Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|-------------------------------------|------------------|------------------------|----------|-------|-------|---------------------------------------|-------|-------|
| Standards | | UL 508, CSA C22.2 N°14 | | | | UL 60947-4-1, CSA-C22.2 No. 60947-4-1 | | |
| Max. operational voltage | | 600 V | | | | | | |
| UL / CSA general use rating | | | | | | | | |
| | 600 V AC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 8 | AWG 6 | AWG 6 | AWG 4 | AWG 2 |
| 1 pole | 80 V DC | 25 A (1) | 30 A (1) | 45 A | 55 A | 60 A | 80 A | 105 A |
| 2 poles in serie | 160 V DC | 25 A (1) | 30 A (1) | 45 A | 55 A | 60 A | 80 A | 105 A |
| 3 poles in serie | 240 V DC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| 4 poles in serie | 320 V DC | 25 A | 30 A | 45 A | 55 A | 60 A | 80 A | 105 A |
| With conductor cross-sectional area | | AWG 10 | AWG 10 | AWG 8 | AWG 8 | AWG 6 | AWG 4 | AWG 2 |
| Max. electrical switching frequency | | | | | | | | |
| For general use | | 600 cycles/h | | | | | | |

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

(1) 20 A for AF09...22-00 and AF16...22-00.

Main pole utilization characteristics - 4 N.O. non-reversing contactors

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|--|------------------|------|----------|------|------|------|------|------|
| Lighting application - UL / CSA - breaking all lines | | | | | | | | |
| Electrical discharge lamps (ballast) | | | | | | | | |
| 1-phase per pole | 347 V AC | 20 A | 30 A | 45 A | 50 A | - | - | - |
| 3-phase break all lines | 600 V AC | 20 A | 30 A | 45 A | 50 A | - | - | - |
| Elevator control, load switching, 500 000 electrical operating cycles acc. to CSA B44.1 / ASME 17.5 paragraph 19.2.1 | | | | | | | | |
| 1-phase | | | | | | | | |
| Horse power rating | 110-120 V AC | - | 1/2 hp | - | - | - | - | - |
| | 220-240 V AC | - | 1-1/2 hp | - | - | - | - | - |
| 3-phase | | | | | | | | |
| Horse power rating | 200-208 V AC | - | 3 hp | - | - | - | - | - |
| | 220-240 V AC | - | 3 hp | - | - | - | - | - |
| | 440-480 V AC | - | 7-1/2 hp | - | - | - | - | - |
| | 550-600 V AC | - | 10 hp | - | - | - | - | - |

Note: 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles, see "General technical data".

AF116 ... EK1000 4-pole contactors

Technical data

Main pole - Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|-------------------------------------|------------------|--------------|---------|---------|---------|---------|---------|------------|------------------------|--------|
| Standards | | UL 60947-4-1 | | | | | | | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | | 600 V | | | | | | | | |
| UL / CSA general use rating | | | | | | | | | | |
| 600 V AC | | 160 A | 175 A | 230 A | 250 A | 300 A | 350 A | 420 A | 540 A | - |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 250 | MCM 400 | MCM 500 | 2//MCM 300 | - | - |
| 1 pole | 90 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 100 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 110 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 2 poles in serie | 175 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 200 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 225 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 3 poles in serie | 260 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 300 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 340 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| 4 poles in series | 350 V DC | 200 A | 200 A | - | - | - | - | - | - | - |
| | 400 V DC | - | - | 250 A | 350 A | - | - | - | - | - |
| | 450 V DC | - | - | - | - | 400 A | 500 A | 520 A | - | - |
| With conductor cross-sectional area | | AWG 2/0 | AWG 3/0 | MCM 250 | MCM 250 | MCM 400 | MCM 500 | 2//MCM 300 | - | - |
| Max. electrical switching frequency | | 300 cycles/h | | | | | | | | |
| For general use | | 300 cycles/h | | | | | | | | |

Main pole utilization characteristics - 4 N.O. non-reversing contactors

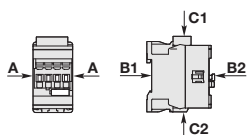
| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | EK550 | EK1000 |
|--|------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Lighting application - UL/CSA - breaking all lines | | | | | | | | | | |
| Electrical discharge lamps (ballast) | | | | | | | | | | |
| 1-phase per pole | 347 V AC | 160 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A | - | - |
| 3-phase break all lines | 600 V AC | 160 A | 200 A | 250 A | 300 A | 400 A | 450 A | 520 A | - | - |

AF09 ... AF80 4-pole contactors

Technical data

General technical data

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|------------------|--|---|------|---|------|---|--|
| Rated insulation voltage Ui acc. to IEC 60947-4-1 | | 690 V | | | | | | 1000 V |
| acc. to UL / CSA | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 6 kV | | | | | | 8 kV |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | | -40...+70 °C | | | | | | |
| Storage | | -60...+80 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | | | | |
| | 4 N.O. | A 30 g | | | | | 20 g | |
| | Main poles | B1 | 25 g Closed position / 5 g Open position | | | | 20 g Closed position / 5 g Open position | |
| | | B2 | 15 g | | | | 10 g | |
| | | C1 | 25 g | | | | 20 g | |
| | | C2 | 25 g | | | | 20 g | |
| | | 2 N.O. + 2 N.C. | A 30 g | | 30 g Closed position / 25 g Open position | | 20 g | |
| | Main poles | B1 | 25 g Closed position / 5 g Open position | | 25 g Closed position / 5 g Open position | | 20 g Closed position / 5 g Open position | 20 g Closed position / 4 g Open position |
| | | B2 | 15 g | | 15 g Closed position / 10 g Open position | | 10 g | |
| | | C1 | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | |
| | | C2 | 25 g | | 25 g Closed position / 20 g Open position | | 20 g | |
| | | Vibration withstand acc. to IEC 60068-2-6 | 5 ... 300 Hz 4 g Closed position / 2 g Open position | | | | 5 ... 300 Hz 3 g Closed position / 2 g Open position | |

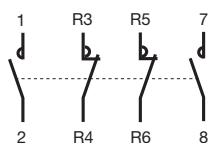


(1) Environment B: all AF09 ... AF38 contactors produced since week 08-2013.
AF09 ... AF38-...-12 (48...130 V 50/60 Hz-DC) compliant to environment A only: for environment B select AF09Z ... AF38Z-...-22.

Mounting characteristics and conditions for use

| Contactor types | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|--|--|------|------|------|---|------|------|
| Mounting positions | | | | | | | |
| Mounting distances | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | |
| On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | | 35 x 15 mm | | |
| By screws (not supplied) | 2 x M4 screws placed diagonally | | | | 2 x M4 or 2 x M6 screws placed diagonally | | |

Remark for 4-pole contactors fitted with 2 N.O. + 2 N.C. main poles



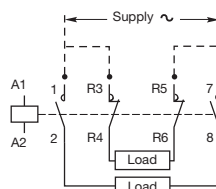
These contactors are suitable for controlling 2 separate circuits, i.e. 2 loads with 2 separate supplies, or 1 circuit comprising 2 separate loads with a single supply (see diagrams beside). When the contactor operates there is no mechanical overlapping between the N.O. poles and the N.C. poles: BREAK before MAKE.



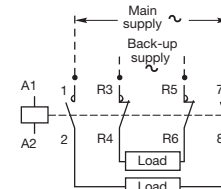
These contactors are not suitable for a reversing starter or for controlling a single load from 2 separate supplies.

Block diagrams

- Single supply and 2 separate loads



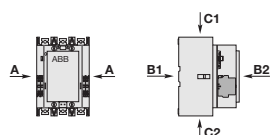
- 2 separate supplies and 2 separate loads



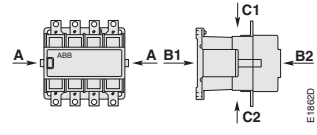
AF116 ... EK1000 4-pole contactors

Technical data

General technical data

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|------------------|--|-------|-------|-------|--|-------|-------|
| Rated insulation voltage Ui | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | |
| acc. to UL / CSA | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | |
| Electromagnetic compatibility | | AF contactors comply with IEC 60947-1 / EN 60947-1 - Environment A | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | | -40 to +70 °C | | | | | | |
| Storage | | -40 to +70 °C | | | | | | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 5 million operating cycles | | | | | | |
| Maximum switching frequency | | 300 cycles/h | | | | | | |
| Shock withstand | | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | No change in contact position, closed or open position | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 11 ms | | | | 1/2 sinusoidal shock for 30 ms | | |
|  | A | 20 g | | | | 20 g | | |
| | B1 | 15 g closed position / 3 g open position | | | | 15 g closed position / 3 g open position | | |
| | B2 | 15 g closed position / 3 g open position | | | | 15 g closed position / 3 g open position | | |
| | C1 | 20 g | | | | 20 g | | |
| | C2 | 20 g | | | | 20 g | | |
| Vibration withstand | | | | | | | | |
| acc to IEC 60068-2-6 | | 0.7 g closed position / 0.7 g open position 13.2...100 Hz | | | | | | |

General technical data

| Contactor types | AC or DC operated | EK550 | EK1000 |
|---|------------------------------------|--|-----------------------------|
| Rated insulation voltage Ui | | | |
| acc. to IEC 60947-4-1 | | 1000 V | |
| acc. to UL | | 600 V | |
| Rated impulse withstand voltage Uimp. | | 8 kV | |
| Electromagnetic compatibility | | EK contactors complying with IEC 60947-1 / EN 60947-1 - Environment A | |
| Ambient air temperature close to contactor | | | |
| Operation | Fitted with thermal overload relay | -25 to +55 °C | - |
| | Without thermal overload relay | -40 to +70 °C | - |
| Storage | | -50 to +70 °C | - |
| Climatic withstand | | Category B acc. to IEC 60068-2-30 | |
| Maximum operating altitude (without derating) | | ≤ 3000 m | |
| Mechanical durability | | | |
| Number of operating cycles | | 5 millions operating cycles | 3 millions operating cycles |
| Max. switching frequency | | 60 cycles/h | |
| Shock withstand | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | |
| Mounting position 1 | | | |
| Closed or open position | | 1/2 sinusoidal shock for 15 ms: no change in contact position, closed or open position | |
|  | A | 10 g | |
| | B1 | 10 g | |
| | B2 | 10 g | |
| | C1 | 10 g | |
| | C2 | 10 g | |

AF09 ... AF80 4-pole contactors

Technical data

Magnet system characteristics AF09 ... AF80 AC / DC operated

| Contactor types | AC / DC operated | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|-----------------------|---|------|------|------|--|------|------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | | at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | |
| | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ | | | | at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| Rated control circuit voltage U_c | | 24...500 V AC | | | | | | |
| Coil consumption | Average pull-in value | 50 VA | | | | 40 VA | | |
| | Average holding value | 2.2 VA / 2 W | | | | 4 VA / 2 W | | |
| DC control voltage | | | | | | | | |
| Rated control circuit voltage U_c | | 20...500 V DC | | | | 20...500 V DC | | |
| Coil consumption | Average pull-in value | 50 W | | | | 40 W | | |
| | Average holding value | 2 W | | | | 2 W | | |
| PLC-output control | | AF...11 not suitable for direct control by PLC-output. | | | | - | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | | $\leq 60\%$ of $U_c \text{ min}$. | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | - | | | | conditions of use on request | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | - | | | | 20 ms average | | |
| Operating time | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | | 48...120 ms | | |
| | N.C. contact opening | 38...90 ms | | | | 44...115 ms | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | | 16...110 ms | | |
| | N.C. contact closing | 13...98 ms | | | | 18...113 ms | | |

Magnet System Characteristics AF09Z...AF38Z 24V DC operated designed for PLC - coil 30

| Contactor types | DC operated | AF09Z | AF16Z |
|---|-----------------------|--|-------|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ at $\theta \leq 70^\circ\text{C}$ U_c | |
| | | | |
| DC control voltage | | 24 V DC | |
| Coil consumption | Average pull-in value | 6 W | |
| | Average holding value | 1.7 W | |
| PLC-output control | | $\geq 250 \text{ mA}$ 24 V DC for PLCs and safety PLCs using broken wire detection | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | |
| Voltage sag immunity acc. to SEMI F47-0706 | | - | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | - | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms | |
| | N.C. contact opening | 20 ... 35 ms | |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms | |
| | N.C. contact closing | 22 ... 57 ms | |

Magnet System Characteristics AF09Z...AF38Z AC / DC operated for specific applications - coils 20, 21, 22, 23

| Contactor types | AC / DC operated | AF09Z | AF16Z | AF26Z | AF38Z |
|---|-----------------------|---|-------|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. | | | |
| | DC supply | at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | |
| AC control voltage 50/60 Hz | | | | | |
| Rated control circuit voltage U_c | | 24...250 V AC | | | |
| Coil consumption | Average pull-in value | 16 VA | | | |
| | Average holding value | 1.7 VA / 1.5 W | | | |
| DC control voltage | | | | | |
| Rated control circuit voltage U_c | | 12...250 V DC | | | |
| Coil consumption | Average pull-in value | 12 ... 16 W | | | |
| | Average holding value | 1.7 W | | | |
| PLC-output control | | (AF..Z coil 21) $\geq 500 \text{ mA}$ 24 V DC for PLCs - Not suitable for safety PLCs | | | |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. | | | |
| Voltage sag immunity acc. to SEMI F47-0706 | | (AF..Z coil 21, 22, 23) conditions of use on request | | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | (AF..Z coil 21, 22, 23) 20 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC | | | |
| Operating time | | | | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms | | | |
| | N.C. contact opening | 38...90 ms | | | |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms | | | |
| | N.C. contact closing | 13...98 ms | | | |

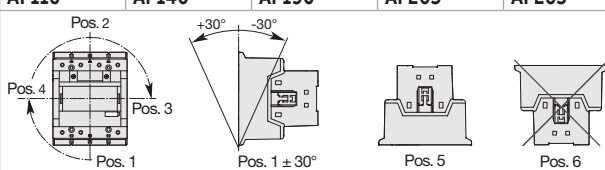
AF116 ... AF370 4-pole contactors

Technical data

Magnet system characteristics

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|--|-----------------------|--|-------|------------|-------|------------|-------|-------|
| Coil operating limits | AC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | | | |
| acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.80 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ | | | | | | |
| Rated control circuit voltage U_c | | 24...500 V AC, 20...500 V DC | | | | | | |
| Coil consumption | | | | | | | | |
| AC control voltage 50/60 Hz | | | | | | | | |
| 24...60 V AC | Average pull-in value | 225 VA | | 165 VA | | 475 VA | | |
| | Average holding value | 5.5 VA | | 6 VA | | 8.5 VA | | |
| 48...130 V AC | Average pull-in value | 170 VA | | 175 VA | | 340 VA | | |
| | Average holding value | 4 VA | | 4 VA | | 17 VA | | |
| 100...250 V AC | Average pull-in value | 130 VA | | 220 VA | | 385 VA | | |
| | Average holding value | 6 VA | | 7 VA | | 17.5 VA | | |
| 250...500 V AC | Average pull-in value | 205 VA | | 185 VA | | 420 VA | | |
| | Average holding value | 16 VA | | 16 VA | | 21 VA | | |
| DC control voltage | | | | | | | | |
| 20...60 V DC | Average pull-in value | 210 W | | 205 W | | 400 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 3.5 W | | |
| 48...130 V DC | Average pull-in value | 130 W | | 130 W | | 360 W | | |
| | Average holding value | 2.5 W | | 2.5 W | | 2.5 W | | |
| 100...250 V DC | Average pull-in value | 135 W | | 190 W | | 410 W | | |
| | Average holding value | 3 W | | 2.5 W | | 4.5 W | | |
| 250...500 V DC | Average pull-in value | 205 W | | 190 W | | 600 W | | |
| | Average holding value | 4 W | | 4 W | | 4.7 W | | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$ | | | | | | |
| Voltage sag immunity acc. to SEMI F47 | | Conditions of use on request | | | | | | |
| Dips withstand | | 20 ms | | | | | | |
| Operating time | | | | | | | | |
| Coil supply between A1 - A2 | | | | | | | | |
| Between coil energization and: | N.O. contact closing | 20...55 ms | | 25...60 ms | | 30...60 ms | | |
| Between coil de-energization and: | N.O. contact opening | 40...70 ms | | 45...80 ms | | 45...80 ms | | |

Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|-------------------------------------|------------------|---|-------|-------|--------|-------|-------|-------|
| Mounting positions | |  <p>Max. add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor AF116 ... AF370</p> | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | | |
| On rail acc. to IEC 60715, EN 60715 | | - | | | | | | |
| By screws | | 4 x M4 | | | 4 x M5 | | | |

EK550 ... EK1000 4-pole contactors

Technical data

Magnet system characteristics

| Contactor types | AC operated | EK550 | EK1000 |
|--|-----------------------|--|---------------|
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | |
| AC control voltage | | Please also refer to "Mounting characteristics and conditions for use" | |
| Rated control circuit voltage | 50 Hz | 48...500 V | |
| | 60 Hz | 110...600 V | |
| Coil consumption | Average pull-in value | 50 Hz | 3500 VA |
| | | 60 Hz | 4000 VA |
| | 50/60 Hz (1) | 3800 / 3400 VA | |
| | Average holding value | 50 Hz | 125 VA / 50 W |
| 60 Hz | | 140 VA / 60 W | |
| 50/60 Hz (1) | | 140 VA / 60 W | |
| Drop-out voltage in % of $U_c \text{ min}$. | | approx. 45...65 % | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 30...60 ms | |
| | N.C. contact opening | 25...55 ms | |
| Between coil de-energization and: | N.O. contact opening | 10...20 ms | |
| | N.C. contact closing | 13...23 ms | |

(1) "A" coil voltage: see "Coil voltage code table".

Magnet system characteristics

| Contactor types | DC operated | EK550 | EK1000 |
|--|-----------------------|--|--------|
| Coil operating limits acc. to IEC 60947-4-1 | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | |
| DC control voltage | | Please also refer to "Mounting characteristics and conditions for use" | |
| Rated control circuit voltage | | 24...220 V | |
| Coil consumption | Average pull-in value | 1100 W | |
| | Average holding value | 20 W | |
| Drop-out voltage | | approx. 15...50 % of $U_c \text{ min}$. | |
| Coil time constant | | | |
| Open | L/R | 12 ms | |
| Closed | L/R | 60 ms | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 60...80 ms | |
| | N.C. contact opening | 55...75 ms | |
| Between coil de-energization and: | N.O. contact opening | 10...35 ms | |
| | N.C. contact closing | 13...38 ms | |

Mounting characteristics and conditions for use


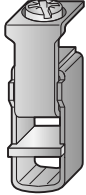
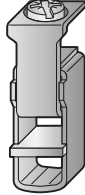
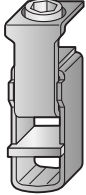














| Contactor types | AC / DC operated | EK550 | EK1000 |
|--|----------------------------------|---|-----------------------------|
| Mounting positions | | | |
| Control voltage / Ambient temperature | | Max. N.O. or N.C. built-in and add-on N.O. or N.C. auxiliary contacts: see accessory fitting details for 4-pole contactor EK550, EK1000 | |
| Mounting positions | 1, $1 \pm 30^\circ$, 2, 3, 4, 5 | at $\theta \leq 70^\circ\text{C}$ | $0.85 \dots 1.1 \times U_c$ |
| Mounting positions | 6 | at $\theta \leq 70^\circ\text{C}$ | Unauthorized |
| Mounting distances | | The contactors can be assembled side by side | |
| Fixing | | | |
| On rail according to IEC 60715, EN 60715 | | - | |
| By screws | | 4 x M6 (2) | |

(2) Damping elements are supplied.

AF09 ... AF80 4-pole contactors

Technical data

Connecting characteristics

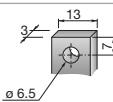
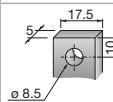
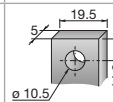











| Contactor types | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 |
|---|---|----------------------------|---|--------------------------|---|------------------------|---|
| Main terminals |  | |  | |  | |  |
| | Screw terminals with cable clamp | | Screw terminals with double connector 2 x (5.5 width x 6.8 depth) | | Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | | Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) |
| Connection capacity (min. ... max.) | | | | | | | |
| Main conductors (poles) | | | | | | | |
|  Rigid Solid ($\leq 4 \text{ mm}^2$) | } 1 x | 1...6 mm ² | 1.5...16 mm ² | | 6...35 mm ² | | 6...70 mm ² |
|  Stranded ($\geq 6 \text{ mm}^2$) | | 2 x | 1...6 mm ² | 1.5...16 mm ² | | 6...35 mm ² | |
|  Flexible with non insulated ferrule | 1 x | 0.75...6 mm ² | 1.5...16 mm ² | | 4...35 mm ² | | 6...50 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75...6 mm ² | 1.5...16 mm ² | | 4...35 mm ² | | 6...50 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...4 mm ² | 1.5...16 mm ² | | 4...35 mm ² | | 6...50 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75...2.5 mm ² | 1.5...16 mm ² | | 4...35 mm ² | | 6...50 mm ² |
|  Bars or lugs | L < | 9.6 mm | - | | 9.2 mm | | 12.2 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 16...10 | AWG 16...6 | | AWG 10...2 | | AWG 6...1 |
| Stripping length | | 10 mm | 12 mm | | 16 mm | | 17 mm |
| Tightening torque | | 1.5 Nm / 13 lb.in | 2.5 Nm / 22 lb.in | | 4 Nm / 35 lb.in | | 6 Nm / 53 lb.in |
| Auxiliary conductors (coil terminals) | | | | | | | |
|  Rigid solid | 1 x | 1...2.5 mm ² | | | | | |
|  Rigid solid | 2 x | 1...2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with non insulated ferrule | 2 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² | | | | | |
|  Lugs | L < | 8 mm | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | | |
| Stripping length | | 10 mm | | | | | |
| Tightening torque | | 1.2 Nm / 11 lb.in | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | |
| Main terminals | IP20 | | | | IP10 * | | |
| Coil terminals | IP20 | | | | | | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | | | | | | |
| Main terminals | | M3.5 | M4.5 | | M6 | | M8 |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | Flat Ø 6.5 / Pozidriv 2 | | hexagon socket (s = 4 mm) |
| Coil terminals | | M3.5 | | | | | |
| | Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | | | |

* For IP20 degree of protection, use LT terminal shroud accessory.

AF116 ... AF370 4-pole contactors

Technical data

Connecting characteristics

| Contractor types | AC / DC operated | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|---|------------------|---|-------|---|-------|---|-------|-------|
| Main terminals | | | | | | | | |
| Flat type | |  | |  | |  | | |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
|  Cu cable - Stranded | 1 x | 10...95 mm ² | | 6...150 mm ² | | 16...300 mm ² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  Cu cable - Stranded | 2 x | 10...95 mm ² | | 50...120 mm ² | | 70...185 mm ² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  Al cable - Stranded | 1 x | - | | 95...185 mm ² | | 185...240 mm ² | | |
| Clamp type | | - | | 1SDA054988R1 | | 1SDA055020R1 | | |
| Tightening torque | | - | | 31 Nm | | 43 Nm | | |
|  Cu cable - Flexible | 1 x | 10...70 mm ² | | 6...120 mm ² | | 16...240 mm ² | | |
| Clamp type | | LD... included (1) | | 1SDA066917R1 | | 1SDA055016R1 | | |
| Tightening torque | | 8 Nm | | 14 Nm | | 25 Nm | | |
|  Cu cable - Flexible | 2 x | 10...70 mm ² | | 50...95 mm ² | | 70...185 mm ² | | |
| Clamp type | | LD... included (1) | | 1SFN074709R1000, LZ185-2C/120 | | 1SCA022194R0890, OZXB4 | | |
| Tightening torque | | 8 Nm | | 16 Nm | | 22 Nm | | |
|  Lugs | L ≤ | 22 mm (.866 in) | | 24 mm (.945 in) | | 32 mm (1.260 in) | | |
| | Ø > | 6 mm (.236 in) | | 8 mm (.315 in) | | 10 mm (.394 in) | | |
| Socket type | | LL... included | | LL... included | | LL... included | | |
| Tightening torque | | 9 Nm / 80 lb.in | | 18 Nm / 160 lb.in | | 28 Nm / 248 lb.in | | |
| Connection capacity acc. to UL / CSA | 1 x | AWG 6...3/0 | | 6...300 MCM | | 4...400 MCM | | |
| Clamp type | | LD... included (1) | | ATK185 (2) | | ATK300 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | 34 Nm / 301 lb.in | | 42 Nm / 372 lb.in | | |
| Connection capacity acc. to UL / CSA | 2 x | AWG 6...3/0 | | - | | 4...500 MCM | | |
| Clamp type | | LD... included (1) | | - | | ATK300/2 (2) | | |
| Tightening torque | | 8 Nm / 71 lb.in | | - | | 42 Nm / 372 lb.in | | |
| Auxiliary conductors (coil terminals) | | | | | | | | |
|  Solid / stranded | 1 x | 1...4 mm ² | | | | | | |
| | 2 x | 1...4 mm ² | | | | | | |
|  Flexible | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Lugs | L < | 8 mm | | | | | | |
| | l > | 3.5 mm | | | | | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | | | | | |
| Stripping length | | 9 mm | | | | | | |
| Tightening torque | | 1.00 Nm / 9 lb.in | | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | M6 | | M8 | | M10 | | |
| | Screwdriver type | Screws and bolts | | | | | | |
| Coil terminals (delivered in open position) | | M3.5 | | | | | | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | | | | | | |

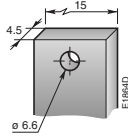
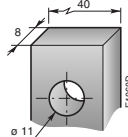





(1) LD... not included for AF116 ... AF146-30-...B.

(2) Available in North America only.

EK550 ... EK1000 4-pole contactors

Technical data

Connecting characteristics

| Contactor types | AC or DC operated | EK550 | EK1000 |
|---|-------------------|---|---|
| Main terminals | | | |
| Flat type | |  |  |
| Connection capacity (min. ... max.) | | | |
| Main conductors (poles) | | | |
|  Rigid with connector | Cu cable | 1 x 70...300 mm ² | - |
| | Al/Cu cable | 1 x 70...300 mm ² | 95...300 mm ² |
| | Al/Cu cable | 2 x 35...185 mm ² | 95...300 mm ² |
|  Bars or lugs | | L ≤ 55 mm | |
| | | Ø > 10 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | 3 x 4 - 500 MCM | - |
| Tightening torque | Recommended | 18 Nm / 160 lb.in | |
| | Max. | 22 Nm | |
| Auxiliary conductors (coil terminals) | | | |
|  Rigid solid | | 1 x 0.5...2.5 mm ² | |
| | | 2 x 0.5...2.5 mm ² | |
|  Flexible with ferrule | | 1 x 0.5...2.5 mm ² | |
| | | 2 x 0.5...2.5 mm ² | |
|  Bars or lugs | | L ≤ 8 mm | |
| | | l > 3.7 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | 18...14 AWG | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | |
| | Max. | 1.20 Nm | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | |
| Main terminals | | IP00 | |
| Coil terminals | | IP20 | |
| Screw terminals | | | |
| Main terminals | | M10 | |
| | | Screws and bolts | |
| Coil terminals (delivered in open positions) | | M3.5 | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | |

4-pole contactors

Electrical durability and utilization categories

General

Utilization categories determine the current making and breaking conditions relating to the characteristics of the loads to be controlled by the contactors. International standard IEC 60947-4-1 and European standard EN 60947-4-1 are the standards to be referred to.

If I_c is the current to be broken by the contactor and I_e the rated operational current normally drawn by the load, then:

- Categories AC-1: $I_c = I_e$

Generally speaking $I_c = m \times I_e$ where m is a multiple of the load operational current.

On next pages, the curves corresponding to categorie AC-1 represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability curves:

- categories AC-1: the curves represent the electrical durability variation of standard contactors in relation to the breaking current I_c .

Electrical durability is expressed in millions of operating cycles.

Curve utilization mode

Electrical durability forecast and contactor selection for categories AC-1

- Note the characteristics of the load to be controlled:
 - Operational voltage..... U_e
 - Current normally drawn..... I_e ($U_e / I_e / kW$ relation for motors, see "Motor rated operational powers and currents").
 - Utilization category..... AC-1
 - Breaking current..... $I_c = I_e$ for AC-1
- Define the number of operating cycles N required.
- On the diagram corresponding to the operational category, select the contactor with the curve immediately above the intersection point ($I_c ; N$).

Case of uninterrupted duty

For uninterrupted duty, some verifications of preventing maintenance are necessary to check the functionality of the concerned product (consult us).

The combined effect of environmental conditions and the proper temperature of the product may require some disposals. As a matter of fact, for this duty, the use duration prevails over the number of operating cycles.

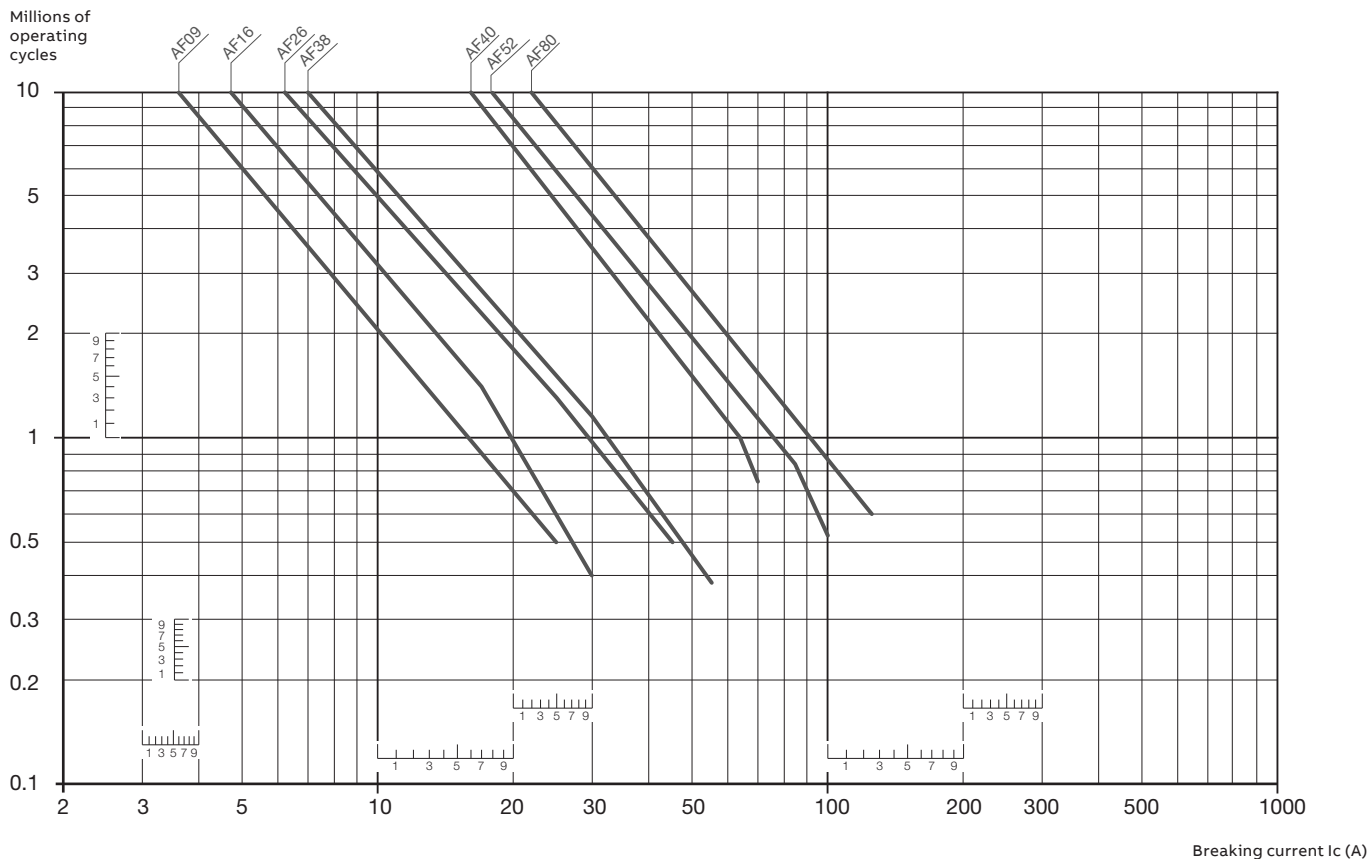
4-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load.

Ambient temperature and maximum electrical switching frequency: see "Technical data".



Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes.



— Contactors for DC switching

GF contactors

3/187 Overview

ordering details

3/190 GF875 ... GF1050 AC / DC operated
with 2 N.O. + 2 N.C. auxiliary contacts

3/191 Technical data

GA, GAF contactors

3/196 overview

3/198 Contactors for DC switching applications

3/199 Connection diagrams

Ordering details

100 A DC-1

3/204 GA75 AC operated

3/205 GAE75 DC operated

250 to 400 A DC-1

3/206 GAF185 ... GAF300 AC / DC operated with 1 N.O. + 1 N.C.

600 to 875 A DC-1

3/207 GAF460 ... GAF750 AC / DC operated with 1 N.O. + 1 N.C.

1040 to 1750 A DC-1

3/208 GAF1250 ... GAF2050 AC / DC operated with 1 N.O. + 1 N.C.

3/209 Technical data

3/436 Voltage code table

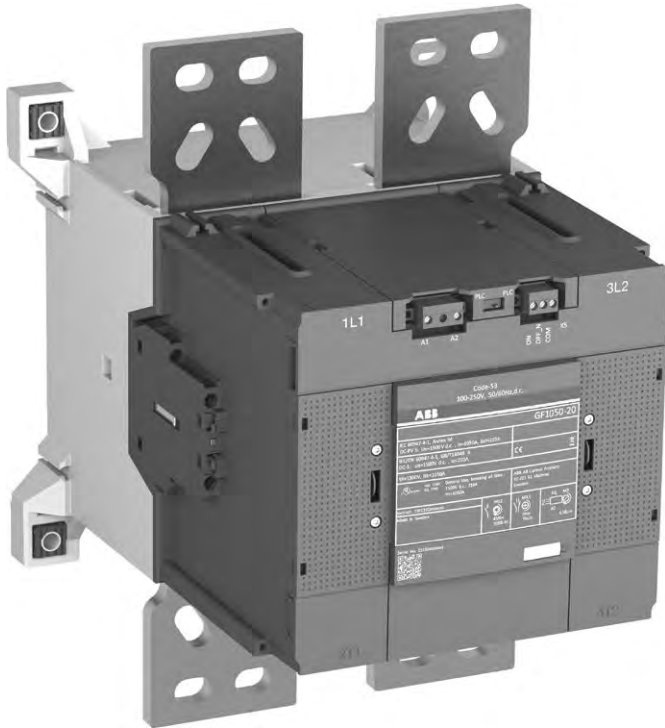


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For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

GF contactors for DC switching

The compact and efficient way of DC switching



The renewable energy industry is continuously striving towards increasing its efficiency in order to compete with traditional power sources. Photovoltaic (PV) solar power is one of the sources leading the way. In moving from 1000 V DC to 1500 V DC, costs of utility-scale power plants are greatly reduced.

The GF range of contactors expands ABB's current AF and GAF PV solar product offering by adding contactor switching capabilities for 1500 V DC.



Energy Efficiency

GF contactors offer tailored solutions to enable remote, automatic and energy efficient switching of 1500 V DC circuits in central PV inverter optimization. The GF contactors are built with ABB's standard low energy electronic coils for safe and controlled operation.



Continuous operation

The GF contactor features AF technology with continuous voltage and current control during the contactors operation. This ensures distinct, safe and energy efficient operations even in unstable networks. Voltage sags, dips or surges pose no threat. The GF contactor secures application uptime.



Speed up your projects

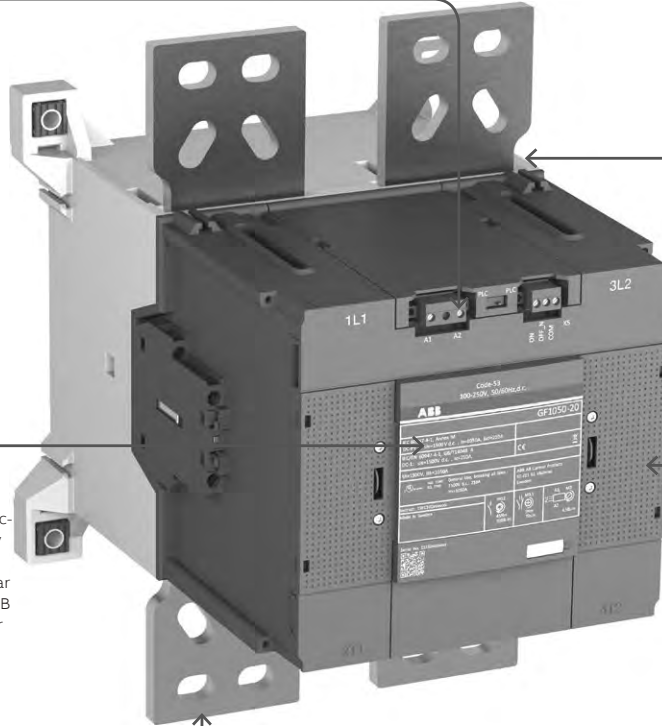
ABB's GF contactor complies with all major international standards. It features AC/DC controlled wide voltage range coils together with easily accessible coil terminals to make easier and quicker product selection and installation.

GF contactor range

The compact and efficient way of DC switching

Easy installation

GF contactors are designed for easy installation. Coil terminals and PLC control terminals are easily identified and accessed from the front of the contactor.



AF technology

GF contactors feature AF technology that ensures controlled, distinct and energy efficient operation of the contactor. Only two coils to cover 24 ... 60 V AC / DC and 100 ... 250 V AC / DC.

New IEC rating

DC-PV3 and DC-PV4 are two new contactor utilization categories introduced by IEC in 2018. Both are specifically tailored for PV solar applications. As a technical pioneer, ABB offers the GF contactor as the first ever DC-PV3 rated contactor.

Bidirectional design

The GF's two pole bidirectional design allows it to break both plus and minus, through the entire current range. Each pole is rated for 750 V DC.

**Up to 1050 A
1500 V DC-PV3**

The new GF range of DC contactors extends up to 1050 A for DC-PV3.

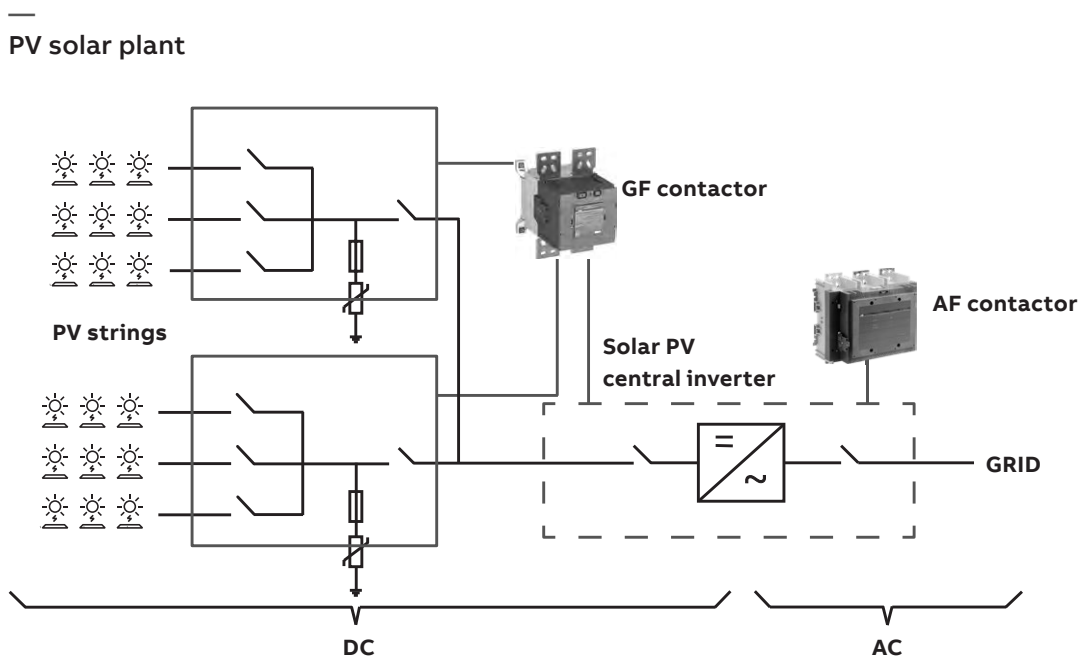


Switching DC in PV Plants

Contactors are typically selected for applications that need automatic remote control and switching. In a central PV inverter it can be necessary to switch the DC side in order to disconnect PV strings for output optimization. Grid codes sometime require a central PV inverter to be used for grid stabilization at night, this requires all PV panels to be disconnected on the DC side.



GF contactors allow remote and energy efficient switching in DC applications. By bringing contactor switching capabilities to 1500 V DC there are now additional options for PV inverter manufacturers to solve DC switching. Together with breakers and switch disconnects, ABB now have the most complete DC switching portfolio available for PV solar power.



GF875 ... GF1050 contactors

875 to 1050 A DC-PV3

AC / DC operated with 2 N.O. + 2 N.C. auxiliary contacts

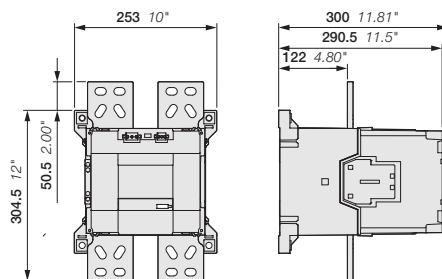


GF1050-30-22

GF875 ... GF1050 contactors are specifically designed for 1500 V DC PV solar central inverters. These contactors are of the block type design with 2 main poles. The main poles are fitted with special arcing contacts enabling bi-directional breaking of currents up to 750 V DC per pole.

- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V DC), only 2 coils to cover control voltages between 24 V AC / 20 V DC ... 60 V AC / DC and 100 ... 250 V AC / DC.
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags.
- built-in surge suppression

| IEC | UL/CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|--|-----------|---------------------------|-----------------|-----------------|-----------------------------|
| | | V 50/60 Hz | V DC | | | | |
| Rated operational current θ ≤ 40 °C 1500 V DC-PV3 A | General use rating θ ≤ 40 °C 1500 V DC A | 24...60 | 20...60 | 2 2 | GF875-20-22-51 | 1SFL617731R5122 | 14.3 |
| | | 100...250 | 100...250 | | | | |
| 875 | 210 | 24...60 | 20...60 | 2 2 | GF1050-20-22-51 | 1SFL637731R5122 | 14.3 |
| | | 100...250 | 100...250 | | | | |



GF875, GF1050
Main dimensions mm, inches

GF875 ... GF1050 contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactors types | AC / DC operated | GF875 | GF1050 |
|--|--|--|---------------------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated operational voltage U _e max. | | 1500 V DC | |
| Conventional free-air thermal current I _{th} acc. to IEC 60947-4-1 | | | |
| For air temperature close to contactor | $\theta \leq 60\text{ }^{\circ}\text{C}$ | 875 A | 1050 A |
| | $\theta \leq 70\text{ }^{\circ}\text{C}$ | 650 A | 850 A |
| With conductor cross-sectional area | | 600 mm ² | 800 mm ² |
| DC-PV3 Utilization category for air temperature close to contactor U _e max. \leq 1500, I _{sc1} = 210 A | | | |
| | $\theta \leq 60\text{ }^{\circ}\text{C}$ | 875 A | 1050 A |
| | $\theta \leq 70\text{ }^{\circ}\text{C}$ | 650 A | 850 A |
| DC-PV4 Utilization category for air temperature close to contactor U _e max. \leq 1500, I _{sc1} = 256 A | | 325 A | 390 A |
| Maximum electrical switching frequency | | 15 cycles/h | |

Main pole - Utilization characteristics according to UL / CSA

| Contactors types | AC / DC operated | GF875 | GF1050 |
|---|------------------|--------------|--------|
| Standards | | UL 60947-4-1 | |
| Thermal current I _{th} | | 875 A | 1050 A |
| DC general use acc. to UL60947-4-1, U _e max. \leq 1500 | | 210 A | 210 A |

General technical data

| Contactors types | AC / DC operated | GF875 | GF1050 |
|--|------------------|------------------------|--------|
| Rated insulation voltage U _i acc. to IEC 60947-4-1 | | 1500 V | |
| acc. to UL | | 1500 V | |
| Rated impulse withstand voltage U _{imp} . | | | |
| Main contacts | | 8 kV | |
| Coil terminal | | 4 kV | |
| Ambient air temperature close to contactor | | | |
| Operation | | -40 to +70 °C | |
| Storage | | -40 to +70 °C | |
| Climatic withstand | | acc. to IEC 60068-2-30 | |
| Maximum operating altitude (without derating) | | 2000 m | |
| Rated short-time withstand current I _{cw} at 40 °C ambient temp. in free air from a cold state | | | |
| | 1 s | 6218 A | 7600 A |
| | 10 s | 5184 A | 6336 A |
| | 30 s | 1450 A | 5072 A |
| | 1 min | 3109 A | 3800 A |
| | 15 min | 1139 A | 1392 A |
| Mechanical durability | | | |
| Number of operating cycles, 1500 V DC | | 50 000 | |
| Max. switching frequency | | 15 cycles/h | |

GF875 ... GF1050 contactors

Technical data

Magnet system characteristics

| Contactor types | AC / DC operated | GF875 | GF1050 |
|---|----------------------|--|--------|
| Coil operating limits acc. to IEC 60947-4-1 | AC or DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | |
| Rated control circuit voltage U_c Coil Consumption (1) | | | |
| AC control voltage | | | |
| 24...60 V AC 50/60Hz | Max. pull-in value | 600 VA | |
| | Max. holding value | 17 VA | |
| 100...250 V AC 50/60Hz | Max. pull-in value | 600 VA | |
| | Max. holding value | 23 VA | |
| DC control voltage | | | |
| 24...60 V DC | Max. pull-in value | 700 W | |
| | Max. holding value | 12 W | |
| 100...250 V DC | Max. pull-in value | 505 W | |
| | Max. holding value | 12 W | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$. | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | $\geq 20 \text{ ms}$ | |
| Operating time | | | |
| Coil supply between A1 - A2 | | | |
| Between coil energization and: | Main contact opening | 50...120 ms | |
| Between coil de-energization and: | Main contact closing | 33...70 ms | |
| Control input for PLC's | | | |
| Between coil energization and: | Main contact closing | 40...90 ms | |
| Between coil de-energization and: | Main contact opening | 10...30 ms | |

(1) Internal measurement for indication.
Official values pending.

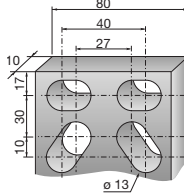




Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | GF875 | GF1050 |
|---------------------------------------|--|--|--------|
| Mounting positions | | | |
| Control voltage / Ambient temperature | | | |
| Mounting positions | 1, $1 \pm 30^\circ$, 2, 3, 4, 5 at $\theta \leq 70^\circ\text{C}$ | $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. | |
| | 6 | Unauthorized | |
| Fixing by screws | | 4 x M5 | |

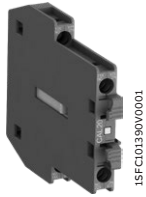
GF875 ... GF1050 contactors

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | GF875 | GF1050 |
|---|------------------|---|--|
| Main terminals | | | |
| Flat type | | |  |
| Connection capacity (min. ... max.) | | | |
| Main conductors (poles) | | | |
|  Bars or lugs | | L ≤ 100 mm | |
| | | Ø > 12 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | busbars only | |
| Tightening torque | Recommended | 45 Nm / 398 lb.in | |
| | Max. | 49 Nm | |
| Auxiliary conductors | | | |
|  Rigid solid | 1 x | 1...4 mm ² (coil terminals : 2.5 mm ²) | |
| | 2 x | 1...4 mm ² (coil terminals : 1.5 mm ²) | |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² | |
| | 2 x | 0.75...2.5 mm ² | |
|  Lugs | L ≤ | 8 mm | |
| | l > | 3.7 mm | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | |
| | Max. | 1.20 Nm | |
| Degree of protection | | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | |
| Main terminals | | IP00 | |
| Coil terminals | | IP00 | |
| Screw terminals | | | |
| Main terminals | | M12 | |
| | | Screws and bolts | |
| Coil terminals (delivered in open position) | | M3.5 | |
| | Screwdriver type | Flat Ø 5.5 mm / Pozidriv 2 | |

Accessories



CAL20-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The CAL20-11B is a second block for mounting in addition to a first CAL20-11 block, right- and/or left-hand of the GF875 ... GF1050 contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Side-mounted instantaneous auxiliary contact blocks

| | | | | | |
|---------------|-----|-----------|-----------------|---|-------|
| GF875, GF1050 | 1 1 | CAL20-11 | 1SFN010920R1011 | 1 | 0.040 |
| | 1 1 | CAL20-11B | 1SFN010920R3011 | 1 | 0.040 |

Auxiliary contact blocks for GF875 ... GF1050 contactors








Technical data

| Type | CAL20 | |
|---|--------------------------------|---------------|
| Contact utilization characteristics according to IEC | | |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | |
| Rated operational voltage U_e max. | 24...690 V AC | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | |
| Rated frequency (without derating) | 50/60 Hz | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 380-440 V 50/60 Hz | 3 A |
| | 500-690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 3 A / 72 W |
| | 48 V DC | 1.5 A / 72 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.3 A / 69 W |
| | 250 V DC | 0.3 A / 75 W |
| Short-circuit protection device gG type fuse | 10 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 24 V / 50 mA | |
| | $\leq 10^{-6}$ | |
| Power dissipation per pole at 6 A | 0.15 W | |
| Mechanical durability | Number of operating cycles | 3 millions |
| | Max. switching frequency | 300 cycles/h |
| Max. electrical switching frequency | AC-15 | 300 cycles/h |
| | DC-13 | 300 cycles/h |

Contact utilization characteristics according to UL / CSA

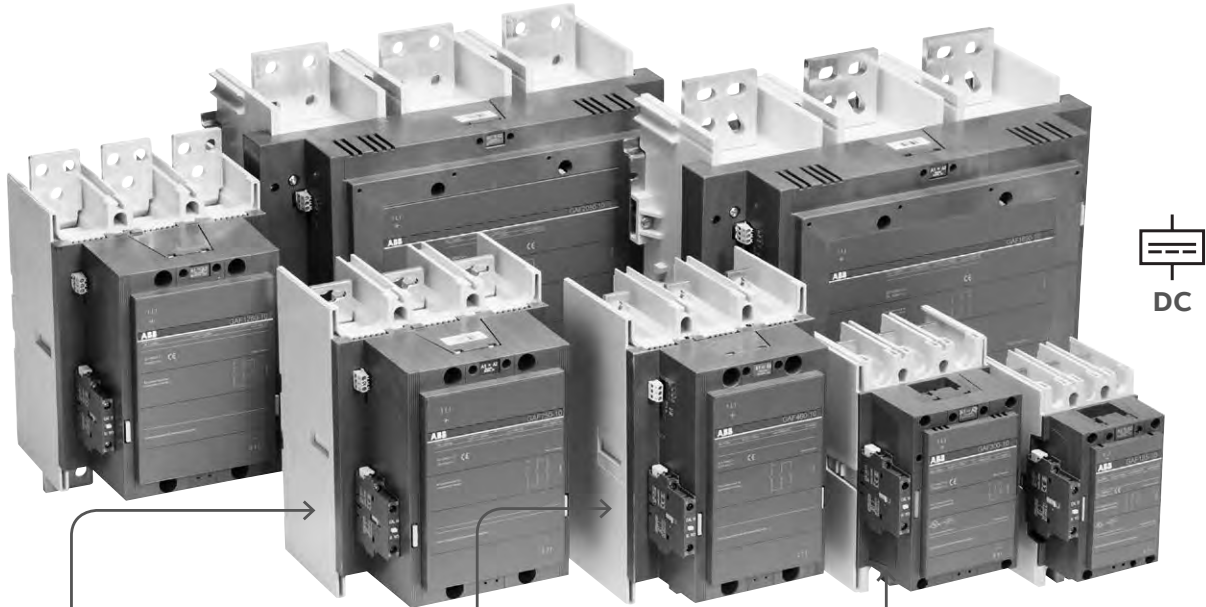
| | | |
|--|------------------------|--|
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 600 V AC, 250 V DC | |
| Pilot duty | A600, Q300 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 VA | |
| AC maximum volt-ampere breaking | 720 VA | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 VA | |

Connecting characteristics

| | | |
|---|--|--------------------------------|
| Connection capacity (min. ... max.) | | |
|  | Solid / stranded | 1 x 1...4 mm ² |
|  | | 2 x 1...4 mm ² |
|  | Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² |
|  | | 2 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² |
|  | | 2 x 0.75...2.5 mm ² |
|  | Lugs | L \leq 8 mm |
| | | L $>$ 3.7 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG18...14 |
| Stripping length | 9 mm | |
| Tightening torque | 1 Nm | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | |

GAF contactors

The compact efficient way to switch DC loads



Up to 2050 A 1000 V DC-1

The GAF range of DC contactors extends from 250 A up to 2050 A for DC-1 and UL DC general use at 1000 V.

Proven technology

The GAF range of contactor is based on the tested and well proven AF contactor range. The GAF share all accessories with the AF range, reducing the number of parts needed.

Easy selection

The GAF contactors feature ABB's AF technology and all of its features. With only four coils the entire voltage range of 20 V DC and 24 V AC to 500 V AC / DC is covered. The built in surge suppression takes away the need of a separate surge suppressor. All to enable easier selection of contactors.



PV plant applications for DC switching

Contactors are typically selected for applications that need remote control and switching of the central inverter's DC side at least once per day. Application examples include: disconnection of the inverter from PV strings; or changing the string configuration to increase plant capacity.



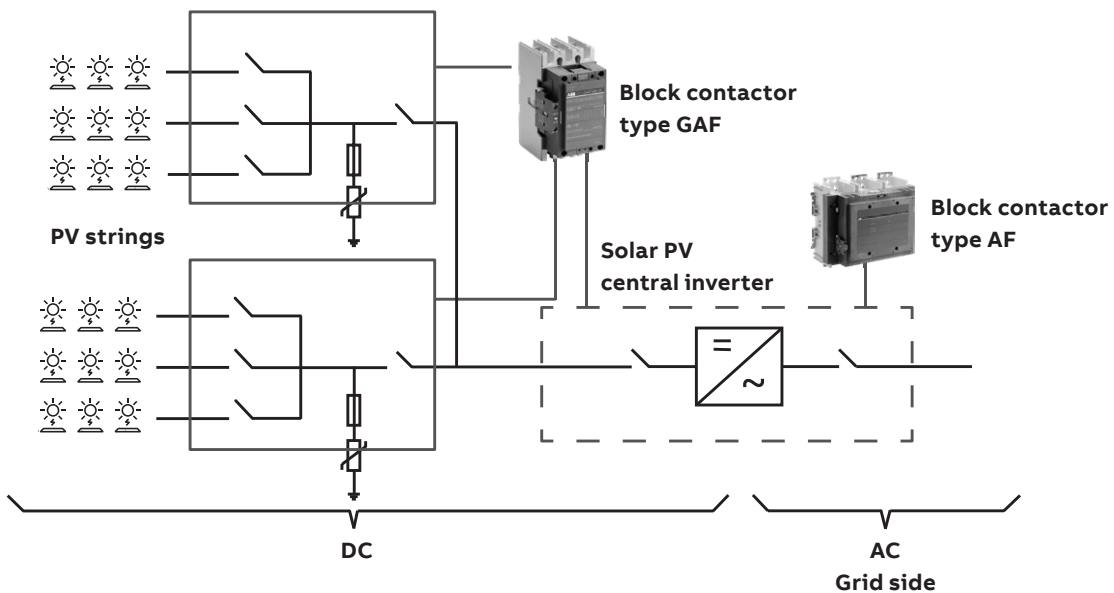
GAF contactors

The compact efficient way to switch DC loads

Optimised for central inverters

ABB offers the widest range of compact contactors for DC load switching in low voltage power distribution applications. Due to their breaking performance for DC circuits, GAF contactors can switch DC loads of up to 2050 A 1000 V DC-1.

PV solar plant



— Contactors for DC switching applications

DC-1, DC-3, DC-5 applications according to IEC 60947-4-1

The circuit switching on DC is more difficult than on AC, as alternating current goes to zero according to the frequency of the supply source while DC current has a continuous value.

The main parameters to be considered for selecting a contactor are the current, the voltage and the L/R time constant of the controlled load.

Time constant and utilization categories

In DC applications, the nature of load to switch (resistor, inductance or a combination) is characterized by the ratio of the inductance to the resistance (L (inductance of operated circuit) / R (resistance of operated circuit) = $\text{mH}/\Omega = \text{ms}$)

This ratio L/R is called the time constant of the circuit.

DC current utilization categories are defined according to IEC 60947-4-1:

- DC-1 non inductive or slightly inductive loads, resistance furnaces ($L/R \leq 1 \text{ ms}$)
- DC-3 shunt motors: starting, plugging, inching, dynamic breaking of DC motors ($L/R \leq 2 \text{ ms}$)
- DC-5 series motors: starting, plugging, inching, dynamic breaking of DC motors ($L/R \leq 7.5 \text{ ms}$).

The higher the time constant value is, the more difficult it is to break the arc.

The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs, by reducing the time constant.

Operational voltage

- The higher the operational voltage value is, the more difficult it is to break the arc.
- The use of main poles connected in series will allow to increase the value of switched voltage.

However, the maximum switched voltage must be within the max operational voltage of the contactor.

All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis) (see recommended connection diagrams).

ABB offer a large choice of possibilities for DC switching applications (see selection tables):

- Standard 3-pole or 4-pole contactors with either 1-pole breaking or breaking with poles connected in series.
- Special contactors designed for DC breaking with permanent magnets fitted on the main poles for use with the 3 poles connected in series and considered as 1-pole devices:
 - GA75 and GAE75 contactors: the 3 poles are connected in series via two supplied and fitted insulated connections (25 mm^2)
 - GAF145 ... GAF2050 contactors: the 3 poles must be connected in series by the user according to conductor cross-sectional area (refer to main pole technical data) or by using LP connection bars to be ordered separately.

Selection tables

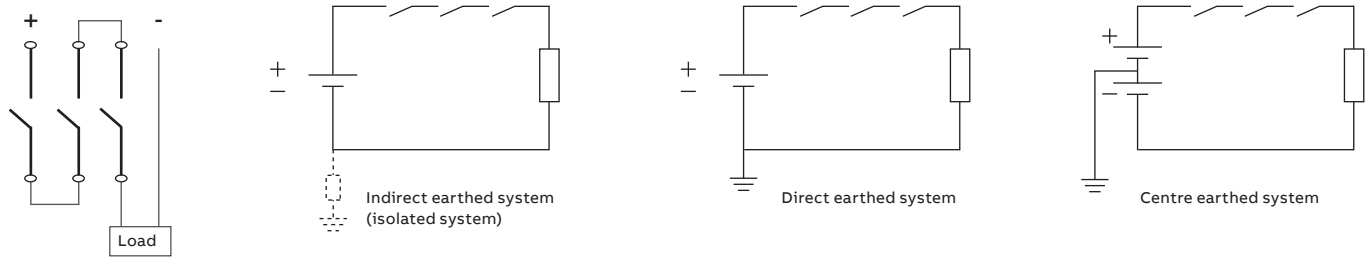
The enclosed selection tables will guide your choice through all contactor variants according to utilization category, for operational voltage up to 1000 V DC-1 and operational current up to 2050 A in ambient temperatures from $-25 \text{ }^\circ\text{C}$ up to $40 \text{ }^\circ\text{C}$. For higher values of current or voltage or heavy DC switching applications see bar mounted R contactors.

Connection diagrams

Connection diagrams

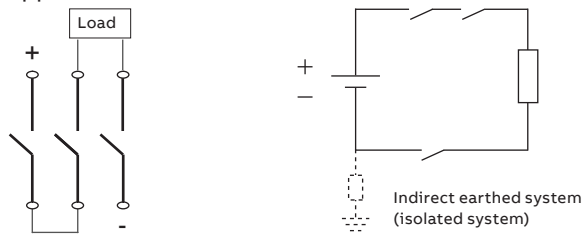
Recommended connection

In the example below, the 3 poles are connected in series without the load in between. This connection is recommended in systems according to the following configurations.



Alternative connection (not possible for GA75, GAE75)

The load could be placed in between the contacts in a indirect earthed system. If not connected according to the configuration below, a fault to earth could result in one or two contacts breaking the full load which the contactor is not approved for.



Points to consider

The above relates to power circuit switching. The SCPD (Short Circuit Protection Device) must comply with applicable protection rules.

Polarity:

For all GA, GAE, GAF types, connection polarities must be respected.
 (See instruction leaflet and see markings on the main terminals or the contactor front)

AF09 ... AF96 contactors

DC circuit switching

General

The arc switching on DC is more difficult than on AC.

- For selecting a contactor it is essential to determine the current, the voltage and the L/R time constant of the controlled load
- For information, typical time constant values are quoted hereafter: non inductive loads such as resistance furnaces (L/R ≈ 1 ms), inductive loads such as shunt motors (L/R ≈ 2 ms) or series motors (L/R ≈ 7.5 ms)
- The addition of a resistor in parallel with an inductive winding helps in the elimination of the arcs
- All the poles required for breaking must be connected in series between the load and the source polarity not linked to earth (or chassis).





Technical data

- The tables indicate for the standard contactors the I_e max. operating currents depending on: the utilization category (i.e. L/R) DC-1, DC-3, DC-5 as defined in the IEC 60947-4-1 publication, the operating voltage U_e and the pole coupling details.
Ampere values quoted in these tables are valid for a -25...+70 °C temperature close to the contactors, as long as these values do not exceed the AC-1 Ampere values for the corresponding ambient temperature
- Max. switching frequency: 300 cycles/h.





Selection table

| Contactor types | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|-----------------|-------------|------|------|--------|--------|--------|--------|--------|--------|--------|--------|
| | 3 or 4-pole | | | 3-pole | 4-pole | 3-pole | 3-pole | 4-pole | 3-pole | 3-pole | 3-pole |





Utilization category DC-1, L/R ≤ 1 ms

| | | | | | | | | | | | | | | |
|---|--------|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 10 A | 15 A | 20 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 10 A | 15 A | 20 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 25 A | 27 A | 30 A | 45 A | 45 A | 50 A | 50 A | 55 A | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | - | - | - | - | - |
| | 110 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | - | - | - | - | - |
| | 220 V | 25 A | - | 30 A | - | 45 A | - | - | 55 A | - | - | - | - | - |
| | 440 V | 10 A | - | 20 A | - | - | - | - | - | - | - | - | - | - |

Utilization category DC-3, L/R ≤ 2 ms

| | | | | | | | | | | | | | | |
|---|--------|------|------|------|------|---|------|------|---|------|-------|-------|-------|-------|
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 6 A | 7 A | 8 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 6 A | 7 A | 8 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | - | - | - | - | - | - | - | - | - |
| | 110 V | 25 A | - | 30 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | 25 A | - | 30 A | - | - | - | - | - | - | - | - | - | - |
| | 440 V | 6 A | - | 8 A | - | - | - | - | - | - | - | - | - | - |

Utilization category DC-5, L/R ≤ 7.5 ms

| | | | | | | | | | | | | | | |
|---|--------|------|------|------|------|---|------|------|---|------|-------|-------|-------|-------|
|  | ≤ 72 V | 9 A | 12 A | 16 A | 20 A | - | 25 A | 25 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 4 A | 4 A | 4 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 10 A | 15 A | 20 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 4 A | 4 A | 4 A | - | - | - | - | - | - | - | - | - | - |
|  | ≤ 72 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 110 V | 25 A | 27 A | 30 A | 45 A | - | 50 A | 50 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
| | 220 V | 9 A | 12 A | 16 A | 20 A | - | 25 A | 25 A | - | 70 A | 100 A | 105 A | 125 A | 130 A |
|  | ≤ 72 V | 25 A | - | 30 A | - | - | - | - | - | - | - | - | - | - |
| | 110 V | 25 A | - | 30 A | - | - | - | - | - | - | - | - | - | - |
| | 220 V | 10 A | - | 20 A | - | - | - | - | - | - | - | - | - | - |
| | 440 V | 4 A | - | 4 A | - | - | - | - | - | - | - | - | - | - |

For additional ratings ≥ 440 V, please consult us.

Note: For AFS09 ... AFS96 safety contactors, DC switching rating are the same as AF09 ... AF96 3-pole contactors.





AF116 ... AF2650 contactors

DC circuit switching

Selection table





| Contactor types | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|-----------------|-------------|-------|-------|--------|-------------|-------|-------|--------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| | 3 or 4-pole | | | 3-pole | 3 or 4-pole | | | 3-pole | | | | | | | | | |

Utilization category DC-1, L/R ≤ 1 ms





| | | | | | | | | | | | | | | | | | | | |
|---|---|---------|-----|-----|-----|-----|-----|-----|-----|-------|-------|-------|--------|--------|--------|--------|--------|--------|---|
|  | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 90 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - | |
| | 100 V | - | - | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - | - |
| | 110 V | - | - | - | - | - | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
|  | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 110 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 175 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - | |
| | 200 V | - | - | - | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - | |
|  | ≤ 72 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 110 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 220 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 260 V | 160 | 200 | 200 | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 300 V | - | - | - | 250 | 350 | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 340 V | - | - | - | - | - | 400 | 500 | 520 | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 440 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 600 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 780 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| | 850 V | - | - | - | - | - | - | - | - | - | - | 800 A | 1050 A | 1250 A | 1350 A | 1650 A | 2050 A | 2650 A | |
| |  | < 350 V | 200 | 200 | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - |
| 400 V | | - | - | - | 250 | 350 | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - | |
| 440 V | | - | - | - | - | - | 400 | 500 | 520 | - | - | - | - | - | - | - | - | - | |

(1) AF2650 at 780 V DC = 2650 A

Utilization category DC-3, L/R ≤ 2 ms

| | | | | | | | | | | | | | | | | | | |
|---|--------|-------|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|---|---|---|---|---|
|  | ≤ 72 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 220 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 440 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | 320 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | - | - | - | - | - | - | - | - | - |

Utilization category DC-5, L/R ≤ 7.5 ms












| | | | | | | | | | | | | | | | | | | |
|---|--------|-------|-------|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|---|---|---|---|---|
|  | ≤ 72 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 220 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | ≤ 72 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 110 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 220 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 440 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
|  | 600 V | - | - | - | - | - | - | - | - | 600 A | 700 A | 800 A | 1050 A | - | - | - | - | - |
| | 320 V | 145 A | 160 A | - | 250 A | 275 A | 350 A | 400 A | 450 A | - | - | - | - | - | - | - | - | - |

For additional ratings ≥ 440 V, please consult us.

EK550, EK1000 contactors

DC circuit switching

Selection table

| Contactor types | EK550 | | EK1000 | |
|--|-------------|---|--------|---|
| Utilization category DC-1, $L/R \leq 1$ ms | | | | |
|  A 829D | ≤ 72 V | A | 550 | - |
| | 110 V | A | 550 | - |
|  A 830D | ≤ 72 V | A | 800 | - |
| | 110 V | A | 800 | - |
| | 220 V | A | 800 | - |
|  A 831D | ≤ 72 V | A | 800 | - |
| | 110 V | A | 800 | - |
| | 220 V | A | 800 | - |
| | 440 V | A | 650 | - |
|  A 832D | ≤ 72 V | A | 800 | - |
| | 110 V | A | 800 | - |
| | 220 V | A | 800 | - |
| | 440 V | A | 650 | - |
| | 600 V | A | 650 | - |
| Utilization category DC-3, $L/R \leq 2$ ms | | | | |
|  A 839D | ≤ 72 V | A | 550 | - |
| | ≤ 72 V | A | 650 | - |
|  A 830D | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
| | ≤ 72 V | A | 650 | - |
|  A 831D | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
| | 440 V | A | 650 | - |
| | 600 V | A | 650 | - |
|  A 832D | ≤ 72 V | A | 650 | - |
| | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
| | 440 V | A | 650 | - |
| | 600 V | A | 650 | - |
| Utilization category DC-5, $L/R \leq 7.5$ ms | | | | |
|  A 830D | ≤ 72 V | A | 650 | - |
| | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
|  A 831D | ≤ 72 V | A | 650 | - |
| | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
| | 440 V | A | 650 | - |
|  A 832D | ≤ 72 V | A | 650 | - |
| | 110 V | A | 650 | - |
| | 220 V | A | 650 | - |
| | 440 V | A | 650 | - |
| | 600 V | A | 650 | - |

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes. The grid covers most of the page below the 'Notes' header.

GA75 1-pole contactors

100 A DC-1

AC operated



GA75-10-11

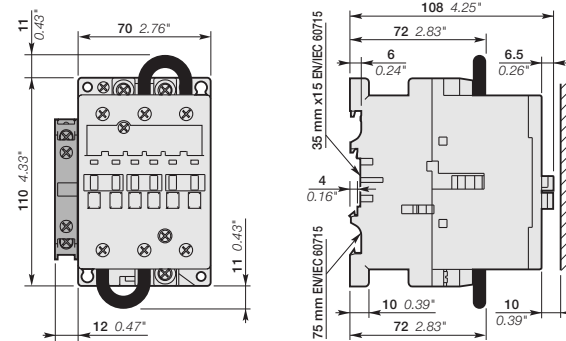
GA75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles delivered connected in serie.

- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC Rated operational current $\theta \leq 55^\circ\text{C}$ 440 V DC-1 A | UL / CSA General use rating 440 V DC A | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|-----------|---|------------|-----------------|--|
| | | V 50 Hz | V 60 Hz | | | | |
| 100 | 100 | 24 | 24 | 0 0 | GA75-10-00 | 1SBL411025R8100 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8111 | 1.260 |
| | | 48 | 48 | 0 0 | GA75-10-00 | 1SBL411025R8300 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8311 | 1.260 |
| | | 110 | 110...120 | 0 0 | GA75-10-00 | 1SBL411025R8400 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8411 | 1.260 |
| | | 220...230 | 230...240 | 0 0 | GA75-10-00 | 1SBL411025R8000 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8011 | 1.260 |
| | | 230...240 | 240...260 | 0 0 | GA75-10-00 | 1SBL411025R8800 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8811 | 1.260 |
| | | 380...400 | 400...415 | 0 0 | GA75-10-00 | 1SBL411025R8500 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8511 | 1.260 |
| | | 400...415 | 415...440 | 0 0 | GA75-10-00 | 1SBL411025R8600 | 1.220 |
| | | | | 1 1 | GA75-10-11 | 1SBL411025R8611 | 1.260 |

(1) Other control voltages see voltage codes table.



GA75-10-11

Main dimensions mm, inches

GAE75 1-pole contactors

100 A DC-1

DC operated




GAE75-10-11

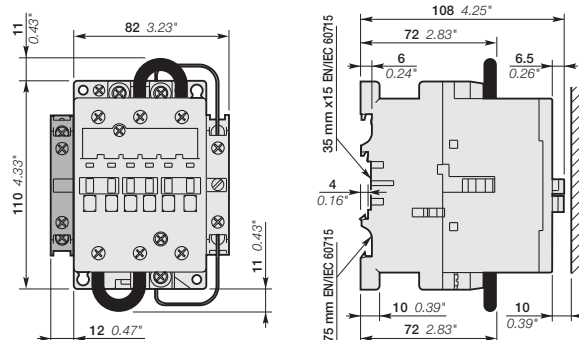
GAE75 contactors are designed for controlling shunt or series motors and resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles delivered connected in serie.

- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: DC operated with double winding coil (and factory mounted lagging contact for "holding" winding insertion)
- add-on auxiliary contact blocks for side mounting and a wide range of accessories

| IEC Rated operational current $\theta \leq 55^\circ\text{C}$ 440 V DC-1 A | UL/CSA General use rating 440 V DC A | Rated control circuit voltage Uc (1) V DC | Auxiliary contacts fitted  | Type | Order code | Weight Pkg (1 pce) kg |
|---|---|---|---|-------------|-----------------|--|
| 100 | 100 | 12 | 0 0 | GAE75-10-00 | 1SBL419025R8000 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8011 | 1.300 |
| | | 24 | 0 0 | GAE75-10-00 | 1SBL419025R8100 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8111 | 1.300 |
| | | 48 | 0 0 | GAE75-10-00 | 1SBL419025R8300 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8311 | 1.300 |
| | | 110 | 0 0 | GAE75-10-00 | 1SBL419025R8600 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8611 | 1.300 |
| | | 125 | 0 0 | GAE75-10-00 | 1SBL419025R8700 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8711 | 1.300 |
| | | 220 | 0 0 | GAE75-10-00 | 1SBL419025R8800 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8811 | 1.300 |
| | | 240 | 0 0 | GAE75-10-00 | 1SBL419025R8900 | 1.260 |
| | | | 1 1 | GAE75-10-11 | 1SBL419025R8911 | 1.300 |

(1) Other control voltages see voltage codes table.



GAE75-10-11

Main dimensions mm, inches

GAF185 ... GAF300 1-pole (3-pole in serie) contactors

250 to 400 A DC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



GAF185-10-11

1SFC101098F0001



GAF300-10-11

1SFC101099F0001

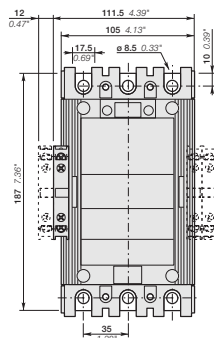
GAF185 ... GAF300 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

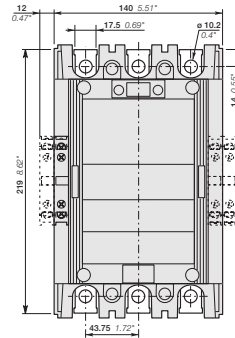
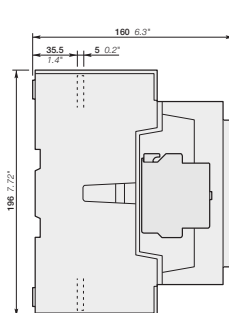
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 3 coils to cover control voltages between 48...250 V 50/60 Hz and 20...250 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|-----|--|--|-------------------------------|-----------|---------------------------|------------------|-----------------|--------|
| | Rated operational current $\theta \leq 55^\circ\text{C}$ 1000 V DC-1 A | General use rating $\theta \leq 40^\circ\text{C}$ 1000 V DC A | V 50/60 Hz | V DC | | | | |
| 250 | 250 | | - | 20...60 | 1 1 | GAF185-10-11 (1) | 1SFL497025R7211 | 3.600 |
| | | | 48...130 | 48...130 | 1 1 | GAF185-10-11 | 1SFL497025R6911 | 3.600 |
| | | | 100...250 | 100...250 | 1 1 | GAF185-10-11 | 1SFL497025R7011 | 3.600 |
| 400 | 400 | | - | 20...60 | 1 1 | GAF300-10-11 (1) | 1SFL557025R7211 | 6.200 |
| | | | 48...130 | 48...130 | 1 1 | GAF300-10-11 | 1SFL557025R6911 | 6.200 |
| | | | 100...250 | 100...250 | 1 1 | GAF300-10-11 | 1SFL557025R7011 | 6.200 |

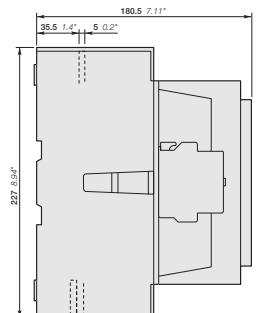
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.



GAF185



GAF300



Main dimensions mm, inches

GAF460 ... GAF750 1-pole (3-pole in serie) contactors

600 to 875 A DC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



GAF460-10-11



GAF750-10-11

GAF460 ... GAF750 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

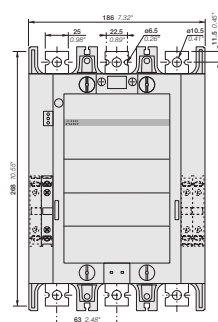
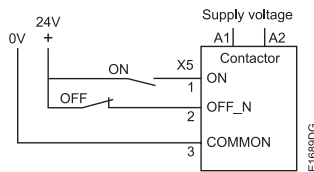
- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL / CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|-----|----------|--|-----------|---------------------------|------------------|-----------------|--------------------|
| | | V 50/60 Hz | V DC | | | | |
| 600 | 650 | - | 24...60 | 1 1 | GAF460-10-11 (1) | 1SFL597025R6811 | 12.000 |
| | | 48...130 | 48...130 | 1 1 | GAF460-10-11 | 1SFL597025R6911 | 12.000 |
| | | 100...250 | 100...250 | 1 1 | GAF460-10-11 | 1SFL597025R7011 | 12.000 |
| | | 250...500 | 250...500 | 1 1 | GAF460-10-11 | 1SFL597025R7111 | 12.000 |
| | | 875 | 900 | - | 24...60 | 1 1 | GAF750-10-11 (1) |
| 875 | 900 | 48...130 | 48...130 | 1 1 | GAF750-10-11 | 1SFL637025R6911 | 15.000 |
| | | 100...250 | 100...250 | 1 1 | GAF750-10-11 | 1SFL637025R7011 | 15.000 |
| | | 250...500 | 250...500 | 1 1 | GAF750-10-11 | 1SFL637025R7111 | 15.000 |

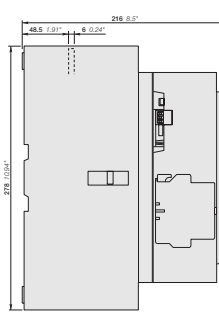
(1) The connection polarities indicated close to the coil terminals must be respected: A1 for the positive pole and A2 for the negative pole.

GAF460 ... GAF750 are equipped with low voltage inputs for control, for example by a PLC.

Control inputs



GAF460



GAF750

Main dimensions mm, inches

GAF1250 ... GAF2050 1-pole (3-pole in serie) contactors

1040 to 1750 A DC-1

AC / DC operated with 1 N.O. + 1 N.C. auxiliary contacts



GAF1250-10-11

15FC101004F0201



GAF1650-10-11

15FC101004F0201

GAF1250 ... GAF2050 contactors are designed for controlling resistive or slightly inductive loads up to 1000 V DC.

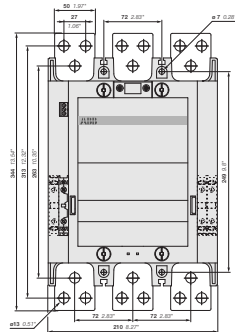
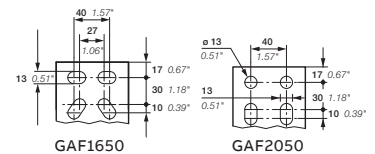
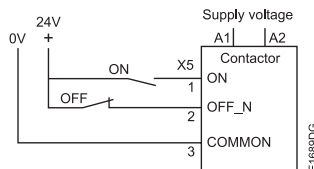
These contactors are of the block type design with 3 main poles for connection in series by the user according to conductor cross-sectional area or by using LP connection bars to be ordered separately.

- main poles arc chutes fitted with permanent magnets specially designed for DC breaking. The connection polarities must be respected.
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC), only 4 coils to cover control voltages between 48...500 V 50/60 Hz and 24...500 V DC
 - can manage large control voltage variations
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

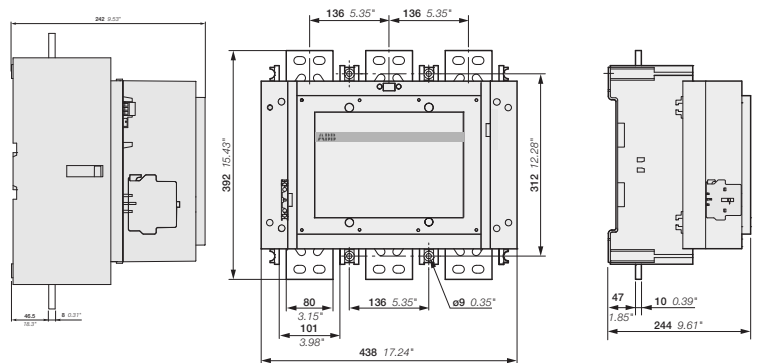
| IEC | UL / CSA | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) | |
|-------------|----------|--|-----------|---------------------------|---------------|-----------------|--------------------|--------|
| | | V 50/60 Hz | V DC | | | | | |
| 1000 V DC-1 | A | 1210 | - | 24...60 | 1 1 | GAF1250-10-11 | 1SFL647025R6811 | 16.000 |
| | | | 48...130 | 48...130 | 1 1 | GAF1250-10-11 | 1SFL647025R6911 | 16.000 |
| | | | 100...250 | 100...250 | 1 1 | GAF1250-10-11 | 1SFL647025R7011 | 16.000 |
| | | | 250...500 | 250...500 | 1 1 | GAF1250-10-11 | 1SFL647025R7111 | 16.000 |
| 1450 | 1650 | 100...250 | 100...250 | 1 1 | GAF1650-10-11 | 1SFL677025R7011 | 35.000 | |
| 1750 | 2050 | 100...250 | 100...250 | 1 1 | GAF2050-10-11 | 1SFL707025R7011 | 35.000 | |

GAF1250 ... GAF2050 are equipped with low voltage inputs for control, for example by a PLC

Control inputs



GAF1250



GAF1650, GAF2050

Main dimensions mm, inches

GA75 ... GAF2050 contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | GA75 | | | | | | | |
|--|--|--------|---------------------|----------------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|
| | DC operated | GAE75 | | | | | | | |
| | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 | |
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | |
| Rated operational voltage U _e max. | 1000 V DC | | | | | | | | |
| DC-1 Utilization category, L/R ≤ 1 ms For air temperature close to contactor I _e / Rated operational current DC-1 | | | | | | | | | |
| θ ≤ 40 °C | 220 V | 120 A | 275 A | 500 A | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 440 V | 100 A | 275 A | 500 A | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 600 V | 75 A | 275 A | 500 A | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| | 1000 V | 35 A | 275 A | 500 A | 700 A | 1050 A | 1250 A | 1650 A | 2050 A |
| θ ≤ 55 °C | 220 V | 100 A | 250 A | 400 A | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 440 V | 100 A | 250 A | 400 A | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 600 V | 75 A | 250 A | 400 A | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| | 1000 V | 35 A | 250 A | 400 A | 600 A | 875 A | 1040 A | 1450 A | 1750 A |
| θ ≤ 70 °C | 220 V | 85 A | 180 A | 325 A | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 440 V | 85 A | 180 A | 325 A | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 600 V | 75 A | 180 A | 325 A | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| | 1000 V | 35 A | 180 A | 325 A | 480 A | 720 A | 875 A | 1270 A | 1500 A |
| With conductor cross-sectional area (3) | | (1) | 150 mm ² | 300 mm ² (2) | 2x 240 mm ² | 2x 50x8 mm ² | 2x 100x5 mm ² | 3x 100x5 mm ² | 4x 100x5 mm ² |
| DC-3 Utilization category, L/R ≤ 2 ms I _e / Rated operational current DC-3 | | | | | | | | | |
| θ ≤ 55 °C | 220 V | 100 A | - | | | | | | |
| | 440 V | 85 A | - | | | | | | |
| DC-5 Utilization category, L/R ≤ 7.5 ms I _e / Rated operational current DC-5 | | | | | | | | | |
| θ ≤ 55 °C | 220 V | 85 A | - | | | | | | |
| | 440 V | 35 A | - | | | | | | |
| Maximum electrical switching frequency | 300 cycles/h | | | | | | | | |

(1) Refer to IEC 60947-1, table 9.

(2) For currents up to 370 A, use 2 x LP300 kits. For higher currents, use 300 mm² conductors of minimum length 500 mm together with terminal extension/enlargement (LX300/LW300).

(3) To minimize terminal temperature for GAF185 ... GAF2050, length of connection should be at least 0.5 m per pole.

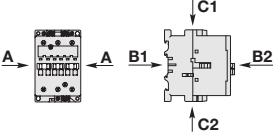
Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | GA75 | | | | | | | |
|---|------------------------|--------|--------|--------|-------------------------------------|---------|---------|---------|--------|
| | DC operated | GAE75 | | | | | | | |
| | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 | |
| Standards | UL 508, CSA C22.2 N°14 | | | | UL 60947-4-1, CSA C22.2 N°60947.4-1 | | | | |
| Maximum operational voltage | 1000 V DC | | | | | | | | |
| UL / CSA DC general use rating θ ≤ 40 °C | 440 V | 100 A | 250 A | 400 A | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| | 600 V | 75 A | 250 A | 400 A | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| | 1000 V | 35 A | 250 A | 400 A | 650 A | 900 A | 1210 A | 1650 A | 2050 A |
| Maximum electrical switching frequency | 300 cycles/h | | | | | | | | |

GA75 and GAE75 contactors

Technical data

General technical data

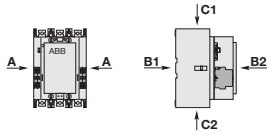
| | | |
|--|----------------------------|--|
| Contactor types | AC operated | GA75 |
| | DC operated | GAE75 |
| Rated insulation voltage U_i acc. to IEC 60947-4-1 acc. to UL | | 1000 V |
| | | 600 V |
| Rated impulse withstand voltage U_{imp} . | | 8 kV |
| Ambient air temperature close to contactor | Operation | -40...+70 °C |
| | Storage | -60...+80 °C |
| Climatic withstand | | acc. to IEC 60068-2-30 and 60068-2-11 - UTE C 63-100 specification II |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | Number of operating cycles | 10 millions operating cycles (5 millions for GAE75) |
| | Max. switching frequency | 3600 cycles/h |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | |
| Mounting position 1  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
| | A | 20 g |
| | B1 | 10 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 20 g |
| | C2 | 20 g |

GAF185 ... GAF2050 contactors

Technical data

General technical data

| Contactor types | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|------------------|--|--------|--------|--------|--------------|-------------------------------|---------|
| Rated insulation voltage Ui | | | | | | | | |
| acc. to IEC 60947-4-1 | | 1000 V | | | | | | |
| acc. to UL | | 600 V | | | | | | |
| Rated impulse withstand voltage Uimp. | | 8 kV | | | | | | |
| Ambient air temperature close to contactor | | | | | | | | |
| Operation | | -40 to +70 °C | | | | | | |
| Storage | | -40 to +70 °C | | | | | | |
| Climatic withstand | | acc. to IEC 60068-2-30 | | | | | | |
| Maximum operating altitude (without derating) | | 3000 m | | | | | | |
| Mechanical durability | | | | | | | | |
| Number of operating cycles | | 5 millions operating cycles | | | | 0.5 millions | 0.5 millions operating cycles | |
| Max. switching frequency | | 300 cycles/h | | | | | 60 cycles/h | |
| Shock withstand | | | | | | | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | | | | | | | |
| Mounting position 1 | | | | | | | | |
| | Shock direction | 1/2 sinusoidal shock for 30 ms: no change in contact position, closed or open position | | | | | | |
| | A | 5 g | | | | | - | |
| | B1 | 5 g | | | | | - | |
| | B2 | 5 g | | | | | - | |
| | C1 | 5 g | | | | | - | |
| | C2 | 5 g | | | | | - | |



GA75 and GAE75 contactors

Technical data

Magnet system characteristics

| | | | |
|--|-----------------------|---|-----------------|
| Contactor types | AC operated | GA75 | |
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 55^\circ\text{C}$ $0.85...1.1 \times U_c$ Please also refer to "Mounting characteristics and conditions for use" | |
| AC control voltage | | | |
| Rated control circuit voltage U_c | at 50 Hz | 24...690 V | |
| | at 60 Hz | 24...690 V | |
| Coil consumption | Average pull-in value | 50 Hz | 180 VA |
| | | 60 Hz | 210 VA |
| | Average holding value | 50/60 Hz (1) | 190 VA / 180 VA |
| | | 50 Hz | 18 VA / 5.5 W |
| | | 60 Hz | 18 VA / 5.5 W |
| | 50/60 Hz (1) | 18 VA / 5.5 W | |
| Drop-out voltage | | Approx. 40...65 % of U_c | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 8...27 ms | |
| | N.C. contact opening | 7...22 ms | |
| Between coil de-energization and: | N.O. contact opening | 4...11 ms | |
| | N.C. contact closing | 7...14 ms | |

(1) 50/60 Hz coils: see "Voltage code table".

Magnet system characteristics

| | | |
|--|--------------------------|---|
| Contactor types | DC operated | GAE75 |
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 55^\circ\text{C}$ $0.85...1.1 \times U_c$ Please also refer to "Mounting characteristics and conditions for use" |
| DC control voltage | | |
| Rated control circuit voltage U_c | | 12...250 V DC |
| Coil consumption | Average pull-in value | 200 W |
| | Average holding value | 4 W |
| Drop-out voltage | | Approx. 15...40 % of U_c |
| Coil time constant | | |
| Open | L/R | 3 ms |
| Closed | L/R | 15 ms |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 13...30 ms |
| | N.C. contact opening | 10...27 ms |
| Between coil de-energization and: | N.O. contact opening (1) | 5...15 ms |
| | N.C. contact closing (1) | 8...18 ms |

(1) The use of surge suppressors increases the opening time with a factor of 1.1 to 1.5 for a RV5 surge suppressor and a factor of 1.5 to 3 for RT5 surge suppressor.

Mounting characteristics and conditions for use

| | | |
|---------------------------------------|--|---|
| Contactor types | AC operated | GA75 |
| | DC operated | GAE75 |
| Mounting positions | | |
| Control voltage / Ambient temperature | | |
| Mounting positions | 1, 1±30°, 2, 3, 4, 5 | at $\theta \leq 55^\circ\text{C}$ $0.85...1.1 \times U_c$ |
| | | at $\theta \leq 70^\circ\text{C}$ U_c |
| | 6 | at $\theta \leq 55^\circ\text{C}$ $0.95...1.1 \times U_c$ |
| | | at $\theta \leq 70^\circ\text{C}$ Unauthorized |
| Mounting distances | The contactors can be assembled side by side | |
| Fixing | | |
| | On rail according to IEC 60715, EN 60715 | 35 x 15 mm or 75 x 25 mm |
| | By screws (not supplied) | 2 x M6 screws placed diagonally |

GAF185 ... GAF2050 contactors

Technical data

Magnet system characteristics

| Contactor types | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|--|-----------------------|--|---------------|-------------|---------------|------------|----------------|---------|
| Coil operating limits acc. to IEC 60947-4-1 | AC or DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min...}1.1 \times U_c \text{ max}$. Please also refer to "Mounting characteristics and conditions for use" | | | | | | |
| AC control voltage 50/60 Hz | | 48...250 V AC | | | 48...500 V AC | | 100...250 V AC | |
| Coil consumption | Average pull-in value | 430 VA | 470 VA | 890 VA | 850 VA | | 1900 VA | |
| | Average holding value | 12 VA / 3.5 W | 10 VA / 2.5 W | 12 VA / 4 W | 12 VA / 4.5 W | | 48 VA / 17 W | |
| DC control voltage | | 20...250 V DC | | | 24...500 V DC | | 100...250 V DC | |
| Coil consumption | Average pull-in value | 500 W | 520 W | 990 W | 950 W | | 1700 W | |
| | Average holding value | 2 W | | 4 W | 4.5 W | | 16 W | |
| Drop-out voltage | | 55 % of $U_c \text{ min}$. | | | | | | |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | $\geq 20 \text{ ms}$ | | | | | | |
| Operating time | | | | | | | | |
| Coil supply between A1 - A2 Between coil energization and: | N.O. contact closing | 30...115 ms | | 50...120 ms | | 50...80 ms | | |
| | N.C. contact opening | 30...115 ms | | 50...120 ms | | 50...80 ms | | |
| Between coil de-energization and: | N.O. contact opening | 25...80 ms | | 33...70 ms | | 35...55 ms | | |
| | N.C. contact closing | 25...80 ms | | 33...70 ms | | 35...55 ms | | |
| Control input for PLC's Between coil energization and: | N.O. contact closing | - | | 40...60 ms | 40...90 ms | 40...65 ms | | |
| | N.C. contact opening | - | | 40...60 ms | 40...90 ms | 40...65 ms | | |
| Between coil de-energization and: | N.O. contact opening | - | | 10...30 ms | | 10...30 ms | | |
| | N.C. contact closing | - | | 10...30 ms | | 10...30 ms | | |









Mounting characteristics and conditions for use

| Contactor types | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|--|--|---|--------|--------|--------|---------|---------|---------|
| Mounting positions | | | | | | | | |
| Control voltage / Ambient temperature | | | | | | | | |
| Mounting positions | 1, $1 \pm 30^\circ$, 2, 3, 4, 5 at $\theta \leq 70^\circ\text{C}$ | 0.85 x $U_c \text{ min...}1.1 \times U_c \text{ max}$. | | | | | | |
| | 6 | Unauthorized | | | | | | |
| Mounting distances | | The contactors can be assembled side by side | | | | | | |
| Fixing | | | | | | | | |
| On rail according to IEC 60715, EN 60715 | | - | | | | | | |
| By screws (not supplied) | | 4 x M5 | | 4 x M6 | | 4 x M8 | | |

GA75 and GAE75 contactors

Technical data



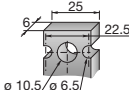
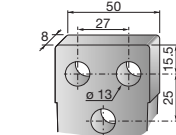
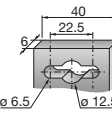
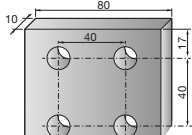
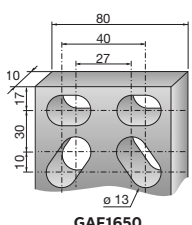





Connecting characteristics

| | | |
|--|---|---|
| Contactor types | AC operated | GA75 |
| | DC operated | GAE75 |
| Main terminals |  Screw terminals with single connector (13 x 10 mm) | |
| Connection capacity (min. ... max.) | | |
| Main conductors (poles) | | |
|  Rigid | Solid ($\leq 4 \text{ mm}^2$) | } 1 x 6...50 mm ² 2 x 6...25 mm ² |
|  Stranded ($\geq 6 \text{ mm}^2$) | | |
|  Flexible with ferrule | | 1 x 6...35 mm ² 2 x 6...16 mm ² |
|  Bars or lugs | | L \leq - l > - |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 8...1 |
| Tightening torque | Recommended | 4.00 Nm / 35 lb.in |
| | Max. | 4.50 Nm |
| Auxiliary conductors (coil terminals) | | |
|  Rigid solid | | 1 x 1...4 mm ² 2 x 1...4 mm ² |
|  Flexible with ferrule | | 1 x 1...2.5 mm ² 2 x 0.75...2.5 mm ² |
|  Lugs | | L \leq 8 mm l > 3.7 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Tightening torque | | |
| Coil terminals | Recommended | 1.00 Nm / 9 lb.in |
| | Max. | 1.20 Nm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | |
| Main terminals | IP10 | |
| Coil terminals | IP20 | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| Main terminals | M6 | |
| Screwdriver type | Flat \varnothing 6.5 / Pozidriv 2 | |
| Coil terminals | M3.5 | |
| Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | |

GAF185 ... GAF2050 contactors

Technical data

Connecting characteristics

| Contactor types | AC / DC operated | GAF185 | GAF300 | GAF460 | GAF750 | GAF1250 | GAF1650 | GAF2050 |
|---|------------------------|---|---|--|---|---|---|---|
| Main terminals Flat type | |  |  |  |  |  |  |  |
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
|  Rigid with connector | Single for Cu cable | 6...185 mm ² | 16...240 mm ² | 240 mm ² | 300 mm ² | - | - | - |
| | Single for Al/Cu cable | 25...150 mm ² | 120...240 mm ² | 240 mm ² | 300 mm ² | - | - | - |
| | Double for Al/Cu cable | - | 2 x 95...120 mm ² | 2 x 240 mm ² | 3 x 185 mm ² | - | - | - |
|  Bars or lugs | L ≤ 24 mm | 32 mm | 47 mm | 52 mm | 100 mm | - | - | - |
| | ∅ > 8 mm | 10 mm | 10 mm | 12 mm | 12 mm | - | - | - |
| Connection capacity acc. to UL/CSA | 1 or 2 x | 6 - 250 MCM | 4 - 500 MCM | 2//250 - 500 MCM | 3// 2/0 - 500 MCM | 1/0 - 750 MCM | - | - |
| Tightening torque | Recommended | 18 Nm / 160 lb.in | 28 Nm / 247 lb.in | 35 Nm / 310 lb.in | 45 Nm / 398 lb.in | 45 Nm / 398 lb.in | 45 Nm / 398 lb.in | 45 Nm / 398 lb.in |
| | Max. | 20 Nm | 30 Nm | 40 Nm | 49 Nm | 49 Nm | 49 Nm | 49 Nm |
| Auxiliary conductors (coil terminals) | | | | | | | | |
|  Rigid solid | 1 x | 1...4 mm ² | | | | | | |
| | 2 x | 1...4 mm ² | | | | | | |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² | | | | | | |
| | 2 x | 0.75...2.5 mm ² | | | | | | |
|  Lugs | L ≤ 8 mm | | | | | | | |
| | l > 3.7 mm | | | | | | | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 | | | | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | | | | | |
| | Max. | 1.20 Nm | | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | |
| Main terminals | | IP00 | | | | | | |
| Coil terminals | | IP20 | | | | | | |
| Screw terminals | | | | | | | | |
| Main terminals | | M8 | M10 | M10 | M12 | | | |
| Coil terminals (delivered in open position) | | Screws and bolts M3.5 | | | | | | |
| Screwdriver type | | Flat ∅ 5.5 mm / Pozidriv 2 | | | | | | |



Contactors for capacitor switching

3/218 Overview**UA16..RA up to UA110..RA - Unlimited peak current \hat{I}** **3/220** Ordering details**3/223** Main accessories**3/224** Technical data**UA16 up to UA110****Peak current $\hat{I} \leq 100$ times the rms current****3/226** Ordering details**3/229** Main accessories**3/230** Technical data**3/437 Voltage code table**

For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Contactors for capacitor switching

AC-6b utilization category according to IEC 60947-4-1

Capacitor transient conditions

In Low Voltage industrial installations, capacitors are mainly used for reactive energy correction (raising the power factor). When these capacitors are energized, overcurrents of high amplitude and high frequencies (3 to 15 kHz) occur during the transient period (1 to 2 ms).

The amplitude of these current peaks, also known as "inrush current peaks", depends on the following factors:

- The network inductances.
- The transformer power and short-circuit voltage.
- The type of power factor correction.

There are 2 types of power factor correction: fixed or automatic.

Fixed power factor correction consists of inserting, in parallel on the network, a capacitor bank whose total power is provided by the assembly of capacitors of identical or different ratings.

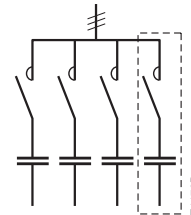
The bank is energized by a contactor that simultaneously supplies all the capacitors (a single step).
The inrush current peak, in the case of fixed correction, can reach 30 times the nominal current of the capacitor bank.



Single-step capacitor bank scheme
Use the AF... contactor ranges.

An automatic power factor correction system, on the other hand, consists of several capacitor banks of identical or different ratings (several steps), energized separately according to the value of the power factor to be corrected.

An electronic device automatically determines the power of the steps to be energized and activates the relevant contactors.
The inrush current peak, in the case of automatic correction, depends on the power of the steps already on duty, and can reach 100 times the nominal current of the step to be energized.



Multi-step capacitor bank scheme
Use the UA... or UA..RA contactor ranges.

Steady state condition data

The presence of harmonics and the network's voltage tolerance lead to a current, estimated to be 1.3 times the nominal current I_n of the capacitor, permanently circulating in the circuit.

Taking into account the manufacturing tolerances, the exact power of a capacitor can reach 1.15 times its nominal power.

Standard IEC 60831-1 Edition 2002 specifies that the capacitor must therefore have a maximum thermal current I_T of:

$$I_T = 1.3 \times 1.15 \times I_n = 1.5 \times I_n$$

Consequences for the contactors

To avoid malfunctions (welding of main poles, abnormal temperature rise, etc.), contactors for capacitor bank switching must be sized to withstand:

- **A permanent current that can reach 1.5 times the nominal current of the capacitor bank.**
- **The short but high peak current on pole closing** (maximum permissible peak current \hat{I}).

Contactor selection tool for capacitor switching

In a given application, if the user does not know the value of the inrush current peak, this value can be approximately calculated using the formulas given on the pages "Calculation and dimensioning".

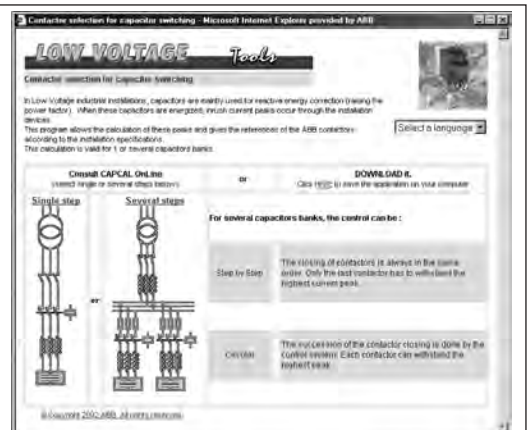
Alternatively by the **CAPCAL selection tool**, available on the ABB Website: www.abb.com/lowvoltage

right hand side menu

search: "Online product selection tools"

select: "Contactors: AC-6b capacitor switching"

This program allows the calculation of these peaks and gives the references of the ABB contactors according to the installation specifications. This calculation is valid for one or several capacitor banks.



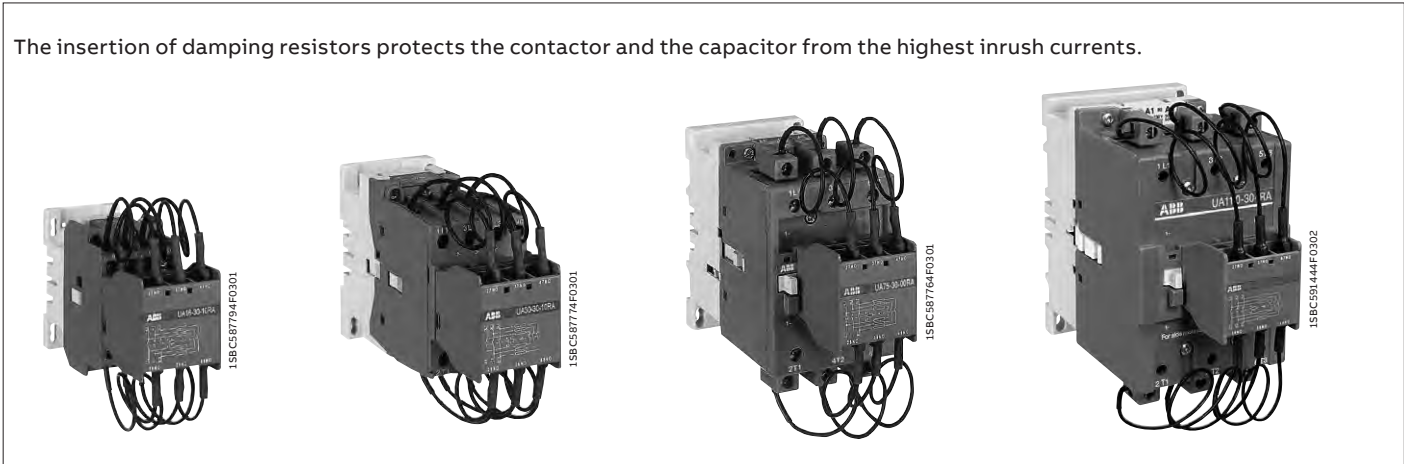
Contactors for capacitor switching

The ABB solutions

ABB offers 2 contactor versions according to the value of the inrush current peak and the power of the capacitor bank.

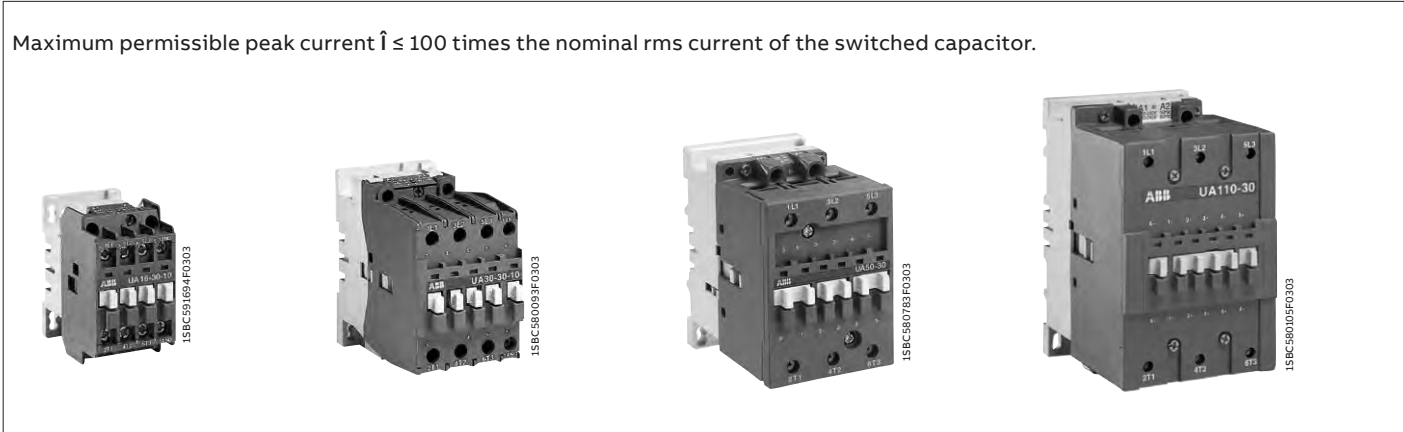
UA..RA contactors for capacitor switching (UA16..RA to UA110..RA) with insertion of damping resistors

The insertion of damping resistors protects the contactor and the capacitor from the highest inrush currents.



UA contactors for capacitor switching (UA16 to UA110)

Maximum permissible peak current $\hat{I} \leq 100$ times the nominal rms current of the switched capacitor.



UA16..RA ... UA30..RA 3-pole contactors for capacitor switching

12.5 to 30 kvar - Unlimited peak current \hat{I}
AC operated



UA16-30-10RA



UA30-30-10RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

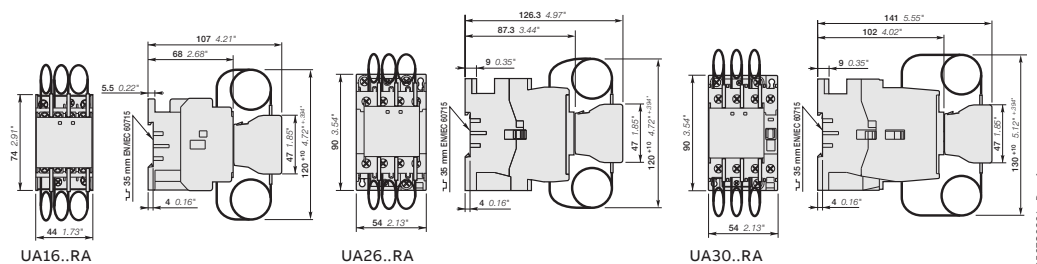
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
 - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
 - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage U _c (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) | |
|--|--------|--|-----------|---------------------------|--------------|-----------------|--------------------|-------|
| | | V 50 Hz | V 60 Hz | | | | | kg |
| Rated operational power $\theta \leq 40^\circ\text{C}$ 400 V AC-6b kvar | 480 V | 16 | 24 | 24 | 1 0 | UA16-30-10RA | 1SBL181024R8110 | 0.460 |
| | | | 110 | 110...120 | 1 0 | UA16-30-10RA | 1SBL181024R8410 | 0.460 |
| | | | 220...230 | 230...240 | 1 0 | UA16-30-10RA | 1SBL181024R8010 | 0.460 |
| | | | 230...240 | 240...260 | 1 0 | UA16-30-10RA | 1SBL181024R8810 | 0.460 |
| | | | 380...400 | 400...415 | 1 0 | UA16-30-10RA | 1SBL181024R8510 | 0.460 |
| | | | 400...415 | 415...440 | 1 0 | UA16-30-10RA | 1SBL181024R8610 | 0.460 |
| | 22 | 22 | 24 | 24 | 1 0 | UA26-30-10RA | 1SBL241024R8110 | 0.710 |
| | | | 110 | 110...120 | 1 0 | UA26-30-10RA | 1SBL241024R8410 | 0.710 |
| | | | 220...230 | 230...240 | 1 0 | UA26-30-10RA | 1SBL241024R8010 | 0.710 |
| | | | 230...240 | 240...260 | 1 0 | UA26-30-10RA | 1SBL241024R8810 | 0.710 |
| | | | 380...400 | 400...415 | 1 0 | UA26-30-10RA | 1SBL241024R8510 | 0.710 |
| | | | 400...415 | 415...440 | 1 0 | UA26-30-10RA | 1SBL241024R8610 | 0.710 |
| 30 | 28 | 24 | 24 | 1 0 | UA30-30-10RA | 1SBL281024R8110 | 0.810 | |
| | | 110 | 110...120 | 1 0 | UA30-30-10RA | 1SBL281024R8410 | 0.810 | |
| | | 220...230 | 230...240 | 1 0 | UA30-30-10RA | 1SBL281024R8010 | 0.810 | |
| | | 230...240 | 240...260 | 1 0 | UA30-30-10RA | 1SBL281024R8810 | 0.810 | |
| | | 380...400 | 400...415 | 1 0 | UA30-30-10RA | 1SBL281024R8510 | 0.810 | |
| | | 400...415 | 415...440 | 1 0 | UA30-30-10RA | 1SBL281024R8610 | 0.810 | |

(1) Other control voltages see voltage code table.

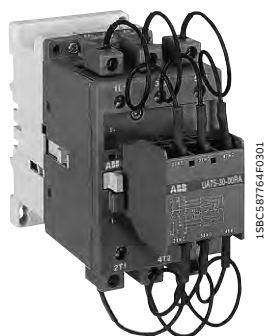


Main dimensions mm, inches

UA50..RA ... UA75..RA 3-pole contactors for capacitor switching

40 to 60 kvar - Unlimited peak current \hat{I}

AC operated



UA75-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

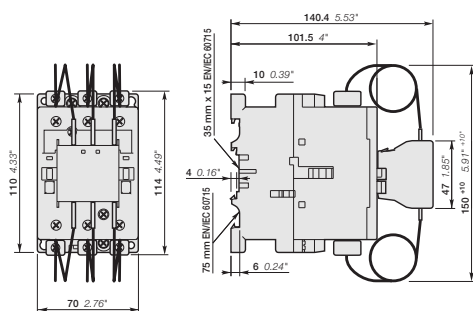
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
 - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
 - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage U _c (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) | | |
|--|---|--|-----------|---------------------------|--------------|-----------------|--------------------|-----------------|-------|
| | | V 50 Hz | V 60 Hz | | | | | | |
| Rated operational power $\theta \leq 40^\circ\text{C}$ 400 V AC-6b kvar | Rated operational power $\theta \leq 40^\circ\text{C}$ 480 V kvar | 40 | 50 | 24 | 24 | 0 0 | UA50-30-00RA | 1SBL351024R8100 | 1.350 |
| | | | | 110 | 110...120 | 0 0 | UA50-30-00RA | 1SBL351024R8400 | 1.350 |
| | | | | 220...230 | 230...240 | 0 0 | UA50-30-00RA | 1SBL351024R8000 | 1.350 |
| | | | | 230...240 | 240...260 | 0 0 | UA50-30-00RA | 1SBL351024R8800 | 1.350 |
| | | | | 380...400 | 400...415 | 0 0 | UA50-30-00RA | 1SBL351024R8500 | 1.350 |
| | | | | 400...415 | 415...440 | 0 0 | UA50-30-00RA | 1SBL351024R8600 | 1.350 |
| | | 50 | 55 | 24 | 24 | 0 0 | UA63-30-00RA | 1SBL371024R8100 | 1.350 |
| | | | | 110 | 110...120 | 0 0 | UA63-30-00RA | 1SBL371024R8400 | 1.350 |
| | | | | 220...230 | 230...240 | 0 0 | UA63-30-00RA | 1SBL371024R8000 | 1.350 |
| | | | | 230...240 | 240...260 | 0 0 | UA63-30-00RA | 1SBL371024R8800 | 1.350 |
| 380...400 | 400...415 | | | 0 0 | UA63-30-00RA | 1SBL371024R8500 | 1.350 | | |
| 400...415 | 415...440 | | | 0 0 | UA63-30-00RA | 1SBL371024R8600 | 1.350 | | |
| 60 | 64 | 24 | 24 | 0 0 | UA75-30-00RA | 1SBL411024R8100 | 1.350 | | |
| | | 110 | 110...120 | 0 0 | UA75-30-00RA | 1SBL411024R8400 | 1.350 | | |
| | | 220...230 | 230...240 | 0 0 | UA75-30-00RA | 1SBL411024R8000 | 1.350 | | |
| | | 230...240 | 240...260 | 0 0 | UA75-30-00RA | 1SBL411024R8800 | 1.350 | | |
| | | 380...400 | 400...415 | 0 0 | UA75-30-00RA | 1SBL411024R8500 | 1.350 | | |
| | | 400...415 | 415...440 | 0 0 | UA75-30-00RA | 1SBL411024R8600 | 1.350 | | |

(1) Other control voltages see voltage code table.

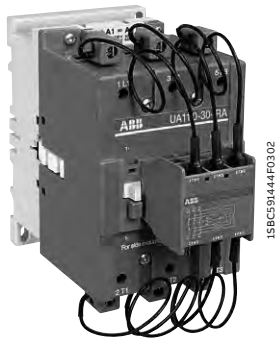


UA50..RA, UA63..RA, UA75..RA

Main dimensions mm, inches

UA95..RA ... UA110..RA 3-pole contactors for capacitor switching

70 to 80 kvar - Unlimited peak current \hat{I}
AC operated



UA110-30-00 RA

UA..RA contactors for capacitor switching can be used for installations in which the peak current far exceeds 100 times nominal rms current. The contactors are delivered complete with their damping resistors and must be used without additional inductances.

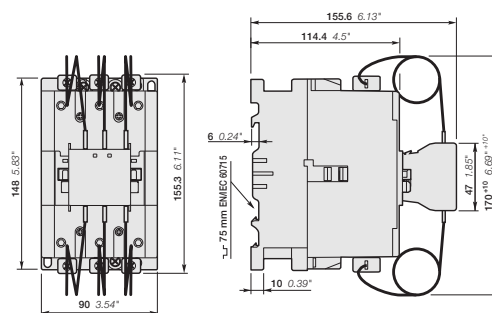
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- the UA..RA contactors are fitted with a special front-mounted block, which ensures the serial insertion of 3 damping resistors into the circuit to limit the current peak on energization of the capacitor bank
 - their connection also ensures capacitor precharging in order to limit the second current peak occurring upon making of the main poles
 - the insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.
- control circuit: AC operated
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| IEC | UL/CSA | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-----|--------|--------------------------------------|-----------|---------------------------|---------------|-----------------|-----------------------|
| | | V 50 Hz | V 60 Hz | | | | |
| 70 | 80 | 24 | 24 | 0 0 | UA95-30-00RA | 1SFL431024R8100 | 2.000 |
| | | 110 | 110...120 | 0 0 | UA95-30-00RA | 1SFL431024R8400 | 2.000 |
| | | 220...230 | 230...240 | 0 0 | UA95-30-00RA | 1SFL431024R8000 | 2.000 |
| | | 230...240 | 240...260 | 0 0 | UA95-30-00RA | 1SFL431024R8800 | 2.000 |
| | | 380...400 | 400...415 | 0 0 | UA95-30-00RA | 1SFL431024R8500 | 2.000 |
| | | 400...415 | 415...440 | 0 0 | UA95-30-00RA | 1SFL431024R8600 | 2.000 |
| 80 | 95 | 24 | 24 | 0 0 | UA110-30-00RA | 1SFL451024R8100 | 2.000 |
| | | 110 | 110...120 | 0 0 | UA110-30-00RA | 1SFL451024R8400 | 2.000 |
| | | 220...230 | 230...240 | 0 0 | UA110-30-00RA | 1SFL451024R8000 | 2.000 |
| | | 230...240 | 240...260 | 0 0 | UA110-30-00RA | 1SFL451024R8800 | 2.000 |
| | | 380...400 | 400...415 | 0 0 | UA110-30-00RA | 1SFL451024R8500 | 2.000 |
| | | 400...415 | 415...440 | 0 0 | UA110-30-00RA | 1SFL451024R8600 | 2.000 |

(1) Other control voltages see voltage code table.





UA95..RA, UA100..RA

Main dimensions mm, inches

UA..RA 3-pole contactors for capacitor switching

Unlimited peak current \hat{I}

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Available auxiliary contacts | Front-mounted accessories | Side-mounted accessories |
|-----------------|---|---|---------------------------|--------------------------|
| | | | Auxiliary contact blocks | Auxiliary contact blocks |
| |  |  | 1-pole CA5-.. | 2-pole CAL... |
| UA16-30-10RA | 3 0 | 1 0 | - | 1 x CAL5-11 |
| UA26-30-10RA | 3 0 | 1 0 | - | 1 to 2 x CAL5-11 |
| UA30-30-10RA | 3 0 | 1 0 | 1 x CA5-.. | + 1 to 2 x CAL5-11 |
| UA50-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5-.. | + 1 to 2 x CAL5-11 |
| UA63-30-00RA | 3 0 | 0 0 | | |
| UA75-30-00RA | 3 0 | 0 0 | | |
| UA95-30-00RA | 3 0 | 0 0 | 1 to 2 x CA5-.. | + 1 to 2 x CAL18-11 |
| UA110-30-00RA | 3 0 | 0 0 | | |

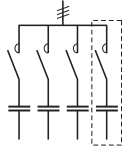
UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

Unlimited peak current \hat{I}

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA | |
|---|---|--|-----------|-----------|-----------|----------|-----------|----------|-----------|----------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | |
| Rated operational voltage U_e max. | | 690 V | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | |
| AC-6b Utilization category | | | | | | | | | | |
| Rated operational power AC-6b (1) | | | | | | | | | | |
| For air temperature close to contactor | $\theta \leq 40^\circ\text{C}$ | 230-240 V | 8 kvar | 12.5 kvar | 16 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar | 45 kvar |
| | | 400-415 V | 12.5 kvar | 22 kvar | 30 kvar | 40 kvar | 50 kvar | 60 kvar | 70 kvar | 80 kvar |
| | | 440 V | 15 kvar | 24 kvar | 32 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar |
| | $\theta \leq 55^\circ\text{C}$ | 500-550 V | 18 kvar | 30 kvar | 34 kvar | 55 kvar | 65 kvar | 75 kvar | 85 kvar | 95 kvar |
| | | 690 V | 22 kvar | 35 kvar | 45 kvar | 72 kvar | 80 kvar | 100 kvar | 120 kvar | 130 kvar |
| | | 230-240 V | 7.5 kvar | 11.5 kvar | 16 kvar | 24 kvar | 27 kvar | 30 kvar | 35 kvar | 40 kvar |
| | $\theta \leq 70^\circ\text{C}$ | 400-415 V | 12.5 kvar | 20 kvar | 27.5 kvar | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 70 kvar |
| | | 440 V | 13 kvar | 20 kvar | 30 kvar | 43 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 16 kvar | 25 kvar | 34 kvar | 50 kvar | 60 kvar | 65 kvar | 75 kvar | 82 kvar |
| | $\theta \leq 70^\circ\text{C}$ | 690 V | 21 kvar | 31 kvar | 45 kvar | 65 kvar | 75 kvar | 80 kvar | 105 kvar | 110 kvar |
| | | 230-240 V | 6 kvar | 9 kvar | 11 kvar | 20 kvar | 23 kvar | 25 kvar | 30 kvar | 35 kvar |
| | | 400-415 V | 10 kvar | 15.5 kvar | 19.5 kvar | 35 kvar | 39 kvar | 41 kvar | 53 kvar | 60 kvar |
| | $\theta \leq 70^\circ\text{C}$ | 440 V | 11 kvar | 17 kvar | 20.5 kvar | 37 kvar | 42.5 kvar | 45 kvar | 58 kvar | 70 kvar |
| | | 500-550 V | 12.5 kvar | 20 kvar | 25 kvar | 46 kvar | 50 kvar | 55 kvar | 70 kvar | 78 kvar |
| | | 690 V | 17 kvar | 26 kvar | 32 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar | 100 kvar |
| Max. permissible peak current \hat{I} | | Unlimited | | | | | | | | |
| Short-circuit protection device for contactors gG type fuse (2) | | 80 A | 125 A | 200 A | | | | 250 A | | |
| Max. electrical switching frequency | | 240 cycles/h | | | | | | | | |
| Electrical durability AC-6b | $U_e \leq 440\text{ V}$ | 250 000 operating cycles | | | | | | | | |
| | $500\text{ V} \leq U_e \leq 690\text{ V}$ | 100 000 operating cycles | | | | | | | | |



Multi-step capacitor bank scheme

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.
Example: 50 kvar / 400 V corresponding to $0.9 \times 50 = 45\text{ kvar}/380\text{ V}$.

(2) The fuse ratings given represent the maximum ratings ensuring type 1 coordination according to the definition of standard IEC 60947-4-1.

Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA | UA63..RA | UA75..RA | UA95..RA | UA110..RA | |
|---|--------------------------------|-----------|----------|----------|----------|----------|-----------|----------|-----------|----------|
| Power - 60 Hz | | | | | | | | | | |
| For air temperature close to contactor | $\theta \leq 40^\circ\text{C}$ | 240 V | 8 kvar | 11 kvar | 14 kvar | 25 kvar | 27.5 kvar | 32 kvar | 40 kvar | 45 kvar |
| | | 480 V | 16 kvar | 22 kvar | 28 kvar | 50 kvar | 55 kvar | 64 kvar | 80 kvar | 95 kvar |
| | | 600 V | 20 kvar | 27 kvar | 35 kvar | 62 kvar | 70 kvar | 80 kvar | 100 kvar | 120 kvar |
| Max. permissible peak Current \hat{I} | | Unlimited | | | | | | | | |

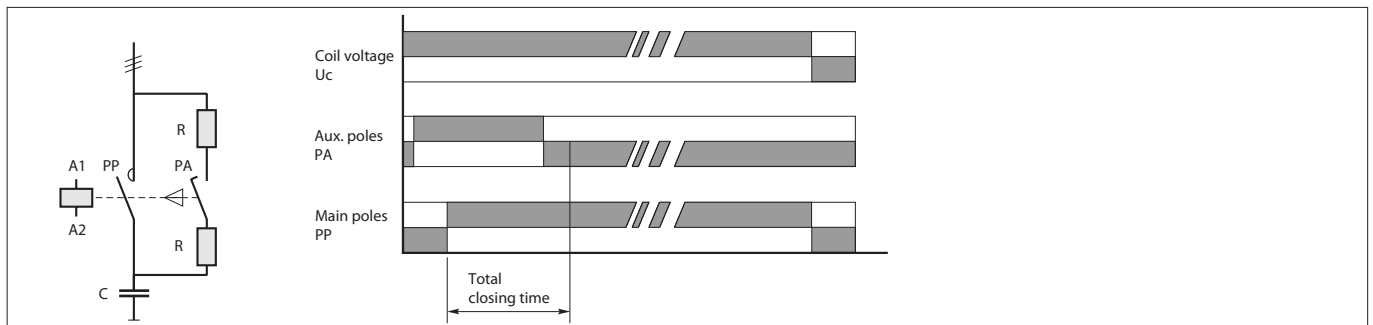
Operating principle

The front-mounted block mechanism of the UA..RA contactors ensures:

- early making of the auxiliary "PA" poles with respect to the main "PP" poles
- automatic return to the open position of the auxiliary "PA" poles after the main poles are closed.

When the coil is energized, the early making auxiliary poles connect the capacitor to the network via the set of 3 resistors. The damping resistors attenuate the first current peak and the second inrush current when the main contacts begin to make. Once the main poles are in the closed position, the auxiliary poles automatically break.

When the coil is de-energized, the main poles break ensuring the breaking of the capacitor bank. The contactor can then begin a new cycle.












The insertion of resistors allows to damp the highest current peak of the capacitor when switching on, whatever its level.

UA16..RA ... UA110..RA 3-pole contactors for capacitor switching

Unlimited peak current \hat{I}

Technical data

Connecting characteristics

| Contactor types | AC operated | UA16..RA | UA26..RA | UA30..RA | UA50..RA UA63..RA UA75..RA | UA95..RA UA110..RA | | |
|---|------------------------------|------------------------------------|-------------|--|----------------------------------|-------------------------------------|---------------------------------|----------------------------|
| Connection capacity (min. ... max.) | | | | | | | | |
| Main conductors (poles) | | | | | | | | |
|  | Rigid | Solid ($\leq 4 \text{ mm}^2$) | 1 x | 1..4 mm ² | 1.5..6 mm ² | 2.5...16 mm ² | 6...50 mm ² | 10...95 mm ² |
|  | | Stranded ($\geq 6 \text{ mm}^2$) | 2 x | - | - | 2.5...16 + 2.5...6 mm ² | 6...25 + 6...16 mm ² | 6...35 mm ² |
|  | Flexible with ferrule | | 1 x | 0.75...2.5 mm ² | 1.5...4 mm ² | 2.5...10 mm ² | 6...35 mm ² | 10...70 mm ² |
|  | Bars or lugs | | 2 x | - | - | 2.5...10 + 2.5...4 mm ² | 6...16 + 6...10 mm ² | 6...35 mm ² |
| | | | L \leq | 7.7 mm | 10 mm | - | - | - |
| | | | l > | 3.7 mm | 4.2 mm | - | - | - |
| | | | 1 or 2 x | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 |
| | | | Recommended | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 53 lb.in |
| | | | Max. | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | |
|  | Rigid solid | | 1 x | 1..4 mm ² | | | | 0.75...2.5 mm ² |
|  | | | 2 x | 1..4 mm ² | | | | 0.75...2.5 mm ² |
|  | Flexible with ferrule | | 1 x | 0.75...2.5 mm ² | | | 1...2.5 mm ² | 0.75...2.5 mm ² |
|  | | | 2 x | 0.75...2.5 mm ² | | | | |
|  | Lugs | Coil terminals | L \leq | 8 mm | | | | |
| | | | l > | 3.7 mm | | | | |
| | | Built-in auxiliary terminals | L \leq | 7.7 mm | 10 mm | 8 mm | - | - |
| | | | l > | 3.7 mm | 4.2 mm | 3.7 mm | - | - |
| | | | 1 or 2 x | AWG 18...14 | | | | |
| Tightening torque | | | | | | | | |
| | Coil terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | | Max. | | 1.2 Nm | | | | |
| | Built-in auxiliary terminals | Recommended | | 1 Nm / 9 lb.in | | | | |
| | | Max. | | 1.2 Nm | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | |
| | Main terminals | | | IP20 | | IP10 | | |
| | Coil terminals | | | IP20 | | | | |
| | Built-in auxiliary terminals | | | IP20 | | | - | - |
| Screw terminals | | | | | | | | |
| | Main terminals | | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| | | | | M 3.5 | M 4 | M 5 | M 6 | M 8 |
| | | Screwdriver type | | Flat \varnothing 5.5 / Pozidriv 2 | | Flat \varnothing 6.5 / Pozidriv 2 | | Hexagon socket (s = 4 mm) |
| | Coil terminals | | | M 3.5 | | | | |
| | | Screwdriver type | | Flat \varnothing 5.5 / Pozidriv 2 | | | | |
| | Built-in auxiliary terminals | | | M 3.5 | M 4 | M 3.5 | - | - |
| | | Screwdriver type | | Flat \varnothing 5.5 / Pozidriv 2 | | | - | - |

Other technical characteristics are the same as those of standard A contactors.

UA16 ... UA30 3-pole contactors for capacitor switching

12.5 to 27.5 kvar - Peak current $\hat{I} \leq 100$ times the rms current
AC operated



UA16-30-10



UA30-30-10

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

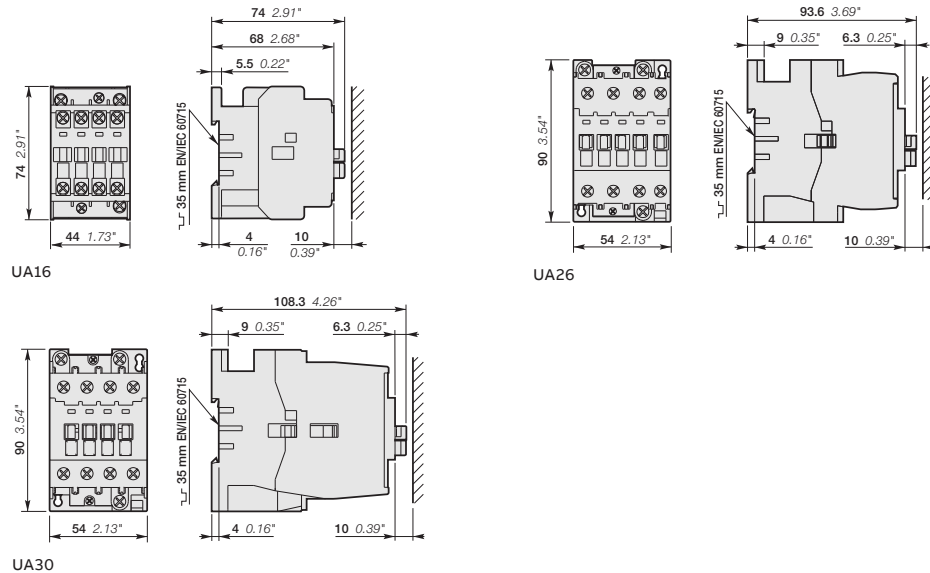
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|---|-------------------------------|--|-------------------------------|-----------------|---------------------------|------------|-----------------|--------|
| Rated operational power $\theta \leq 40^\circ\text{C}$ 400 V AC-6b | Max peak current \hat{I} | Rated operational power $\theta \leq 40^\circ\text{C}$ 480 V | Uc (1) | | | | | |
| kvar | kA | kvar | V 50 Hz | V 60 Hz | | | kg | |
| 12.5 | 1.8 | - | 24 | 24 | 1 0 | UA16-30-10 | 1SBL181022R8110 | 0.340 |
| | | | 48 | 48 | 1 0 | UA16-30-10 | 1SBL181022R8310 | 0.340 |
| | | | 110 | 110...120 | 1 0 | UA16-30-10 | 1SBL181022R8410 | 0.340 |
| | | | 220...230 | 230...240 | 1 0 | UA16-30-10 | 1SBL181022R8010 | 0.340 |
| | | | 230...240 | 240...260 | 1 0 | UA16-30-10 | 1SBL181022R8810 | 0.340 |
| | | | 380...400 | 400...415 | 1 0 | UA16-30-10 | 1SBL181022R8510 | 0.340 |
| 20 | 3 | 25 | 48 | 48 | 1 0 | UA26-30-10 | 1SBL241022R8310 | 0.600 |
| | | | 110 | 110...120 | 1 0 | UA26-30-10 | 1SBL241022R8410 | 0.600 |
| | | | 220...230 | 230...240 | 1 0 | UA26-30-10 | 1SBL241022R8010 | 0.600 |
| | | | 230...240 | 240...260 | 1 0 | UA26-30-10 | 1SBL241022R8810 | 0.600 |
| | | | 380...400 | 400...415 | 1 0 | UA26-30-10 | 1SBL241022R8510 | 0.600 |
| | | | 400...415 | 415...440 | 1 0 | UA26-30-10 | 1SBL241022R8610 | 0.600 |
| 27.5 | 3.5 | 32 | 24 | 24 | 1 0 | UA30-30-10 | 1SBL281022R8110 | 0.710 |
| | | | 48 | 48 | 1 0 | UA30-30-10 | 1SBL281022R8310 | 0.710 |
| | | | 110 | 110...120 | 1 0 | UA30-30-10 | 1SBL281022R8410 | 0.710 |
| | | | 220...230 | 230...240 | 1 0 | UA30-30-10 | 1SBL281022R8010 | 0.710 |
| | | | 230...240 | 240...260 | 1 0 | UA30-30-10 | 1SBL281022R8810 | 0.710 |
| | | | 380...400 | 400...415 | 1 0 | UA30-30-10 | 1SBL281022R8510 | 0.710 |
| 400...415 | 415...440 | 1 0 | UA30-30-10 | 1SBL281022R8610 | 0.710 | | | |

(1) Other control voltages see voltage code table.



Main dimensions mm, inches

UA50 ... UA75 3-pole contactors for capacitor switching

33 to 50 kvar - Peak current $\hat{I} \leq 100$ times the rms current
 AC operated



UA50-30-00

UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less than or equal to 100 times nominal rms current.

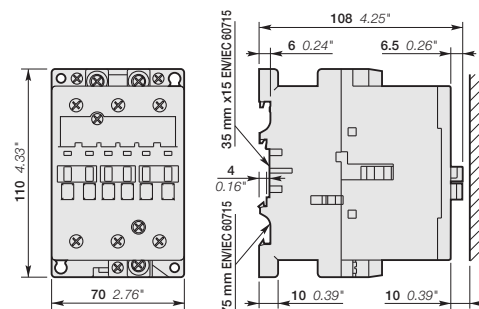
The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Weight |
|--|-------------------------------------|---|-------------------------------|-----------|---------------------------|------------|-----------------|--------|
| Rated operational power $\theta \leq 40^\circ\text{C}$ 400 V AC-6b kvar | Max peak current \hat{I} kA | Rated operational power $\theta \leq 40^\circ\text{C}$ 480 V kvar | Uc (1) V 50 Hz | V 60 Hz | | | | |
| 33 | 5 | 40 | 24 | 24 | 0 0 | UA50-30-00 | 1SBL351022R8100 | 1.160 |
| | | | 48 | 48 | 0 0 | UA50-30-00 | 1SBL351022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA50-30-00 | 1SBL351022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA50-30-00 | 1SBL351022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA50-30-00 | 1SBL351022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA50-30-00 | 1SBL351022R8500 | 1.160 |
| 45 | 6.5 | - | 48 | 48 | 0 0 | UA63-30-00 | 1SBL371022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA63-30-00 | 1SBL371022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA63-30-00 | 1SBL371022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA63-30-00 | 1SBL371022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA63-30-00 | 1SBL371022R8500 | 1.160 |
| | | | 400...415 | 415...440 | 0 0 | UA63-30-00 | 1SBL371022R8600 | 1.160 |
| 50 | 7.5 | 55 | 24 | 24 | 0 0 | UA75-30-00 | 1SBL411022R8100 | 1.160 |
| | | | 48 | 48 | 0 0 | UA75-30-00 | 1SBL411022R8300 | 1.160 |
| | | | 110 | 110...120 | 0 0 | UA75-30-00 | 1SBL411022R8400 | 1.160 |
| | | | 220...230 | 230...240 | 0 0 | UA75-30-00 | 1SBL411022R8000 | 1.160 |
| | | | 230...240 | 240...260 | 0 0 | UA75-30-00 | 1SBL411022R8800 | 1.160 |
| | | | 380...400 | 400...415 | 0 0 | UA75-30-00 | 1SBL411022R8500 | 1.160 |
| | | | 400...415 | 415...440 | 0 0 | UA75-30-00 | 1SBL411022R8600 | 1.160 |

(1) Other control voltages see voltage code table.



UA50, UA63, UA75

Main dimensions mm, inches

UA95 ... UA110 3-pole contactors for capacitor switching

65 to 75 kvar - Peak current $\hat{I} \leq 100$ times the rms current
AC operated



UA110-30-00

1SFC5801095F0303

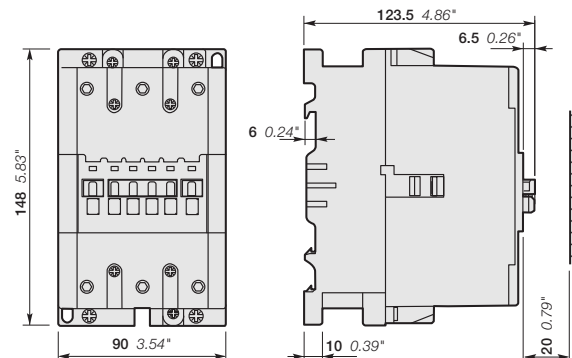
UA contactors can be used for the switching of capacitor banks whose inrush current peaks are less or equal to 100 times nominal rms current. The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

These contactors are of the block type design with:

- 3 main poles
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| IEC | | UL/CSA | Rated control circuit voltage U_c (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--|----------------------------------|---|---|-----------|---------------------------|-------------|-----------------|-----------------------------|
| Rated operational power $\theta \leq 40^\circ\text{C}$ 400 V AC-6b kvar | Max peak current \hat{I} kA | Rated operational power $\theta \leq 40^\circ\text{C}$ 480 V kvar | V 50 Hz | V 60 Hz | | | | |
| 65 | 9.3 | 70 | 24 | 24 | 0 0 | UA95-30-00 | 1SFL431022R8100 | 2.000 |
| | | | 48 | 48 | 0 0 | UA95-30-00 | 1SFL431022R8300 | 2.000 |
| | | | 110 | 110...120 | 0 0 | UA95-30-00 | 1SFL431022R8400 | 2.000 |
| | | | 220...230 | 230...240 | 0 0 | UA95-30-00 | 1SFL431022R8000 | 2.000 |
| | | | 230...240 | 240...260 | 0 0 | UA95-30-00 | 1SFL431022R8800 | 2.000 |
| | | | 380...400 | 400...415 | 0 0 | UA95-30-00 | 1SFL431022R8500 | 2.000 |
| | | | 400...415 | 415...440 | 0 0 | UA95-30-00 | 1SFL431022R8600 | 2.000 |
| 75 | 10.5 | 80 | 24 | 24 | 0 0 | UA110-30-00 | 1SFL451022R8100 | 2.000 |
| | | | 48 | 48 | 0 0 | UA110-30-00 | 1SFL451022R8300 | 2.000 |
| | | | 110 | 110...120 | 0 0 | UA110-30-00 | 1SFL451022R8400 | 2.000 |
| | | | 220...230 | 230...240 | 0 0 | UA110-30-00 | 1SFL451022R8000 | 2.000 |
| | | | 230...240 | 240...260 | 0 0 | UA110-30-00 | 1SFL451022R8800 | 2.000 |
| | | | 380...400 | 400...415 | 0 0 | UA110-30-00 | 1SFL451022R8500 | 2.000 |
| | | | 400...415 | 415...440 | 0 0 | UA110-30-00 | 1SFL451022R8600 | 2.000 |

(1) Other control voltages see voltage code table.



UA95, UA110



Main dimensions mm, inches

UA... 3-pole contactors for capacitor switching

Peak current $\hat{I} \leq 100$ times the rms current

Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

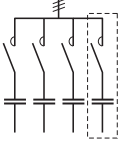
| Contactor types | Main poles  | Available auxiliary contacts  | Front-mounted accessories Auxiliary contact blocks | | Side-mounted accessories Auxiliary contact blocks |
|-----------------|---|---|---|---|--|
| | | | 1-pole CA5-.. | 4-pole CA5-.. | 2-pole CAL... |
| UA16-30-10 | 3 0 | 1 0 | 1 to 4 x CA5-.. | or 1 x CA5-.. (4-pole) | + 1 to 2 x CAL5-11 |
| UA26-30-10 | 3 0 | 1 0 | 1 to 4 x CA5-.. | or 1 x CA5-.. (4-pole) | + 1 to 2 x CAL5-11 |
| UA30-30-10 | 3 0 | 1 0 | 1 to 5 x CA5-.. | or 1 x CA5-.. (4-pole) + 1 x 1-pole CA5-.. | + 1 to 2 x CAL5-11 |
| UA50-30-00 | 3 0 | 0 0 | 1 to 6 x CA5-.. | or 1 x CA5-.. (4-pole) | + 1 to 2 x CAL5-11 |
| UA63-30-00 | 3 0 | 0 0 | | + 2 x 1-pole CA5-.. | |
| UA75-30-00 | 3 0 | 0 0 | | | |
| UA95-30-00 | 3 0 | 0 0 | 1 to 6 x CA5-.. | or 1 x CA5-.. (4-pole) | + 1 to 2 x CAL18-11 |
| UA110-30-00 | 3 0 | 0 0 | | + 2 x 1-pole CA5-.. | |

UA16 ... UA110 3-pole contactors for capacitor switching

Peak current $\hat{I} \leq 100$ times the rms current

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 | |
|---|--|--|--------------|-----------|-----------|---------|-----------|---------|---------|---------|
| Standards | | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | | | | | | |
| Rated operational voltage U _e max. | | 690 V | | | | | | | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | | | | | | | |
| AC-6b Utilization category | | | | | | | | | | |
| Rated operational power AC-6b (1) | | | | | | | | | | |
| For air temperature close to contactor $\theta \leq 40\text{ }^{\circ}\text{C}$  Multi-step capacitor bank scheme | $\theta \leq 40\text{ }^{\circ}\text{C}$ | 230-240 V | 7.5 kvar | 12 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | | 400-415 V | 12.5 kvar | 20 kvar | 27.5 kvar | 33 kvar | 45 kvar | 50 kvar | 65 kvar | 75 kvar |
| | | 440 V | 13.7 kvar | 22 kvar | 30 kvar | 36 kvar | 50 kvar | 55 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 15.5 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | 690 V | 21.5 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | | 230-240 V | 6.7 kvar | 11 kvar | 16 kvar | 20 kvar | 25 kvar | 30 kvar | 35 kvar | 40 kvar |
| | $\theta \leq 55\text{ }^{\circ}\text{C}$ | 400-415 V | 11.7 kvar | 18.5 kvar | 27.5 kvar | 33 kvar | 43 kvar | 50 kvar | 65 kvar | 70 kvar |
| | | 440 V | 13 kvar | 20 kvar | 30 kvar | 36 kvar | 48 kvar | 53 kvar | 65 kvar | 75 kvar |
| | | 500-550 V | 14.7 kvar | 22 kvar | 34 kvar | 40 kvar | 50 kvar | 62 kvar | 70 kvar | 80 kvar |
| | | 690 V | 20 kvar | 30 kvar | 45 kvar | 55 kvar | 70 kvar | 75 kvar | 80 kvar | 90 kvar |
| | | 230-240 V | 6 kvar | 8.5 kvar | 11 kvar | 19 kvar | 21 kvar | 22 kvar | 30 kvar | 35 kvar |
| | | 400-415 V | 10 kvar | 14.5 kvar | 19 kvar | 32 kvar | 37 kvar | 39 kvar | 55 kvar | 65 kvar |
| $\theta \leq 70\text{ }^{\circ}\text{C}$ | 440 V | 11 kvar | 16 kvar | 20 kvar | 35 kvar | 41 kvar | 43 kvar | 55 kvar | 70 kvar | |
| | 500-550 V | 12.5 kvar | 19.5 kvar | 23.5 kvar | 40 kvar | 45 kvar | 47.5 kvar | 60 kvar | 75 kvar | |
| | 690 V | 17 kvar | 25 kvar | 32 kvar | 52 kvar | 60 kvar | 65 kvar | 70 kvar | 85 kvar | |
| | Max. permissible peak current \hat{I} | U _e ≤ 500 V | 1.8 kA | 3 kA | 3.5 kA | 5 kA | 6.5 kA | 7.5 kA | 9.3 kA | 10.5 kA |
| | | U _e > 500 V | 1.6 kA | 2.7 kA | 3.1 kA | 4.5 kA | 5.8 kA | 6.75 kA | 8 kA | 9 kA |
| | Short-circuit protection device for contactors | | gG type fuse | | | | | | | |
| | | sized 1.5...1.8 I _n of the capacitor | | | | | | | | |
| Max. electrical switching frequency | | 240 cycles/h | | | | | | | | |
| Electrical durability AC-6b | U _e ≤ 690 V | 100 000 operating cycles | | | | | | | | |

(1) For 220 V and 380 V, multiply by 0.9 the rated values at 230 V and 400 V respectively.

Example: 50 kvar / 400 V corresponding to 0.9 x 50 = 45 kvar/380 V.

If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

Main pole - Utilization characteristics according to UL / CSA

| Contactor types | AC operated | UA16 | UA26 | UA30 | UA50 | UA63 | UA75 | UA95 | UA110 | |
|--|--|-------|------|-----------|---------|---------|------|-----------|---------|---------|
| Power - 60 Hz | | | | | | | | | | |
| For air temperature close to contactor | $\theta \leq 40\text{ }^{\circ}\text{C}$ | 240 V | - | 12.5 kvar | 16 kvar | 20 kvar | - | 27.5 kvar | 35 kvar | 40 kvar |
| | | 480 V | - | 25 kvar | 32 kvar | 40 kvar | - | 55 kvar | 70 kvar | 80 kvar |
| | | 600 V | - | 30 kvar | 40 kvar | 50 kvar | - | 70 kvar | 75 kvar | 85 kvar |











If, in an application, the current peak is greater than the maximum peak current \hat{I} specified in the tables above, select a higher rating, refer to the UA..RA contactors, or add inductances. (see application guide "Contactors for capacitor switching").

UA16 ... UA110 3-pole contactors for capacitor switching

Peak current $\hat{I} \leq 100$ times the rms current

Technical data

Connecting characteristics

| Contactor types | AC operated | UA16 | | UA26 | | UA30 | | UA50 | UA95 |
|--|-----------------------|--|----------|---|--------------------------|---|-------------------------|------------------------------------|-------|
| | | | | | | | | UA63 | UA110 |
| | | | | | | | | UA75 | |
| Connection capacity (min. ... max.) | | | | | | | | | |
| Main conductors (poles) | | | | | | | | | |
|  | Rigid | Solid ($\leq 4 \text{ mm}^2$) | 1 x | 1...4 mm ² | 1.5...6 mm ² | 2.5...16 mm ² | 6...50 mm ² | 10...95 mm ² | |
|  | | Stranded ($\geq 6 \text{ mm}^2$) | 2 x | 1...4 mm ² | 1.5...6 mm ² | 2.5...16 mm ² | 6...25 mm ² | 6...35 mm ² | |
|  | Flexible with ferrule | | 1 x | 0.75...2.5 mm ² | 0.75...4 mm ² | 2.5...10 mm ² | 6...35 mm ² | 10...70 mm ² | |
|  | | | 2 x | 0.75...2.5 mm ² | 0.75...4 mm ² | 2.5...10 mm ² | 6...16 mm ² | 6...35 mm ² | |
|  | Bars or lugs | | L \leq | 7.7 mm | 10 mm | - | - | - | |
| | | | l > | 3.7 mm | 4.2 mm | - | - | - | |
| Connection capacity acc. to UL/CSA | | | 1 or 2 x | AWG 18...10 | AWG 12...8 | AWG 8...4 | AWG 8...1 | AWG 6...2/0 | |
| Tightening torque | | Recommended | | 1 Nm / 9 lb.in | 1.7 Nm / 15 lb.in | 2.3 Nm / 20 lb.in | 4 Nm / 35 lb.in | 8 Nm / 71 lb.in | |
| | | Max. | | 1.2 Nm | 2.2 Nm | 2.6 Nm | 4.5 Nm | 9 Nm | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | | | | | | |
|  | Rigid solid | | 1 x | 1...4 mm ² | | | | 0.75...2.5 mm ² | |
|  | | | 2 x | 1...4 mm ² | | | | 0.75...2.5 mm ² | |
|  | Flexible with ferrule | | 1 x | 0.75...2.5 mm ² | | | 1...2.5 mm ² | 0.75...2.5 mm ² | |
|  | | | 2 x | 0.75...2.5 mm ² | | | | | |
|  | Lugs | Coil terminals | L \leq | 8 mm | | | | | |
| | | | l > | 3.7 mm | | | | | |
| | | Built-in auxiliary terminals | L \leq | 7.7 mm | 10 mm | 8 mm | - | - | |
| | | | l > | 3.7 mm | 4.2 mm | 3.7 mm | - | - | |
| Connection capacity acc. to UL/CSA | | | | AWG 18...14 | | | | | |
| Tightening torque | | | | | | | | | |
| Coil terminals | | Recommended | | 1 Nm / 9 lb.in | | | | | |
| | | Max. | | 1.2 Nm | | | | | |
| Built-in auxiliary terminals | | Recommended | | 1 Nm / 9 lb.in | | | | | |
| | | Max. | | 1.2 Nm | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | | | | | | |
| Main terminals | | | | IP20 | | | IP10 | | |
| Coil terminals | | | | IP20 | | | | | |
| Built-in auxiliary terminals | | | | IP20 | | | - | - | |
| Screw terminals | | | | | | | | | |
| Main terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | | | | |
| | | Screwdriver type | | M3.5 Flat \varnothing 5.5 / Pozidriv 2 | M4 | M5 Flat \varnothing 6.5 / Pozidriv 2 | M6 | M8 Hexagon socket (s = 4 mm) | |
| Coil terminals | | Screwdriver type | | M3.5 Flat \varnothing 5.5 / Pozidriv 2 | | | | | |
| Built-in auxiliary terminals | | Screwdriver type | | M3.5 Flat \varnothing 5.5 / Pozidriv 2 | M4 | M3.5 | - | - | |

Other technical characteristics are the same as those of standard A contactors.

AF 3-pole contactors for capacitor switching

Single step - Peak current $\hat{I} \leq 30$ times the rms current

The AF116 ... AF1650 3-pole contactors are suited for capacitor bank switching for the peak current and power values in the table below.

The capacitors must be discharged (maximum residual voltage at terminals ≤ 50 V) before being re-energized when the contactors are making.

In this conditions, electrical durability of contactors is equal to 100 000 operating cycles.

AF116 ... AF370 3-pole contactors

| Contactor types | AF116 | AF140 | AF146 | AF190 | AF205 | AF265 | AF305 | AF370 | |
|--|------------------|---------|---------|----------|----------|----------|----------|----------|----------|
| AC-6b Utilization category | | | | | | | | | |
| For air temperature close to contactor | | | | | | | | | |
| Rated operational power AC-6b | | | | | | | | | |
| $\theta \leq 40^\circ\text{C}$ | 230-240 V | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 75 kvar | 85 kvar | 100 kvar | 110 kvar |
| | 400-415 V | 75 kvar | 85 kvar | 90 kvar | 110 kvar | 130 kvar | 145 kvar | 165 kvar | 200 kvar |
| | 440 V | 75 kvar | 90 kvar | 93 kvar | 115 kvar | 135 kvar | 155 kvar | 180 kvar | 200 kvar |
| | 500-550 V | 83 kvar | 95 kvar | 110 kvar | 140 kvar | 160 kvar | 180 kvar | 210 kvar | 240 kvar |
| | 690 V | 80 kvar | 95 kvar | 110 kvar | 135 kvar | 170 kvar | 200 kvar | 240 kvar | 280 kvar |
| | 1000 V | - | - | 100 kvar | 140 kvar | 150 kvar | 155 kvar | 160 kvar | 170 kvar |
| | 230-240 V | 40 kvar | 45 kvar | 50 kvar | 60 kvar | 75 kvar | 85 kvar | 100 kvar | 110 kvar |
| | 400-415 V | 70 kvar | 85 kvar | 90 kvar | 110 kvar | 130 kvar | 145 kvar | 165 kvar | 200 kvar |
| | 440 V | 75 kvar | 90 kvar | 93 kvar | 115 kvar | 135 kvar | 155 kvar | 180 kvar | 200 kvar |
| | 500-550 V | 83 kvar | 95 kvar | 110 kvar | 135 kvar | 160 kvar | 180 kvar | 210 kvar | 240 kvar |
| | 690 V | 80 kvar | 95 kvar | 110 kvar | 135 kvar | 170 kvar | 200 kvar | 240 kvar | 280 kvar |
| | 1000 V | - | - | 100 kvar | 140 kvar | 150 kvar | 155 kvar | 160 kvar | 170 kvar |
| | 230-240 V | 35 kvar | 40 kvar | 42 kvar | 45 kvar | 57 kvar | 70 kvar | 85 kvar | 100 kvar |
| | 400-415 V | 65 kvar | 70 kvar | 74 kvar | 83 kvar | 105 kvar | 135 kvar | 155 kvar | 180 kvar |
| | 440 V | 65 kvar | 75 kvar | 80 kvar | 85 kvar | 110 kvar | 140 kvar | 163 kvar | 180 kvar |
| | 500-550 V | 78 kvar | 90 kvar | 96 kvar | 102 kvar | 130 kvar | 165 kvar | 196 kvar | 220 kvar |
| | 690 V | 75 kvar | 90 kvar | 110 kvar | 135 kvar | 160 kvar | 200 kvar | 240 kvar | 260 kvar |
| | 1000 V | - | - | 95 kvar | 120 kvar | 130 kvar | 140 kvar | 150 kvar | 160 kvar |
| Max. permissible peak current I | $U_e \leq 500$ V | 4 kA | 4 kA | 4 kA | 5 kA | 6.5 kA | 8 kA | 8 kA | 8 kA |

AF400 ... AF1650 3-pole contactors

| Contactor types | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 | |
|--|------------------|----------|----------|----------|----------|----------|----------|
| AC-6b Utilization category | | | | | | | |
| For air temperature close to contactor | | | | | | | |
| Rated operational power AC-6b | | | | | | | |
| $\theta \leq 40^\circ\text{C}$ | 230-240 V | 120 kvar | 140 kvar | 170 kvar | 220 kvar | 300 kvar | |
| | 400-415 V | 210 kvar | 240 kvar | 285 kvar | 400 kvar | 500 kvar | |
| | 440 V | 220 kvar | 260 kvar | 300 kvar | 410 kvar | 550 kvar | |
| | 500-550 V | 260 kvar | 325 kvar | 350 kvar | 490 kvar | 600 kvar | |
| | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 800 kvar | |
| | 1000 V | 250 kvar | 300 kvar | 350 kvar | 450 kvar | - | |
| | 230-240 V | 120 kvar | 140 kvar | 170 kvar | 220 kvar | 250 kvar | 300 kvar |
| | 400-415 V | 210 kvar | 240 kvar | 285 kvar | 400 kvar | 450 kvar | 500 kvar |
| | 440 V | 220 kvar | 260 kvar | 300 kvar | 410 kvar | 500 kvar | 550 kvar |
| | 500-550 V | 260 kvar | 325 kvar | 350 kvar | 480 kvar | 550 kvar | 600 kvar |
| | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 650 kvar | 800 kvar |
| | 1000 V | 250 kvar | 300 kvar | 350 kvar | 450 kvar | - | - |
| | 230-240 V | 105 kvar | 120 kvar | 160 kvar | 190 kvar | 230 kvar | 280 kvar |
| | 400-415 V | 195 kvar | 225 kvar | 275 kvar | 370 kvar | 430 kvar | 480 kvar |
| | 440 V | 200 kvar | 230 kvar | 290 kvar | 380 kvar | 470 kvar | 520 kvar |
| | 500-550 V | 241 kvar | 300 kvar | 340 kvar | 435 kvar | 530 kvar | 570 kvar |
| | 690 V | 300 kvar | 325 kvar | 440 kvar | 600 kvar | 630 kvar | 750 kvar |
| | 1000 V | 220 kvar | 270 kvar | 300 kvar | 400 kvar | - | - |
| Max. permissible peak current I | $U_e \leq 500$ V | 10 kA | 10 kA | 12 kA | 12 kA | 18 kA | 20 kA |



NF 4-pole and 8-pole contactor relays

Ordering details 4-pole contactor relays

- 3/236** NF AC / DC operated
- 3/237** NFZ 24 V DC operated designed for PLC
- 3/238** NFZ AC / DC operated for specific applications
- 3/239** Contactor relays and main accessories

Ordering details 8-pole contactor relays

- 3/240** NF AC / DC operated
- 3/241** NFZ 24 V DC operated designed for PLC
- 3/242** NFZ AC / DC operated for specific applications
- 3/243** Contactor relays and main accessories

3/244 Technical data

Ordering details contactor relays with Push-in Spring terminals

- 3/247** NF..K AC / DC operated
- 3/248** NFZ..K 24 V DC operated designed for PLC
- 3/249** NFZ..K AC / DC operated for specific applications
- 3/250** Contactor relays and main accessories

3/251 Technical data

3/434 Voltage code table



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

NF 4-pole contactor relays

AC / DC operated



NF22E

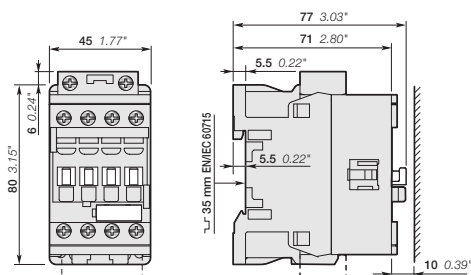
NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - reduced panel energy consumption
 - very distinct closing and opening.
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Weight Pkg (1 pce) kg | |
|--------------------|--|-----------|------|------------|---------------------------------|-------|
| | V 50/60 Hz | V DC | | | | |
| | 24...60 | 20...60 | (1) | NF22E-11 | 1SBH137001R1122 | 0.270 |
| | 48...130 | 48...130 | | NF22E-12 | 1SBH137001R1222 | 0.270 |
| | 100...250 | 100...250 | | NF22E-13 | 1SBH137001R1322 | 0.270 |
| | 250...500 | 250...500 | | NF22E-14 | 1SBH137001R1422 | 0.310 |
| | 24...60 | 20...60 | (1) | NF31E-11 | 1SBH137001R1131 | 0.270 |
| | 48...130 | 48...130 | | NF31E-12 | 1SBH137001R1231 | 0.270 |
| | 100...250 | 100...250 | | NF31E-13 | 1SBH137001R1331 | 0.270 |
| | 250...500 | 250...500 | | NF31E-14 | 1SBH137001R1431 | 0.310 |
| | 24...60 | 20...60 | (1) | NF40E-11 | 1SBH137001R1140 | 0.270 |
| | 48...130 | 48...130 | | NF40E-12 | 1SBH137001R1240 | 0.270 |
| | 100...250 | 100...250 | | NF40E-13 | 1SBH137001R1340 | 0.270 |
| | 250...500 | 250...500 | | NF40E-14 | 1SBH137001R1440 | 0.310 |

(1) NF...-11 not suitable for direct control by PLC-output.



NF22E, NF31E, NF40E

Main dimensions mm, inches

NFZ 4-pole contactor relays

24 V DC operated designed for PLC



NFZ22E-30

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

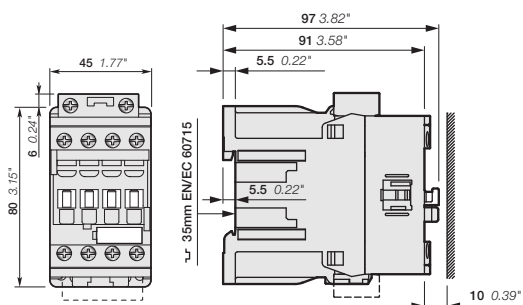
- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage U_c | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|-------------------------------------|------|------------|-----------------------------|
| | V DC | | | |

4-pole contactor relays

| | | | | |
|--|----|-----------|-----------------|-------|
| | 24 | NFZ22E-30 | 1SBH136001R3022 | 0.430 |
| | 24 | NFZ31E-30 | 1SBH136001R3031 | 0.430 |
| | 24 | NFZ40E-30 | 1SBH136001R3040 | 0.430 |

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

NFZ 4-pole contactor relays

AC / DC operated for specific applications



NFZ22E

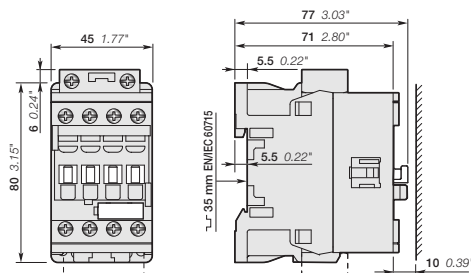
NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 4 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|-----------|-----------|-----------------|--------------------------------|
| | V 50/60 Hz | V DC | | | |
| | - | 12...20 | NFZ22E-20 | 1SBH136001R2022 | 0.310 |
| | 24...60 | 20...60 | NFZ22E-21 | 1SBH136001R2122 | 0.310 |
| | 48...130 | 48...130 | NFZ22E-22 | 1SBH136001R2222 | 0.310 |
| | 100...250 | 100...250 | NFZ22E-23 | 1SBH136001R2322 | 0.310 |
| | - | 12...20 | NFZ31E-20 | 1SBH136001R2031 | 0.310 |
| | 24...60 | 20...60 | NFZ31E-21 | 1SBH136001R2131 | 0.310 |
| | 48...130 | 48...130 | NFZ31E-22 | 1SBH136001R2231 | 0.310 |
| | 100...250 | 100...250 | NFZ31E-23 | 1SBH136001R2331 | 0.310 |
| | - | 12...20 | NFZ40E-20 | 1SBH136001R2040 | 0.310 |
| | 24...60 | 20...60 | NFZ40E-21 | 1SBH136001R2140 | 0.310 |
| | 48...130 | 48...130 | NFZ40E-22 | 1SBH136001R2240 | 0.310 |
| | 100...250 | 100...250 | NFZ40E-23 | 1SBH136001R2340 | 0.310 |

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

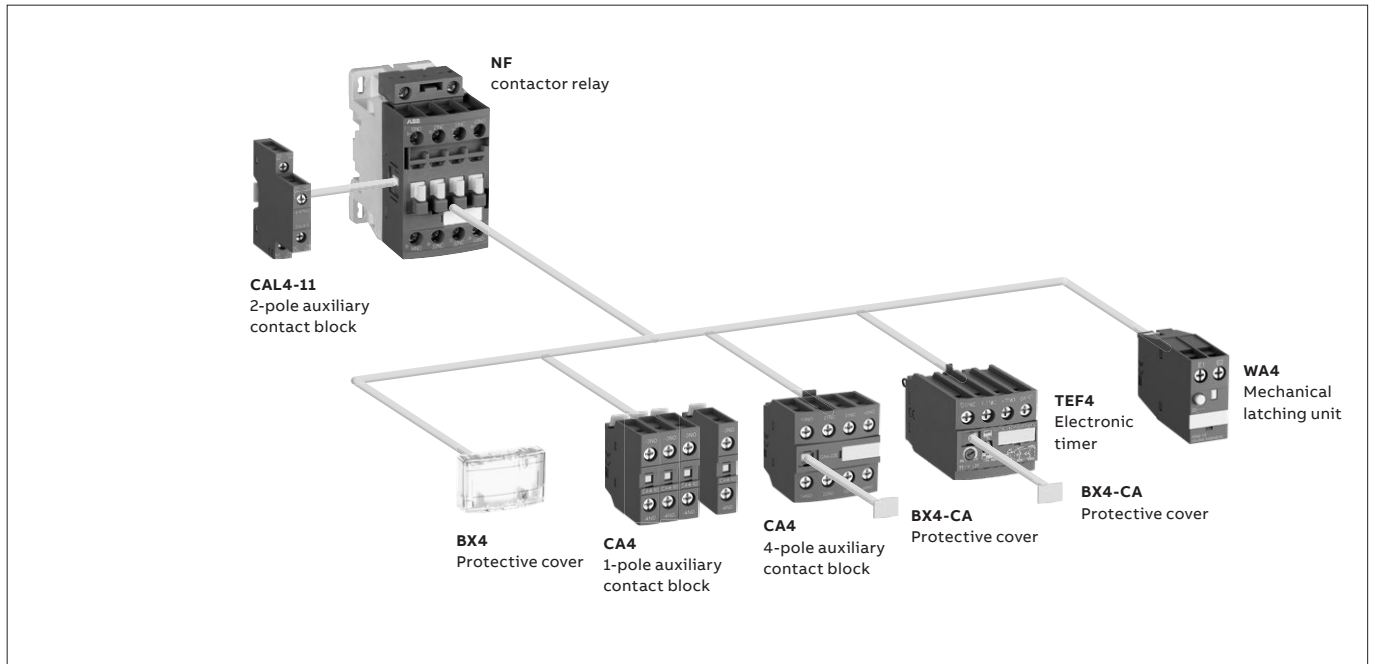


NFZ22E, NFZ31E, NFZ40E

Main dimensions mm, inches

NF 4-pole contactor relays

Contactor relays and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles | Front-mounted accessories | | | | Side-mounted accessories | |
|---|-------------------------------------|---------------------------|------------|------------------|--------------------------|-----------------------------|------------|
| | | Auxiliary contact blocks | | Electronic timer | Mechanical latching unit | Auxiliary contact blocks | |
| | | 1-pole CA4 | 4-pole CA4 | TEF4 | WA4 (3) | 2-pole CAL4-11 Left side | Right side |
| NF(Z) | | | | | | | |
| NF | 2 2 E (1) 3 1 E (1) 4 0 E (2) | 4 max. | or 1 | or 1 | or 1 | + 1 | - |
| | | 2 max. | - | or 1 | or 1 | + 1 | + 1 |
| NFZ 24 V DC designed for PLC - coil 30 | | | | | | | |
| NFZ | 2 2 E (1) 3 1 E (1) 4 0 E (2) | 4 max. | or 1 | or 1 | - | or 1 | + 1 |
| | | 2 max. | - | or 1 | - | + 1 | - |
| | | - | - | 1 | - | + 1 | + 1 |

(1) Including add-on contacts: 3 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5.

(2) Including add-on contacts: 4 N.C. auxiliary contacts max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5.

(3) Accept 1-pole CA4 auxiliary contacts (1 block on each side of the mechanical latch) in respect to the total number of additional N.C. auxiliary contacts.

For WA4, accessory use with contactor relays coil 30, please consult your ABB local sales organization.

NF 8-pole contactor relays

AC / DC operated



NF44E



NF33/11



NF51/11

NF contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NF33/11 and NF51/11 variants
- overlapping of lagging / leading contacts for NF33/11 and NF51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 coils to cover control voltages between 24...500 V 50/60 Hz and 20...500 V DC
 - reduced panel energy consumption
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| Number of contacts | | Rated control circuit voltage Uc min. ... Uc max. | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|-----------|--|------|------------|--------------------------------|
| 1st stack | 2nd stack | | | | |
| | | V 50/60 Hz | V DC | | |

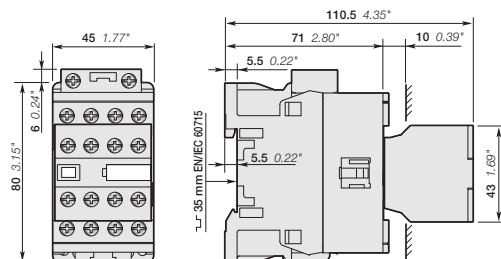
8-pole contactor relays

| | | | | | | |
|--|-----------|-----------|-----|----------|-----------------|-------|
| | 24...60 | 20...60 | (1) | NF44E-11 | 1SBH137001R1144 | 0.320 |
| | 48...130 | 48...130 | | NF44E-12 | 1SBH137001R1244 | 0.320 |
| | 100...250 | 100...250 | | NF44E-13 | 1SBH137001R1344 | 0.320 |
| | 250...500 | 250...500 | | NF44E-14 | 1SBH137001R1444 | 0.360 |
| | 24...60 | 20...60 | (1) | NF53E-11 | 1SBH137001R1153 | 0.320 |
| | 48...130 | 48...130 | | NF53E-12 | 1SBH137001R1253 | 0.320 |
| | 100...250 | 100...250 | | NF53E-13 | 1SBH137001R1353 | 0.320 |
| | 250...500 | 250...500 | | NF53E-14 | 1SBH137001R1453 | 0.360 |
| | 24...60 | 20...60 | (1) | NF62E-11 | 1SBH137001R1162 | 0.320 |
| | 48...130 | 48...130 | | NF62E-12 | 1SBH137001R1262 | 0.320 |
| | 100...250 | 100...250 | | NF62E-13 | 1SBH137001R1362 | 0.320 |
| | 250...500 | 250...500 | | NF62E-14 | 1SBH137001R1462 | 0.360 |
| | 24...60 | 20...60 | (1) | NF71E-11 | 1SBH137001R1171 | 0.320 |
| | 48...130 | 48...130 | | NF71E-12 | 1SBH137001R1271 | 0.320 |
| | 100...250 | 100...250 | | NF71E-13 | 1SBH137001R1371 | 0.320 |
| | 250...500 | 250...500 | | NF71E-14 | 1SBH137001R1471 | 0.360 |
| | 24...60 | 20...60 | (1) | NF80E-11 | 1SBH137001R1180 | 0.320 |
| | 48...130 | 48...130 | | NF80E-12 | 1SBH137001R1280 | 0.320 |
| | 100...250 | 100...250 | | NF80E-13 | 1SBH137001R1380 | 0.320 |
| | 250...500 | 250...500 | | NF80E-14 | 1SBH137001R1480 | 0.360 |

8-pole contactor relays with overlapping of lagging / leading contacts

| | | | | | | |
|--|-----------|-----------|-----|------------|-----------------|-------|
| | 24...60 | 20...60 | (1) | NF33/11-11 | 1SBH137001R1139 | 0.320 |
| | 48...130 | 48...130 | | NF33/11-12 | 1SBH137001R1239 | 0.320 |
| | 100...250 | 100...250 | | NF33/11-13 | 1SBH137001R1339 | 0.320 |
| | 250...500 | 250...500 | | NF33/11-14 | 1SBH137001R1439 | 0.320 |
| | 24...60 | 20...60 | (1) | NF51/11-11 | 1SBH137001R1159 | 0.320 |
| | 48...130 | 48...130 | | NF51/11-12 | 1SBH137001R1259 | 0.320 |
| | 100...250 | 100...250 | | NF51/11-13 | 1SBH137001R1359 | 0.320 |
| | 250...500 | 250...500 | | NF51/11-14 | 1SBH137001R1459 | 0.320 |

(1) NF...-11 not suitable for direct control by PLC.

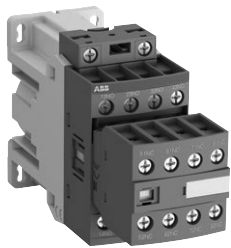


NF44E, NF53E, NF62E, NF71E, NF80E, NF33/11, NF51/11

Main dimensions mm, inches

NFZ 8-pole contactor relays

24 V DC operated designed for PLC



NFZ44E

1SBH101539V001.4

NFZ contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

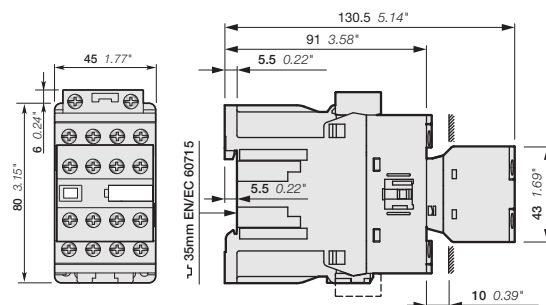
- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression.

| Number of contacts | Rated control circuit voltage U _c | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|------|------------|-----------------------------|
| | V DC | | | |

8-pole contactor relays

| | | | | |
|--|----|-----------|-----------------|-------|
| | 24 | NFZ44E-30 | 1SBH136001R3044 | 0.490 |
| | 24 | NFZ53E-30 | 1SBH136001R3053 | 0.490 |
| | 24 | NFZ62E-30 | 1SBH136001R3062 | 0.490 |
| | 24 | NFZ71E-30 | 1SBH136001R3071 | 0.490 |
| | 24 | NFZ80E-30 | 1SBH136001R3080 | 0.490 |

Note: NFZ contactor relays with DC control voltage 24 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E

Main dimensions mm, inches

NFZ 8-pole contactor relays

AC / DC operated for specific applications



NFZ44E



NFZ33/11



NFZ51/11

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with:

- 8 poles with a permanently fixed 4-pole auxiliary contact block. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol) except for NFZ33/11 and NFZ51/11 variants
- overlapping of lagging / leading contacts for NFZ33/11 and NFZ51/11 variants
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 coils to cover control voltages between 24 ... 250 V 50/60 Hz and 12 ... 250 V DC
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for side mounting and a wide range of accessories.

| Number of contacts 1st stack 2nd stack | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Weight Pkg (1 pce) kg |
|--|--|------|------|------------|--------------------------------|
| | V 50/60 Hz | V DC | | | |

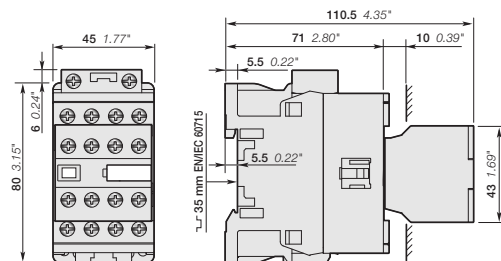
8-pole contactor relays

| | | | | | |
|--|-----------|-----------|-----------|-----------------|-------|
| | - | 12...20 | NFZ44E-20 | 1SBH136001R2044 | 0.360 |
| | 24...60 | 20...60 | NFZ44E-21 | 1SBH136001R2144 | 0.360 |
| | 48...130 | 48...130 | NFZ44E-22 | 1SBH136001R2244 | 0.360 |
| | 100...250 | 100...250 | NFZ44E-23 | 1SBH136001R2344 | 0.360 |
| | - | 12...20 | NFZ53E-20 | 1SBH136001R2053 | 0.360 |
| | 24...60 | 20...60 | NFZ53E-21 | 1SBH136001R2153 | 0.360 |
| | 48...130 | 48...130 | NFZ53E-22 | 1SBH136001R2253 | 0.360 |
| | 100...250 | 100...250 | NFZ53E-23 | 1SBH136001R2353 | 0.360 |
| | - | 12...20 | NFZ62E-20 | 1SBH136001R2062 | 0.360 |
| | 24...60 | 20...60 | NFZ62E-21 | 1SBH136001R2162 | 0.360 |
| | 48...130 | 48...130 | NFZ62E-22 | 1SBH136001R2262 | 0.360 |
| | 100...250 | 100...250 | NFZ62E-23 | 1SBH136001R2362 | 0.360 |
| | - | 12...20 | NFZ71E-20 | 1SBH136001R2071 | 0.360 |
| | 24...60 | 20...60 | NFZ71E-21 | 1SBH136001R2171 | 0.360 |
| | 48...130 | 48...130 | NFZ71E-22 | 1SBH136001R2271 | 0.360 |
| | 100...250 | 100...250 | NFZ71E-23 | 1SBH136001R2371 | 0.360 |
| | - | 12...20 | NFZ80E-20 | 1SBH136001R2080 | 0.360 |
| | 24...60 | 20...60 | NFZ80E-21 | 1SBH136001R2180 | 0.360 |
| | 48...130 | 48...130 | NFZ80E-22 | 1SBH136001R2280 | 0.360 |
| | 100...250 | 100...250 | NFZ80E-23 | 1SBH136001R2380 | 0.360 |

8-pole contactor relays with overlapping of lagging / leading contacts

| | | | | | |
|--|-----------|-----------|-------------|-----------------|-------|
| | - | 12...20 | NFZ33/11-20 | 1SBH136001R2039 | 0.360 |
| | 24...60 | 20...60 | NFZ33/11-21 | 1SBH136001R2139 | 0.360 |
| | 48...130 | 48...130 | NFZ33/11-22 | 1SBH136001R2239 | 0.360 |
| | 100...250 | 100...250 | NFZ33/11-23 | 1SBH136001R2339 | 0.360 |
| | - | 12...20 | NFZ51/11-20 | 1SBH136001R2059 | 0.360 |
| | 24...60 | 20...60 | NFZ51/11-21 | 1SBH136001R2159 | 0.360 |
| | 48...130 | 48...130 | NFZ51/11-22 | 1SBH136001R2259 | 0.360 |
| | 100...250 | 100...250 | NFZ51/11-23 | 1SBH136001R2359 | 0.360 |

Note: Only NFZ contactor relays with DC control voltage 12...20 V DC need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole

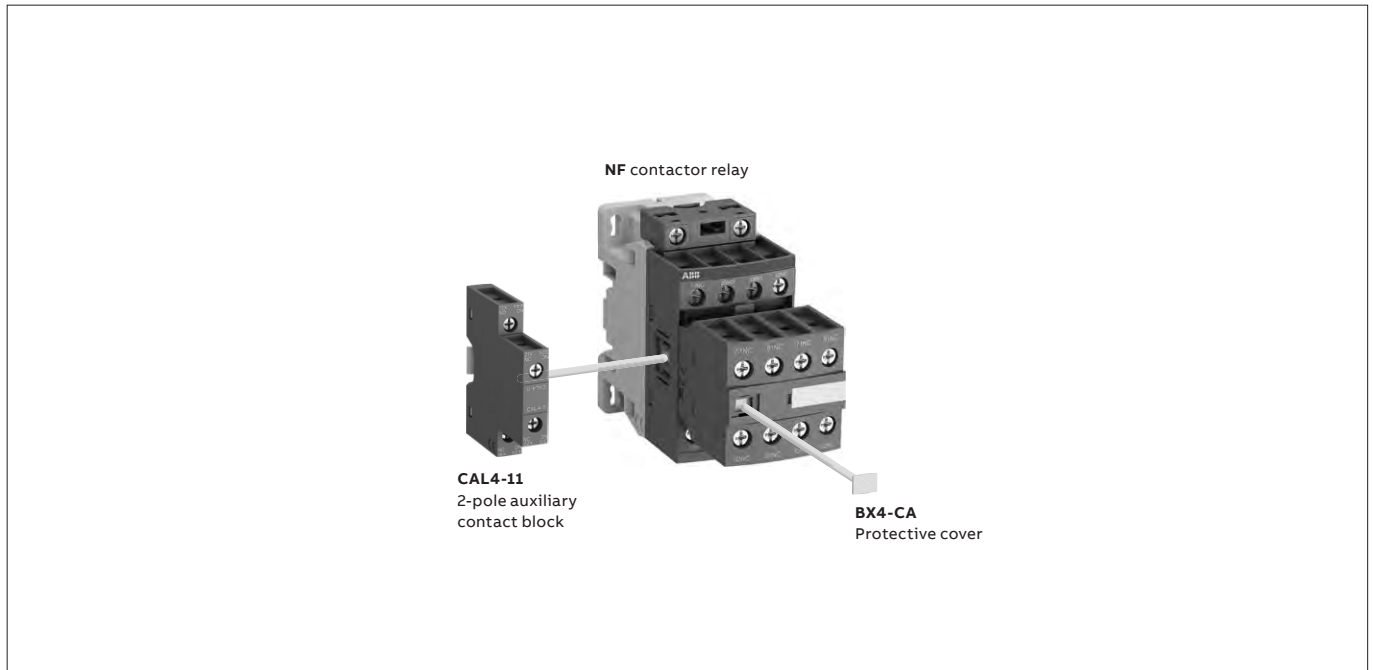


NFZ44E, NFZ53E, NFZ62E, NFZ71E, NFZ80E, NFZ33/11, NFZ51/11

Main dimensions mm, inches

NF 8-pole contactor relays

Contactor relays and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

| Contactor relay types | Main poles | Side-mounted accessories | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|--|--|------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|---|---|-----|--|---|---|-----|---|---|
| | | Auxiliary contact blocks 2-pole CAL4-11 (1) | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | Left side | Right side | | | | | | | | | | | | | | | | | | | | | | | | |
| NF | <table border="0"> <tr> <td>4</td> <td>4</td> <td>E</td> <td rowspan="5" style="font-size: 2em; vertical-align: middle;">➤</td> </tr> <tr> <td>5</td> <td>3</td> <td>E</td> </tr> <tr> <td>6</td> <td>2</td> <td>E</td> </tr> <tr> <td>7</td> <td>1</td> <td>E</td> </tr> <tr> <td>8</td> <td>0</td> <td>E</td> </tr> <tr> <td></td> <td>3</td> <td>/</td> <td>1 1</td> </tr> <tr> <td></td> <td>5</td> <td>/</td> <td>1 1</td> </tr> </table> | 4 | 4 | E | ➤ | 5 | 3 | E | 6 | 2 | E | 7 | 1 | E | 8 | 0 | E | | 3 | / | 1 1 | | 5 | / | 1 1 | 1 | - |
| 4 | 4 | E | ➤ | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | 3 | E | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | 2 | E | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | 1 | E | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | 0 | E | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 3 | / | 1 1 | | | | | | | | | | | | | | | | | | | | | | | | |
| | 5 | / | 1 1 | | | | | | | | | | | | | | | | | | | | | | | | |

(1) not allowed for 24 V DC operated contactor relay (coil 30).

NF contactor relays

Technical data

Contact utilization characteristics according to IEC

| Contact relay types | AC / DC operated | NF |
|--|--------------------|---|
| Standards | | IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1 |
| Rated operational voltage U _e max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | | 16 A |
| I _e / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Rated making capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| Rated breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| I _e / Rated operational current DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Conditional short-circuit current | | 1 kA |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts. |

Contact utilization characteristics according to UL / CSA

| Contact relay types | AC / DC operated | NF |
|--|------------------|------------------------|
| Standards | | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | | 600 V AC, 600 V DC |
| Pilot duty | | A600, Q600 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

NF contactor relays

Technical data

Magnet System Characteristics - NF contactor relays AC / DC operated

| | | |
|--|-----------------------|---|
| Contact relay types | AC / DC operated | NF |
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$. At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$. |
| | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage U_c | | 24...500 V AC |
| Coil consumption | Average pull-in value | 50 VA |
| | Average holding value | 2.2 VA / 2 W |
| DC control voltage | | |
| Rated control circuit voltage U_c | | 20...500 V DC |
| Coil consumption | Average pull-in value | 50 W |
| | Average holding value | 2 W |
| PLC-output control | | Not suitable for direct control by PLC-output |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Voltage sag immunity acc. to SEMI F47-0706 | | - |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | - |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms |
| | N.C. contact opening | 38...90 ms |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms |
| | N.C. contact closing | 13...98 ms |

Magnet System Characteristics - NFZ contactor relays 24V DC operated - designed for PLC - coil 30

| | | |
|--|-----------------------|--|
| Contact relay types | DC operated | NFZ |
| Coil operating limits acc. to IEC 60947-5-1 | DC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ at $\theta \leq 70^\circ\text{C}$ U_c |
| | | |
| DC control voltage | | |
| Rated control circuit voltage U_c | | 24 V DC |
| Coil consumption | Average pull-in value | 6 W |
| | Average holding value | 1.7 W |
| PLC-output control | | $\geq 250 \text{ mA}$ 24 V DC for PLCs and safety PLCs using broken wire detection |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 27 ... 53 ms |
| | N.C. contact opening | 20 ... 35 ms |
| Between coil de-energization and: | N.O. contact opening | 17 ... 29 ms |
| | N.C. contact closing | 22 ... 57 ms |

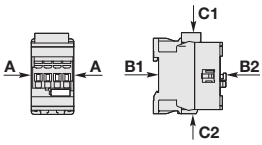
Magnet System Characteristics - NFZ... contactor relays - for specific applications - coils 20, 21, 22, 23

| | | |
|--|-----------------------|---|
| Contact relay types | AC / DC operated | NFZ |
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ |
| | DC supply | at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage U_c | | 24...250 V AC |
| Coil consumption | Average pull-in value | 16 VA |
| | Average holding value | 1.7 VA / 1.5 W |
| DC control voltage | | |
| Rated control circuit voltage U_c | | 12...250 V DC |
| Coil consumption | Average pull-in value | 12 ... 16 W |
| | Average holding value | 1.7 W |
| PLC-output control | | (NFZ coil 21) $\geq 500 \text{ mA}$ 24 V DC for PLCs - Not suitable for safety PLCs |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Voltage sag immunity acc. to SEMI F47-0706 | | Conditions of use on request |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | (NFZ coil 21, 22, 23) 20 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC |
| Operating time | | |
| Between coil energization and: | N.O. contact closing | 40...95 ms |
| | N.C. contact opening | 38...90 ms |
| Between coil de-energization and: | N.O. contact opening | 11...95 ms |
| | N.C. contact closing | 13...98 ms |

NF contactor relays

Technical data

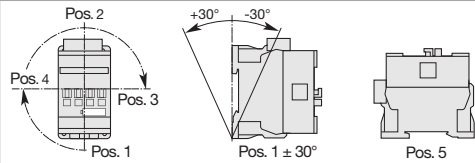
General technical data

| Contactor relay types | AC / DC operated | NF |
|---|------------------|--|
| Rated insulation voltage U_i acc. to IEC 60947-5-1 acc. to UL / CSA | | 690 V 600 V |
| Rated impulse withstand voltage U_{imp} . | | 6 kV |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40...+70 °C |
| Storage | | -60...+80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 millions operating cycles |
| Max. switching frequency | | 6000 cycles/h |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | | |
| Mounting position 1 | | |
|  | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
| | A | 30 g |
| | B1 | 25 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 25 g |
| | C2 | 25 g |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 4 g closed position / 2 g open position |


(1) Environment B: all NF contactor relays produced since week 08-2013.

NF..E-12 (48...130 V 50/60 Hz-DC) compliant to environment B, select NFZ..E-22.

Mounting characteristics

| Contactor relay types | AC / DC operated | NF |
|--|------------------|---|
| Mounting positions | |  |
| Mounting distances | | Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay The contactor relays can be assembled side by side. |
| Fixing | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |

Connecting characteristics

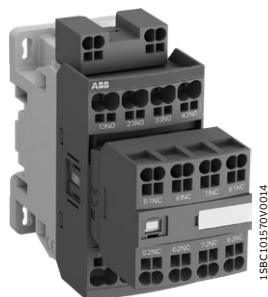
| Contactor relay types | AC / DC operated | NF |
|---|------------------|---|
| Main terminals | |  Screw terminals with cable clamp |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
| Rigid | 1 x | 1...2.5 mm ² |
| | 2 x | 1...2.5 mm ² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...1.5 mm ² |
| Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | |
| Pole terminals | | 1.2 Nm / 11 lb.in |
| Coil terminals | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

NF.K contactor relays - with Push-in Spring terminals

AC / DC operated



NF22EK



NF44EK

NF.K contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...500 V 50/60 Hz and 20...500 V DC
 - reduced panel energy consumption
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | Type | Order code | Weight |
|--------------------|--|------|------------|-------------------|
| | | | | Pkg (1 pce) kg |
| | V 50/60 Hz V DC | | | |

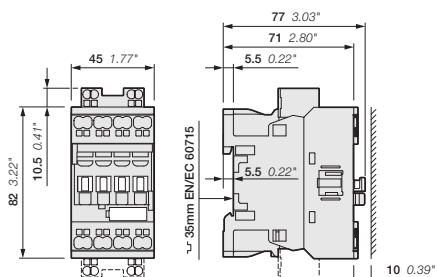
4-pole contactor relays

| | | | | | |
|--|-------------|---------------|-----------|-----------------|-------|
| | 24 ... 60 | 20 ... 60 (1) | NF22EK-11 | 1SBH137005R1122 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF22EK-12 | 1SBH137005R1222 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF22EK-13 | 1SBH137005R1322 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF22EK-14 | 1SBH137005R1422 | 0.325 |
| | 24 ... 60 | 20 ... 60 (1) | NF31EK-11 | 1SBH137005R1131 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF31EK-12 | 1SBH137005R1231 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF31EK-13 | 1SBH137005R1331 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF31EK-14 | 1SBH137005R1431 | 0.325 |
| | 24 ... 60 | 20 ... 60 (1) | NF40EK-11 | 1SBH137005R1140 | 0.285 |
| | 48 ... 130 | 48 ... 130 | NF40EK-12 | 1SBH137005R1240 | 0.285 |
| | 100 ... 250 | 100 ... 250 | NF40EK-13 | 1SBH137005R1340 | 0.285 |
| | 250 ... 500 | 250 ... 500 | NF40EK-14 | 1SBH137005R1440 | 0.325 |

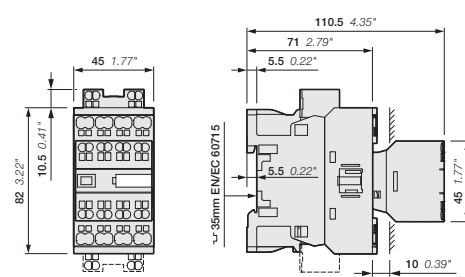
8-pole contactor relays

| | | | | | |
|--|-------------|---------------|-----------|-----------------|-------|
| | 24 ... 60 | 20 ... 60 (1) | NF44EK-11 | 1SBH137005R1144 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF44EK-12 | 1SBH137005R1244 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF44EK-13 | 1SBH137005R1344 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF44EK-14 | 1SBH137005R1444 | 0.370 |
| | 24 ... 60 | 20 ... 60 (1) | NF53EK-11 | 1SBH137005R1153 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF53EK-12 | 1SBH137005R1253 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF53EK-13 | 1SBH137005R1353 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF53EK-14 | 1SBH137005R1453 | 0.370 |
| | 24 ... 60 | 20 ... 60 (1) | NF62EK-11 | 1SBH137005R1162 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF62EK-12 | 1SBH137005R1262 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF62EK-13 | 1SBH137005R1362 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF62EK-14 | 1SBH137005R1462 | 0.370 |
| | 24 ... 60 | 20 ... 60 (1) | NF71EK-11 | 1SBH137005R1171 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF71EK-12 | 1SBH137005R1271 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF71EK-13 | 1SBH137005R1371 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF71EK-14 | 1SBH137005R1471 | 0.370 |
| | 24 ... 60 | 20 ... 60 (1) | NF80EK-11 | 1SBH137005R1180 | 0.330 |
| | 48 ... 130 | 48 ... 130 | NF80EK-12 | 1SBH137005R1280 | 0.330 |
| | 100 ... 250 | 100 ... 250 | NF80EK-13 | 1SBH137005R1380 | 0.330 |
| | 250 ... 500 | 250 ... 500 | NF80EK-14 | 1SBH137005R1480 | 0.370 |

(1) NF.K-11 not suitable for direct control by PLC-output.



NF22EK, NF31EK, NF40EK



NF44EK, NF53EK, NF62EK, NF71EK, NF80EK

Main dimensions mm, inches

NFZ..K contactor relays - with Push-in Spring terminals

24 V DC operated designed for PLC



1SBH136005R3022

NFZ22EK-30



1SBH136005R3044

NFZ44EK-30

NFZ contactor relays are used for switching auxiliary and control circuits.

These contactor relays are of the block type design with 4 poles or 8 poles (with a permanently fixed 4-pole auxiliary contact block).

- contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: 24 V DC operated with electronic coil interface allowing low holding consumption up to 1.7 W and reduced panel energy consumption
 - allow direct control by PLC-output ≥ 250 mA 24 V DC
 - very distinct closing and opening
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|------|------------|-----------------------------|
| | V DC | | | |

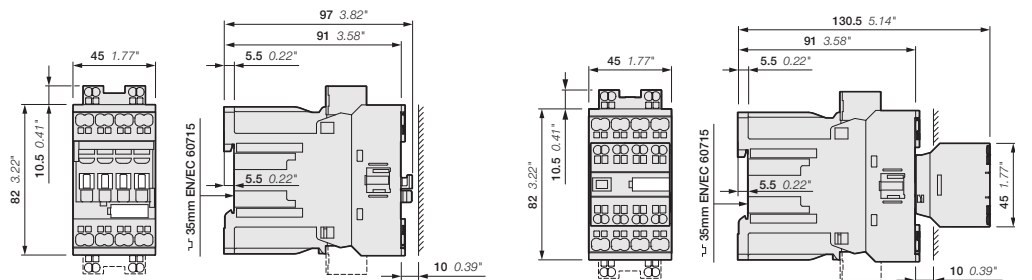
4-pole contactor relays

| | | | | |
|--|----|------------|-----------------|-------|
| | 24 | NFZ22EK-30 | 1SBH136005R3022 | 0.435 |
| | 24 | NFZ31EK-30 | 1SBH136005R3031 | 0.435 |
| | 24 | NFZ40EK-30 | 1SBH136005R3040 | 0.435 |

8-pole contactor relays

| | | | | |
|--|----|------------|-----------------|-------|
| | 24 | NFZ44EK-30 | 1SBH136005R3044 | 0.490 |
| | 24 | NFZ53EK-30 | 1SBH136005R3053 | 0.490 |
| | 24 | NFZ62EK-30 | 1SBH136005R3062 | 0.490 |
| | 24 | NFZ71EK-30 | 1SBH136005R3071 | 0.490 |
| | 24 | NFZ80EK-30 | 1SBH136005R3080 | 0.490 |

Note: NFZ contactor relays with 24 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.
For product availability, please consult your ABB local sales organization.



NFZ22EK, NFZ31EK, NFZ40EK

NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK

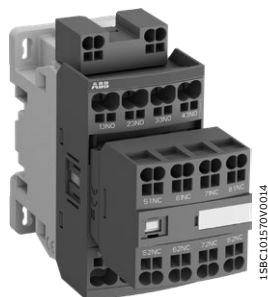
Main dimensions mm, inches

NFZ..K contactor relays - with Push-in Spring terminals

AC / DC operated for specific applications



NFZ22EK



NFZ44EK

NFZ..K contactor relays are used for switching auxiliary and control circuits. These contactor relays are of the block type design with:

- 4 poles and 8 poles with a permanently fixed 4-pole auxiliary contact block.
- Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC or DC operated with electronic coil interface accepting a wide control voltage range (e.g. 100...250 V AC and DC)
 - can manage large control voltage variations
 - only 4 control voltage ranges covering 24...250 V 50/60 Hz and 12...250 V DC
 - allow direct control by PLC-output ≥ 24 V DC 500 mA
 - reduced panel energy consumption
 - very distinct closing and opening
 - can withstand short voltage dips and voltage sags (SEMI F47-0706 conditions of use on request).
- built-in surge suppression
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories.

| Number of contacts | Rated control circuit voltage Uc min. ... Uc max. | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|--|------|------------|---------------------------------|
| | V 50/60 Hz V DC | | | |

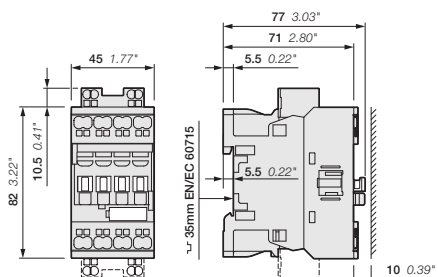
4-pole contactor relays

| | | | | | |
|--|-------------|-------------|------------|-----------------|-------|
| | - | 12 ... 20 | NFZ22EK-20 | 1SBH136005R2022 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ22EK-21 | 1SBH136005R2122 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ22EK-22 | 1SBH136005R2222 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ22EK-23 | 1SBH136005R2322 | 0.315 |
| | - | 12 ... 20 | NFZ31EK-20 | 1SBH136005R2031 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ31EK-21 | 1SBH136005R2131 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ31EK-22 | 1SBH136005R2231 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ31EK-23 | 1SBH136005R2331 | 0.315 |
| | - | 12 ... 20 | NFZ40EK-20 | 1SBH136005R2040 | 0.315 |
| | 24 ... 60 | 20 ... 60 | NFZ40EK-21 | 1SBH136005R2140 | 0.315 |
| | 48 ... 130 | 48 ... 130 | NFZ40EK-22 | 1SBH136005R2240 | 0.315 |
| | 100 ... 250 | 100 ... 250 | NFZ40EK-23 | 1SBH136005R2340 | 0.315 |

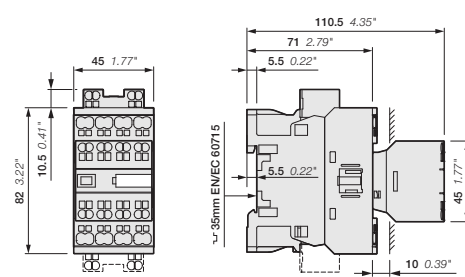
8-pole contactor relays

| | | | | | |
|--|-------------|-------------|------------|-----------------|-------|
| | - | 12 ... 20 | NFZ44EK-20 | 1SBH136005R2044 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ44EK-21 | 1SBH136005R2144 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ44EK-22 | 1SBH136005R2244 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ44EK-23 | 1SBH136005R2344 | 0.360 |
| | - | 12 ... 20 | NFZ53EK-20 | 1SBH136005R2053 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ53EK-21 | 1SBH136005R2153 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ53EK-22 | 1SBH136005R2253 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ53EK-23 | 1SBH136005R2353 | 0.360 |
| | - | 12 ... 20 | NFZ62EK-20 | 1SBH136005R2062 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ62EK-21 | 1SBH136005R2162 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ62EK-22 | 1SBH136005R2262 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ62EK-23 | 1SBH136005R2362 | 0.360 |
| | - | 12 ... 20 | NFZ71EK-20 | 1SBH136005R2071 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ71EK-21 | 1SBH136005R2171 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ71EK-22 | 1SBH136005R2271 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ71EK-23 | 1SBH136005R2371 | 0.360 |
| | - | 12 ... 20 | NFZ80EK-20 | 1SBH136005R2080 | 0.360 |
| | 24 ... 60 | 20 ... 60 | NFZ80EK-21 | 1SBH136005R2180 | 0.360 |
| | 48 ... 130 | 48 ... 130 | NFZ80EK-22 | 1SBH136005R2280 | 0.360 |
| | 100 ... 250 | 100 ... 250 | NFZ80EK-23 | 1SBH136005R2380 | 0.360 |

Note: NFZ contactor relays with 12...20 V DC control voltage need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.



NFZ22EK, NFZ31EK, NFZ40EK

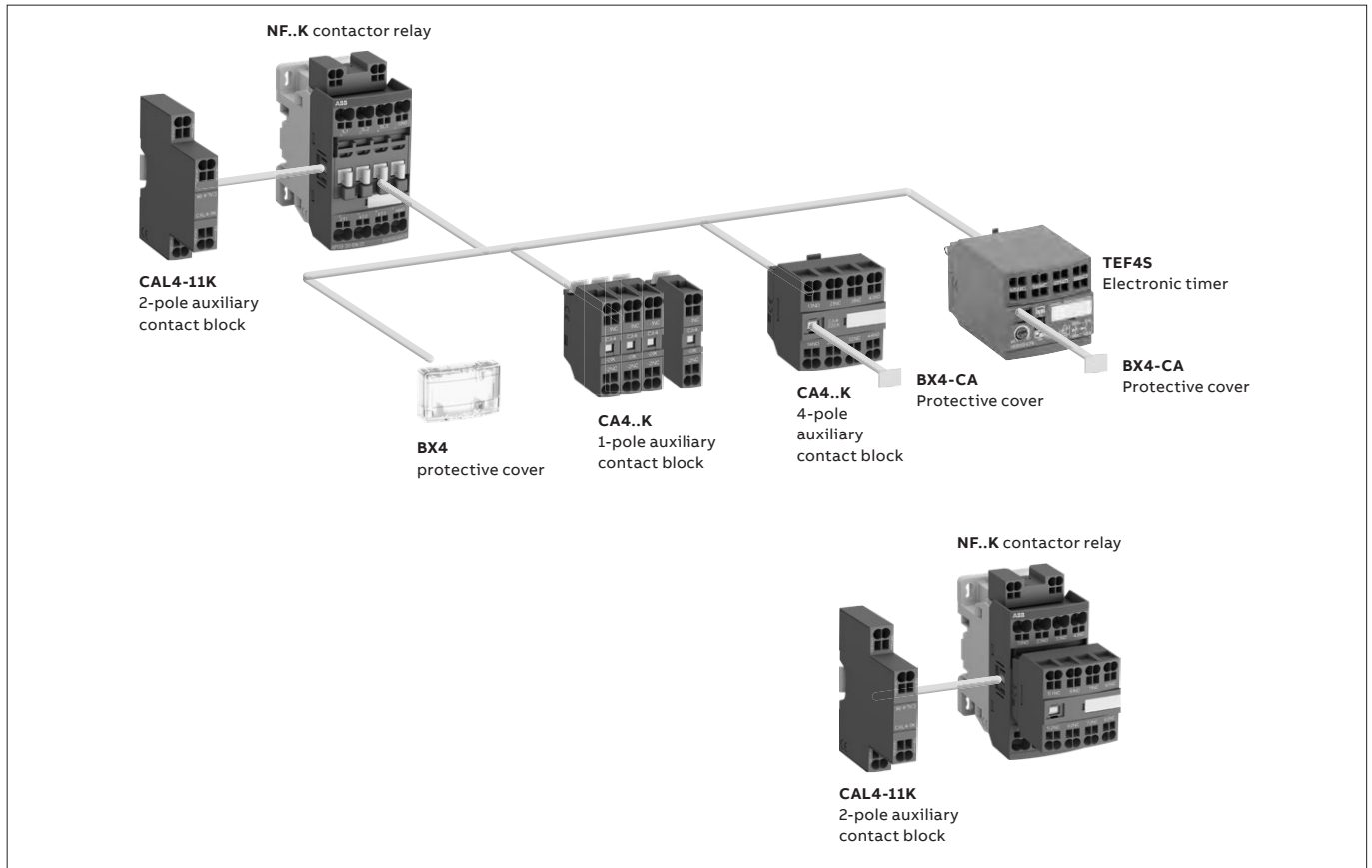


NFZ44EK, NFZ53EK, NFZ62EK, NFZ71EK, NFZ80EK


Main dimensions mm, inches

NF..K contactor relays - with Push-in Spring terminals

Contactor relays and main accessories



Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories
 Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles  | Front-mounted accessories | | | Side-mounted accessories | |
|---|---|---------------------------|---------------|------------------|--|------------|
| | | Auxiliary contact blocks | | Electronic timer | Auxiliary contact blocks 2-pole CAL4-11K | |
| | | 1-pole CA4..K | 4-pole CA4..K | TEF4S | Left side | Right side |
| NF(Z) | | | | | | |
| NF | 2 2 EK (1) | 4 max. | or 1 | or 1 | + 1 | - |
| | 3 1 EK (1) | 2 max. | - | or 1 | + 1 | + 1 |
| | 4 0 EK (2) | | | | | |
| NF | 4 4 EK | - | - | - | + 1 | - |
| | 5 3 EK | | | | | |
| | 6 2 EK | | | | | |
| | 7 1 EK | | | | | |
| | 8 0 EK | | | | | |
| NFZ 24 V DC designed for PLC - coil 30 | | | | | | |
| NFZ | 2 2 EK (1) | 4 max. | or 1 | or 1 | or 1 | + 1 |
| | 3 1 EK (1) | 2 max. | - | or 1 | + 1 | |
| | 4 0 EK (2) | | | 1 | + 1 | + 1 |
| NFZ | 4 4 EK | - | - | - | - | - |
| | 5 3 EK | | | | | |
| | 6 2 EK | | | | | |
| | 7 1 EK | | | | | |
| | 8 0 EK | | | | | |

(1) Including add-on contacts: 3 N.C. max. on positions 1, 2, 3, 4 and 2 N.C. max. on positions 1 ±30°, 5

(2) Including add-on contacts: 4 N.C. max. on positions 1, 2, 3, 4 and 3 N.C. max. on positions 1 ±30°, 5

NF..K contactor relays - with Push-in Spring terminals

Technical data

Contact utilization characteristics according to IEC

| | | |
|--|--------------------|--|
| Contactor relay types | AC / DC operated | NF..K |
| Standards | | IEC 60947-1 / 60947-5-1 and EN 60947-1 / 60947-5-1 |
| Rated operational voltage U _e max. | | 690 V |
| Rated frequency (without derating) | | 50 / 60 Hz |
| Conventional free air thermal current I _{th} - θ ≤ 40 °C | | 16 A |
| I _e / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| Breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 |
| I _e / Rated operational current DC-13 | | |
| acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | | 10 A |
| Conditional short-circuit current | | 1 kA |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 mA 10 ⁻⁷ |
| Non-overlapping time between N.O. and N.C. contacts | | ≥ 2 ms |
| Power dissipation per pole at 6 A | | 0.1 W |
| Maximum electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA4, CAL4 aux. contact blocks) are mechanically linked contacts |

Contact utilization characteristics according to UL / CSA

| | | |
|--|--|------------------------|
| Contactor relay types | | NF..K |
| Standards | | UL 508, CSA C22.2 N°14 |
| Maximum operational voltage | | 600 V AC, 600 V DC |
| Pilot duty | | A600, Q600 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

NF..K contactor relays - with Push-in Spring terminals

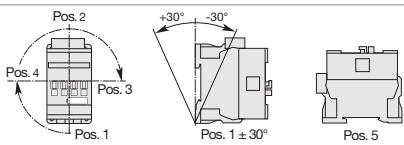
Technical data

General technical data










| Contactor relay types | AC / DC operated | NF..K |
|--|------------------|--|
| Rated insulation voltage U_i | | |
| acc. to IEC 60947-5-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Rated impulse withstand voltage U_{imp} . | | 6 kV |
| Electromagnetic compatibility | | Devices complying with IEC 60947-1 / EN 60947-1 - Environment A and B (1) |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40 ... +70 °C |
| Storage | | -60 ... +80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 million operating cycles |
| Maximum switching frequency | | 6000 cycles/h |
| Shock withstand | | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | | |
| Mounting position 1 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
| | A | 30 g |
| | B1 | 25 g closed position / 5 g open position |
| | B2 | 15 g |
| | C1 | 25 g |
| | C2 | 25 g |
| Vibration withstand | | |
| acc. to IEC 60068-2-6 | | 5 ... 300 Hz 4 g closed position / 2 g open position |

(1) NF..-12 (48...130 V 50/60 Hz-DC) compliant to environment A only. For environment B: select NFZ...-22.

Mounting characteristics

| Contactor relay types | AC / DC operated | NF..K |
|--|------------------|---|
| Mounting positions | |  <p>Max. add-on N.C. auxiliary contacts: see accessory fitting details for a NF contactor relay</p> |
| Mounting distances | | The contactor relays can be assembled side by side |
| Fixing | | |
| On rail according to IEC 60715, EN 60715 | | 35 x 7.5 mm or 35 x 15 mm |
| By screws (not supplied) | | 2 x M4 screws placed diagonally |

Connecting characteristics

| Contactor relay types | AC / DC operated | NF..K |
|---|------------------|---|
| Main terminals | |  <p>Push-in Spring terminals</p> |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
|  Rigid | 1 x | 1 ... 2.5 mm ² |
|  Rigid | 2 x | 1 ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible without ferrule | 1 x | (spring) 0.5 ... 2.5 mm ² |
|  Flexible without ferrule | 2 x | (spring) 0.5 ... 2.5 mm ² |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | 10 mm |
| Degree of protection | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screwdriver type | All terminals | Flat Ø 3 mm x 0.5 mm |

NF..K contactor relays - with Push-in Spring terminals

Technical data

Magnet System Characteristics for NF..K contactor relays - AC / DC operated

| Contactor relay types | AC / DC operated | NF..K |
|--|-----------------------|---|
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | at $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ at $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ |
| | DC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ |
| AC control voltage 50/60 Hz | | 24 ... 500 V AC |
| Rated control circuit voltage U_c | | 50 VA |
| Coil consumption | Average pull-in value | 50 VA |
| | Average holding value | 2.2 VA / 2 W |
| DC control voltage | | 20 ... 500 V DC |
| Rated control circuit voltage U_c | | 50 W |
| Coil consumption | Average pull-in value | 50 W |
| | Average holding value | 2 W |
| PLC-output control | | Not suitable for direct control by PLC-output |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Voltage sag immunity according to SEMI F47-0706 | | - |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | - |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 40 ... 95 ms |
| | N.C. contact opening | 38 ... 90 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 11 ... 95 ms |
| | N.C. contact closing | 13 ... 98 ms |

Magnet System Characteristics for NFZ..K contactor relays 24V DC operated - designed for PLC - coil 30

| Contactor relay types | AC / DC operated | NFZ..K |
|--|-----------------------|--|
| Coil operating limits acc. to IEC 60947-5-1 | DC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \dots 1.1 \times U_c$ At $\theta \leq 70^\circ\text{C}$ U_c |
| | | |
| DC control voltage | | 24 V DC |
| Rated control circuit voltage U_c | | 6 W |
| Coil consumption | Average pull-in value | 6 W |
| | Average holding value | 1.7 W |
| PLC-output control | | $\geq 250 \text{ mA}$ 24 V DC for PLCs and safety PLCs using broken wire detection |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 27 ... 53 ms |
| | N.C. contact opening | 20 ... 35 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 17 ... 29 ms |
| | N.C. contact closing | 22 ... 57 ms |

Magnet System Characteristics for NFZ..K contactor relays - for specific applications - coils 20, 21, 22, 23

| Contactor relay types | AC / DC operated | NFZ..K |
|--|-----------------------|---|
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | At $\theta \leq 60^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots U_c \text{ max}$ |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ |
| AC control voltage 50/60 Hz | | 24 ... 250 V AC |
| Rated control circuit voltage U_c | | 16 VA |
| Coil consumption | Average pull-in value | 16 VA |
| | Average holding value | 1.7 VA / 1.5 W |
| DC control voltage | | 12 ... 250 V DC |
| Rated control circuit voltage U_c | | 12 ... 16 W |
| Coil consumption | Average pull-in value | 12 ... 16 W |
| | Average holding value | 1.7 W |
| PLC-output control | | (AF..Z coil 21) $\geq 500 \text{ mA}$ 24 V DC for PLCs - Not suitable for safety PLCs |
| Drop-out voltage | | $\leq 60\%$ of $U_c \text{ min}$. |
| Voltage sag immunity according to SEMI F47-0706 | | (NFZ coil 21, 22, 23) conditions of use on request |
| Dips withstand $-20^\circ\text{C} \leq \theta \leq +60^\circ\text{C}$ | | (NFZ coil 21, 22, 23) 20 ms average for $U_c \geq 24 \text{ V}$ 50/60 Hz or $U_c \geq 20 \text{ V}$ DC |
| Operating time | | |
| Between coil energization and: | | |
| | N.O. contact closing | 40 ... 95 ms |
| | N.C. contact opening | 38 ... 90 ms |
| Between coil de-energization and: | | |
| | N.O. contact opening | 11 ... 95 ms |
| | N.C. contact closing | 13 ... 98 ms |



—
For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Accessories

Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays

- 3/258** Auxiliary contact blocks
- 3/272** Electronic timers
- 3/275** Interlocks
- 3/277** Impulse contact blocks
- 3/279** Interface relays
- 3/281** Mechanical latching units
- 3/283** Other accessories
- 3/285** Terminal shrouds
- 3/286** Additional terminal blocks
- 3/287** Terminals for control lead connections
- 3/288** Connections
- 3/289** Terminal connecting strips and shorting bars
- 3/290** Connection accessories for starting solutions
- 3/291** Connection sets for star-delta starter
- 3/292** Connection accessories for starting solutions with Push-in Spring terminals
- 3/293** Connection bars
- 3/294** Adapter plates
- 3/295** Low Voltage Ride Through (LVRT) modules
- 3/296** Spare parts contactors

Accessories for UA, UA..RA, GA75, GAE75, GAF contactors

- 3/302** Auxiliary contact blocks
- 3/308** Electronic timers
- 3/312** Mechanical and electrical interlock units
- 3/314** CA5, CE5, CAL, CEL18 and TEF5 fitting details
- 3/315** Function markers - Mounting piece
- 3/316** Surge suppressors for contactor coils
- 3/318** Interface relays
- 3/320** Mechanical latching units
- 3/322** Additional terminal blocks and others accessories
- 3/323** Terminals for control lead connections
- 3/324** Connection bar for contactors
- 3/325** Contactor coils and main contact sets

Accessories for EK550, EK1000 4-pole contactors

- 3/328** Auxiliary contact blocks
- 3/332** Mechanical interlock units, terminal shrouds and connection sets
- 3/333** Surge suppressors for contactor coils
- 3/335** Main contact sets - Arc chutes
- 3/336** Contactor coils
- 3/434** **Voltage code table**



Accessories for AF09 ... AF2850 3-pole contactors, AF09 ... AF370 4-pole contactors and NF contactor relays

- 3/258 Auxiliary contact blocks**
- 3/272 Electronic timers**
- 3/275 Interlocks**
- 3/277 Impulse contact blocks**
- 3/279 Interface relays**
- 3/281 Mechanical latching units**
- 3/283 Other accessories**
- 3/286 Additional terminal blocks**
- 3/287 Terminal shrouds**
- 3/288 Connections**
- 3/289 Terminal connecting strips and shorting bars**
- 3/290 Connection accessories for starting solutions**
- 3/291 Connection sets for star-delta starter**
- 3/292 Connection accessories for starting solutions with Push-in Spring terminals**
- 3/293 Connection bars**
- 3/294 Adapter plates**
- 3/295 Low Voltage Ride Through (LVRT) modules**
- 3/296 Spare parts contactors**



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays



CA4-10

1SBC100001V0014



CAL4-11

1SBC100007V0014



CA4-22E

1SBC100006V0014



CAT4-11E

1SBC100002V0014

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4 1 or 4-pole block, with instantaneous N.O., N.C. contacts
- CC4 1-pole block, with N.O. leading contact or N.C. lagging contact
- CAT4 2-pole block, with instantaneous N.O. + N.C. contacts and A1 / A2 coil terminal connection on front face.

Select the 4-pole auxiliary contact blocks CA4-..E, CA4-..M, CA4-..U or CA4-..N type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front-mounted instantaneous auxiliary contact blocks

| | | | | | | |
|-----------------------|-----|----|----------|-----------------|----|-------|
| AF09 ... AF96 | 1 0 | -- | CA4-10 | 1SBN010110R1010 | 1 | 0.014 |
| 4-pole NF | 1 0 | -- | CA4-10-T | 1SBN010110T1010 | 10 | 0.014 |
| | 0 1 | -- | CA4-01 | 1SBN010110R1001 | 1 | 0.014 |
| | 0 1 | -- | CA4-01-T | 1SBN010110T1001 | 10 | 0.014 |
| | 2 2 | -- | CA4-22M | 1SBN010140R1122 | 1 | 0.055 |
| AF09 ... AF16..-30-10 | 3 1 | -- | CA4-31M | 1SBN010140R1131 | 1 | 0.055 |
| | 1 3 | -- | CA4-13M | 1SBN010140R1113 | 1 | 0.055 |
| | 0 4 | -- | CA4-04M | 1SBN010140R1104 | 1 | 0.055 |
| | 2 2 | -- | CA4-22E | 1SBN010140R1022 | 1 | 0.055 |
| AF26 ... AF96..-30-00 | 3 1 | -- | CA4-31E | 1SBN010140R1031 | 1 | 0.055 |
| AF09 ... AF80..-40-00 | 4 0 | -- | CA4-40E | 1SBN010140R1040 | 1 | 0.055 |
| AF26 ... AF96..-30-00 | 0 4 | -- | CA4-04E | 1SBN010140R1004 | 1 | 0.055 |
| AF09 ... AF16..-40-00 | | | | | | |
| AF40 ... AF80..-40-00 | | | | | | |
| AF09 ... AF16..-30-01 | 2 2 | -- | CA4-22U | 1SBN010140R1322 | 1 | 0.055 |
| | 3 1 | -- | CA4-31U | 1SBN010140R1331 | 1 | 0.055 |
| | 4 0 | -- | CA4-40U | 1SBN010140R1340 | 1 | 0.055 |
| 4-pole NF | 2 2 | -- | CA4-22N | 1SBN010140R1222 | 1 | 0.055 |
| | 3 1 | -- | CA4-31N | 1SBN010140R1231 | 1 | 0.055 |
| | 4 0 | -- | CA4-40N | 1SBN010140R1240 | 1 | 0.055 |
| | 1 3 | -- | CA4-13N | 1SBN010140R1213 | 1 | 0.055 |
| NF..40E | 0 4 | -- | CA4-04N | 1SBN010140R1204 | 1 | 0.055 |

Front-mounted auxiliary contact blocks with N.O. leading contact and N.C. lagging contact

| | | | | | | |
|---------------|----|-----|--------|-----------------|---|-------|
| AF09 ... AF96 | -- | 1 0 | CC4-10 | 1SBN010111R1010 | 1 | 0.014 |
| 4-pole NF | -- | 0 1 | CC4-01 | 1SBN010111R1001 | 1 | 0.014 |

Note: 1 max CC4-10 and 1 max CC4-01.

CC4-01 use: on each "Accessory fitting details" table, the allowed number of N.C. add-on and built-in contacts including CC4-01, is decreased by one.

Side-mounted instantaneous auxiliary contact blocks

| | | | | | | |
|---------------|-----|----|-----------|-----------------|----|-------|
| AF09 ... AF96 | 1 1 | -- | CAL4-11 | 1SBN010120R1011 | 1 | 0.040 |
| NF | 1 1 | -- | CAL4-11-T | 1SBN010120T1011 | 10 | 0.040 |

Front-mounted instantaneous auxiliary contact and A1/A2 coil terminal blocks

| | | | | | | |
|-----------------------|-----|----|----------|-----------------|---|-------|
| AF09 ... AF16..-30-10 | 1 1 | -- | CAT4-11M | 1SBN010151R1111 | 1 | 0.040 |
| AF26 ... AF65..-30-00 | 1 1 | -- | CAT4-11E | 1SBN010151R1011 | 1 | 0.040 |
| AF09 ... AF52..-40-00 | | | | | | |
| AF09 ... AF40..-22-00 | | | | | | |
| AF09 ... AF16..-30-01 | 1 1 | -- | CAT4-11U | 1SBN010151R1311 | 1 | 0.040 |

For each contactor or contactor relay type, refer to "Accessory fitting details" table.

Note: CAT4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays

Technical data








Contact utilization characteristics according to IEC

| Types | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 | |
|---|---|------------------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | |
| Rated operational voltage U_e max. | 24...690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | |
| Rated frequency (without derating) | 50/60 Hz | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | 10 A | |
| Conditional short-circuit current | 1 kA | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity | 12 V / 3 mA | |
| with failure rate acc. to IEC 60947-5-4 | 10^{-7} | |
| Power dissipation per pole at 6 A | 0.1 W | |
| Mechanical durability | Number of operating cycles | 10 millions operating cycles |
| | Max. switching frequency | 3600 cycles/h |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | Additional N.O. or N.C. auxiliary contacts (CA4, CAL4, CAT4) are mechanically linked contacts | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | Additional N.C. auxiliary contacts (CA4, CAL4, CAT4) are mirror contacts | |

Contact utilization characteristics according to UL / CSA

| Types | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 | |
|--|---|--|
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 600 V AC, 600 V DC | |
| Pilot duty | A600, Q600 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 VA | |
| AC maximum volt-ampere breaking | 720 VA | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 VA | |

Connecting characteristics

| Types | 1-pole CA4, 1-pole CC4, 4-pole CA4, 2-pole CAT4, 2-pole CAL4 | |
|---|--|----------------------------|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 1...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² |
|  Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | 10 mm | |
| Tightening torque | 1.2 Nm / 11 lb.in | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | |

Auxiliary contact blocks with Push-in Spring terminals



CA4-10K

1SBCL00080V0014



CA4-22EK

1SECI00081V0014



CAL4-11K

1SBC100082V0014

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA4..K 1 or 4-pole block, with instantaneous N.O., N.C. contacts

Select the 4-pole auxiliary contact blocks CA4-..EK, CA4-..MK or CA4-..NK type, according to the contactor or contactor relay type for compliance with the standard requirements (see "Terminal marking and positioning").

Types of auxiliary contact blocks for side mounting:

- CAL4..K 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with push-in spring terminals protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front-mounted instantaneous auxiliary contact blocks

| | | | | | |
|-----------------------|-----|-----------|-----------------|----|-------|
| AF09 ... AF96 | 1 0 | CA4-10K | 1SBN010160R1010 | 1 | 0.012 |
| NF | 1 0 | CA4-10K-T | 1SBN010160T1010 | 10 | 0.012 |
| | 0 1 | CA4-01K | 1SBN010160R1001 | 1 | 0.012 |
| | 0 1 | CA4-01K-T | 1SBN010160T1001 | 10 | 0.012 |
| AF09 ... AF16..-30-10 | 2 2 | CA4-22MK | 1SBN010146R1122 | 1 | 0.050 |
| | 3 1 | CA4-31MK | 1SBN010146R1131 | 1 | 0.050 |
| | 1 3 | CA4-13MK | 1SBN010146R1113 | 1 | 0.050 |
| | 0 4 | CA4-04MK | 1SBN010146R1104 | 1 | 0.050 |
| AF26 ... AF96..-30-00 | 2 2 | CA4-22EK | 1SBN010146R1022 | 1 | 0.050 |
| AF09 ... AF80..-40-00 | 3 1 | CA4-31EK | 1SBN010146R1031 | 1 | 0.050 |
| AF09 ... AF80..-22-00 | 4 0 | CA4-40EK | 1SBN010146R1040 | 1 | 0.050 |
| 4-pole NF | 1 3 | CA4-13NK | 1SBN010146R1213 | 1 | 0.050 |
| | 2 2 | CA4-22NK | 1SBN010146R1222 | 1 | 0.050 |
| | 3 1 | CA4-31NK | 1SBN010146R1231 | 1 | 0.050 |
| | 4 0 | CA4-40NK | 1SBN010146R1240 | 1 | 0.050 |
| NF40E | 0 4 | CA4-04NK | 1SBN010146R1204 | 1 | 0.050 |

Side-mounted instantaneous auxiliary contact blocks

3-pole

| | | | | | |
|---------------|-----|----------|-----------------|---|-------|
| AF09 ... AF96 | 1 1 | CAL4-11K | 1SBN010134R1011 | 1 | 0.030 |
| NF | | | | | |

Note: for each contactor or contactor relay type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays with Push-in Spring terminals

Technical data









Contact utilization characteristics according to IEC

| Contactor relay types | 1-pole CA4..K, 4-pole CA4..K, 2-pole CAL4..K | |
|---|--|-----------------------------|
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | |
| Rated operational voltage U_e max. | 690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| | 400 V DC | 0.15 A / 60 W |
| | 500 V DC | 0.13 A / 65 W |
| | 600 V DC | 0.1 A / 60 W |
| Short-circuit protection device gG type fuse | 10 A | |
| Conditional short-circuit current | 1 kA | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 12 V / 3 mA | |
| | 10^{-7} | |
| Power dissipation per pole at 6 A | 0.1 W | |
| Mechanical durability | Number of operating cycles | 10 million operating cycles |
| | Max. switching frequency | 3600 cycles/h |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | Additional N.O. or N.C. auxiliary contacts (CA4, CAL4) are mechanically linked contacts. | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | Additional N.C. auxiliary contacts (CA4, CAL4) are mirror contacts. | |

Contact utilization characteristics according to UL / CSA

| | |
|--|----------------------|
| Standards | UL 508, CSA C22 N°14 |
| Max. operational voltage | 600 V AC, 600 V DC |
| Pilot duty | A600, Q600 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

Connecting characteristics

| | |
|---|--|
| Connection capacity (min. ... max.) | |
|  Rigid solid | 1 x 1 ... 2.5 mm ² |
|  Rigid solid | 2 x 1 ... 2.5 mm ² |
|  Flexible with ferrule | 1 x 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with ferrule | 2 x 1 (push-in) / 0.5 (spring) ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible with insulated ferrule | 2 x 1 (push-in) / 0.5 (spring) ... 1.5 mm ² |
|  Flexible without ferrule | 1 x (spring) 0.5 ... 2.5 mm ² |
|  Flexible without ferrule | 2 x (spring) 0.5 ... 2.5 mm ² |
| Connection capacity acc. to UL/CSA | 1 or 2 x AWG 18 ... 14 |
| Stripping length | 10 mm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 |
| Screwdriver type | Flat \varnothing 3 mm x 0.5 mm |

Auxiliary contact blocks for severe industrial environments

for AF09 ... AF96 contactors and NF contactor relays



The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for severe industrial environments.

Types of auxiliary contact blocks for front mounting:

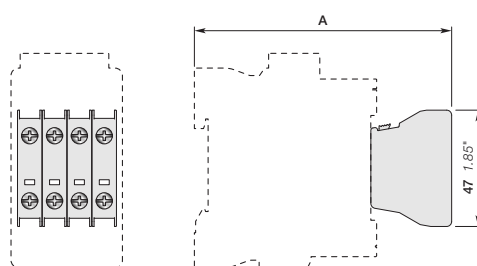
- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, available in 2 IP degrees
 - CE5 D with built-in microswitch IP40, degree of protection (IP20 on terminals)
 - CE5 W with built-in microswitch IP67, degree of protection (IP20 on terminals).

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|-----|------------|-----------------|---------|----------------|
| | | | | | | kg |
| AF09 ... AF96 | 1 0 | - - | CE5-10D0.1 | 1SBN010015R1010 | 1 | 0.020 |
| NF | 0 1 | - - | CE5-01D0.1 | 1SBN010015R1001 | 1 | 0.020 |
| | 1 0 | - - | CE5-10D2 | 1SBN010017R1010 | 1 | 0.020 |
| | 0 1 | - - | CE5-01D2 | 1SBN010017R1001 | 1 | 0.020 |
| | 1 0 | - - | CE5-10W0.1 | 1SBN010016R1010 | 1 | 0.020 |
| | 0 1 | - - | CE5-01W0.1 | 1SBN010016R1001 | 1 | 0.020 |
| | 1 0 | - - | CE5-10W2 | 1SBN010018R1010 | 1 | 0.020 |
| | 0 1 | - - | CE5-01W2 | 1SBN010018R1001 | 1 | 0.020 |

(1) For each contactor type, refer to "Accessory fitting details" table.

Note: For use with 24 V DC operated AF..Z contactor and NFZ contactor relay (coil 30), please consult your ABB local sales organization.



Main dimensions mm, inches

| 1-pole CE5 on | A |
|-------------------------------|------------------|
| AF09 ... AF16..-30-xx 1 stack | 103.5 mm / 4.07" |
| AF09, AF16..-40/22-00 | |
| NF..E 1-stack | |
| AF26 ... AF38..-30-00 | 112.5 mm / 4.43" |
| AF26, AF38..-40/22-00 | 127.5 mm / 5.02" |
| AF40 ... AF65-30-00 | 137 mm / 5.39" |
| AF40 ... AF65-40/22-00 | 140 mm / 5.51" |
| AF80 ... AF96-30-00 | 142 mm / 5.59" |
| AF80-40/22-00 | 142 mm / 5.59" |

Auxiliary contact blocks for severe industrial environments

Technical data

| | | |
|--------------|-------------------------|-----------------------|
| | Front mounted | |
| Types | 1-pole CE5-..0.1 | 1-pole CE5-..2 |






Contact utilization characteristics according to IEC

| | | |
|--|---|--|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 250 V | |
| Rated operational voltage U_e max. | 125 V | 250 V |
| Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$ | 0.1 A | 2 A |
| Rated frequency (without derating) | 50 / 60 Hz | |
| I_e / Rated operational current | AC-14 | AC-15 |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz 220-240 V 50/60 Hz | 0.1 A 2 A 2 A |
| Making capacity | 6 x le AC-14 acc. to IEC 60947-5-1 | |
| Breaking capacity | 6 x le AC-14 acc. to IEC 60947-5-1 | |
| I_e / Rated operational current DC-12 acc. to IEC 60947-5-1 | 24 V DC 48 V DC 72 V DC 110 V DC 125 V DC 220 V DC | 0.1 A 0.1 A 0.1 A 0.1 A - - 2 A 1 A 0.3 A 0.2 A 0.2 A 0.1 A |
| Short-circuit protection device FF type fuse (1) | 0.1 A | |
| Conditional short-circuit current | 1 kA | |
| Minimum switching capacity | | |
| AF09 ... AF38 contactors with failure rate acc. to IEC 60947-5-4 | 3 V / 1 mA - | 17 V / 1 mA $\leq 10^{-7}$ |
| Mechanical durability | | |
| Number of operating cycles | 5 millions for CE5-..D0.1 2.5 millions for CE5-..W0.1 | 5 millions for CE5-..D2 2.5 millions for CE5-..W2 |
| Max. switching frequency | 3600 cycles/h | |
| Electrical durability | | |
| Number of operating cycles | 2.5 millions for CE5-..D0.1 0.7 millions for CE5-..W0.1 | 1 million for CE5-..D2 0.3 millions for CE5-..W2 |
| Max. electrical switching frequency | AC-14 AC-15 DC-12 | 1200 cycles/h 1200 cycles/h 900 cycles/h |

Contact utilization characteristics according to UL / CSA

| | | |
|--------------------------|------------------------|---------------------|
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 125 V AC / 110 V DC | 250 V AC / 220 V DC |
| Pilot duty | | |
| AC thermal rated current | 0.1 A | 2 A |

Connecting characteristics

| | | |
|---|--|--|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...4 mm ² |
|  Flexible with ferrule | 2 x | 1...4 mm ² |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with ferrule | 2 x | 0.75...2.5 mm ² |
|  Lugs | L ≤ | 7.7 mm |
| | I > | 3.7 mm |
| Connecting capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | 10 mm | |
| Tightening torque | 1 Nm | |
| Degree of protection | Terminals | IP20 |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | Microswitches | IP40 for CE5-..D0.1 IP67 for CE5-..W0.1 IP40 for CE5-..D2 IP67 for CE5-..W2 |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | |

(1) HRC fuses for very fast action (6.3 x 32 mm size).


Auxiliary contact blocks for severe industrial environments

For AF09 ... AF96 3-pole contactors and AF09 ... AF80 4-pole contactors

For AF contactors

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | Side-mounted accessories | |
|-----------------|------------|---|---------------------------|--|--------------------------|--------------------------|------------|
| | | | Auxiliary contact blocks | Electrical and mechanical interlock set (Between 2 contactors) | Auxiliary contact blocks | Left side | Right side |
| | |  | 1-pole CE5 | 1-pole CA4 | VEM4 | 2-pole CAL4-11 | |

3-pole contactors AF09 ... AF96

On positions 1, 2, 3, 4; Max. N.C. built-in and add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5

| | | | | | | | |
|---------------|---------|---|---|----------|-----|-----|-----|
| AF09 ... AF16 | 3 0 0 1 | ▶ | 1 | + 3 max. | - | + 1 | - |
| AF09 ... AF16 | 3 0 1 0 | ▶ | 2 | + 2 max. | - | - | - |
| AF26 ... AF38 | 3 0 0 0 | ▶ | 1 | + 3 max. | - | + 1 | - |
| | | ▶ | 1 | + 1 max. | - | + 1 | + 1 |
| | | ▶ | 1 | + 2 max. | + 1 | + 1 | - |

On positions 1 ±30°, 5; Max. N.C. built-in or add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5

| | | | | | | | |
|---------------|---------|---|---|----------|-----|-----|---|
| AF09 ... AF16 | 3 0 0 1 | ▶ | 1 | + 3 max. | - | - | - |
| AF09 ... AF16 | 3 0 1 0 | ▶ | 1 | + 3 max. | - | + 1 | - |
| AF26 ... AF38 | 3 0 0 0 | ▶ | 1 | + 2 max. | + 1 | - | - |

On positions 1, 1 ±30°, 2, 3, 4, 5; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5

| | | | | | | | |
|---------------|---------|---|---|----------|---|-----|-----|
| AF40 ... AF96 | 3 0 0 0 | ▶ | 2 | + 2 max. | - | + 1 | + 1 |
| | | ▶ | 1 | + 3 max. | - | + 1 | + 1 |

4-pole contactors AF09 ... AF80

On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 2 max. with 1 CE5, none with 2 CE5

| | | | | | | | |
|------------|---------|---|---|----------|-----|-----|-----|
| AF09, AF16 | 4 0 0 0 | ▶ | 2 | + 2 max. | - | - | - |
| | | ▶ | 1 | + 3 max. | - | + 1 | - |
| | | ▶ | 1 | + 1 max. | - | + 1 | + 1 |
| | | ▶ | 1 | + 2 max. | + 1 | + 1 | - |

On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5

| | | | | | | | |
|---------------|---------|---|---|----------|-----|-----|---|
| AF26, AF38 | 4 0 0 0 | ▶ | 1 | + 3 max. | - | + 1 | - |
| | | ▶ | 1 | + 2 max. | + 1 | - | - |
| AF09 ... AF38 | 2 2 0 0 | ▶ | 1 | + 3 max. | - | + 1 | - |

On positions 1 ±30°, 5; Max. add-on N.C. auxiliary contacts (CA4, CAL4, VEM4): 1 max. with 1 CE5

| | | | | | | | |
|------------|---------|---|---|----------|-----|-----|---|
| AF09, AF16 | 4 0 0 0 | ▶ | 1 | + 3 max. | - | + 1 | - |
| | | ▶ | 1 | + 2 max. | + 1 | - | - |

On positions 1 ±30°, 5; No add-on N.C. auxiliary contacts

| | | | | | | | |
|---------------|---------|---|---|----------|---|---|---|
| AF26, AF38 | 4 0 0 0 | ▶ | 1 | + 3 max. | - | - | - |
| AF09 ... AF38 | 2 2 0 0 | ▶ | | | | | |

On positions 1, 1 ±30°, 2, 3, 4, 5; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 4 max. with 1 CE5, 2 max. with 2 CE5

| | | | | | | | |
|---------------|---------|---|---|----------|---|-----|-----|
| AF40 ... AF80 | 4 0 0 0 | ▶ | 2 | + 2 max. | - | + 1 | + 1 |
| | | ▶ | 1 | + 3 max. | - | + 1 | + 1 |

On positions 1, 1 ±30°, 2, 3, 4, 5; No add-on N.C. auxiliary contacts


| | | | | | | | |
|------------|---------|---|---|----------|---|---|---|
| AF40, AF80 | 2 2 0 0 | ▶ | 1 | + 3 max. | - | - | - |
|------------|---------|---|---|----------|---|---|---|

Auxiliary contact blocks for severe industrial environments

For NF contactor relays

Main accessory fitting details - for ordering details, technical data and other accessories: see section accessories

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor relay types | Main poles  | Front-mounted accessories | | | | Side-mounted accessories | |
|--|---|---------------------------|-------------|----------------------------------|-------------|-----------------------------|---------------|
| | | Auxiliary contact blocks | | | | Auxiliary contact blocks | |
| | | 1-pole CE5 | 1-pole CA4 | | | Left side 2-pole CAL4-11 | Right side |
| On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5 | | | | | | | |
| NF | 2 2 3 1 | E E | 1 | + 3 max. | - | + 1 | - |
| On positions 1, 2, 3, 4; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 2 max. with 1 CE5, none with 2 CE5 | | | | | | | |
| NF | 4 0 | E | 2 1 1 | + 2 max. + 3 max. + 1 max. | - - - | - + 1 + 1 | - - + 1 |
| On positions 1 ±30°, 5; Max. add-on N.C. auxiliary contacts (CA4): none with 1 CE5 | | | | | | | |
| NF | 2 2 3 1 | E E | 1 | + 3 max. | - | - | - |
| On positions 1 ±30°, 5; Max. add-on N.C. auxiliary contacts (CA4, CAL4): 1 max. with 1 CE5 | | | | | | | |
| NF | 4 0 | E | 1 | + 3 max. | - | + 1 | - |

Auxiliary contact blocks for AF116 ... AF2850 contactors



CAL19-11



CAL18-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block, with instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The CAL ...-11B is a second block for mounting in addition to a first CAL ...-11 block, right- and/or left-hand of the AF116 ... AF2850 contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Side-mounted instantaneous auxiliary contact blocks

| | | | | | |
|------------------|-----|-----------|-----------------|---|-------|
| AF116 ... AF370 | 1 1 | CAL19-11 | 1SFN010820R1011 | 1 | 0.040 |
| | 1 1 | CAL19-11B | 1SFN010820R3311 | 1 | 0.040 |
| AF400 ... AF2850 | 1 1 | CAL18-11 | 1SFN010720R1011 | 2 | 0.050 |
| | 1 1 | CAL18-11B | 1SFN010720R3311 | 2 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AF116 ... AF2850 contactors

Technical data








| Types | CAL18 | CAL19 | | | | | | | | | | | | | | | | | | | | | |
|---|---|-----------------------------|----------------------------|--------------------------------|-----------------------------|--------------------------|---------------------------------|--------------|--------------------|------------|------------|----------|---------------|---------------|----------|---------------|---------------|----------|--------------|--------------|----------|--------------|--------------|
| Contact utilization characteristics according to IEC | | | | | | | | | | | | | | | | | | | | | | | |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | | | | | | | | | | | | | | | | | | | | | | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | | | | | | | | | | | | | | | | | | | | | | |
| Rated impulse withstand voltage U_{imp} . | 6 kV | | | | | | | | | | | | | | | | | | | | | | |
| Rated operational voltage U_e max. | 24...690 V AC | | | | | | | | | | | | | | | | | | | | | | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | | | | | | | | | | | | | | | | | | | | | | |
| Rated frequency (without derating) | 50/60 Hz | | | | | | | | | | | | | | | | | | | | | | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | <table border="1"> <tr> <td>24-127 V 50/60 Hz</td> <td>6 A</td> </tr> <tr> <td>220-240 V 50/60 Hz</td> <td>4 A</td> </tr> <tr> <td>380-440 V 50/60 Hz</td> <td>3 A</td> </tr> <tr> <td>500-690 V 50/60 Hz</td> <td>2 A</td> </tr> </table> | | 24-127 V 50/60 Hz | 6 A | 220-240 V 50/60 Hz | 4 A | 380-440 V 50/60 Hz | 3 A | 500-690 V 50/60 Hz | 2 A | | | | | | | | | | | | | |
| 24-127 V 50/60 Hz | 6 A | | | | | | | | | | | | | | | | | | | | | | |
| 220-240 V 50/60 Hz | 4 A | | | | | | | | | | | | | | | | | | | | | | |
| 380-440 V 50/60 Hz | 3 A | | | | | | | | | | | | | | | | | | | | | | |
| 500-690 V 50/60 Hz | 2 A | | | | | | | | | | | | | | | | | | | | | | |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | | | | | | | | | | | | | | | | | | | | | | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | | | | | | | | | | | | | | | | | | | | | | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | <table border="1"> <tr> <td>24 V DC</td> <td>6 A / 144 W</td> <td>3 A / 72 W</td> </tr> <tr> <td>48 V DC</td> <td>2.8 A / 134 W</td> <td>1.5 A / 72 W</td> </tr> <tr> <td>72 V DC</td> <td>1 A / 72 W</td> <td>1 A / 72 W</td> </tr> <tr> <td>110 V DC</td> <td>0.55 A / 60 W</td> <td>0.55 A / 60 W</td> </tr> <tr> <td>125 V DC</td> <td>0.55 A / 69 W</td> <td>0.55 A / 69 W</td> </tr> <tr> <td>220 V DC</td> <td>0.3 A / 66 W</td> <td>0.3 A / 69 W</td> </tr> <tr> <td>250 V DC</td> <td>0.3 A / 75 W</td> <td>0.3 A / 75 W</td> </tr> </table> | | 24 V DC | 6 A / 144 W | 3 A / 72 W | 48 V DC | 2.8 A / 134 W | 1.5 A / 72 W | 72 V DC | 1 A / 72 W | 1 A / 72 W | 110 V DC | 0.55 A / 60 W | 0.55 A / 60 W | 125 V DC | 0.55 A / 69 W | 0.55 A / 69 W | 220 V DC | 0.3 A / 66 W | 0.3 A / 69 W | 250 V DC | 0.3 A / 75 W | 0.3 A / 75 W |
| 24 V DC | 6 A / 144 W | 3 A / 72 W | | | | | | | | | | | | | | | | | | | | | |
| 48 V DC | 2.8 A / 134 W | 1.5 A / 72 W | | | | | | | | | | | | | | | | | | | | | |
| 72 V DC | 1 A / 72 W | 1 A / 72 W | | | | | | | | | | | | | | | | | | | | | |
| 110 V DC | 0.55 A / 60 W | 0.55 A / 60 W | | | | | | | | | | | | | | | | | | | | | |
| 125 V DC | 0.55 A / 69 W | 0.55 A / 69 W | | | | | | | | | | | | | | | | | | | | | |
| 220 V DC | 0.3 A / 66 W | 0.3 A / 69 W | | | | | | | | | | | | | | | | | | | | | |
| 250 V DC | 0.3 A / 75 W | 0.3 A / 75 W | | | | | | | | | | | | | | | | | | | | | |
| Short-circuit protection device gG type fuse | 10 A | | | | | | | | | | | | | | | | | | | | | | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | <table border="1"> <tr> <td>for 1.0 s</td> <td>100 A</td> </tr> <tr> <td>for 0.1 s</td> <td>140 A</td> </tr> </table> | | for 1.0 s | 100 A | for 0.1 s | 140 A | | | | | | | | | | | | | | | | | |
| for 1.0 s | 100 A | | | | | | | | | | | | | | | | | | | | | | |
| for 0.1 s | 140 A | | | | | | | | | | | | | | | | | | | | | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 24 V / 50 mA (0.5 million of operating cycles) $\leq 10^{-6}$ | | | | | | | | | | | | | | | | | | | | | | |
| Power dissipation per pole at 6 A | 0.15 W | | | | | | | | | | | | | | | | | | | | | | |
| Mechanical durability | <table border="1"> <tr> <td>Number of operating cycles</td> <td>3 millions (A/AF400 ... AF750)</td> <td>5 millions operating cycles</td> </tr> <tr> <td>Max. switching frequency</td> <td>0.5 million (AF1250 ... AF2050)</td> <td>300 cycles/h</td> </tr> </table> | | Number of operating cycles | 3 millions (A/AF400 ... AF750) | 5 millions operating cycles | Max. switching frequency | 0.5 million (AF1250 ... AF2050) | 300 cycles/h | | | | | | | | | | | | | | | |
| Number of operating cycles | 3 millions (A/AF400 ... AF750) | 5 millions operating cycles | | | | | | | | | | | | | | | | | | | | | |
| Max. switching frequency | 0.5 million (AF1250 ... AF2050) | 300 cycles/h | | | | | | | | | | | | | | | | | | | | | |
| Max. electrical switching frequency | <table border="1"> <tr> <td>AC-15</td> <td>1200 cycles/h</td> <td>300 cycles/h</td> </tr> <tr> <td>DC-13</td> <td>900 cycles/h</td> <td>300 cycles/h</td> </tr> </table> | | AC-15 | 1200 cycles/h | 300 cycles/h | DC-13 | 900 cycles/h | 300 cycles/h | | | | | | | | | | | | | | | |
| AC-15 | 1200 cycles/h | 300 cycles/h | | | | | | | | | | | | | | | | | | | | | |
| DC-13 | 900 cycles/h | 300 cycles/h | | | | | | | | | | | | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | N.C. auxiliary contacts are mirror contacts (1) | | | | | | | | | | | | | | | | | | | | | | |

(1) CAL19: for 3-pole contactors only.

Contact utilization characteristics according to UL / CSA

| | |
|--|------------------------|
| Standards | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | 600 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 V A |
| AC maximum volt-ampere breaking | 720 V A |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 V A |

Connecting characteristics

| | | |
|---|-------------------------------------|--|
| Connection capacity (min. ... max.) | | |
|  | Solid / stranded | 1 x 1...4 mm ² |
|  | Flexible with non insulated ferrule | 2 x 1...4 mm ² |
|  | Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² |
|  | Flexible with non insulated ferrule | 2 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 2 x 0.75...2.5 mm ² |
|  | Lugs | L \leq 8 mm |
| | | l > 3.7 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG18...14 |
| Stripping length | | 9 mm |
| Tightening torque | | 1 Nm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat \varnothing 5.5 / Pozidriv 2 |

Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments



CEL19

1SFNC0124W0001



CEL18

1SFNC01083V0001

The auxiliary contact blocks are used for the operation of auxiliary and control circuits for severe industrial environments.

Types of auxiliary contact blocks for side mounting:

- CEL 1-pole block, with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Side-mounting instantaneous auxiliary contact blocks

| | | | | | |
|------------------|-----|----------|-----------------|---|-------|
| AF116 ... AF370 | 1 0 | CEL19-10 | 1SFN010832R1010 | 1 | 0.040 |
| | 0 1 | CEL19-01 | 1SFN010832R1001 | 1 | 0.040 |
| AF400 ... AF2850 | 1 0 | CEL18-10 | 1SFN010716R1010 | 1 | 0.050 |
| | 0 1 | CEL18-01 | 1SFN010716R1001 | 1 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

Auxiliary contact blocks for AF116 ... AF2850 contactors for severe industrial environments

Technical data

| | |
|-------|--------------|
| Types | CEL18, CEL19 |
|-------|--------------|




Contact utilization characteristics according to IEC

| | | | |
|---|---|-------------------|-------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 250 V | | |
| Rated operational voltage U_e max. | 125 V | | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 0.1 A | | |
| I_e / Rated operational current AC-14 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 0.1 A | |
| Making capacity acc. to IEC 60947-5-1 | 6 x I_e AC-14 | | |
| Breaking capacity acc. to IEC 60947-5-1 | 6 x I_e AC-14 | | |
| I_e / Rated operational current DC-12 acc. to IEC 60947-5-1 | 24 V DC | 0.1 A | |
| | 48 V DC | 0.1 A | |
| | 72 V DC | 0.1 A | |
| | 110 V DC | 0.1 A | |
| | 220 V DC | - | |
| Short-circuit protection device | 0.1 A (FF type fuses) (1) | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 3 V / 1 mA | | |
| Mechanical durability | Number of operating cycles | 1 million (2) | |
| | Max. switching frequency | 1200 cycles/h (2) | |
| Electrical durability | Number of operating cycles | 0.7 millions (2) | |
| | Max. switching frequency | AC-14, AC15 | 1200 cycles/h (2) |
| | | DC-12 | 900 cycles/h (2) |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | N.C. auxiliary contacts are mirror contacts | | |

Contact utilization characteristics according to UL / CSA

| | |
|--------------------------|------------------------|
| Standards | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | 125 V |
| Pilot duty | |
| AC thermal rated current | 0.1 A |

Connecting characteristics

| | | |
|---|--|----------------------------|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...4 mm ² |
| | 2 x | 1...4 mm ² |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Lugs | $L \leq$ | 7.7 mm |
| | $L >$ | 3.7 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 18...14 |
| Tightening torque | | 1 Nm |
| Degree of protection | Terminals | IP20 |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | Microswitches | IP67 |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat \varnothing 5.5 / Pozidriv 2 | |

(1) or HRC fuses for very fast action (6.3 x 32 mm size).

(2) For CEL19, please consult us.

Auxiliary contact blocks for AF09 ... AF96 contactors and NF contactor relays

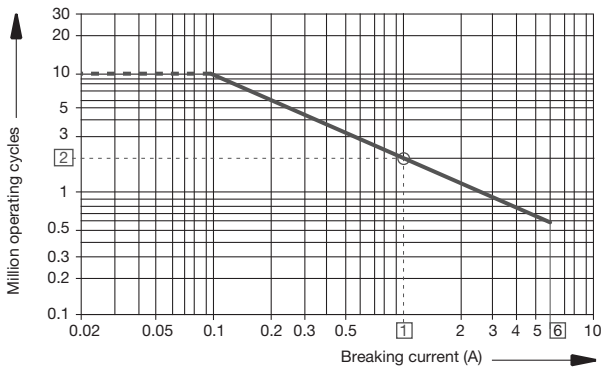
Electrical durability

Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

These curves represent the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current. The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

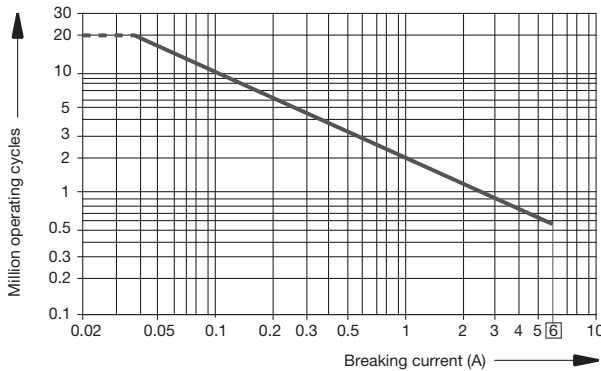


- AF09 ... AF96 contactor built-in auxiliary contacts
- 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4, 2-pole CAL4 add-on auxiliary contacts.

Example:

Breaking current = 1 A

On the opposite curve at intersection "O" 1 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

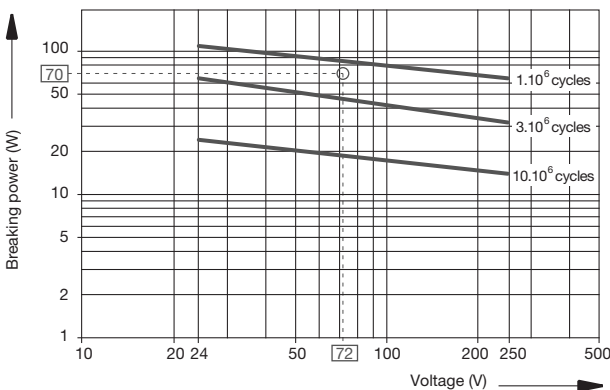


NF contactor relays.

(For add on auxiliary contacts see curve above).

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current I_e and U_e .



- AF09 ... AF96 contactor built-in auxiliary contacts 1-pole and 4-pole CA4, 2-pole CAT4, 1-pole CC4,
- 2-pole CAL4 add-on auxiliary contacts,
- NF contactor relays.

Example:

Control of DC electro-magnet:

U_e voltage = 72 V DC and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Auxiliary contact blocks for AF116 ... AF2850 contactors

Electrical durability

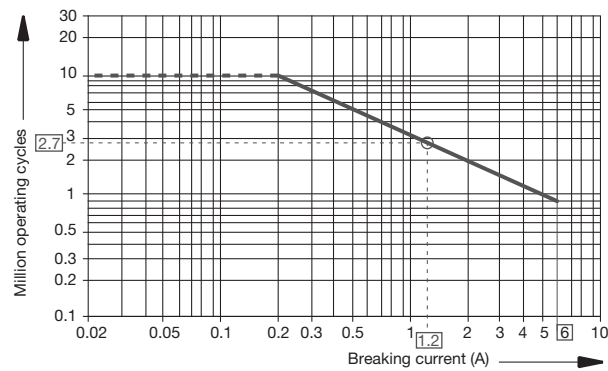
Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

These curves represent the electrical durability of the add-on auxiliary contacts, in relation to the breaking current.

The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



- AF116 ... AF2850 contactors auxiliary contacts
- 2-pole CAL18 and CAL19 add-on auxiliary contacts

Example:

Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

Electronic timers



1SBCT0000AV0014

TEF4-ON



1SBCT00012V0014

TEF4-OFF



1SBCT01394F0014

TEF4S-ON



1SBCT01394F0014

TEF4S-OFF

TEF4 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF4 electronic timers are front-mounted and locked on AF contactors or NF contactor relays. A mechanical indicator allows to show the state of the contactor.

Safe and cost-reduced wiring

TEF4 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

Available for a wide control voltage range 24...240 V AC/DC

TEF4-ON or TEF4-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage U _c | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) |
|----------------------------------|-------------------------------------|------------|--|--------------------|------|------------|--------------------|
| | | | V 50/60 Hz or DC | | | | kg |

With screw terminals

| | | | | | | | |
|---------------|------------------------|-----------|----------|-----|----------|-----------------|-------|
| AF09 ... AF96 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF4-ON | 1SBN020112R1000 | 0.065 |
| NF | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF4-OFF | 1SBN020114R1000 | 0.065 |

With spring terminals

| | | | | | | | |
|---------------|------------------------|-----------|----------|-----|-----------|-----------------|-------|
| AF09 ... AF96 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF4S-ON | 1SBN020113R1000 | 0.065 |
| NF | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF4S-OFF | 1SBN020115R1000 | 0.065 |

Electronic timers

Technical data

Contact utilization characteristics according to IEC

| Types | TEF4-ON | TEF4-OFF |
|--|---|-----------------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 400 V | |
| Rated impulse withstand voltage U_{imp} | 4 kV | |
| Rated operational voltage U_e max. | 240V AC / 24 V DC | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$ | 5 A | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 3 A |
| | 220-240 V 50/60 Hz | 1.5 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 1 A / 24 W |
| | | |
| Short-circuit protection device gG type fuse | 10 A | |
| Conditional short-circuit current | 1 kA | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 8 A |
| | for 0.1 s | 8 A |
| Minimum switching capacity | 12 V / 3 mA | |
| with failure rate acc. to IEC 60947-5-4 | 24 V DC | 10-7 |
| Power dissipation per pole at 3 A | 0.1 W | |
| Function diagram | ON-delay | OFF-delay |
| | | |
| Bistable relay inside. Before use, once apply U_c then switch it off in order to initialize position of the contacts. | | |
| Control circuit voltage | | |
| AC control voltage | Rated control circuit voltage U_c | 24...240 V AC |
| 50/60 Hz | Average consumption | 1.5 mA RMS |
| DC control voltage | Rated control circuit voltage U_c | 24...240 V DC |
| | Average consumption | 1.5 mA |
| | | 1 mA |
| Rated frequency limits | 50 / 60 Hz | |
| Supply voltage range | 0.85...1.1 x U_c (at $\theta \leq 70^\circ\text{C}$) | |
| Oversvoltage protection | Varistor included | |
| Time delay range (t) selected by switch | 0.1...1 s | <input type="checkbox"/> |
| | 1...10 s | <input type="checkbox"/> |
| | 10...100 s | <input type="checkbox"/> |
| On-load reiteration accuracy under constant conditions | $\leq 1\%$ | |
| Minimum ON period | 0.1 s | 1 s |
| Recovery time | 0.15 s | 0.1 s |
| Ambient air temperature | Operation | -25 °C ... +70 °C |
| | Storage | -40 °C ... +80 °C |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude | 2000 m | |
| Mounting positions | Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5 | |
| Shock withstand | 1/2 sinusoidal shock for 11 ms: no change in contact position | |
| acc. to IEC 60068-2-27 and EN 60068-2-27 (Mounting position 1) | Same as contactor or contactor relay | |
| Vibration withstand | 5...300 Hz | |
| acc. to IEC 60068-2-6 | 3 g closed position / 2 g open position | |
| Mechanical durability | | |
| | Number of operating cycles | 5 millions operating cycles |
| | Max. switching frequency | 3600 cycles/h |
| Max. electrical switching frequency | | 1800 cycles/h |
| | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |






Electronic timers

Technical data

Contact utilization characteristics according to UL / CSA

| Types | TEF4-ON | TEF4-OFF |
|---|------------------------|----------|
| Standards | UL 508, CSA C22.2 N°14 | |
| Rated insulation voltage U_i acc. to UL / CSA | 300 V | |
| Max. operational voltage | 240 V | |
| Pilot duty | B300, R300 | |
| AC thermal rated current | 5 A | |
| AC maximum volt-ampere making | 3600 VA | |
| AC maximum volt-ampere breaking | 360 VA | |
| DC thermal rated current | 1 A | |
| DC maximum volt-ampere making-breaking | 28 VA | |

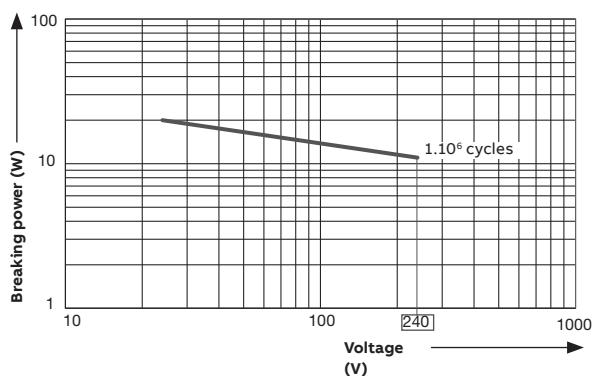
Connecting characteristics

| | | |
|---|--|---|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...2.5 mm ² |
| | 2 x | 1...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² (0.75 ... 1.5 mm ² with spring terminals) |
| | 2 x | 0.75...1.5 mm ² (0.75 ... 1.5 mm ² with spring terminals) |
|  Lugs | L ≤ | 8 mm (1) |
| | l > | 3.7 mm (1) |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 N.m / 11 lb.in (1) |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals should be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |
| Spring terminals | | |
| Screwdriver type | | Ø 3.5 |
| Terminal Marking |  | |

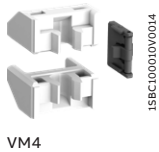
(1) Not applicable for TEF4S-ON and TEF4S-OFF with spring terminal Spring terminals)

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current I_e and U_e .



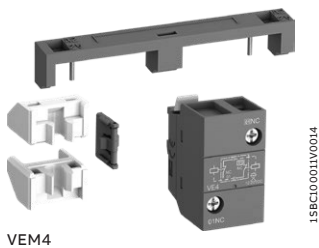
Interlocks



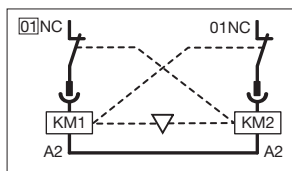
VM4



VM19



VEM4



BB4

Mechanical interlock units

The VM mechanical interlock units are designed for the interlocking of two AF contactors. When mounted between two contactors, the VM mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed. The mechanical interlock units VM4 and VM96-4 include 2 fixing clips (BB4).

| For contactors | Mounting | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|----------|------|------------|---------|-------------------|
|----------------|----------|------|------------|---------|-------------------|

Mechanical interlock units for two contactors mounted side by side

| | | | | | |
|---|--|-----------|-----------------|----|-------|
| AF09 ... AF38..-30-.. | | VM4 | 1SBN030105T1000 | 10 | 0.005 |
| AF09 ... AF38..-40-00 | | | | | |
| AF40 ... AF96-30-.. | | VM96-4 | 1SBN033405T1000 | 10 | 0.006 |
| AF40 ... AF80-40-00 | | | | | |
| For same size contactors: AF116 ... AF146 AF190, AF205 AF265 ... AF370 | | VM19 | 1SFN030300R1000 | 1 | 0.054 |
| AF116 ... AF146 and AF190, AF205 | | VM140/190 | 1SFN034403R1000 | 1 | 0.088 |
| AF190, AF205 and AF265 ... AF370 | | VM205/265 | 1SFN035203R1000 | 1 | 0.090 |
| AF265 ... AF370 and AF400 ... AF460 | | VM370/400 | 1SFN035403R1000 | 1 | 0.100 |
| AF400 ... AF1250 | PN.. mounting plate to be ordered separately | VM750H | 1SFN035700R1000 | 1 | 0.200 |
| AF1350 ... AF2650 | Plate included | VM1650H | 1SFN036503R1001 | 1 | 6.000 |

Mechanical interlock units for two contactors mounted one above the other

| | | | | | |
|------------------|---------------------------------|--------|-----------------|---|-------|
| AF400 ... AF1250 | Additional plate (not supplied) | VM750V | 1SFN035701R1000 | 1 | 0.200 |
|------------------|---------------------------------|--------|-----------------|---|-------|

Mechanical and electrical interlock sets

VEM4 mechanical and electrical interlock set for the interlocking of two AF contactors. VEM4 set includes a mechanical interlock unit VM4 with 2 fixing clips (BB4) and a VE4 electrical interlock block with A2-A2 connection. Fixing the electrical interlock block to the contactor front face connects the 2 built-in N.C. interlocking contacts with the two coils. VE4 block must be used with A2-A2 connection to respect the electrical connection diagram.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--------------------|------|------------|---------|-------------------|
| | | | | | kg |

Mechanical and electrical interlock set

| | | | | | |
|---|-----|------|-----------------|---|-------|
| For same size contactors: AF09 ... AF16..-30-.. AF26 ... AF38..-30-00 AF09, AF16..-40-00 AF26, AF38..-40-00 | 0 2 | VEM4 | 1SBN030111R1000 | 1 | 0.035 |
|---|-----|------|-----------------|---|-------|

Fixing clips

| | | | | |
|---------------|-----|-----------------|----|-------|
| AF09 ... AF96 | BB4 | 1SBN110120W1000 | 50 | 0.002 |
|---------------|-----|-----------------|----|-------|

Note: VEM4 not suitable for AF..Z contactors with DC control voltage 12...20 V DC (coil 20) and 24 V DC (coil 30).

Interlocks

Technical data

Mechanical interlock unit

| Types | | VM4, VM96 | VM19 ... VM750 | VM1650H |
|-----------------------|-------------------------------------|-----------------------------|----------------------------|--------------------------|
| Mechanical durability | Number of operating cycles | 5 millions operating cycles | 1 million operating cycles | 500 000 operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h | 300 cycles/h | |

Mechanical and electrical interlock set





Contact utilization characteristics according to IEC

| Types | | VEM4 |
|--|-------------------------------------|--------------------------------|
| Standards | | IEC 60947-5-1 and EN 60947-5-1 |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 690 V |
| Rated impulse withstand voltage U_{imp} . | | 6 kV |
| Rated control circuit voltage U_c | | |
| | AC 50/60 Hz control voltage | 24...500 V AC |
| | DC control voltage | 20...500 V DC |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 16 A |
| Mechanical durability | Number of operating cycles | 5 millions operating cycles |
| | Max. mechanical switching frequency | 1800 cycles/h |
| Electrical durability | Max. electrical switching frequency | 1200 cycles/h |

Contact utilization characteristics according to UL / CSA

| Types | | VEM4 |
|--------------------------|--|------------------------|
| Standards | | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | | 500 V AC, 500 V DC |

Connecting characteristics

| Types | | VEM4 |
|---|---------------------------------|--|
| Connection capacity (min. ... max.) | | |
|  | Rigid solid | 1 x 1...2.5 mm ² |
| | | 2 x 1...2.5 mm ² |
|  | Flexible with ferrule | 1 x 0.75...2.5 mm ² |
| | | 2 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² |
| | | 2 x 0.75...1.5 mm ² |
|  | Lugs | L < 8 mm |
| Connection capacity acc. to UL / CSA | | 1 or 2 x AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

Impulse contact blocks




CB5

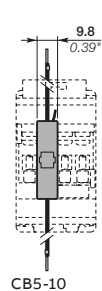
Impulse contact blocks are designed for use in enclosures, in association with an adjustable mechanical pushbutton. Two types are available:

- CB5-10: N.O. contact with a black actuator ("ON" function)
- CB5-01: N.C. contact with a light grey actuator ("OFF" function).

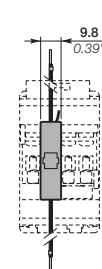
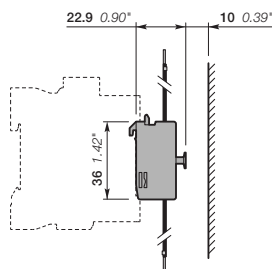
These blocks are equipped with 2 connecting leads 0.5 mm² with end, approximately 18 cm long.

Mounting: Clipped onto the front face of the contactors.

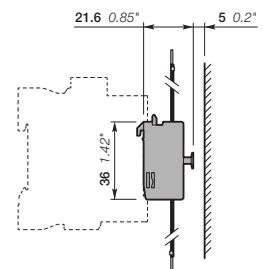
| For contactors | Contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|---|--------|-----------------|---------|----------------|
| |  | | | | kg |
| AF09 ... AF96 | 1 - | CB5-10 | 1SBN010013R1010 | 1 | 0.012 |
| | - 1 | CB5-01 | 1SBN010013R1001 | 1 | 0.012 |



CB5-10



CB5-01



Main dimensions mm, inches

RA4 interface relays



RA4

RA4 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant AF09 ... AF96 contactors or the NF contactor relays. RA4 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA4 is protected from surge thanks to the built-in surge protection of AF09 ... AF96. Furthermore, the RA4 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.

Connection

The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC-output.

The RA4 is equipped with two terminal pads for connection to the A1 and A2 terminals of the contactor coil.

This coil is supplied between the A0 and A2 terminals of the RA4.

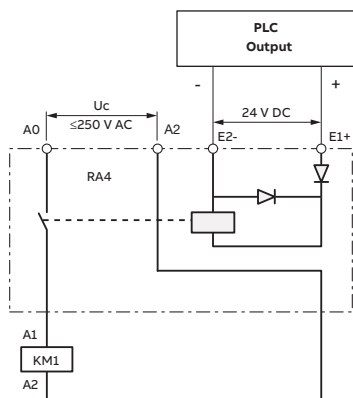
Mounting

Remove the coil terminal block from the contactor and clip the interface relay without any screwing operation.

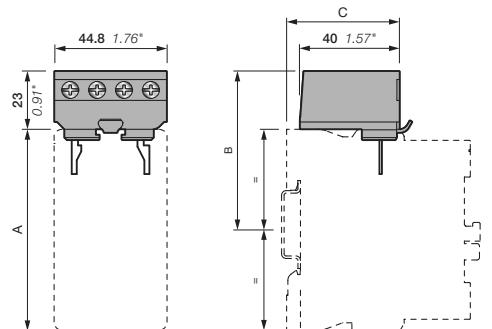
| For contactors (1) | Coil voltages (2) | Rated control circuit voltage U _c | Type | Order code | Pkg qty | Weight (1 pce) |
|---------------------|-------------------|--|------|-----------------|---------|----------------|
| | V AC 50/60 Hz (4) | V DC | | | | kg |
| AF09 ... AF96 NF | 24 ... 250 | 24 | RA4 | 15BN060100R1000 | 1 | 0.040 |

(1) LDC4 additional terminal blocks and CAT4 auxiliary contact blocks not suitable with RA4.

(2) Main use with contactor coils 41, 11, 12, 13.



Wiring diagram



| RA4 mounted on | AF09 ... AF38 | AF40 ... AF96 |
|----------------|---------------|------------------|
| A | 80 mm / 3.15" | 119.5 mm / 4.70" |
| B | 63 mm / 2.48" | 83 mm / 3.27" |
| C | 45 mm / 1.77" | 40 mm / 1.57" |

Main dimensions mm, inches








RA4 interface relays

Technical data

Utilization characteristics according to IEC

| Type | RA4 |
|--|--|
| Standards | IEC 60947 5-1 |
| Rated insulation voltage U_i acc. to IEC 60947 5-1 | 250 V AC 50/60 Hz |
| Ambient air temperature | |
| In free air operation | at $U_c = 24$ V DC (between E1 and E2) -25 ... +70 °C |
| Storage | from 0.85 to 1.1 x U_c -25 ... +60 °C |
| Storage | -40 ... +70 °C |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude | ≤3000 m |
| Mounting positions | Mounting positions 1, 1 ±30°, 2, 3, 4, 5 |

Connecting characteristics

| Connection capacity (min. ... max.) | | | |
|---|-------------------------------------|----------|--|
|  | Rigid solid | 1 x | 1 ... 2.5 mm ² |
|  | Flexible with non insulated ferrule | 2 x | 1 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 2 x | 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 2 x | 0.75 ... 1.5 mm ² |
|  | Lugs | L < | 8 mm |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | | 10 mm |
| Tightening torque | | | 1.2 Nm / 11 lb.in |
| Degree of protection | | | IP20 protection against direct contact in acc. with EN 50274 |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | RA4 wired and mounted on the associated contactor |
| Screw terminals | | | Delivered in open position |
| All terminals | | | M3.5 |
| Screwdriver type | | | Flat Ø 5.5 / Pozidriv 2 |

Working data

| | | | |
|--|----------------------|--|---|
| Surge suppression | | | Included inside AF built-in surge protection |
| For interface relay coil | | | |
| Protection against polarity reversal between terminals E1 and E2 | | | Diode |
| Interface relay operating time | | | Closing and drop-out ≤10 ms |
| Total operating time | | | |
| interface relay + contactor (1) | | | |
| Between energization and: | N.O. contact closing | | 42 ... 95 ms (AF09 ... AF38, NF) 44 ... 105 ms (AF40 ... AF96) |
| | N.C. contact opening | | 40 ... 90 ms (AF09 ... AF38, NF) 40 ... 100 ms (AF40 ... AF96) |
| Between de-energization and: | N.O. contact opening | | 15 ... 57 ms (AF09 ... AF38, NF) 21 ... 107 ms (AF40 ... AF96) |
| | N.C. contact closing | | 17 ... 60 ms (AF09 ... AF38, NF) 23 ... 112 ms (AF40 ... AF96) |

(1) For contactor coils 41, 11, 12, 13.

Electrical input data

| | | | |
|--|-----------|--|----------------|
| Control voltage (E1 and E2 terminals) U_c | | | |
| Rated value | | | 24 V DC |
| Max. range at ambient temperature 20 °C | | | 19 ... 30 V DC |
| Max. consumption for $U_c = 24$ V DC, $\theta = 20$ °C | | | 0.3 W |
| "0" status (relay open) | for U_c | | ≤2.4 V DC |
| | for I_c | | <1 mA |
| "1" status (relay closed) | for U_c | | ≥19 V DC |
| Max. short supply interruption immunity time | | | 2 ms |

Electrical output data

| | | | |
|---|--|--|----------------------------|
| Switching voltage (A0 and A2 terminals) | | | ≤250 V AC |
| Electrical durability | | | |
| Switching frequency | | | 600 cycles/h |
| Number of operating cycles | | | 2 million operating cycles |

Mechanical latching unit



WA4

1SBCL01058V0014

The WA4 mechanical latching unit for AF09 ... AF96 contactors and NF contactor relays ensures that the contactor or contactor relay remains switched on even if there is a lack or a failure of voltage. Standard contactors can be easily converted into compact latched contactors.

The WA4 block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Operation

After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

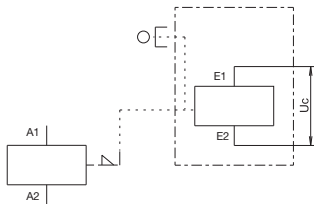
- electrically by an impulse (AC or DC) on the WA4 block coil (the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WA4 block.

Mounting

The WA4 block is clipped onto the front face of the 1-stack contactor where it takes up two slots in central position (see fig. below).

The two other slots may accept CA4 single pole auxiliary contacts (1 block on each side of the mechanical latch).

Additional CAL4 can be fitted on the side of the contactor in respect to the total number of built-in or additional N.O. and N.C. auxiliary contacts as described in the accessory fitting details part of each contactor type.



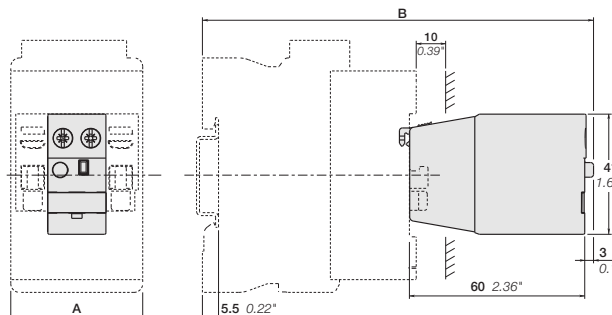
Wiring diagram

| For contactors and contactor relays | Rated control circuit voltage U _c | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------------------------|--|-----------|-----------|-----------------|---------|-------------------|
| | V AC 50/60 Hz | V DC | | | | |
| AF09 ... AF65, 4-pole NF | 24...60 | 24...60 | WA4-11 | 1SBN040100R1011 | 1 | 0.080 |
| | 48...130 | 48...130 | WA4-12 | 1SBN040100R1012 | 1 | 0.080 |
| | 100...250 | 100...250 | WA4-13 | 1SBN040100R1013 | 1 | 0.080 |
| | 250...500 | 250...500 | WA4-14 | 1SBN040100R1014 | 1 | 0.080 |
| AF80, AF96 | 24...60 | 24...60 | WA4-96-11 | 1SBN040200R1011 | 1 | 0.080 |
| | 48...130 | 48...130 | WA4-96-12 | 1SBN040200R1012 | 1 | 0.080 |
| | 100...250 | 100...250 | WA4-96-13 | 1SBN040200R1013 | 1 | 0.080 |
| | 250...500 | 250...500 | WA4-96-14 | 1SBN040200R1014 | 1 | 0.080 |

Mechanical latching unit for 24 V DC - 500 mA PLC control

| | | | | | | |
|--------------------------|---|----|--------|-----------------|---|-------|
| AF09 ... AF38, 4-pole NF | - | 24 | WA4-10 | 1SBN040100R1010 | 1 | 0.080 |
|--------------------------|---|----|--------|-----------------|---|-------|

Note: For WA4 accessory use with contactor or contactor relay coil 30, please consult your ABB local sales organization.



WA4 + AF09 ... AF96, NF 1-stack

Main dimensions mm, inches








| For contactors and contactor relays | A mm in. | B mm in. |
|-------------------------------------|----------|-------------|
| AF09 ... 16(Z)-30-.. | 45 1.77" | 133.5 5.25" |
| AF09 ... 16(Z)-40/22-00 NF(Z) | | |
| AF26 ... 38(Z)-30-00 | 45 1.77" | 142.5 5.61" |
| AF26 ... 38(Z)-40/22-00 | 45 1.77" | 157.5 6.17" |
| AF40 ... 65-30-00 | 55 2.16" | 167 6.57" |
| AF40-40/22-00 | 70 2.75" | 170 6.70" |
| AF52-40-00 | 70 2.75" | 170 6.70" |
| AF80, 96-30-00 | 70 2.75" | 172 6.77" |
| AF80-40/22-00 | 90 3.54" | 172 6.77" |

Mechanical latching unit

Technical data

| Types | WA4, WA4-96 | WA4 |
|---|--|--|
| Coil voltage code | 11, 12, 13, 14 | 10 |
| Standards | IEC 60947-4-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-1 | 690 V AC | |
| Coil operating limits acc. to IEC 60947-4-1 | AC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ |
| | DC supply | At $\theta \leq 70^\circ\text{C}$ $0.85 \times U_c \text{ min} \dots 1.1 \times U_c \text{ max}$ |
| Control circuit voltage | | |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage U_c | 24 ... 500 V AC 50/60 Hz | - |
| Coil consumption | Average pull-in value | 15 ... 100 VA |
| DC control voltage 50/60 Hz | | |
| Rated control circuit voltage U_c | 24 ... 500 V DC | 24 V DC |
| Coil consumption | Average pull-in value | 15 ... 100 W |
| Max. electrical impulse time | | |
| On AC control supply (with load factor 1.6%) | 4 s | - |
| On DC control supply (with load factor 1.6%) | 4 s | - |
| Min. electrical impulse time | | |
| For latching, energizing of the contactor coil | 120 ms | |
| For unlatching, energizing of the mechanical latching unit coil | 50 ms | |
| Operating time | | |
| On contactor closing (latching) between coil energization and: | | |
| N.O. contact closing | No difference with the operation of a contactor without mechanical latching unit | |
| N.C. contact opening | No difference with the operation of a contactor without mechanical latching unit | |
| On contactor opening (unlatching) between mechanical latching unit coil energization and: | | |
| N.O. contact opening | 8 ... 15 ms | |
| N.C. contact closing | 10 ... 17 ms | |
| Ambient air temperature | | |
| Operation | -25 ... +70 °C | |
| Storage | -60 ... +80 °C | |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q | |
| Max. operating altitude | ≤ 3000 m | |
| Mounting positions | Mounting positions 1, 1+/- 30°, 2, 3, 4, 5 | |
| Mechanical durability | AF09 ... AF38, NF: 1 million operating cycles AF40 ... AF65: 0.5 million operating cycles AF80, AF96: 0.2 million operating cycles | |
| Max. switching frequency with on-load factor of 1.6% | cycles/h | 600 |

Connecting characteristics

| | | |
|---|-------------------------------------|----------------------------------|
| Connection capacity (min. ... max.) | | |
|  | Rigid solid | 1 x 1 ... 2.5 mm ² |
|  | Flexible with non insulated ferrule | 2 x 1 ... 2.5 mm ² |
|  | Flexible with non insulated ferrule | 1 x 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 2 x 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75 ... 2.5 mm ² |
|  | Lugs | 2 x 0.75 ... 1.5 mm ² |
|  | Lugs | L < 8 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18 ... 14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 Nm / 11 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

Other accessories



LDC4

1SBC100023V0014



LDC4K

1SBC100090V0014



BX4

1SBC100021V0014



BX4-CA

1SBC100023V0014



BA4

1SNC16010F0014



BA5-50

1SBC100044V0014

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|----------------------|
|----------------|------|------------|---------|----------------------|

Additional coil terminal blocks

Additional coil terminal blocks for a top and/or bottom access to the coil terminals of contactors or contactor relays.

With screw terminal

| | | | | |
|-------------------|------|-----------------|----|-------|
| AF09 ... AF96, NF | LDC4 | 1SBN070156T1000 | 10 | 0.010 |
|-------------------|------|-----------------|----|-------|

With Push-in Spring terminal

| | | | | |
|-------------------|-------|-----------------|----|-------|
| AF09 ... AF96, NF | LDC4K | 1SBN070159T1000 | 10 | 0.010 |
|-------------------|-------|-----------------|----|-------|

Protective covers

Sealable and transparent protective covers BX4 and non-removable BX4-CA to protect the devices against accidental contact.

| | | | | |
|--|--------|-----------------|----|-------|
| AF09 ... AF96 1-stack contactors and NF contactor relays | BX4 | 1SBN110108T1000 | 10 | 0.006 |
| 4-pole CA4, 2-pole CAT4 auxiliary contact blocks and TEF4 electronic timer | BX4-CA | 1SBN110109W1000 | 50 | 0.001 |

Note: BX4 produced since 13045 (day 045 - year 2013) are suitable for AF40 ... AF96.

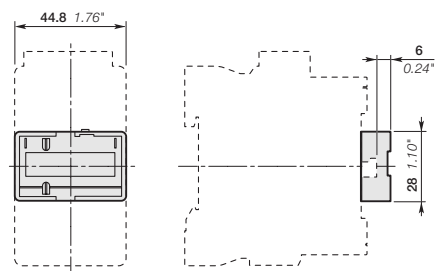
Function markers AF09 ... AF2850

Function markers designed to be clipped onto the front face of the contactor, manual motor starter or overload relays to identify them. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.

Self-adhesive labels (not supplied) can also be added to them.

- BA4 : box with 16 blank cards (16 markers by card).
Marker dimensions: 7 x 20 mm (.276" x .787").
- BA5 : set of 50 pieces. Marker dimensions: 7 x 19 mm (.276" x .748").

| | | | | |
|---|--------|-----------------|----|-------|
| AF09 ... AF370 contactors, TF thermal overload relays, EF electronic overload relays and MS116, MS132 manual motor starters | BA4 | 1SNA235156R2700 | 16 | 0.011 |
| AF400 ... AF2850 and accessories | BA5-50 | 1SBN110000R1000 | 1 | 0.017 |



BX4

Main dimensions mm, inches

Other accessories



BP38-4



BDT4
For AF09 ... AF65, NF



BDT4
For AF80 ... AF96

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|-------------------|
|----------------|------|------------|---------|-------------------|

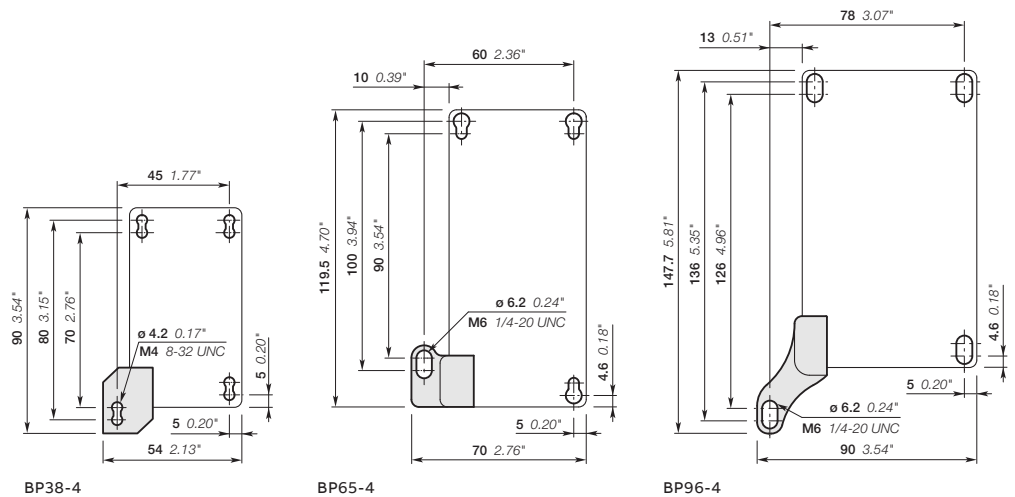
Mounting piece for replacing installed contactors fixed by screws by AF contactors.

| From contactor | To contactor | | | |
|---|---------------|--------|-----------------|----------|
| A26 ... A40, AL26 ... AL40 | AF09 ... AF38 | BP38-4 | 1SBN112303T1000 | 10 0.003 |
| A50 ... A75, AE50 ... AE75, AF50 ... AF75 | AF40 ... AF65 | BP65-4 | 1SBN113403T1000 | 10 0.004 |
| A95, A110, AE95, AE110, AF95, AF110 | AF80 ... AF96 | BP96-4 | 1SBN113903T1000 | 10 0.005 |

Test block

BDT4 test block is suitable for switching on contactor off-load.
Marking on the block indicates the contactor type to fit with.

| | | | | |
|-----------------|------|-----------------|----|-------|
| AF09...AF96, NF | BDT4 | 1SBN110122T1000 | 10 | 0.007 |
|-----------------|------|-----------------|----|-------|



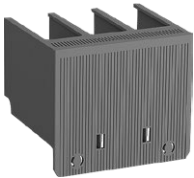
Main dimensions mm, inches

Terminal shrouds



LT65-30

1SFC100073V0014



LT140-30L

1SFC101038V0001



LT370-30C

1SFC101041V0001



LT460-AC

1SFC101089V0001



LT80-40

1SFC100073V0014



LT205-40

1SFC10199V0001

Main terminal protection for AF40 ... AF1250 contactors.

The auxiliary contact blocks and coils are designed to provide an IP 20 degree of protection.

The main terminals, equipped with compression lugs or cable clamps, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

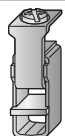



| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|-----------|-----------------|---------|----------------------|
| 3-pole contactors | | | | |
| AF40 ... AF65 | LT65-30 | 1SBN123401R1000 | 1 | 0.015 |
| AF80, AF96 | LT96-30 | 1SBN123901R1000 | 1 | 0.020 |
| AF116 ... AF146, with compression lugs | LT140-30L | 1SBN124203R1000 | 2 | 0.070 |
| AF190, AF205, with cable clamps | LT205-30C | 1SBN124801R1000 | 2 | 0.050 |
| AF190, AF205, with compression lugs | LT205-30L | 1SBN124803R1000 | 2 | 0.220 |
| AF190, AF205, with shorting bar or between contactor and TOL/EOL in DOL starters | LT205-30Y | 1SBN124804R1000 | 1 | 0.050 |
| AF265 ... AF370, with cable clamps | LT370-30C | 1SBN125401R1000 | 2 | 0.035 |
| AF265 ... AF370, with compression lugs | LT370-30L | 1SBN125403R1000 | 2 | 0.280 |
| AF265 ... AF370, with shorting bar or between contactor and TOL/EOL in DOL starters | LT370-30Y | 1SBN125404R1000 | 1 | 0.075 |
| AF265 ... AF370, for use with extending cable clamps, ATK300/2 and OZXB4 | LT370-30D | 1SBN125406R1000 | 1 | 0.15 |
| AF400, AF460 with cable clamps | LT460-AC | 1SBN125701R1000 | 2 | 0.100 |
| AF400, AF460 with compression lugs | LT460-AL | 1SBN125703R1000 | 2 | 0.800 |
| AF580, AF750 with cable clamps | LT750-AC | 1SBN126101R1000 | 2 | 0.120 |
| AF580, AF1250 with compression lugs | LT750-AL | 1SBN126103R1000 | 2 | 0.825 |

4-pole contactors

| | | | | |
|--|-----------|-----------------|---|-------|
| AF40, AF52 | LT52-40 | 1SBN123402R1000 | 1 | 0.020 |
| AF80 | LT80-40 | 1SBN123902R1000 | 1 | 0.025 |
| AF116 ... AF140, with compression lugs | LT140-40L | 1SBN124203R2000 | 2 | 0.090 |
| AF190 ... AF205, with cable clamps | LT205-40C | 1SBN124801R2000 | 2 | 0.035 |
| AF190 ... AF205, with compression lugs | LT205-40L | 1SBN124803R2000 | 2 | 0.140 |
| AF265 ... AF370, with cable clamps | LT370-40C | 1SBN125401R2000 | 2 | 0.040 |
| AF265 ... AF370, with compression lugs | LT370-40L | 1SBN125403R2000 | 2 | 0.165 |

Note: With LT65-30, LT96-30, LT52-40, LT80-40, use rigid cables or flexible cables with insulated ferrules including a stripping length \geq 18 mm.

Connecting characteristics with LT ... terminal shrouds

| Contactor types | AC / DC operated | AF40 ... 65 + LT65 ... | AF80 ... 96 + LT ... |
|---|------------------|---|---|
| | |  | |
| | | Screw terminals with double connector 2 x (9.3 width x 7.9/10.3 depth) | Screw terminals with double connector 2 x (12.4 width x 9.3/11.1 depth) |
| Connection capacity (min. ... max.) | | | |
| Main contactor (poles) | | | |
|  Rigid solid | 1 x | 6...16 mm ² or 25 ...35 mm ² | 6...16 mm ² or 25 ...70 mm ² |
|  Flexible with insulated ferrule | 2 x | 6...16 mm ² or 25 ...35 mm ² | 6...16 mm ² or 35 ... 50 mm ² |
|  Bars or Lugs | 1 x | 4...16 mm ² or 25 ...35 mm ² | 6...16 mm ² or 25 ...50 mm ² |
| | 2 x | 4...16 mm ² or 25 ...35 mm ² | 6...16 mm ² or 35 ...50 mm ² |
| | L < | 9.2 mm | 12.2 mm |
| Connection capacity acc. to UL / CSA | | | |
| | 1 x | AWG 10...6 or AWG 4..2 | AWG 6 or AWG 4..1 |
| | 2 x | AWG 10...6 or AWG 4..2 | AWG 6 or AWG 2..1 |
| Stripping length | | 18 mm | 18 mm |
| Tightening torque | | | |
| Recommended | | 4 Nm / 35 lb.in | 6 Nm / 53 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 | |
| Main terminals equipped with LT | | IP20 | |
| Screw terminals | | | |
| Main terminals | | M6 | M8 |
| | Screwdriver type | Flat Ø 6.5 / Pozidriv 2 | hexagon socket (s = 4 mm) |

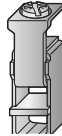





Additional terminal blocks



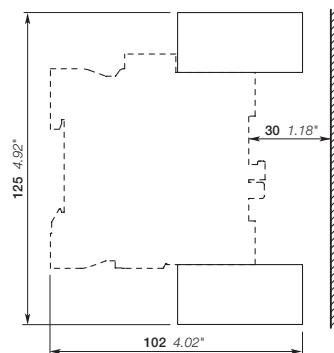
The LD terminal block is designed to increase the connecting capacity of 3-pole AF26 ... AF38 contactors on which it is fitted and for preparation of the wiring before final connection to the contactor. LD38-4 blocks are 3-pole terminal blocks with tunnel terminals.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--------|-----------------|---------|----------------------|
| AF26 ... AF38 | LD38-4 | 1SBN072308R1000 | 2 | 0.070 |

Technical data

| Types | | LD38-4 |
|---|---------------------------------|---|
| Rated insulation voltage Ui | | |
| acc. to IEC 60947-4-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Main terminals | |  |
| | | Screw terminals with double connector 2 x (7 width x 5.8/9.2 depth) |
| Connection capacity (min. ... max.) | | |
|  Rigid | Solid ($\leq 4 \text{ mm}^2$) | } 1x 2.5...25 mm ² |
|  Stranded ($\geq 6 \text{ mm}^2$) | | |
|  Flexible with non insulated ferrule | | 1x 2.5...25 mm ² + 1x 2.5...16mm ² |
|  Flexible with insulated ferrule | | 1x 2.5...16 mm ² |
|  Flexible with insulated ferrule | | 1x 2.5...16mm ² + 1x 2.5...10mm ² |
| Connection capacity acc. to UL / CSA | | 1x AWG 8-4 2x AWG 8-6 |
| Stripping length | | 14 mm |
| Tightening torque | | 2.5 Nm / 22 lb.in |
| Degree of protection | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in closed position, screws of unused terminals must be tightened |
| Main terminals | | M5 |
| | | Screwdriver type Flat $\varnothing 6.5$ / Pozidriv 2 |

Note: The utilization of LD38-4 additional terminal blocks does not allow the use of BER and BEY connection sets.



Main dimensions mm, inches

Terminals for control lead connections



LK96-4F

Terminal designed to connect the control conductors to the main poles of the AF40 ... AF96 contactors and derivative versions.

Accessory clipped into the slots placed above each power terminal connector.

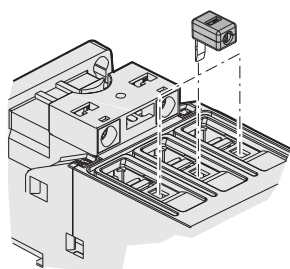
The LK96-4F is fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|---------|-----------------|---------|-------------------|
| AF40 ... AF96 | LK96-4F | 1SBN073452R2000 | 2 | 0.005 |

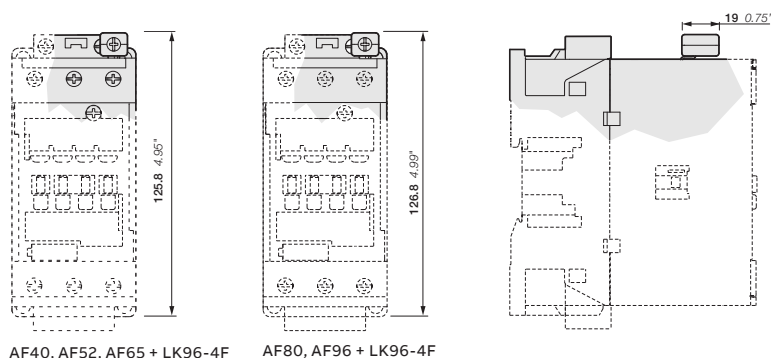
Note : LK96 not compatible with LT Terminal shrouds

Technical data

| Types | LK96-4.. | |
|--|----------|---|
| Connection capacity (min. ... max.) | | |
| Rigid | 1 x | 1...2.5 mm ² |
| | 2 x | 1...2.5 mm ² |
| Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
| Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...1.5 mm ² |
| Lugs | L ≤ | 8 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm |
| Tightening torque | | 1.2 N.m / 11 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals should be tightened M3.5 |
| All terminals | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |



LK positioning



Main dimensions mm, inches

Connections



LW140



LW205-40



LX140



LL146-30



LD146-30

Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted.

| For contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|------------|----------|--------|-----------------|---------|-------------------|
| | hole Ø mm | bar mm | | | | |
| 3-pole contactors | | | | | | |
| AF116 ... AF146 | 6.5 | 13 x 3 | LW140 | 1SFN074207R1000 | 1 | 0.115 |
| AF190, AF205 | 10.5 | 17.5 x 5 | LW205 | 1SFN074807R1000 | 1 | 0.260 |
| AF265 ... AF370 | 10.5 | 25 x 5 | LW370 | 1SFN075407R1000 | 1 | 0.340 |
| AF400, AF460 | 10.5 | 25 x 5 | LW460 | 1SFN075707R1000 | 1 | 0.730 |
| AF580, AF750 | 13 | 40 x 6 | LW750 | 1SFN076107R1000 | 1 | 1.230 |
| AF1250 | 13 | 50 x 10 | LW1250 | 1SFN076407R1000 | 1 | 2.000 |

4-pole contactors

| | | | | | | |
|-----------------|------|--------|----------|-----------------|---|-------|
| AF190 ... AF205 | 10.5 | 20 x 5 | LW205-40 | 1SFN074807R2000 | 1 | 0.306 |
| AF265 ... AF370 | 10.5 | 25 x 5 | LW370-40 | 1SFN075407R2000 | 1 | 0.540 |

Terminal extension

Extension pieces designed to extend the main terminals of contactors for combined mounting of contactors and connection sets.

| For 3-pole contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|------------|----------|-------|-----------------|---------|-------------------|
| | hole Ø mm | bar mm | | | | |
| AF116 ... AF146 | 6.5 | 13 x 3 | LX140 | 1SFN074210R1000 | 1 | 0.072 |
| AF190, AF205 | 8.5 | 17.5 x 5 | LX205 | 1SFN074810R1000 | 1 | 0.180 |
| AF265 ... AF370 | 10.5 | 20 x 5 | LX370 | 1SFN075410R1000 | 1 | 0.234 |
| AF400, AF460 | 10.5 | 25 x 5 | LX460 | 1SFN075710R1000 | 1 | 0.500 |
| AF580, AF750 | 13 | 40 x 6 | LX750 | 1SFN076110R1000 | 1 | 0.850 |

Connection sockets

Connection socket can be used to replace built-in cable clamps in AF116 ... AF146.

| For contactor | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|----------|-----------------|---------|-------------------|
| 3-pole contactors | | | | |
| AF116 ... AF146 | LL146-30 | 1SFN074211R1000 | 6 | 0.102 |
| AF190 ... AF205 | LL205-30 | 1SFN074811R1000 | 1 | 0.166 |
| AF265 ... AF370 | LL370-30 | 1SFN075411R1000 | 1 | 0.173 |
| AF400 ... AF460 | LE460 | 1SFN075716R1000 | 6 | 0.600 |
| AF580 ... AF750 | LE750 | 1SFN076116R1000 | 6 | 0.750 |

4-pole contactors

| | | | | |
|-----------------|----------|-----------------|---|-------|
| AF116 ... AF140 | LL146-40 | 1SFN074211R2000 | 8 | 0.132 |
| AF190 ... AF205 | LL205-40 | 1SFN074811R2000 | 2 | 0.216 |
| AF265 ... AF370 | LL370-40 | 1SFN075411R2000 | 2 | 0.224 |

Connection module

Connection module can be fixed on AF116 ... AF146 delivered with bar terminals.

| For contactor | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|----------|-----------------|---------|-------------------|
| 3-pole contactors | | | | |
| AF116 ... AF146 | LD146-30 | 1SFN074208R1000 | 2 | 0.165 |
| 4-pole contactors | | | | |
| AF116 ... AF140 | LD146-40 | 1SFN074208R2000 | 2 | 0.225 |

Terminal connecting strips and shorting bars



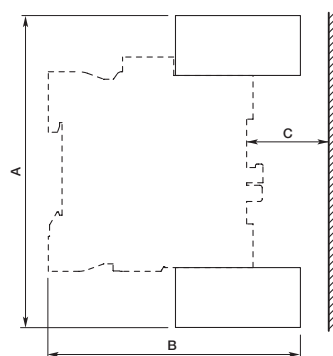
Parallel and series connection of 3-pole contactors:

- To obtain a star point (3 parallel-connected poles)
- To connect poles in parallel and thus increase the AC load passing through the flow path made up of the parallel-connected poles: LP, LY, LH, LF, LG.
The relevant cable cross-sectional area may limit the maximum permissible current. Consult information in table below
- To connect poles in series and thus increase the DC voltage controlled by the poles: LP, LY (only LY16-4 and LY38-4 secable strips).

| Types | for connection of "n" poles | with terminal | insulated |
|-------|--|---------------|-----------|
| LP | n = 2 | no | no (1) |
| LY | n = 2 (secable LY16-4, LY38-4 connecting strips) | no | yes |
| | n = 3 | no | yes (1) |
| LH | n = 2 | yes | no |
| LF | n = 3 | yes | yes |
| LG | n = 4 | yes | yes |

(1) LP460 ... LP750, LY185 ... LY750 not insulated. Use terminal shrouds.

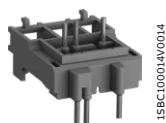
| For contactors | max. nominal continuous current with "n" poles | | | | Cable cross-sectional area mm ² | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------|--|---------|-----------|---------|---|--------|-----------------|---------|----------------------|
| | in parallel | | in series | | | | | | |
| | 2 poles | 3 poles | 4 poles | 2 poles | | | | | |
| AF09 | 30 | 33 | - | 25 | 6 | LY16-4 | 1SBN071303T1000 | 10 | 0.006 |
| AF12 | 32 | 36 | - | 27 | | | | | |
| AF16 | 34 | 40 | - | 30 | | | | | |
| AF26 | 50 | 60 | - | 45 | 10 | LY38-4 | 1SBN072303T1000 | 10 | 0.012 |
| AF116 ... AF146 | - | 240 | - | - | - | LY140 | 1SFN074203R1000 | 1 | 0.055 |
| AF190, AF205 | - | 400 | - | - | - | LY185 | 1SFN074703R1000 | 1 | 0.200 |
| AF265 ... AF370 | - | 670 | - | - | - | LY300 | 1SFN075103R1000 | 1 | 0.300 |
| AF400, AF460 | - | 1000 | - | - | - | LY460 | 1SFN075703R1000 | 1 | 0.450 |
| AF580, AF750 | - | 1650 | - | - | - | LY750 | 1SFN076103R1000 | 1 | 0.800 |
| AF190, AF205 | 300 | - | - | - | - | LP185 | 1SFN074712R1000 | 2 | 0.300 |
| AF265 ... AF370 | 475 | - | - | - | - | LP300 | 1SFN075112R1000 | 2 | 0.400 |
| AF400, AF460 | 725 | - | - | - | - | LP460 | 1SFN075712R1000 | 2 | 0.550 |
| AF580, AF750 | 1200 | - | - | - | - | LP750 | 1SFN076112R1000 | 2 | 0.950 |
| AF09 | 45 | - | - | - | 10 | LH38-4 | 1SBN072304R1000 | 2 | 0.012 |
| AF12 | 50 | - | - | - | 10 | | | | |
| AF16 | 54 | - | - | - | 16 | | | | |
| AF26 | 81 | - | - | - | 25 | | | | |
| AF30, AF38 | 90 | - | - | - | 25 | | | | |
| AF09 | - | 62 | - | - | 16 | LF16-4 | 1SBN071305R1000 | 2 | 0.020 |
| AF12 | - | 70 | - | - | 25 | | | | |
| AF16 | - | 75 | - | - | 25 | | | | |
| AF26 | - | 112 | - | - | 35 | LF38-4 | 1SBN072305R1000 | 2 | 0.040 |
| AF30, AF38 | - | 125 | - | - | 50 | | | | |
| AF09 | - | - | 70 | - | 25 | LG16-4 | 1SBN071306R1000 | 2 | 0.025 |
| AF12 | - | - | 78 | - | 25 | | | | |
| AF16 | - | - | 84 | - | 25 | | | | |



Main dimensions

| Type | For contactors | Dimensions | | | | | |
|--------|----------------|------------|-------|-----|-------|----|-------|
| | | A | | B | | C | |
| | | mm | inch | mm | inch | mm | inch |
| LH38-4 | AF09 ... AF16 | 111.20 | 4.38" | 83 | 3.27" | 22 | 0.87" |
| | AF26 ... AF38 | 114 | 4.49" | 86 | 3.39" | 16 | 0.63" |
| LF16-4 | AF09 ... AF16 | 121 | 4.76" | 87 | 3.43" | 23 | 0.91" |
| LF38-4 | AF26 ... AF38 | 135.20 | 5.32" | 103 | 4.06" | 31 | 1.22" |
| LG16-4 | AF09 ... AF16 | 124.20 | 4.89" | 87 | 3.43" | 23 | 0.91" |

Connection accessories for starting solutions



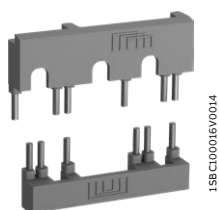
BEA16-4

1SBC100014V0014



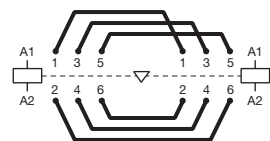
BPR65-4

1SBC100078V0014



BER16-4

1SBC100016V0014



BER, BEM
Reversing connections

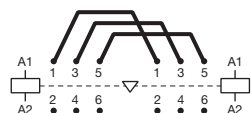


BEP16-30

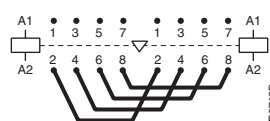


BEP140-30

1SFC01035V0001



BEP, BES
3-pole phase to phase connections



BEP
4-pole changeover connections

E0743D

Connecting links with manual motor starters

The BEA insulated 3-pole connecting links are used to connect AF09 ... AF65 contactors with the MS116 or MS132 or MS165 manual motor starters. The BEA insulated 3-pole connecting links ensure the electrical and mechanical connection between the contactor and the associated manual motor starter. BPR65-4 35 mm rail hooks used with BEA65-4 connecting link, allow direct mounting on 2 rails 35 mm of MS165 manual motor starters with AF40 ... AF65 contactors.

| For 3-pole contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|--|-------------|-----------------|---------|-------------------|
| AF09 ... AF16 | MS116-0.16 ... MS116-25, MS132-0.16 ... MS132-25 | BEA16-4 | 1SBN081306T1000 | 10 | 0.025 |
| AF26 ... AF38 | MS116-0.16 ... MS116-16, MS132-0.16 ... MS132-10 | BEA26-4 | 1SBN082306T1000 | 10 | 0.025 |
| | MS116-20 ... MS116-32, MS132-12 ... MS132-32 | BEA38-4 | 1SBN082306T2000 | 10 | 0.030 |
| AF40 ... AF65 | MS165-16 ... MS165-65 | BEA65-4 | 1SBN083406R1000 | 1 | 0.090 |
| | MS165-16 ... MS165-65 (1) | BPR65-4 (2) | 1SBN113405R1000 | 1 | 0.014 |

Note : BEA not suitable for AF..Z contactors with DC control voltage 24 V DC (coil 30).

(1) Applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

(2) Use one BPR65-4 for each contactor AF40 ... AF65.

Connection sets for reversing contactors

The BER and BEM connection sets are used to connect the main poles of two 3-pole contactors mounted side by side. The BER connection sets are made up of 1 upstream and 1 downstream connections. The BEM connection sets are made up of 3 upstream and 3 downstream connections. BER and BEM connection sets are insulated and made of solid copper bars.

| For 3-pole contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|-----------|-----------------|---------|-------------------|
| AF09 ... AF16 | BER16-4 | 1SBN081311R1000 | 1 | 0.045 |
| AF26 ... AF38 | BER38-4 | 1SBN082311R1000 | 1 | 0.100 |
| AF40 ... AF65 | BER65-4 | 1SBN083411R1000 | 1 | 0.175 |
| AF80, AF96 | BER96-4 | 1SBN083911R1000 | 1 | 0.250 |
| AF116 ... AF146 | BER140-4 | 1SBN084211R1000 | 1 | 0.615 |
| AF190, AF205 | BER205-4 | 1SBN084811R1000 | 1 | 1.237 |
| AF265 ... AF370 | BER370-4 | 1SBN085411R1000 | 1 | 2.140 |
| AF400, AF460 | BEM460-30 | 1SBN085701R1000 | 1 | 4.400 |
| AF580, AF750 | BEM750-30 | 1SBN086101R1000 | 1 | 7.300 |

Phase to phase connections

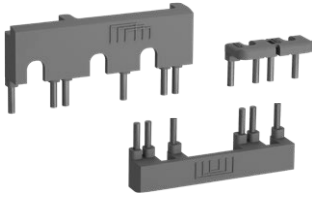
The BEP and BES connection sets are used to connect phase to phase between the main poles of two contactors mounted side by side. 4-pole contactors will then operate as source reversing contactors. The BEP connection sets contain 1 busbar used for upstream or downstream connection. The BES connection sets are made up of 3 busbars used for upstream or downstream connection. BEP and BES connection sets are insulated and made of solid copper bars.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|-----------|-----------------|---------|-------------------|
| 3-pole contactors | | | | |
| AF09 ... AF16 | BEP16-30 | 1SBN081314R1000 | 1 | 0.025 |
| AF26 ... AF38 | BEP38-30 | 1SBN082314R1000 | 1 | 0.050 |
| AF116 ... AF146 | BEP140-30 | 1SBN084214R1000 | 1 | 0.320 |
| AF190, AF205 | BEP205-30 | 1SBN084814R1000 | 1 | 0.534 |
| AF265 ... AF370 | BEP370-30 | 1SBN085414R1000 | 1 | 0.926 |
| AF400, AF460 | BES460 | 1SBN085704R1000 | 1 | 2.200 |
| AF580, AF750 | BES750 | 1SBN086104R1000 | 1 | 3.700 |

4-pole contactors

| | | | | |
|-----------------|-----------|-----------------|---|-------|
| AF116 ... AF140 | BEP140-40 | 1SBN084214R2000 | 1 | 0.420 |
| AF190 ... AF205 | BEP205-40 | 1SBN084814R2000 | 1 | 0.710 |
| AF265 ... AF370 | BEP370-40 | 1SBN085414R2000 | 1 | 1.230 |

Connection sets for star-delta starter



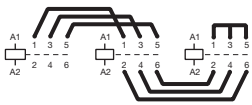
BEY16-4

1SBC10001B/0014

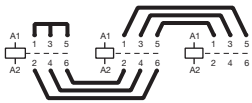
The BEY and BED connection sets are used to connect the main poles of the Line, Delta and Star contactors of a star-delta starter.

The connection sets are made up of:

- Line contactor / delta contactor:
 - BEY: upstream phase-to-phase connection
 - BED: upstream connection in parallel
- Delta contactor / star contactor: downstream connection in parallel
- Star contactor: star point upstream
- Insulated, solid copper bar.



AF09 ... AF370
Line-delta-star connection



AF400 ... AF750
Star-delta-line connection

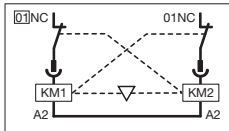
| For 3-pole line, delta & star contactors | Interlock unit between delta & star contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|--|----------|-----------------|---------|-------------------|
| AF09 ... AF16 | With or without VM4 or VEM4 | BEY16-4 | 1SBN081313R2000 | 1 | 0.050 |
| AF26 ... AF38 | With or without VM4 or VEM4 | BEY38-4 | 1SBN082713R2000 | 1 | 0.110 |
| AF40 ... AF65 | With or without VM96-4 | BEY65-4 | 1SBN083413R2000 | 1 | 0.200 |
| AF80, AF96 | With or without VM96-4 | BEY96-4 | 1SBN083913R2000 | 1 | 0.250 |
| AF116 ... AF146 | With or without VM19 | BEY140-4 | 1SFN084413R1000 | 1 | 1.040 |
| AF190 ... AF205 (line and delta) AF116 ... AF146 (star) | With or without VM140/190 | BEY190-4 | 1SFN084813R1000 | 1 | 1.154 |
| AF190, AF205 | With or without VM19 | BEY205-4 | 1SFN085213R1000 | 1 | 1.205 |
| AF265 ... AF370 (line and delta) AF190 ... AF205 (star) | With or without VM205/265 | BEY265-4 | 1SFN085413R1000 | 1 | 2.020 |
| AF265 ... AF370 | With or without VM19 | BEY370-4 | 1SFN085813R1000 | 1 | 2.110 |
| AF400 ... AF460 | With or without VM750H | BED460 | 1SFN085703R1000 | 1 | 4.700 |
| AF580 ... AF750 (line and delta) AF400 ... AF460 (star) | With or without VM750H | BED580 | 1SFN085903R1000 | 1 | 6.300 |
| AF580 ... AF750 | With or without VM750H | BED750 | 1SFN086103R1000 | 1 | 7.700 |

Connection accessories for starting solutions- with Push-in Spring terminals



VEM4K

1SBC100083V0014



BEA16-4K1

1SBC101673V014

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Mechanical and electrical interlock set (1)

| | | | | | |
|---------------------|-----|-------|-----------------|---|-------|
| AF09..K ... AF16..K | 0 2 | VEM4K | 1SBN030113R1000 | 1 | 0.030 |
| AF26..K ... AF38..K | | | | | |

Note: - VEM4K includes a VM4 mechanical interlock unit with 2 fixing clips (BB4), a VE4K electrical interlock block with A2 - A2 connection.
 - VE4K block must be used with A2-A2 connection to respect the electrical connection diagram.
 - VEM4K not suitable for AF..Z contactors with DC control voltage 12 ... 20 V DC (coil 20) and 24 V DC (coil 30).
 For product availability, please consult your ABB local sales organization.

Connecting links with manual motor starters (1)

| | | | | | |
|---------------------|-------------------------------|-----------|-----------------|----|-------|
| AF09..K ... AF16..K | with MS132-0.16K... MS132-25K | BEA16-4K1 | 1SBN081324T1000 | 10 | 0.052 |
| AF26..K ... AF38..K | with MS132-0.16K... MS132-32K | BEA38-4K1 | 1SBN082324T1000 | 10 | 0.057 |

(1) For product availability, please consult your ABB local sales organization.
 Note: BEA not suitable for AF..Z contactors with DC control voltage 24 V DC (coil 30).

Connection bars



BEA140/XT2

1SFC10106AV0001



BEA205/T4

1SFC10106AV0001



BEA370/T5

1SFC101065V0001

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

| For 3-pole contactors | MCCB | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|------|------|------------|---------|-------------------|
|-----------------------|------|------|------------|---------|-------------------|

Vertical assembly

| | | | | | |
|-----------------|-----|------------|-----------------|---|-------|
| AF116 ... AF146 | XT2 | BEA140/XT2 | 1SFN084206R1000 | 1 | 0.058 |
| AF116 ... AF146 | XT3 | BEA140/XT3 | 1SFN084206R1002 | 1 | 0.070 |
| AF116 ... AF146 | XT4 | BEA140/XT4 | 1SFN084206R1001 | 1 | 0.068 |
| AF190, AF205 | XT4 | BEA205/XT4 | 1SFN084806R1000 | 1 | 0.200 |
| AF190, AF205 | T4 | BEA205/T4 | 1SFN084806R1001 | 1 | 0.190 |
| AF265 ... AF370 | T5 | BEA370/T5 | 1SFN085406R1000 | 1 | 0.350 |
| AF400 ... AF750 | T6 | BEA750/T6 | 1SFN086106R1000 | 1 | 0.410 |
| AF400 ... AF750 | T5 | BEA750/T5 | 1SFN086106R1001 | 1 | 0.410 |

Vertical assembly with control wire terminals

(also suitable when using busbar kits for starter combinations)

| | | | | | |
|-----------------|----|------------|-----------------|---|-------|
| AF400 ... AF750 | T5 | BEA750D/T5 | 1SFN086106R1003 | 1 | 0.720 |
| AF400 ... AF750 | T6 | BEA750D/T6 | 1SFN086106R1002 | 1 | 0.720 |

Horizontal assembly

(also suitable when using busbar kits for starter combinations)

| | | | | | |
|--------------|--------|------------|-----------------|---|-------|
| AF400, AF460 | T6/XT6 | BEA460H/S6 | 1SFN085907R1000 | 1 | 2.450 |
|--------------|--------|------------|-----------------|---|-------|

Connection bars between contactors and switch fuse

Connection between contactors/starters and moulded case circuit breakers.
These connection sets are solid copper bars.

| For 3-pole contactors | Switch fuse | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|-------------|------|------------|---------|-------------------|
|-----------------------|-------------|------|------------|---------|-------------------|

Vertical assembly

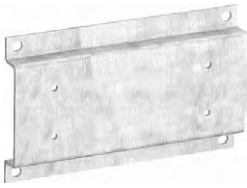
| | | | | | |
|-----------------|--------------------|----------------|-----------------|---|-------|
| AF400, AF460 | OESA400 | BEF460/OESA400 | 1SFN085708R1000 | 1 | 0.340 |
| AF460 ... AF750 | OESA630 to OESA800 | BEF750/OESA800 | 1SFN086108R1000 | 1 | 0.740 |

Horizontal assembly

| | | | | | |
|--------------|--------------|------------------|-----------------|---|-------|
| AF400, AF460 | OESA400...LR | OESA460H/OESA400 | 1SFN085709R1000 | 1 | 1.250 |
|--------------|--------------|------------------|-----------------|---|-------|

Note: The BEF connection bars provided for the A145 ... A300 contactors can be used for the AF145 ... AF300 contactors.

Adapter plates

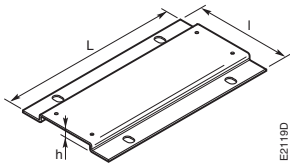


PR146-1

1SFC101048V0001

Adapter plates with fixing holes for replacing installed contactors.

| From contactors | To contactor | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------------------|---------------------|---------|-----------------|---------|-------------------|
| A95, AF95, A110, AF110 | AF116, AF140, AF146 | PR146-1 | 1SFN094200R1000 | 1 | 0.300 |
| EH150, EH160, EH175, EH210, EG160 | AF190, AF205 | PR210-1 | 1SFN094900R1000 | 1 | 0.440 |
| EH250, EH260, EH300 | AF265, AF305, AF370 | PR300-1 | 1SFN095300R1000 | 1 | 0.560 |
| EH370, EH550, EG315 | AF400, AF460, AF580 | PR460-1 | 1SFN095700R1000 | 1 | 0.900 |
| EH700, EH800 | AF750 | PR750-1 | 1SFN096100R1000 | 1 | 0.500 |
| OKYM150, OKYM175 | AF190 | PR185-2 | 1SFN095100R1001 | 1 | 0.500 |
| OKYM200, OKYM250 | AF265, AF305, AF370 | PR300-2 | 1SFN095300R1001 | 1 | 0.500 |
| OKYM315 | AF400, AF460 | PR400-2 | 1SFN095700R1002 | 1 | 0.820 |
| OKYM400 | AF400, AF460 | PR460-2 | 1SFN095700R1001 | 1 | 0.800 |
| OKYM500 | AF580 | PR580-2 | 1SFN096100R1002 | 1 | 0.700 |
| EH550, EG630, OKYM630 | AF580, AF750 | PR750-2 | 1SFN096100R1001 | 1 | 1.100 |



EZ118D

Dimensions (mm)

| Type of the plate | Dimensions | | | Fixing holes mm |
|-------------------|------------|-----|------|-----------------------|
| | L | l | h | |
| PR146-1 | 150 | 90 | 15 | 4 x \varnothing 6.5 |
| PR210-1 | 200 | 132 | 11.5 | 4 x \varnothing 7 |
| PR300-1 | 200 | 172 | 11.5 | 4 x \varnothing 7 |
| PR460-1 | 278 | 198 | 11.5 | 4 x \varnothing 7 |
| PR750-1 | 283 | 244 | 11.5 | 4 x \varnothing 7 |
| PR185-2 | 202 | 152 | 11.2 | 4 x \varnothing 11 |
| PR300-2 | 202 | 152 | 11.2 | 4 x \varnothing 11 |
| PR400-2 | 278 | 151 | 11.5 | 4 x \varnothing 11 |
| PR460-2 | 278 | 176 | 11.5 | 4 x \varnothing 11 |
| PR580-2 | 283 | 176 | 11.5 | 4 x \varnothing 11 |
| PR750-2 | 283 | 255 | 11.5 | 4 x \varnothing 14 |

Fixing holes according to the plate types

Low Voltage Ride Through (LVRT) modules



RU19/120

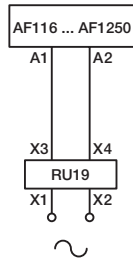
1SFC101223V0001

RU19 is designed to meet the Low Voltage Ride Through (LVRT) requirements for grid connections by staying operational during voltage dips preventing disturbances on the grid it self.

The RU19 is a separate module connected to the contactors coil connection A1-A2 creating a delay function of the opening of the contactor. When controlled by PLC, the contactor is operated directly without delay functionality. The RU19 can be screw or DIN rail mounted.

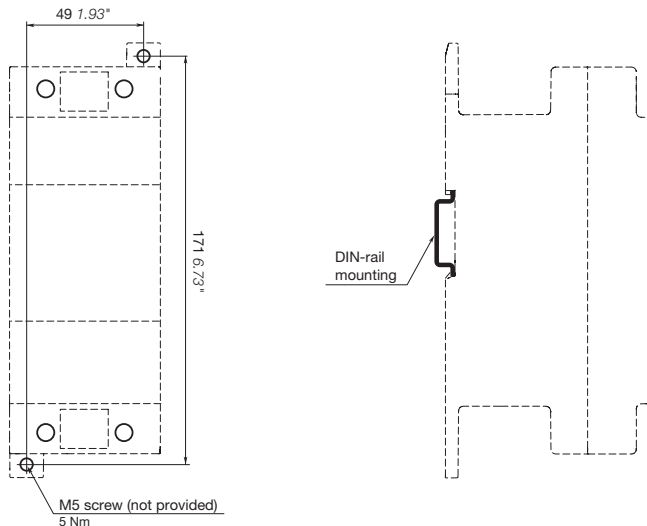
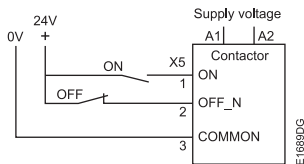
| For contactor | Rated control circuit voltage Uc | Type | Order code | Weight Pkg (1 pce) |
|---|-------------------------------------|----------|-----------------|--------------------|
| | V 50/60 Hz | | | kg |
| AF116 ... AF370 use coil 33 AF400 ... AF1250 use coil 69 | 110...120 | RU19/120 | 1SFN170801R1001 | 0.400 |
| AF116 ... AF370 use coil 33 AF400 ... AF1250 use coil 70 | 230...240 | RU19/240 | 1SFN170801R1002 | 0.400 |

AF116 ... AF1250



For direct opening of AF400 ... AF1250 contactors, connect through built in PLC interface.

Control inputs



RU19/240

Main dimensions mm, inches

1SFC101077D0201

Spare parts contactors

Contactor coils, main contact sets and arc chutes



ZAF1650

Contactor coils

| For contactors | Rated control circuit voltage Uc min. ... Uc max. | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------|--|-----------|-------------|-----------------|------------|-------------------------|
| | V 50/60 Hz | V DC | | | | |
| AF400, AF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| AF580 ... AF1250 | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| AF1350 ... AF2050 | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF1650 (1) | 1SFN156570R7026 | 1 set | 0.900 |
| AF2650 | 100...250 | 100...250 | ZP1650 (2) | 1SFN166521R1070 | 1 | 0.300 |
| | | | ZP2650 (2) | 1SFN166621R1070 | 1 | 0.300 |

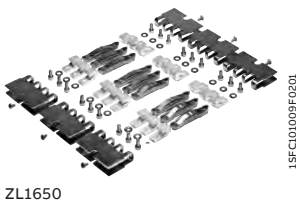
ZAF460, ZAF750 : printed circuit board included.

- (1) One set of two coil.
- (2) Printed circuit board.

Main contact sets

Replacement parts for the main contacts. Set for AF116 ... AF370 includes complete base, complete moving contact bridge and return springs.

Set for AF400 ... AF2650 consists of six fixed contacts, three moving contacts, springs and the required screws.



ZL1650

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|------------|-------------------------|
|----------------|------|------------|------------|-------------------------|

3-pole contactors

| | | | | | |
|------------|--|-----------------|-----------------|-------|-------|
| AF116 | ZL116 | 1SFN164203R1000 | 1 | 0.410 | |
| AF140 | ZL140 | 1SFN164403R1000 | 1 | 0.410 | |
| AF146 | ZL146 | 1SFN164603R1000 | 1 | 0.410 | |
| AF190 | ZL190 | 1SFN164803R1000 | 1 | 1.093 | |
| AF205 | ZL205 | 1SFN165203R1000 | 1 | 1.093 | |
| AF265 | ZL265 | 1SFN165403R1000 | 1 | 2.010 | |
| AF305 | ZL305 | 1SFN165803R1000 | 1 | 2.010 | |
| AF370 | ZL370 | 1SFN166003R1000 | 1 | 2.010 | |
| AF400 | ZL400 | 1SFN165703R1000 | 1 | 1.320 | |
| AF460 | ZL460 | 1SFN165903R1000 | 1 | 1.320 | |
| AF580 | ZL580 | 1SFN166103R1000 | 1 | 1.840 | |
| AF750 | ZL750 | 1SFN166303R1000 | 1 | 1.840 | |
| AF1250 | ZL1250 | 1SFN166403R1000 | 1 | 1.840 | |
| AF1350 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL1350 | 1SFN166503R1000 | 1 | 2 500 |
| | | ZL1350-1 | 1SFN166503R1001 | 1 | 4 500 |
| AF1650 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL1650 | 1SFN166703R1000 | 1 | 3 500 |
| | | ZL1650-1 | 1SFN166703R1001 | 1 | 4 500 |
| AF2050 | For contactors produced before 2014-01-13, with serial number before 1S16010051403xxxx For contactors produced since 2014-01-13, with serial number above 1S16010051403xxxx | ZL2050 | 1SFN167003R1000 | 1 | 3 500 |
| | | ZL2050-1 | 1SFN167003R1001 | 1 | 4 500 |
| AF2650 (3) | | ZL2650 (3) | 1SFN166603R1000 | 1 | 1.200 |

4-pole contactors

| | | | | |
|-------|--------|-----------------|---|-------|
| AF116 | ZLT116 | 1SFN164204R1000 | 1 | 0.435 |
| AF140 | ZLT140 | 1SFN164404R1000 | 1 | 0.435 |
| AF190 | ZLT190 | 1SFN164804R1000 | 1 | 2.038 |
| AF205 | ZLT205 | 1SFN165204R1000 | 1 | 2.038 |
| AF265 | ZLT265 | 1SFN165404R1000 | 1 | 2.222 |
| AF305 | ZLT305 | 1SFN165804R1000 | 1 | 2.222 |
| AF370 | ZLT370 | 1SFN166004R1000 | 1 | 2.222 |

(3) Does not include fixed contacts and screws.

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactors coils, main contact sets and arc chutes

Contactors coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

| | Rated control circuit | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|-----------------------|-----------|-------------|-----------------|---------|-------------------|
| | Voltage Uc | V DC | | | | |
| 3-pole contactors | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-11 | 1SFN154270R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF116-12 | 1SFN154270R1206 | 1 | 0.313 |
| | 100...250 | 100...250 | ZAF116-13 | 1SFN154270R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF116-14 | 1SFN154270R1406 | 1 | 0.040 |
| AF140 | 24...60 | 20...60 | ZAF140-11 | 1SFN154470R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF140-12 | 1SFN154470R1206 | 1 | 0.313 |
| | 100...250 | 100...250 | ZAF140-13 | 1SFN154470R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF140-14 | 1SFN154470R1406 | 1 | 0.298 |
| AF146 | 24...60 | 20...60 | ZAF146-11 | 1SFN154670R1106 | 1 | 0.324 |
| | 48...130 | 48...130 | ZAF146-12 | 1SFN154670R1206 | 1 | 0.313 |
| | 100...250 | 100...250 | ZAF146-13 | 1SFN154670R1306 | 1 | 0.288 |
| | 250...500 | 250...500 | ZAF146-14 | 1SFN154670R1406 | 1 | 0.298 |
| AF19, AF205 | 24...60 | 20...60 | ZAF205-11 | 1SFN154870R1106 | 1 | 0.856 |
| | 48...130 | 48...130 | ZAF205-12 | 1SFN154870R1206 | 1 | 0.831 |
| | 100...250 | 100...250 | ZAF205-13 | 1SFN154870R1306 | 1 | 0.823 |
| | 250...500 | 250...500 | ZAF205-14 | 1SFN154870R1406 | 1 | 0.818 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZAF370-11 | 1SFN155470R1106 | 1 | 1.262 |
| | 48...130 | 48...130 | ZAF370-12 | 1SFN155470R1206 | 1 | 1.316 |
| | 100...250 | 100...250 | ZAF370-13 | 1SFN155470R1306 | 1 | 1.036 |
| | 250...500 | 250...500 | ZAF370-14 | 1SFN155470R1406 | 1 | 1.006 |
| AF400, AF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| AF580 ... AF1250 | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| AF1350 ... AF2050 | 100...250 | 100...250 | ZAF1650 (1) | 1SFN156570R7026 | 1 set | 0.900 |
| | | | ZP1650 (2) | 1SFN166521R1070 | 1 | 0.300 |
| AF2650 | 100...250 | 100...250 | ZAF2650 (1) | 1SFN156670R7026 | 1 set | 0.900 |
| | | | ZP2650 (2) | 1SFN166621R1070 | 1 | 0.300 |

3-pole contactors with built-in PLC interface

| | | | | | | |
|-------|-----------|-----------|-----------|-----------------|---|-------|
| AF116 | 100...250 | 100...250 | ZAF116-33 | 1SFN154270R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF116-34 | 1SFN154270R3406 | 1 | 0.324 |
| AF140 | 100...250 | 100...250 | ZAF140-33 | 1SFN154470R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF140-34 | 1SFN154470R3406 | 1 | 0.324 |
| AF146 | 100...250 | 100...250 | ZAF146-33 | 1SFN154670R3306 | 1 | 0.310 |
| | 250...500 | 250...500 | ZAF146-34 | 1SFN154670R3406 | 1 | 0.324 |
| AF190 | 100...250 | 100...250 | ZAF190-33 | 1SFN154870R3306 | 1 | 0.893 |
| | 250...500 | 250...500 | ZAF190-34 | 1SFN154870R3406 | 1 | 0.878 |
| AF205 | 100...250 | 100...250 | ZAF205-33 | 1SFN155270R3306 | 1 | 0.893 |
| | 250...500 | 250...500 | ZAF205-34 | 1SFN155270R3406 | 1 | 0.878 |
| AF265 | 100...250 | 100...250 | ZAF265-33 | 1SFN155470R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF265-34 | 1SFN155470R3406 | 1 | 1.094 |
| AF305 | 100...250 | 100...250 | ZAF305-33 | 1SFN155870R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF305-34 | 1SFN155870R3406 | 1 | 1.094 |
| AF370 | 100...250 | 100...250 | ZAF370-33 | 1SFN156070R3306 | 1 | 1.124 |
| | 250...500 | 250...500 | ZAF370-34 | 1SFN156070R3406 | 1 | 1.094 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactors coils, main contact sets and arc chutes

Contactors coil modules

Coil modules replacement kit for 3-pole contactors. Includes coil, electronic module, fasteners, damping and terminal cover.

| | Rated control circuit | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|------------------------|-----------|--------------|-----------------|---------|----------------------|
| | Voltage U _c | V DC | | | | |
| 4-pole contactors | | | | | | |
| AF116 | 24...60 | 20...60 | ZAF116-40-11 | 1SFN154270R1146 | 1 | 0.340 |
| | 48...130 | 48...130 | ZAF116-40-12 | 1SFN154270R1246 | 1 | 0.331 |
| | 100...250 | 100...250 | ZAF116-40-13 | 1SFN154270R1346 | 1 | 0.308 |
| AF140 | 250...500 | 250...500 | ZAF116-40-14 | 1SFN154270R1446 | 1 | 0.320 |
| | 24...60 | 20...60 | ZAF140-40-11 | 1SFN154470R1146 | 1 | 0.340 |
| | 48...130 | 48...130 | ZAF140-40-12 | 1SFN154470R1246 | 1 | 0.331 |
| AF190, AF205 | 100...250 | 100...250 | ZAF140-40-13 | 1SFN154470R1346 | 1 | 0.308 |
| | 250...500 | 250...500 | ZAF140-40-14 | 1SFN154470R1446 | 1 | 0.320 |
| | 24...60 | 20...60 | ZAF205-40-11 | 1SFN154870R1146 | 1 | 0.864 |
| AF265, AF305, AF370 | 48...130 | 48...130 | ZAF205-40-12 | 1SFN154870R1246 | 1 | 0.841 |
| | 100...250 | 100...250 | ZAF205-40-13 | 1SFN154870R1346 | 1 | 0.839 |
| | 250...500 | 250...500 | ZAF205-40-14 | 1SFN154870R1446 | 1 | 0.834 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZAF370-40-11 | 1SFN155470R1146 | 1 | 1.272 |
| | 48...130 | 48...130 | ZAF370-40-12 | 1SFN155470R1246 | 1 | 1.328 |
| | 100...250 | 100...250 | ZAF370-40-13 | 1SFN155470R1346 | 1 | 1.052 |
| | 250...500 | 250...500 | ZAF370-40-14 | 1SFN155470R1446 | 1 | 1.032 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Electronic Modules

Control circuit electronic module spare part.

| | Rated control circuit | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------|------------------------|-----------|----------|-----------------|---------|----------------------|
| | Voltage U _c | V DC | | | | |
| 3-pole contactors | | | | | | |
| AF116 | 24...60 | 20...60 | ZP116-11 | 1SFN164223R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP116-12 | 1SFN164223R1012 | 1 | 0.131 |
| | 100...250 | 100...250 | ZP116-13 | 1SFN164223R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP116-14 | 1SFN164223R1014 | 1 | 0.143 |
| AF140 | 24...60 | 20...60 | ZP140-11 | 1SFN164423R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP140-12 | 1SFN164423R1012 | 1 | 0.131 |
| | 100...250 | 100...250 | ZP140-13 | 1SFN164423R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP140-14 | 1SFN164423R1014 | 1 | 0.143 |
| AF146 | 24...60 | 20...60 | ZP146-11 | 1SFN164623R1011 | 1 | 0.133 |
| | 48...130 | 48...130 | ZP146-12 | 1SFN164623R1012 | 1 | 0.131 |
| | 100...250 | 100...250 | ZP146-13 | 1SFN164623R1013 | 1 | 0.133 |
| | 250...500 | 250...500 | ZP146-14 | 1SFN164623R1014 | 1 | 0.143 |
| AF190, AF205 | 24...60 | 20...60 | ZP205-11 | 1SFN164823R1011 | 1 | 0.610 |
| | 48...130 | 48...130 | ZP205-12 | 1SFN164823R1012 | 1 | 0.610 |
| | 100...250 | 100...250 | ZP205-13 | 1SFN164823R1013 | 1 | 0.610 |
| | 250...500 | 250...500 | ZP205-14 | 1SFN164823R1014 | 1 | 0.620 |
| AF265, AF305, AF370 | 24...60 | 20...60 | ZP370-11 | 1SFN165423R1011 | 1 | 0.696 |
| | 48...130 | 48...130 | ZP370-12 | 1SFN165423R1012 | 1 | 0.704 |
| | 100...250 | 100...250 | ZP370-13 | 1SFN165423R1013 | 1 | 0.694 |
| | 250...500 | 250...500 | ZP370-14 | 1SFN165423R1014 | 1 | 0.694 |

3-pole contactors with built-in PLC interface

| | | | | | | |
|-------|-----------|-----------|----------|-----------------|---|-------|
| AF116 | 100...250 | 100...250 | ZP116-33 | 1SFN164223R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP116-34 | 1SFN164223R1034 | 1 | 0.169 |
| AF140 | 100...250 | 100...250 | ZP140-33 | 1SFN164423R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP140-34 | 1SFN164423R1034 | 1 | 0.169 |
| AF146 | 100...250 | 100...250 | ZP146-33 | 1SFN164623R1033 | 1 | 0.155 |
| | 250...500 | 250...500 | ZP146-34 | 1SFN164623R1034 | 1 | 0.169 |
| AF190 | 100...250 | 100...250 | ZP190-33 | 1SFN164823R1033 | 1 | 0.680 |
| | 250...500 | 250...500 | ZP190-34 | 1SFN164823R1034 | 1 | 0.680 |
| AF205 | 100...250 | 100...250 | ZP205-33 | 1SFN165223R1033 | 1 | 0.680 |
| | 250...500 | 250...500 | ZP205-34 | 1SFN165223R1034 | 1 | 0.680 |
| AF265 | 100...250 | 100...250 | ZP265-33 | 1SFN165423R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP265-34 | 1SFN165423R1034 | 1 | 0.782 |
| AF305 | 100...250 | 100...250 | ZP305-33 | 1SFN165823R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP305-34 | 1SFN165823R1034 | 1 | 0.782 |
| AF370 | 100...250 | 100...250 | ZP370-33 | 1SFN166023R1033 | 1 | 0.782 |
| | 250...500 | 250...500 | ZP370-34 | 1SFN166023R1034 | 1 | 0.782 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Spare parts contactors

Contactors coils, main contact sets and arc chutes

Electronic Modules

Control circuit electronic module spare part.

| | Rated control circuit Voltage U _c | | Type | Pkg qty | Weight (1 pce) kg |
|--|---|------|------|------------|-------------------------|
| | V 50/60Hz | V DC | | | |

4-pole contactors

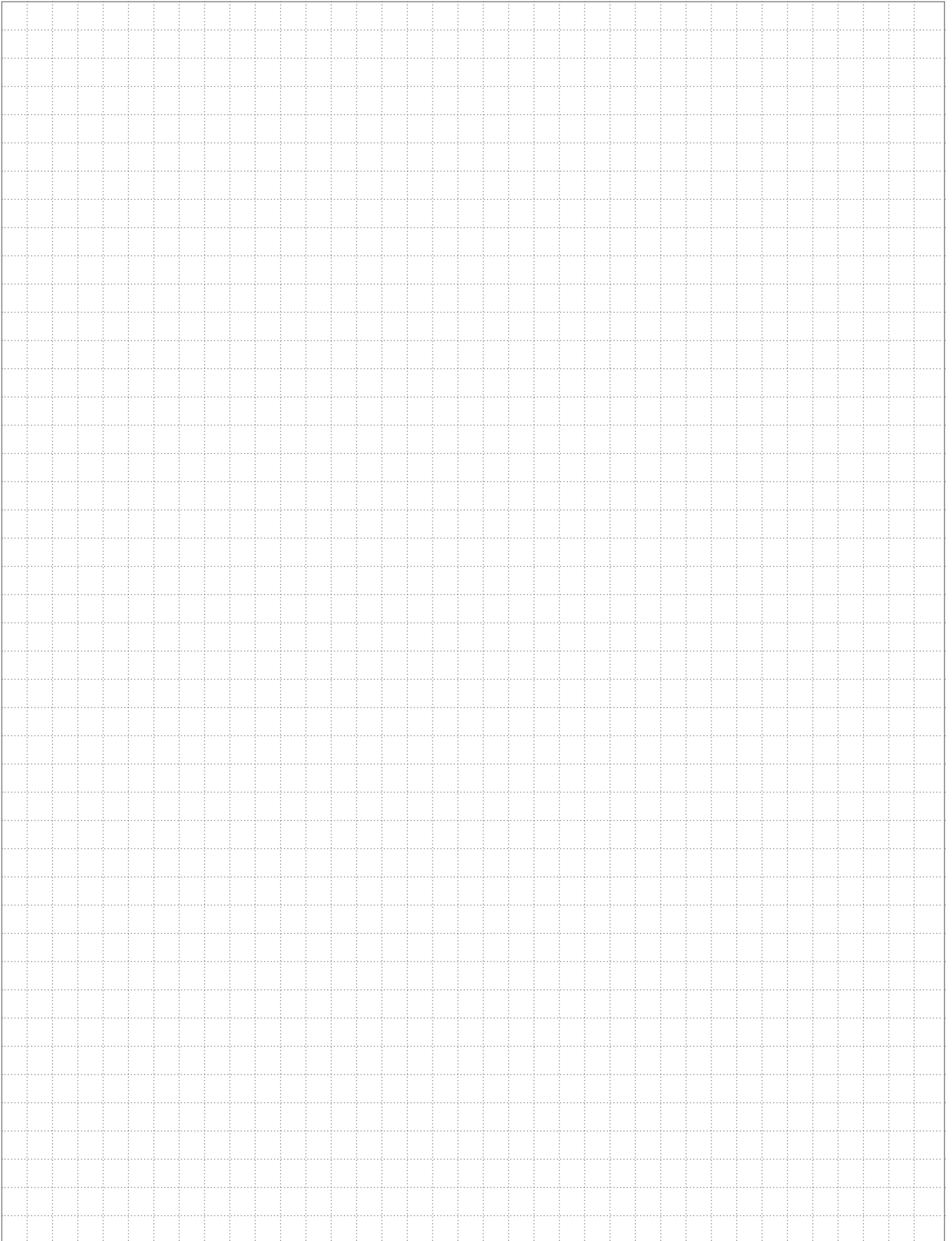
| | | | | | | |
|---------------------|-----------|-----------|-----------|-----------------|---|-------|
| AF116 | 24...60 | 20...60 | ZPT116-11 | 1SFN164224R1011 | 1 | 0.149 |
| | 48...130 | 48...130 | ZPT116-12 | 1SFN164224R1012 | 1 | 0.149 |
| | 100...250 | 100...250 | ZPT116-13 | 1SFN164224R1013 | 1 | 0.153 |
| | 250...500 | 250...500 | ZPT116-14 | 1SFN164224R1014 | 1 | 0.165 |
| AF140 | 24...60 | 20...60 | ZPT140-11 | 1SFN164424R1011 | 1 | 0.149 |
| | 48...130 | 48...130 | ZPT140-12 | 1SFN164424R1012 | 1 | 0.149 |
| | 100...250 | 100...250 | ZPT140-13 | 1SFN164424R1013 | 1 | 0.153 |
| AF190, AF205 | 24...60 | 20...60 | ZPT140-14 | 1SFN164424R1014 | 1 | 0.165 |
| | 48...130 | 48...130 | ZPT205-11 | 1SFN165224R1011 | 1 | 0.618 |
| | 100...250 | 100...250 | ZPT205-12 | 1SFN165224R1012 | 1 | 0.620 |
| AF265, AF305, AF370 | 250...500 | 250...500 | ZPT205-13 | 1SFN165224R1013 | 1 | 0.626 |
| | 24...60 | 20...60 | ZPT205-14 | 1SFN165224R1014 | 1 | 0.636 |
| | 48...130 | 48...130 | ZPT370-11 | 1SFN166024R1011 | 1 | 0.706 |
| | 100...250 | 100...250 | ZPT370-12 | 1SFN166024R1012 | 1 | 0.716 |
| | 250...500 | 250...500 | ZPT370-13 | 1SFN166024R1013 | 1 | 0.710 |
| | 24...60 | 20...60 | ZPT370-14 | 1SFN166024R1014 | 1 | 0.720 |

Note: Only suitable for AF116...AF370 contactors "Made in Sweden" produced after 2018-09-01 (010918).

Arc chutes

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|------------------------|--------|-----------------|------------|-------------------------|
| AF400, AF460 | ZW460 | 1SFN165710R1000 | 1 | 1.380 |
| AF580, AF750, AF1250 | ZW750 | 1SFN166110R1000 | 1 | 1.500 |
| AF1350, AF1650, AF2050 | ZW1650 | 1SFN166510R1001 | 1 | 4.560 |
| AF2650 | ZW2650 | 1SFN166610R1000 | 1 | 4.000 |

Notes

A large rectangular area filled with a grid of small, dotted lines, intended for taking notes. The grid consists of approximately 25 columns and 45 rows of squares.



Accessories for UA, UA..RA contactors and GA75, GAE75, GAF contactors

| | |
|--------------|---|
| 3/302 | Auxiliary contact blocks |
| 3/308 | Electronic timers |
| 3/312 | Mechanical and electrical interlock units |
| 3/314 | CA5, CE5, CAL, CEL18 and TEF5 fitting details |
| 3/315 | Function markers - Mounting piece |
| 3/316 | Surge suppressors for contactor coils |
| 3/318 | Interface relays |
| 3/320 | Mechanical latching units |
| 3/322 | Additional terminal blocks and others accessories |
| 3/323 | Terminals for control lead connections |
| 3/324 | Connection bar for contactors |
| 3/325 | Contactors coils and main contact sets |



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Auxiliary contact blocks



CA5-10



CA5-40E



CAL5-11



CAL18-11

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits for standard industrial environments.

Types of auxiliary contact blocks for front mounting:

- CA5 1 or 4-pole block, instantaneous with N.O., N.C. contacts
- CC5 1-pole block, with N.O. leading contact or N.C. lagging contact.

Select the 4-pole auxiliary contact blocks CA5 type, according to the contactor type for compliance with the standard requirements (see "Terminal Marking and Positioning").

Types of auxiliary contact blocks for side mounting:

- CAL 2-pole block instantaneous N.O. + N.C. contacts.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front-mounted instantaneous auxiliary contact blocks, 1-pole

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|--------|-----------------|---------|----------------|
| UA16... UA110 | 1 0 -- | CA5-10 | 1SBN010010R1010 | 10 | 0.014 |
| | 0 1 -- | CA5-01 | 1SBN010010R1001 | 10 | 0.014 |
| | -- 1 0 | CC5-10 | 1SBN010011R1010 | 10 | 0.014 |
| | -- 0 1 | CC5-01 | 1SBN010011R1001 | 10 | 0.014 |

Front-mounted instantaneous auxiliary contact blocks, 4-pole

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------------|-----------------|---------|----------------|
| UA16... UA30 | 2 2 -- | CA5-22M | 1SBN010040R1122 | 2 | 0.060 |
| | 3 1 -- | CA5-31M | 1SBN010040R1131 | 2 | 0.060 |
| | 1 3 -- | CA5-13M | 1SBN010040R1113 | 2 | 0.060 |
| | 0 4 -- | CA5-04M | 1SBN010040R1104 | 2 | 0.060 |
| | 1 1 1 1 | CA5-11/11M | 1SBN010040R1118 | 2 | 0.060 |
| UA50... UA110 | 2 2 -- | CA5-22E | 1SBN010040R1022 | 2 | 0.060 |
| | 3 1 -- | CA5-31E | 1SBN010040R1031 | 2 | 0.060 |
| | 4 0 -- | CA5-40E | 1SBN010040R1040 | 2 | 0.060 |
| | 0 4 -- | CA5-04E | 1SBN010040R1004 | 2 | 0.060 |
| | 1 1 1 1 | CA5-11/11E | 1SBN010040R1018 | 2 | 0.060 |

Side-mounted instantaneous auxiliary contact blocks, 2-pole

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------------|--------------------|----------|-----------------|---------|----------------|
| UA16... UA75 | 1 1 -- | CAL5-11 | 1SBN010020R1011 | 2 | 0.050 |
| UA95, UA110, GAF185...GAF2050 | 1 1 -- | CAL18-11 | 1SBN010720R1011 | 2 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

Note:

- The front-mounted auxiliary contact blocks provided for the UA75 contactors can be used with the GA and GAE types
- The CAL auxiliary contact blocks can be used with GA contactors:
 - GA75-10-00: 2 x CAL5-11 blocks
 - GA75-10-11: 1 x CAL5-11 block
 - GAE75-10-00: 1 x CAL5-11 block
 - GAE75-10-11: no add-on block.
- The CAL auxiliary contact blocks can be used with UA...RA contactors. See "Accessory fitting details" for this contactor type.

Auxiliary contact blocks

Technical data

| | Front mounted | Side mounted | |
|-------|------------------------------------|--------------|---------------------|
| Types | 1-pole CA5, 1-pole CC5, 4-pole CA5 | CAL5-11 | CAL18-11, CAL18-11B |




Contact utilization characteristics according to IEC

| | | | | |
|---|---|------------------------------------|-----------------------------------|--|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | | | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | | | |
| Rated operational voltage U_e max. | 24...690 V AC | | | |
| Conventional thermal current I_{th} - $\theta \leq 40^\circ\text{C}$ | 16 A | | | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 380-440 V 50/60 Hz | 3 A | | |
| | 500-690 V 50/60 Hz | 2 A | | |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | | | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | | | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.3 A / 66 W | | |
| | 250 V DC | 0.3 A / 75 W | | |
| Short-circuit protection device gG type fuse | 10 A | | | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity | A40 ... A75 contactors | 17 V / 1 mA | | |
| | with failure rate acc. to IEC 60947-5-4 | $\leq 10^{-7}$ | | |
| | A95 ... A110 contactors | 24 V / 50 mA | - | 24 V / 50 mA (0.5 million of operating cycles) |
| | with failure rate acc. to IEC 60947-5-4 | - | - | $\leq 10^{-6}$ |
| Power dissipation per pole at 6 A | 0.1 W | | | |
| Mechanical durability Number of operating cycles | 10 millions (UA16 ... UA75) | 10 millions | 5 millions (UA95 ... UA110) | |
| | 3 millions (UA95 ... UA110) | | 3 millions (GAF185 ... GAF750) | |
| | | | 0.5 million (GAF1250 ... GAF2050) | |
| Max. switching frequency | 3600 cycles/h | | | |
| Electrical durability | Number of operating cycles | see "Electrical durability" curves | | |
| | Max. switching frequency | AC-15 | 1200 cycles/h | |
| | | DC-13 | 900 cycles/h | |

Contact utilization characteristics according to UL / CSA

| | |
|--------------------------|------------------------|
| Standards | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | 600 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |

Connecting characteristics

| | | | |
|---|--|----------------------------|--------|
| Connection capacity (min. ... max.) | | | |
|  Rigid solid | 1 x | 1...4 mm ² | |
| | 2 x | 1...4 mm ² | |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² | |
| | 2 x | 0.75...2.5 mm ² | |
|  Lugs | $L \leq$ | 7.7 mm | 8 mm |
| | $L >$ | 3.7 mm | 3.7 mm |
| Stripping length | 10 mm | | |
| Tightening torque | 1 Nm | | |
| Degree of protection | Terminals | IP20 | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | M3.5 | | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | |

Auxiliary contact blocks for severe industrial environments



CE5-01W

The auxiliary contact blocks are used for the operation of auxiliary and control circuits for severe industrial environments.

Types of auxiliary contact blocks for front mounting:

- CE5 1-pole block, instantaneous with N.O. contact or N.C. contact, designed in 2 protection versions:
 - CE5-.. D with built-in microswitch IP40, degree of protection (IP20 on terminals)
 - CE5-.. W with built-in microswitch IP67, degree of protection (IP20 on terminals).

Types of auxiliary contact blocks for side mounting:

- CEL18 1-pole block with built-in microswitch IP67 degree of protection (IP20 on terminals). Instantaneous N.O. or N.C. contact.

For clipping onto the right- and/or left-hand side of the contactors.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact and bear the corresponding function marking.

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front-mounting instantaneous auxiliary contact blocks, 1-pole

| | | | | | |
|---------------|-----------|------------|-----------------|---|-------|
| UA16 ... UA75 | 1 - - - | CE5-10D0.1 | 1SBN010015R1010 | 1 | 0.020 |
| | - 1 - - - | CE5-01D0.1 | 1SBN010015R1001 | 1 | 0.020 |
| | 1 - - - | CE5-10D2 | 1SBN010017R1010 | 1 | 0.020 |
| | - 1 - - - | CE5-01D2 | 1SBN010017R1001 | 1 | 0.020 |
| | 1 - - - | CE5-10W0.1 | 1SBN010016R1010 | 1 | 0.020 |
| | - 1 - - - | CE5-01W0.1 | 1SBN010016R1001 | 1 | 0.020 |
| | 1 - - - | CE5-10W2 | 1SBN010018R1010 | 1 | 0.020 |
| | - 1 - - - | CE5-01W2 | 1SBN010018R1001 | 1 | 0.020 |

Side-mounting instantaneous auxiliary contact blocks, 1-pole microswitch auxiliary contact N.O. or N.C.

| | | | | | |
|-----------------------------------|---------|----------|-----------------|---|-------|
| UA95, UA110 GAF185 ... GAF2050 | 1 0 - - | CEL18-10 | 1SBN010716R1010 | 1 | 0.050 |
| UA95, UA110 GAF185 ... GAF2050 | 0 1 - - | CEL18-01 | 1SBN010716R1001 | 1 | 0.050 |

For each contactor type, refer to "Accessory fitting details" table.

Note: The front-mounted auxiliary contact blocks provided for the UA contactors can be used with the GA and GAE types. The side-mounted auxiliary contact blocks provided for the UA95, UA110 contactors can be used with the GAF types.

Auxiliary contact blocks

Technical data

| Types | Front-mounted | | Side-mounted |
|-------|------------------|----------------|--------------------|
| | 1-pole CE5-..0.1 | 1-pole CE5-..2 | CEL18-10, CEL18-01 |




Contact utilization characteristics according to IEC

| Standards | | IEC 60947-5-1 and EN 60947-5-1 | | |
|--|--------------------|--------------------------------|---------------------------|---------------------------|
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 250 V | | |
| Rated operational voltage U_e max. | | 125 V | 250 V | 125 V |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 0.1 A | 2 A | 0.1 A |
| I _e / Rated operational current | | AC-14 | AC-15 | AC-14 |
| acc. to IEC 60947-5-1 | | | | |
| | 24-127 V 50/60 Hz | 0.1 A | 2 A | 0.1 A |
| | 220-240 V 50/60 Hz | – | 2 A | – |
| Making capacity acc. to IEC 60947-5-1 | | 6 x I _e AC-14 | 10 x I _e AC-15 | 6 x I _e AC-14 |
| Breaking capacity acc. to IEC 60947-5-1 | | 6 x I _e AC-14 | 10 x I _e AC-15 | 6 x I _e AC-14 |
| I _e / Rated operational current | | DC-12 | | |
| acc. to IEC 60947-5-1 | | | | |
| | 24 V DC | 0.1 A | 2 A | 0.1 A |
| | 48 V DC | 0.1 A | 1 A | 0.1 A |
| | 72 V DC | 0.1 A | 0.3 A | 0.1 A |
| | 110 V DC | 0.1 A | 0.2 A | 0.1 A |
| | 125 V DC | – | 0.2 A | – |
| | 220 V DC | – | 0.1 A | – |
| Short-circuit protection device | | 0.1 A (FF type fuses) (1) | 10 A (FF type fuses) (1) | 0.1 A (FF type fuses) (1) |
| Minimum switching capacity | | | | |
| A40 ... A75 contactors | | 3 V / 1 mA | 17 V / 1 mA | 3 V / 1 mA |
| With failure rate acc. to IEC 60947-5-4 | | – | ≤ 10 ⁻⁷ | – |
| A95 ... A110 contactors | | 3 V / 1 mA | 17 V / 1 mA | – |
| With failure rate acc. to IEC 60947-5-4 | | – | ≤ 10 ⁻⁷ | – |
| Mechanical durability | | | | |
| Number of operating cycles | | 5 millions for CE5-..D0.1 | 5 millions for CE5-..D2 | 1 million |
| | | 2.5 millions for CE5-..W0.1 | 2.5 millions for CE5-..W2 | – |
| Max. switching frequency | | 3600 cycles/h | | |
| Electrical durability | | | | |
| Number of operating cycles | | 2.5 millions for CE5-..D0.1 | 1 million for CE5-..D2 | 0.7 millions |
| | | 0.7 millions for CE5-..W0.1 | 0.3 millions for CE5-..W2 | – |
| Max. switching frequency | | AC-14, 1200 cycles/h | | |
| | | AC-15, 900 cycles/h | | |
| | | DC-12, 900 cycles/h | | |

Contact utilization characteristics according to UL / CSA

| Standards | | UL 508, CSA C22.2 N°14 | | |
|--------------------------|--|------------------------|---------------------|-------|
| Max. operational voltage | | 125 V AC / 110 V DC | 250 V AC / 220 V DC | 125 V |
| Pilot duty | | | | |
| AC thermal rated current | | 0.1 A | 2 A | 0.1 A |

Connecting characteristics

| Connection capacity (min. ... max.) | | | | |
|---|-----------------------|--|----------------------------|-------------------|
|  | Rigid solid | 1 x | 1...4 mm ² | |
| | | 2 x | 1...4 mm ² | |
|  | Flexible with ferrule | 1 x | 0.75...2.5 mm ² | |
| | | 2 x | 0.75...2.5 mm ² | |
|  | Bars or lugs | L ≤ | 7.7 mm | |
| | | l > | 3.7 mm | |
| Connection capacity acc. to UL/CSA | | 1 or 2 x | AWG 18...14 | |
| Tightening torque | | 1 Nm | | |
| Degree of protection | | Terminals IP20 | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | Microswitches | IP40 for CE5-..D0.1 | IP40 for CE5-..D2 |
| | | | IP67 for CE5-..W0.1 | IP67 for CE5-..W2 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | |
| All terminals | | M3.5 | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | |

(1) or HRC fuses for very fast action (6.3 x 32 mm size).

Auxiliary contacts

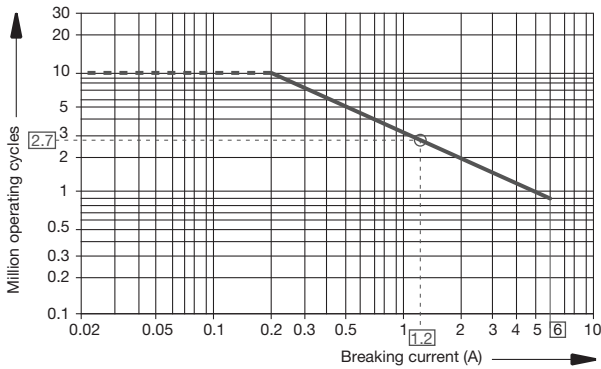
Electrical durability

Electrical durability for AC-15 utilization category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

These curves represent the electrical durability of the built-in or add-on auxiliary contacts, in relation to the breaking current. The curves have been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.



- 1-pole and 4-pole CA5,
1-pole CC5,
2-pole CAL5 and CAL18 add-on auxiliary contacts.

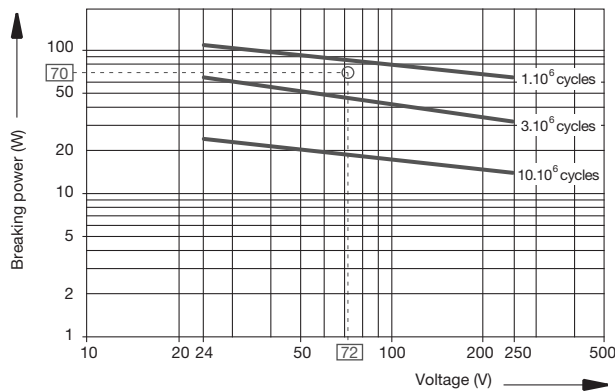
Example:

Breaking current = 1.2 A

On the opposite curve at intersection "O" 1.2 A the corresponding value for the electrical durability is approximately 2.7 millions operating cycles.

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1: making and breaking current = I_e with U_e value.



- 1-pole and 4-pole CA5,
1-pole CC5,
2-pole CAL5 and CAL18 add-on auxiliary contacts.

Example:

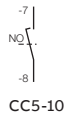
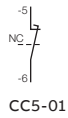
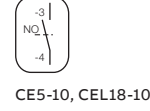
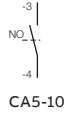
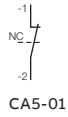
Control of DC electro-magnet: U_e voltage = 72 V DC and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions operating cycles.

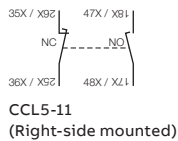
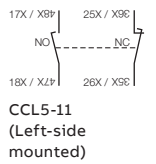
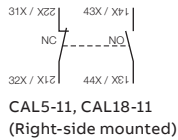
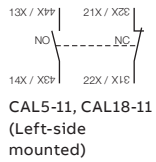
Add-on auxiliary contacts

Terminal marking and positioning

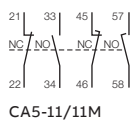
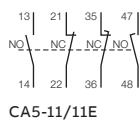
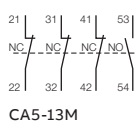
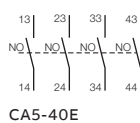
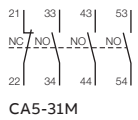
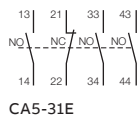
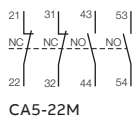
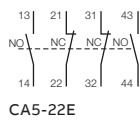
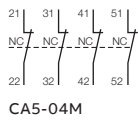
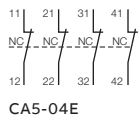
1-pole auxiliary contacts



2-pole auxiliary contacts



4-pole auxiliary contacts



Electronic timers



TEF5-OFF

1SBC101396F0014

TEF5 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF5 electronic timers are front-mounted and locked on contactors.

A mechanical indicator allows to show the state of the contactor.

TEF5 electronic timers are supplied by direct wiring to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

Available for a wide control voltage range 24...240 V AC/DC

TEF5-ON or TEF5-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage U _c | Auxiliary contacts | Type | Order code | Weight |
|----------------------------------|-------------------------------------|------------|--|--------------------|----------|-----------------|-------------------|
| | | | V 50/60 Hz or DC | | | | Pkg (1 pce) kg |
| UA16 ... UA75 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF5-ON | 1SBN020312R1000 | 0.065 |
| GA75, GAE75 | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF5-OFF | 1SBN020314R1000 | 0.065 |

Electronic timers

Technical data





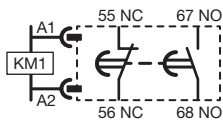
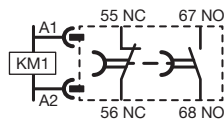
Contact utilization characteristics according to IEC

| Types | TEF5-ON | TEF5-OFF |
|---|---|-----------------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 400 V | |
| Rated impulse withstand voltage U_{imp} | 4 kV | |
| Rated operational voltage U_e max. | 240 V | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ C$ | 5 A | |
| I_e / Rated operational current AC-15 | | |
| acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 3 A |
| | 220-240 V 50/60 Hz | 1.5 A |
| Making capacity | 10 x I_e AC-15 acc. to IEC 60947-5-1 | |
| Breaking capacity | 10 x I_e AC-15 acc. to IEC 60947-5-1 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 1 A / 24 W |
| Short-circuit protection device gG type fuse | 6 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ C$ | for 1.0 s | 8 A |
| | for 0.1 s | 8 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 24 V DC | 10-7 |
| Power dissipation per pole at 3 A | 0.1 W | |
| Function diagram | <p>ON-delay</p> | <p>OFF-delay</p> |
| <p>Bistable relay inside. Before use, once apply U_c then switch it off in order to initialize position of the contacts.</p> | | |
| Control circuit voltage | | |
| AC control voltage | Rated control circuit voltage U_c | 24...240 V AC |
| 50/60 Hz | Average consumption | 1.5 mA RMS |
| | | 1 mA RMS |
| DC control voltage | Rated control circuit voltage U_c | 24...240 V DC |
| | Average consumption | 1.5 mA |
| | | 1 mA |
| Rated frequency limits | 50 / 60 Hz | |
| Supply voltage range | 0.85...1.1 x U_c (at $\theta \leq 70^\circ C$) | |
| Overvoltage protection | Varistor included | |
| Time delay range (t) selected by switch | 0.1...1 s | <input type="checkbox"/> |
| | 1...10 s | <input type="checkbox"/> |
| | 10...100 s | <input type="checkbox"/> |
| On-load reiteration accuracy under constant conditions | $\leq 1\%$ | |
| Minimum ON period | 0.1 s | 1 s |
| Recovery time | 0.15 s | 0.1 s |
| Ambient air temperature | Operation | -25 °C ... +70 °C |
| | Storage | -40 °C ... +80 °C |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude | 2000 m | |
| Mounting positions | Acc. to mounting positions permitted on contactors or contactor relays | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 (Mounting position 1) | 1/2 sinusoidal shock for 11 ms: no change in contact position Same as contactor or contactor relay | |
| Mechanical durability | | |
| | Number of operating cycles | 5 millions operating cycles |
| | Max. switching frequency | 3600 cycles/h |
| | | 1800 cycles/h |
| Max. electrical switching frequency | | |
| | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |

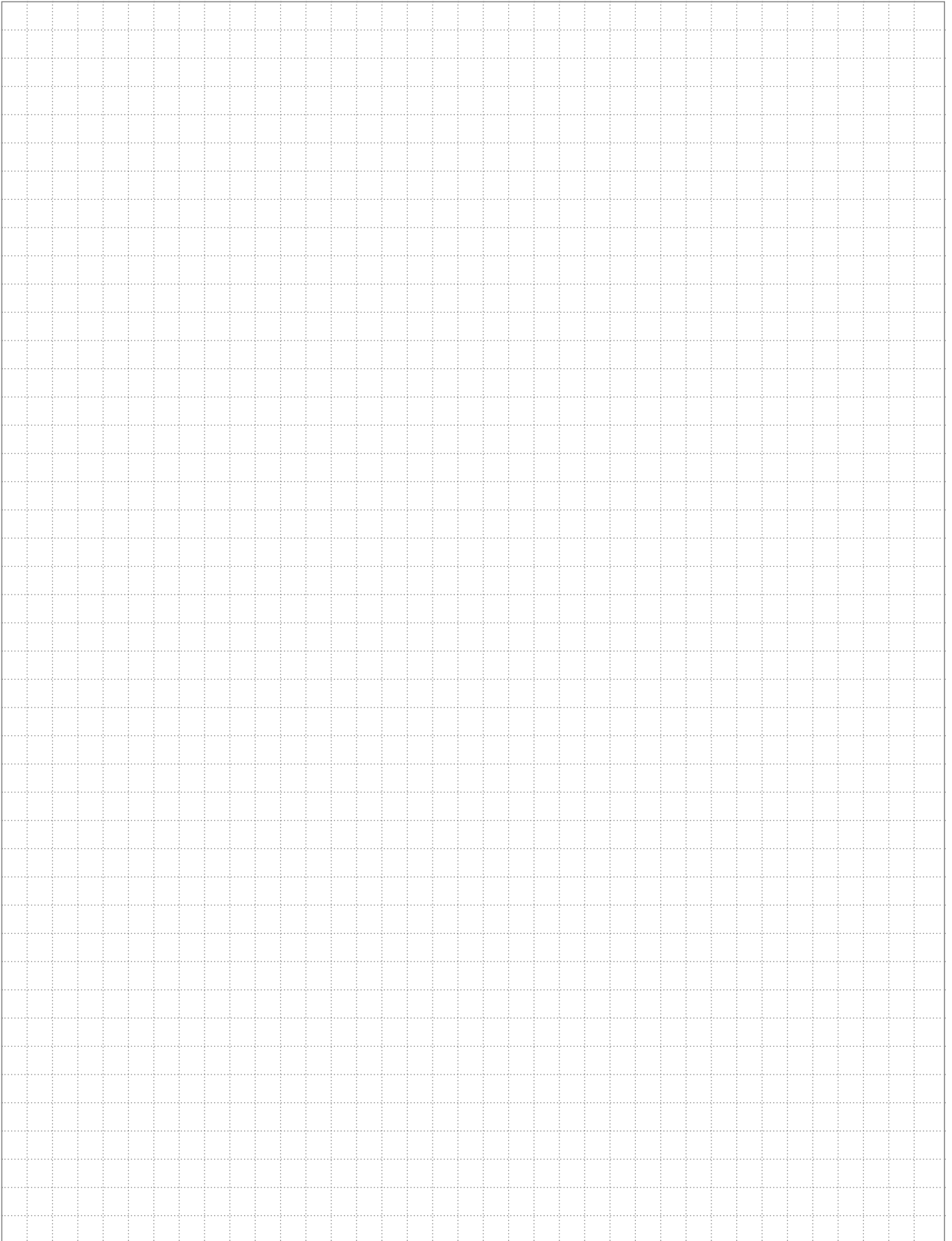
Electronic timers

Technical data

Connecting characteristics

| | | |
|---|-------------------------------------|---|
| Connection capacity (min. ... max.) | | |
|  | Rigid solid | 1 x 1...2.5 mm ² |
| | | 2 x 1...2.5 mm ² |
|  | Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² |
| | | 2 x 0.75...2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² |
| | | 2 x 0.75...1.5 mm ² |
|  | Lugs | L ≤ 8 mm |
| | | l > 3.7 mm |
| Stripping length | | 10 mm |
| Tightening torque | | 1 N.m / 9 lb.in |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | |
| | | IP20 |
| Screw terminals | | |
| All terminals | | Delivered in open position, screws of unused terminals should be tightened |
| Screwdriver type | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |
| Terminal Marking | | |
| | |  |
| | |  |

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes.

Mechanical and electrical interlock units



1SBC10429F0014

VE5-2

When mounted between two contactors, the mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VE interlock units are used for mechanical and electrical interlocking of two AC or DC operated contactors mounted side by side.

| For contactors | Mounting | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|---------------|-------|-----------------|---------|----------------------|
| Mechanical and electrical interlock units for two horizontal mounted contactors | | | | | |
| GA75, GAE75 | Rail mounting | VE5-2 | 1SBN030210R1000 | 1 | 0.146 |

Mechanical and electrical interlock units

Technical data

| | |
|-------|--------------|
| Types | VE5-2 |
|-------|--------------|




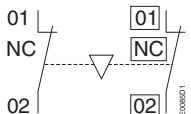
Contact utilization characteristics according to IEC

| | | |
|--|---------------------------------------|------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated operational voltage U_e max. | 24...690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 16 A | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 380-440 V 50/60 Hz | 3 A |
| | 500-690 V 50/60 Hz | 2 A |
| | Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A |
| | 48 V DC | 2.8 A |
| | 72 V DC | 1 A |
| | 125 V DC | 0.55 A |
| | 250 V DC | 0.3 A |
| Short-circuit protection device - gG type fuse | 10 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Power dissipation per pole at 6 A | 0.15 W | |
| Mechanical durability | | |
| Number of operating cycles | 5 millions operating cycles | |
| Max. switching frequency | 600 cycles/h | |

Utilization characteristics according to UL/CSA

| | |
|--------------------------|------------------------|
| Standards | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | 600 V |

Connecting characteristics



| | | |
|---|---|----------------------------|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 1...4 mm ² |
| | 2 x | 1...4 mm ² |
|  Flexible with ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Lugs | L < | 8 mm |
| | L > | 3.5 mm |
| Stripping length | 10 mm | |
| Tightening torque | Recommended | 1 Nm |
| | Max. | 1.2 Nm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | |
| Screw terminals | delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | |
| Terminal marking |  | |

Technical note: when, during switching, the arc time is estimated to more than 40 ms, the closing signal of one of the two contactors must be delayed with respect to the opening signal of the other contactor in order to prevent a short-circuit.

Use a TEF5 electronic timer according to application use with time lapse for GA75, GAE75 contactors.

CA5, CE5, CAL, CEL18 and TEF5 fitting details

Many configurations are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | Electronic timer | Side-mounted accessories | | |
|-------------------------------|---|---|---------------------------|---------------------------------------|--|---------------------------------|--|-------------------------------|
| | | | Auxiliary contact blocks | | | Auxiliary contact blocks | Interlock unit | |
| |  |  | 1-pole CA5 1-pole CE5 | 4-pole CA5 | TEF5 | 2-pole CAL 1-pole CEL18 | VE5 | |
| UA contactors | | | | | | | | |
| UA16 ... UA26 | 3 0 | 1 0 | ▶ | 1 to 4 x CA5 1 to 2 x CE5 max. (1) | or 1 x 4-pole CA5 + 1 x 1-pole CA5 or CE5 (1) | or 1 x TEF5 + 1 x 1-pole CA5 | + 1 to 2 x CAL5-11 - | - - |
| UA30 | 3 0 | 1 0 | ▶ | 1 to 5 x CA5 1 to 3 x CE5 max. (1) | or 1 x 4-pole CA5 + 1 x 1-pole CA5 or CE5 (1) | or 1 x TEF5 + 1 x 1-pole CA5 | + 1 to 2 x CAL5-11 - | - - |
| UA50 ... UA75 | 3 0 | 0 0 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1) | or 1 x TEF5 + 2 x 1-pole CA5 | + 1 to 2 x CAL5-11 - | - - |
| | 3 0 | 1 1 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1) | or 1 x TEF5 + 2 x 1-pole CA5 | + 1 x CAL5-11 - | - - |
| UA95, UA110 | 3 0 | 0 0 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1) | - - | + 1 to 2 x CAL18-11 or 1 to 2 x CEL18 | - - |
| | 3 0 | 1 1 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (1) | - - | + 1 x CAL18-11 or 1 x CEL18 | - - |
| UA..RA contactors | | | | | | | | |
| UA16-30-10RA | 3 0 | 1 0 | ▶ | - | - | - | + 1 x CAL5-11 | - |
| UA26-30-10RA | 3 0 | 1 0 | ▶ | - | - | - | + 1 to 2 x CAL5-11 | - |
| UA30-30-10RA | 3 0 | 1 0 | ▶ | 1 x CA5 | - | - | + 1 to 2 x CAL5-11 | - |
| | | | | 1 x CE5 | - | - | + 1 to 2 x CAL5-11 | - |
| UA50-30-00RA | 3 0 | 0 0 | ▶ | 1 to 2 x CA5 | - | - | + 1 to 2 x CAL18-11 | - |
| UA63-30-00RA | 3 0 | 0 0 | ▶ | 1 to 2 x CE5 | - | - | or 1 to 2 x CEL18 | - |
| UA75-30-00RA | 3 0 | 0 0 | ▶ | - | - | - | - | - |
| UA95-30-00RA | 3 0 | 0 0 | ▶ | 1 to 2 x CA5 | - | - | + 1 to 2 x CAL18-11 | - |
| UA110-30-00RA | 3 0 | 0 0 | ▶ | 1 to 2 x CE5 | - | - | or 1 to 2 x CEL18 | - |
| GA75, GAE75 contactors | | | | | | | | |
| GA75 | 1 0 | 0 0 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2) | or 1 x TEF5 + 2 x 1-pole CA5 | + 1 to 2 x CAL5-11 - | or 1 x VE5-2 + 1 x CAL5-11 |
| | 1 0 | 1 1 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2) | or 1 x TEF5 + 2 x 1-pole CA5 | + 1 x CAL5-11 - | or 1 x VE5-2 - |
| GAE75 | 1 0 | 0 0 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2) | or 1 x TEF5 + 2 x 1-pole CA5 | + 1 x CAL5-11 - | or 1 x VE5-2 - |
| | 1 0 | 1 1 | ▶ | 1 to 6 x CA5 1 to 5 x CE5 max. (2) | or 1 x 4-pole CA5 + 2 x 1-pole CA5 or CE5 (2) | or 1 x TEF5 + 2 x 1-pole CA5 | - - | - - |

Notes regarding combination of CE5 with other accessories:

(1) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 3. CE5 auxiliary contacts not allowed in mounting position 5.

(2) The total number of N.O. or N.C. CE5 and other additional N.C. CA5 auxiliary contacts is limited to 5.

Function markers

Mounting piece



BA5-50

1SBCE7587AF0301

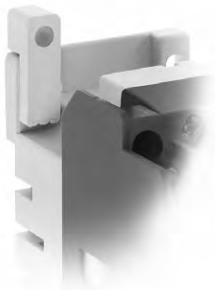
BA5-50 Function markers

Set of 50 function markers designed to be clipped onto the front face of devices. Details can be added to these markers using a ball point pen, indelible felt-tip pen or pentel white.

Self-adhesive labels (not supplied) can also be added to them.

Marker dimensions: 7 x 19 mm (0.276" x 0.748").

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|--------|-----------------|---------|----------------------|
| UA, UA..RA and accessories GA75, GAE75 | BA5-50 | 1SBN110000R1000 | 1 | 0.017 |



BP16

1SBCE586724F0302

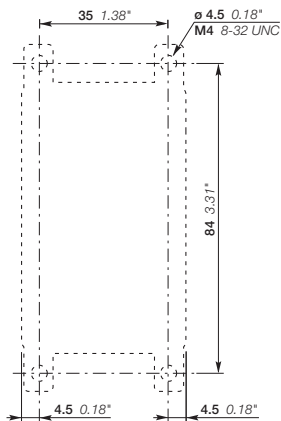
BP16 Mounting piece

Mounting piece for screw fixing (M4, not supplied) of UA, UA..RA series contactors indicated in the table below.

Easy handling of screwdrivers and screw driving.

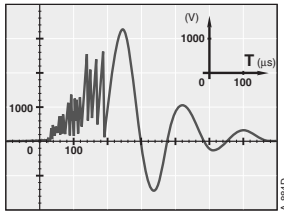
Add-on mounting piece on contactor's rear face, offering a wide fixing facility.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|-----------------|---------|----------------------|
| UA16, UA16..RA | BP16 | 1SBN111403R1000 | 100 | 0.141 |



Drilling plan for UA16, UA16..RA contactors with BP16

Surge suppressors for contactor coils



The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil. The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components. The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC: } k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{or in AC: } k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



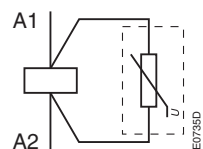
| For contactors | Rated control circuit voltage U_c | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|-------------------------------------|-------|-----------|-----------------|---------|-------------------|
| | V | AC DC | | | | |
| UA, UA..RA GA75, GAE75 | 24...50 | ● ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| UA16...UA30, UA16RA...UA30RA | 24...50 | ● - | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● - | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● - | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● - | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| UA50...UA110, UA50RA...UA110RA GA75 | 24...50 | ● - | RC5-2/50 | 1SBN050200R1000 | 2 | 0.015 |
| | 50...133 | ● - | RC5-2/133 | 1SBN050200R1001 | 2 | 0.015 |
| | 110...250 | ● - | RC5-2/250 | 1SBN050200R1002 | 2 | 0.015 |
| | 250...440 | ● - | RC5-2/440 | 1SBN050200R1003 | 2 | 0.015 |
| GAE75 | 12...32 | - ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | - ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | - ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | - ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | - ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

Surge suppressors for contactor coils

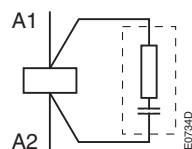
Technical data

| Varistor | RV5/50 | RV5/133 | RV5/250 | RV5/440 | |
|--|---|--------------------------------|----------------------------------|----------------------------------|----------------|
| Rated control circuit voltage U _c | 24...50 V AC 24...50 V DC | 50...133 V AC 50...133 V DC | 110...250 V AC 110...250 V DC | 250...440 V AC 250...440 V DC | |
| Residual overvoltage (clipping voltage) | 132 V AC 132 V DC | 270 V AC 270 V DC | 480 V AC 480 V DC | 825 V AC 825 V DC | |
| Opening time growth factor | 1.1...1.5 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | | |
| Drawback | Clipping as from U _{vdr} *, thus voltage front up to this point. *U _{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance ± 10 %. | | | | |
| RC type | RC5-1/50 RC5-2/50 | RC5-1/133 RC5-2/133 | RC5-1/250 RC5-2/250 | RC5-1/440 RC5-2/440 | |
| Rated control circuit voltage U _c | 24...50 V AC | | | | |
| Residual overvoltage (clipping voltage) | 2 to 3 x U _c max. | | | | |
| Opening time growth factor | 1.2...1.3 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. No operating delays. | | | | |
| Transil diode | RT5/32 | RT5/65 | RT5/90 | RT5/150 | RT5/264 |
| Rated control circuit voltage U _c | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| Residual overvoltage (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| Opening time growth factor | 1.5...3 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Connection to the coil terminals (parallel mounting) | Clip-on for both fixing and connection. | | | | |
| Fixing | Clipped onto the top part of the contactor base without change in contactor overall dimensions. | | | | |
| Advantages | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| Drawback | A certain delay on drop out which does not however reduce contactor breaking capacity. | | | | |

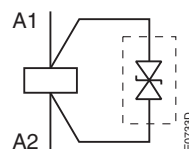
Wiring diagrams



Varistor

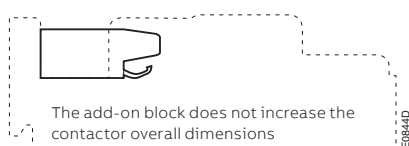


RC type



Transil diode

Dimensions



RV5, RC5, RT5

Interface relays



RA5-1

RA5-1 interface relay is designed to receive 24 V DC signals delivered by PLC's or other sources with a low output power and to restore them with sufficient power to operate the coils of the relevant contactors.

RA5-1 interface relay is made up of a miniature electromechanical relay equipped with a N.O. contact and with a low consumption 24 V DC coil.

The interface relay coil is controlled by the PLC while the N.O. contact ensures switching of the power contactor.

Coil switching gives rise to overvoltages which have adverse effects on the electronic devices, insulators and, more generally, on component lifetime. The RA5-1 is equipped with surge suppressors:

- on the 24 V DC relay coil via a diode,
- on the power contactor coil via a varistor.

Furthermore, the RA5-1 is protected against relay pole reversal by a diode inserted between the E1 and E2 input terminals.






| For contactors | Coil voltages | Rated control circuit voltage Uc | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|---------------|-------------------------------------|-------|-----------------|---------|----------------|
| | V 50/60 Hz | V DC | | | | kg |
| UA, UA..RA | 24...250 | 24 | RA5-1 | 1SBN060300R1000 | 1 | 0.050 |
| GA75 | | | RA5-1 | 1SBN060300T1000 | 10 | 0.050 |

Interface relays

Technical data

| | |
|--|---|
| Type | RA5-1 |
| Utilization characteristics according to IEC | |
| Standards | IEC 60255-5 |
| Rated insulation voltage U_i acc. to IEC 60947-4-1 | 250 V AC |
| Ambient air temperature | |
| In free air operation | at $U_c = 24$ V DC (between E1 and E2) -25...+70 °C |
| Storage | from 0.85 to 1.1 x U_c -25...+55 °C |
| Storage | -40...+70 °C |
| Climatic withstand | Complies with that of associated contactors |
| Maximum operating altitude | 3000 m |
| Mounting positions | No limitation |
| Fixing | Using the contactor A1 and A2 terminal connecting parts |

Connecting characteristics

| | |
|---|--|
| Connection capacity (min. ... max.) | |
|  Rigid solid | 1 x 1...4 mm ² |
|  Flexible with ferrule | 2 x 1...4 mm ² |
|  Flexible with ferrule | 1 x 0.75...2.5 mm ² |
|  Flexible with ferrule | 2 x 0.75...2.5 mm ² |
|  Lugs | L < 8 mm |
| | l > 3.5 mm |
| Stripping length (all terminals) | 10 mm |
| Tightening torque | |
| Recommended | 1 Nm |
| Max. | 1.2 Nm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | Protection against direct contact in acc. with EN 50274 RA5-1 wired and mounted on the associated contactor |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | M3.5 |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 |

Working data

| | |
|--|---------------------------------|
| Surge suppression | |
| For contactor coil | Varistor |
| For interface relay coil | Diode |
| Protection against polarity reversal between terminals E1 and E2 | Diode |
| Interface relay operating time | Closing and drop-out ≤ 10 ms |
| Total operating time, interface relay + contactor | |
| Between energization and: | N.O. contact closing 20...37 ms |
| | N.C. contact opening 17...32 ms |
| Between de-energization and: | N.O. contact opening 17...25 ms |
| | N.C. contact closing 20...28 ms |

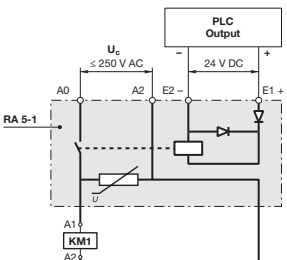
Electrical input data

| | |
|--|----------------------|
| Control voltage (E1 and E2 terminals) U_c | |
| Rated value | 24 V DC |
| Max. range at ambient temperature 20 °C | 19...30 V DC |
| Max. consumption for $U_c = 24$ V DC, $\theta = 20$ °C | 0.3 W |
| "0" status (relay open) | for U_c ≤ 2.4 V DC |
| | for I_c < 1 mA |
| "1" status (relay closed) | for U_c ≥ 19 V DC |
| Max. short supply interruption immunity time | 2 ms |

Electrical output data

| | |
|---|---|
| Switching voltage (A0 and A2 terminals) | ≤ 250 V AC |
| Electrical durability | |
| Number of operating cycles | 2 millions (600 cycles/h) on UA16(RA) ... UA75(RA), GA75, GAE75 contactors 0.5 million (600 cycles/h) on UA95(RA) and UA110(RA) contactors |

Connection



The "E1+" and "E2-" input terminals must be connected, according to their polarity, to the PLC output. The RA5-1 is equipped with two terminal pads for connection to the A1 and the A2 terminals of the contactor coil.

This coil is supplied between the A0 and the A2 terminals of the RA 5-1.

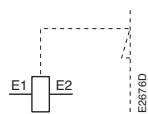
Mounting: terminals pads clamped inside the contactor coil terminals.

Mechanical latching units



1SBC565483P0301

WB75-A



Terminal marking

For converting standard contactors into latched contactors.

The WB75-A block contains a mechanical latching device with electromagnetic impulse unlatching (AC or DC) or manual unlatching.

Captive screw type connecting terminals, built-in cable clamps, M3.5 (+,-) pozidriv 2 screw with screwdriver guidance; delivered untightened and protected against accidental direct contact.

Operation

After closing, the contactor continues to be held in the closed position by the latching mechanism should the supply voltage fail at the contactor coil terminals.

Contactor opening can be controlled:

- electrically by an impulse (AC or DC) on the WB75-A block coil.
(the coil is not designed to be permanently energized)
- manually by pressing the pushbutton on the front face of the WB75-A block.

Mounting

The WB75-A block is clipped onto the front face of the 1-stack contactor where it takes up two slots. The two other slots may accept CA5... single pole auxiliary contacts (1 block on each side of the mechanical latch).






| For contactors | Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------------------|-------------------------------------|-----------|--------|-----------------|---------|----------------------|
| | V 50 Hz or DC | V 60 Hz | | | | |
| UA16 ... UA75, GA75, GAE75 | 24 | 24...28 | WB75-A | FPTN372726R1001 | 1 | 0.120 |
| | 42 | 42...48 | WB75-A | FPTN372726R1002 | 1 | 0.120 |
| | 48 | 48...55 | WB75-A | FPTN372726R1003 | 1 | 0.120 |
| | 110 | 110...127 | WB75-A | FPTN372726R1004 | 1 | 0.120 |
| | 220...230 | 220...255 | WB75-A | FPTN372726R1006 | 1 | 0.120 |
| | 230...240 | 230...277 | WB75-A | FPTN372726R1005 | 1 | 0.120 |
| | 380...415 | 380...440 | WB75-A | FPTN372726R1007 | 1 | 0.120 |
| | 415...440 | 440...480 | WB75-A | FPTN372726R1008 | 1 | 0.120 |

Mechanical latching units

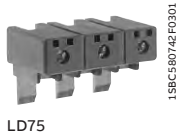
Technical data

| | | |
|---|--|--|
| Type | WB75-A | |
| Utilization characteristics according to IEC | | |
| Rated insulation voltage U_i acc. to IEC 60947-1 | 690 V | |
| Max. electrical impulse time | | |
| On AC coil (with load factor 5 %) | 20 s | |
| On DC coil (with load factor 3 %) | 8 s | |
| Min. electrical impulse time | | |
| For latching (energizing of the contactor coil) | AC | 50 ms (UA, GA contactors) |
| | DC | 50 ms (GAE contactors) |
| For pull-out (energizing of the WB block coil) | AC | 30 ms (UA, GA contactors) |
| | DC | 50 ms (GAE contactors) |
| Coil operating limits | AC or DC supply | 0.85...1.1 x U_c |
| AC control voltage 50/60 Hz | | |
| Rated control circuit voltage U_c | 24...480 V AC | |
| Coil consumption | Average pull-in value | 90 VA |
| | Average holding value | 60 VA |
| DC control voltage | | |
| Rated control circuit voltage U_c | 24...440 V DC | |
| Coil consumption | Average pull-in value | 110 W |
| | Average holding value | 110 W |
| On contactor closing (latching) | | |
| Between coil energization and: | N.O. contact closing | No difference with the operation of a contactor without mechanical latching unit |
| | N.C. contact opening | No difference with the operation of a contactor without mechanical latching unit |
| On contactor opening (unlatching) | | |
| Between WB coil energization and: | N.O. contact opening | 5...25 ms |
| | N.C. contact closing | 7...28 ms |
| Mechanical durability | Number of operating cycles | 1 million operating cycles |
| Max. switching frequency | 3600 cycles/h with on-load factor of 8 % | |

Connecting characteristics

| | | |
|---|--|--------------------------------|
| Connection capacity (min. ... max.) | | |
|  | Rigid solid | 1 x 1...4 mm ² |
|  | | 2 x 1...4 mm ² |
|  | Flexible with ferrule | 1 x 0.75...2.5 mm ² |
|  | | 2 x 0.75...2.5 mm ² |
|  | Lugs | L < 8 mm |
| | | L > 3.5 mm |
| Stripping length | 10 mm | |
| Tightening torque | Recommended | 1 Nm |
| | Max. | 1.2 Nm |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | |
| All terminals | M3.5 | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | |

Additional terminal blocks and other accessories






LD75

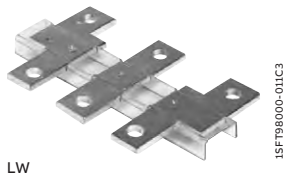
Terminal blocks

The LD terminal blocks are designed to increase the connecting capacity of the contactor on which they are fitted and for preparation of the wiring before final connection on the contactor. The LD blocks are 3-pole terminal blocks with tunnel terminals. The LD75 terminal blocks are fixed in the 3 independent slots located above the built-in connectors.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|------|-----------------|---------|-------------------|
| UA50(RA) ... UA75(RA) | LD75 | 15BN073508R1000 | 1 | 0.115 |

Technical data

| Types | | LD75 |
|---|------------------------------------|---|
| Rated insulation voltage U_i | | |
| acc. to IEC 60947-4-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Main terminals | |  Screw terminals with single connector 10x11 mm |
| Connection capacity (min. ... max.) | | |
|  Rigid | Solid ($\leq 4 \text{ mm}^2$) | } 1 x 6...50 mm ² 2 x 6...25 mm ² |
| | Stranded ($\geq 6 \text{ mm}^2$) | |
|  Flexible with ferrule | | 1 x 6...35 mm ² |
| | | 2 x 6...16 mm ² |
| Bars | | 10 mm |
| Tightening torque | | 4 Nm |
| Degree of protection | | IP10 |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | |
| Screw terminals | | Delivered in closed position M6 |
| Screwdriver type | | pozidriv 2 |
| Note: The utilization of LD additional terminal blocks leaves the possibility to connect the following cables directly into the contactor main terminals. | | |
| | | LD75 |
| Possible cross section of rigid cable in the contactor terminals | | 50 mm ² |



LW

Terminal enlargements

Enlargement pieces designed to increase the width of the contactor terminal pads in order to allow larger connections to be mounted. Sets containing 3 tin plated copper bars fixed by an isolating spacer.

| For contactors | Dimensions | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|-----------------------|--------|-------|-----------------|---------|-------------------|
| | hole \varnothing mm | bar mm | | | | |
| UA95, UA110 | 6.5 | 15 x 3 | LW110 | 15FN074307R1000 | 1 | 0.100 |

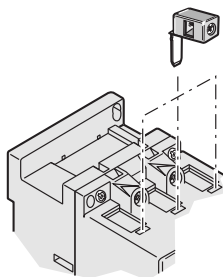
Terminals for control lead connections



LK75-L



LK75-F



LK positioning

Terminals designed to connect the control conductors to the main poles of the UA and GA contactors and derivative versions.

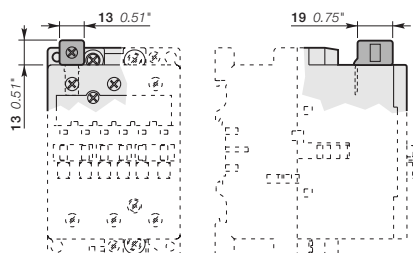
Accessories clipped into the slots placed above each power terminal connector.

The LK75 are fitted with a pin designed to hold them in place until the connector has been fully clamped with its power cable.

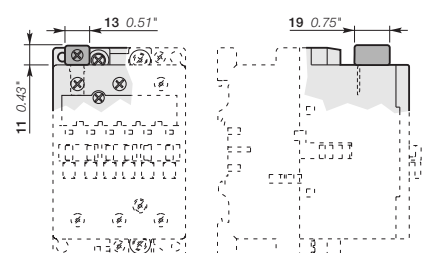
- Degree of protection IP20
- Connecting terminal delivered in open position: cable clamp and M3.5 (+,-) pozidriv 2 screw.
- Cable cross-sectional area:
 - 1 or 2 rigid conductors.....1...4 mm²
 - 1 or 2 flexible conductors with cable end 0.75...2.5 mm²
- Tightening torque for the LK screw:
 - recommended1.00 Nm
 - maxi.1.20 Nm

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|--------|-----------------|---------|-------------------|
| Right and left on: UA50(RA) ... UA75(RA) GA75, GAE75 | LK75-L | 1SBN073552R1003 | 2 | 0.006 |
| Opposite on: UA50(RA) ... UA75(RA) GA75, GAE75 | LK75-F | 1SBN073552R1002 | 2 | 0.006 |

Note: The LK terminals provided for the UA contactors can be used with the AM types.



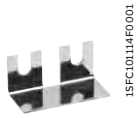
LK75-L



LK75-F

Main dimensions mm, inches

Connection bar for contactor



LP185

1SFC10117P001



LP2050

1SFC10117P001

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------------------------|--------|-----------------|---------|-------------------|
| Connection bar for contactor | | | | |
| GAF185 | LP185 | 1SFN074712R1000 | 2 | 0.300 |
| GAF300 | LP300 | 1SFN075112R1000 | 2 | 0.400 |
| GAF460 | LP460 | 1SFN075712R1000 | 4 | 0.550 |
| GAF750 | LP750 | 1SFN076112R1000 | 4 | 0.950 |
| GAF1250 | LP1250 | 1SFN076412R1000 | 4 | 1.900 |
| GAF1650, GAF2050 | LP2050 | 1SFN076512R1000 | 4 | 2.900 |

Maximum continuous current with two parallel connection strips per pole

| Connexion kit (includes 4 pcs of connection strips) | Ie max |
|---|--------|
| 2 x LP185 | 220 A |
| 2 x LP300 | 370 A |
| 1 x LP460 | 600 A |
| 1 x LP750 | 800 A |
| 1 x LP1250 | 900 A |
| 1 x LP2050 | 1650 A |

Contactors coils and main contact sets



1SB C573800P0302

ZA16

Contactors coils

| For contactors | Rated control circuit | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-----------------------|-----------------------|-----------|---------------------------|------------------------------------|------------|----------------------|
| | voltage | | | | | |
| | Uc V 50 Hz | V 60 Hz | | | | |
| UA16, | 24 | 24 | ZA16 | 1SBN151410R8106 | 1 | 0.093 |
| | 110 | 110...120 | ZA16 | 1SBN151410R8406 | 1 | 0.093 |
| | 220...230 | 230...240 | ZA16 | 1SBN151410R8006 | 1 | 0.093 |
| | 230...240 | 240...260 | ZA16 | 1SBN151410R8806 | 1 | 0.093 |
| | 380...400 | 400...415 | ZA16 | 1SBN151410R8506 | 1 | 0.093 |
| | 400...415 | 415...440 | ZA16 | 1SBN151410R8606 | 1 | 0.093 |
| UA26, UA30, | 24 | 24 | ZA40 | 1SBN152410R8106 | 1 | 0.148 |
| | 110 | 110...120 | ZA40 | 1SBN152410R8406 | 1 | 0.148 |
| | 220...230 | 230...240 | ZA40 | 1SBN152410R8006 | 1 | 0.148 |
| | 230...240 | 240...260 | ZA40 | 1SBN152410R8806 | 1 | 0.148 |
| | 380...400 | 400...415 | ZA40 | 1SBN152410R8506 | 1 | 0.148 |
| | 400...415 | 415...440 | ZA40 | 1SBN152410R8606 | 1 | 0.148 |
| UA50 ... UA75 GA75 | 24 | 24 | ZA75 | 1SBN153510R8106 | 1 | 0.166 |
| | 110 | 110...120 | ZA75 | 1SBN153510R8406 | 1 | 0.166 |
| | 220...230 | 230...240 | ZA75 | 1SBN153510R8006 | 1 | 0.166 |
| | 230...240 | 240...260 | ZA75 | 1SBN153510R8806 | 1 | 0.166 |
| | 380...400 | 400...415 | ZA75 | 1SBN153510R8506 | 1 | 0.166 |
| | 400...415 | 415...440 | ZA75 | 1SBN153510R8606 | 1 | 0.166 |
| UA95, UA110 | 24 | 24 | ZA110 | 1SFN154310R8106 | 1 | 0.170 |
| | 110 | 110...120 | ZA110 | 1SFN154310R8406 | 1 | 0.170 |
| | 220...230 | 230...240 | ZA110 | 1SFN154310R8006 | 1 | 0.170 |
| | 230...240 | 240...260 | ZA110 | 1SFN154310R8806 | 1 | 0.170 |
| | 380...400 | 400...415 | ZA110 | 1SFN154310R8506 | 1 | 0.170 |
| | 400...415 | 415...440 | ZA110 | 1SFN154310R8606 | 1 | 0.170 |
| GAF460 | - | 24...60 | ZAF460 | 1SFN155770R6806 | 1 | 0.525 |
| | 48...130 | 48...130 | ZAF460 | 1SFN155770R6906 | 1 | 0.525 |
| | 100...250 | 100...250 | ZAF460 | 1SFN155770R7006 | 1 | 0.525 |
| | 250...500 | 250...500 | ZAF460 | 1SFN155770R7106 | 1 | 0.525 |
| | - | 24...60 | ZAF750 | 1SFN156170R6806 | 1 | 1.335 |
| GAF750 ... AF1250 | 48...130 | 48...130 | ZAF750 | 1SFN156170R6906 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF750 | 1SFN156170R7006 | 1 | 1.335 |
| | 250...500 | 250...500 | ZAF750 | 1SFN156170R7106 | 1 | 1.335 |
| | 100...250 | 100...250 | ZAF1650 (1) ZP1650 (2) | 1SFN156570R7026 1SFN166521R1070 | 1 set 1 | 0.900 0.300 |



1SFC101007F0201

ZAF1650

ZAF460, ZAF750 : printed circuit board included.
 (1) One set of two coil.
 (2) Printed circuit board.

Main contact sets

The contact sets for 3-pole contactors consists of six fixed contacts, three moving contacts, springs and the required screws.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--------|-----------------|---------|----------------------|
| UA50 | ZLU50 | 1SBN163502R1000 | 1 | 0.115 |
| UA63 | ZLU63 | 1SBN163702R1000 | 1 | 0.145 |
| UA75 | ZLU75 | 1SBN164102R1000 | 1 | 0.145 |
| UA95 | ZLU95 | 1SFN164302R1000 | 1 | 0.190 |
| UA110 | ZLU110 | 1SFN164502R1000 | 1 | 0.190 |



Accessories for EK550, EK1000 4-pole contactors

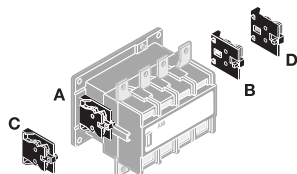
- 3/328** Auxiliary contact blocks
- 3/332** Mechanical interlock units, terminal shrouds and connection sets
- 3/333** Surge suppressors for contactor coils
- 3/335** Main contact sets - Arc chutes
- 3/336** Contactor coils



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Auxiliary contact blocks



Mounting positions of the CAL16-11

E2074D

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits.

Types of auxiliary contact blocks for standard industrial environments:

- CAL instantaneous with N.O. + N.C. contacts
- CCL N.O. leading contact + N.C. lagging contact.

The auxiliary contact blocks are equipped with screw type connecting terminals delivered open, protected against accidental direct contact, and bear the corresponding function marking.
Mounting: Screwed onto the right and / or lefthand side of the EK550, EK1000 contactors.

| For contactors | Number of blocks | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|------------------|--------------------|------|------------|---------|----------------|
| | | | | | | kg |

2-pole auxiliary contacts N.O. + N.C.

| EK | Number of blocks | N.O. | N.C. | Type | Order code | Pkg qty | Weight (1 pce) |
|----|------------------|------|------|---------------|------------|---------|----------------|
| | 1 | 1 | 1 | CAL16-11A | SK829002-A | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11B | SK829002-B | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11C | SK829002-C | 1 | 0.050 |
| | 1 | 1 | 1 | CAL16-11D | SK829002-D | 1 | 0.050 |
| | 1 | 1 | - | CCL16-11E (1) | SK829002-E | 1 | 0.050 |

(1) Mounting of CCL16-11E blocks does not allow an additional second block to be added on top of it.
All DC operated EK contactors are equipped with one CCL16-11E on the right side.

Auxiliary contact blocks

Technical data

| | |
|-------|------------------------------------|
| Types | 2-pole CAL 16-11, 2-pole CCL 16-11 |
|-------|------------------------------------|








Contact utilization characteristics according to IEC

| | | |
|--|----------------------------------|------------------------------------|
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated operational voltage U_e max. | 24...690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 10 A | |
| Rated frequency (without derating) | 50/60 Hz | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V | 6 A |
| | 220-240 V | 6 A |
| | 380-440 V | 4 A |
| | 500-690 V | 1 A |
| Making capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | 10 x I_e AC-15 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A |
| | 48 V DC | 6 A |
| | 72 V DC | 4 A |
| | 125 V DC | 1.8 A |
| | 250 V DC | 0.6 A |
| Short-circuit protection device gG type fuse | 10 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 50 A |
| | for 0.1 s | 100 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 0.25 VA / 12 V or 0.25 VA / 5 mA | |
| Power dissipation per pole at 6 A | 0.2 W | |
| Mechanical durability | Number of operating cycles | 10 millions operating cycles |
| | Max. switching frequency | 3600 cycles/h |
| Electrical durability | Number of operating cycles | see "Electrical durability" curves |
| | Max. switching frequency | 1200 cycles/h |

Contact utilization characteristics according to UL / CSA

| | |
|--------------------------|-------|
| Max. operational voltage | 600 V |
| Pilot duty | A600 |

Connecting characteristics

| | | |
|---|--|-------------------------------|
| Connection capacity (min. ... max.) | | |
|  | Rigid solid | 1 x 0.5...2.5 mm ² |
|  | Flexible with ferrule | 2 x 0.5...2.5 mm ² |
|  | | 1 x 0.5...2.5 mm ² |
|  | Flexible with insulated ferrule | 2 x 0.5...2.5 mm ² |
|  | | 1 x 0.5...1.5 mm ² |
|  | Lugs | 2 x 0.5...1.5 mm ² |
|  | | L ≤ 8 mm |
| | | l > 3.7 mm |
| Tightening torque | Recommended | 1.00 Nm |
| | Max. | 1.20 Nm |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | |
| Screw terminals All terminals | Delivered in open position, screws of unused terminals must be tightened | |
| | M3.5 | |
| Screwdriver type | Pozidriv 2 | |

Auxiliary contacts

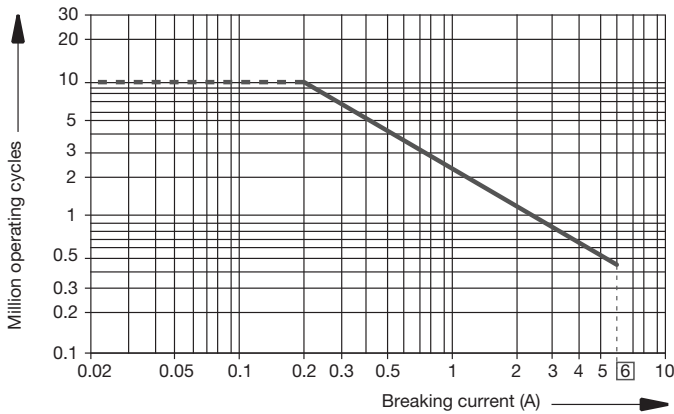
Electrical durability

Electrical Durability for AC-15 Utilization Category

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

This curve represents the electrical durability of the auxiliary contacts in relation to the breaking current. The curve has been drawn for resistive and inductive loads up to 690 V, 40...60 Hz.

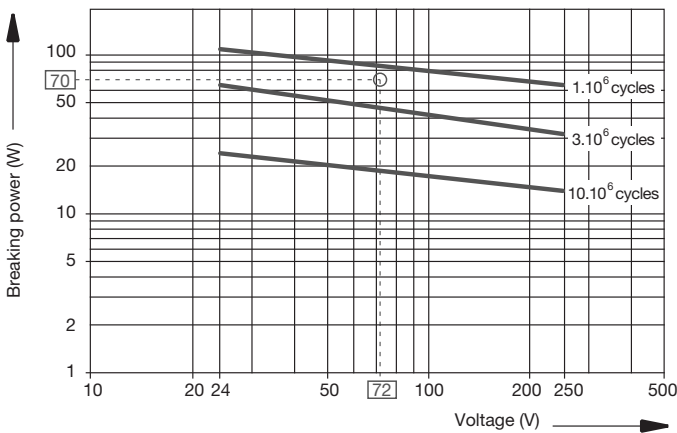


2-pole CAL16... and CCL16... auxiliary contact blocks

Electrical Durability for DC-13 Utilization Category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making and breaking current = I_e with U_e value.



2-pole CAL16... and CCL16... auxiliary contact blocks

Example:

Control of d.c. electro-magnet: U_e voltage = 72 V d.c. and breaking power = 70 W.

On the opposite curve at intersection "O" 72 V / 70 W the corresponding value for the electrical durability is approximately 2 millions cycles.

Add-on auxiliary contacts

Terminal marking and positioning

2-pole auxiliary contacts



CAL16-11A



CAL16-11B



CAL16-11C



CAL16-11 D



CAL16-11E

Mechanical interlock units, terminal shrouds and connection sets



A090C4

Mechanical interlock units

The mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

VH800 interlock unit is used for the mechanical interlocking of two horizontal mounted EK550, EK1000 contactors. Mounting plate is included.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|-------------------|
|----------------|------|------------|---------|-------------------|

Mechanical interlock unit for two horizontal mounted contactors

| | | | | |
|---------------|-------|------------|---|-------|
| EK550, EK1000 | VH800 | SK829070-F | 1 | 6.000 |
|---------------|-------|------------|---|-------|

Terminal shrouds

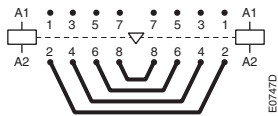
The use of terminal shrouds on the main terminals of EK contactors is required in electrical panels or cubicles to be built in compliance with the rules for protection against direct contact with live parts in acc. with EN 50274.

On EK550, EK1000 contactors:

- The auxiliary contact blocks and coils are designed to provide an IP20 degree of protection
- The main terminals, equipped with lugs or connectors, can be protected against accidental direct contact after wiring (EN 50274) by the addition of terminal shrouds (see table below).

Each terminal shroud protects all the terminals on one side of the contactor. Two terminal shrouds should be provided for each separate contactor.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|-----------|-------------|---------|-------------------|
| EK550 | LT550-EK | SK178001-LB | 1 | 0.190 |
| EK1000 | LT1000-EK | SK178001-MB | 1 | 0.200 |



E0747D

BSS550, BSS1000

Connection sets

Connection between the main poles of two 4-pole contactors mounted side by side so that they operate as source reversing contactors.

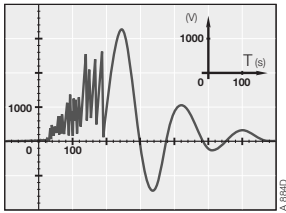
These sets are made up of four downstream connections. BSS550, BSS1000 – Bare, solid copper bars.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|------------|---------|-------------------|
|----------------|------|------------|---------|-------------------|

Mechanical and electrical interlock units for two horizontal mounted contactors

| | | | | |
|--------|---------|------------|---|-------|
| EK550 | BSS550 | SK829090-E | 1 | 3.300 |
| EK1000 | BSS1000 | SK829090-H | 1 | 5.500 |

Surge suppressors for contactor coils



The operation of inductive circuits causes overvoltages, in particular on opening of the contactor coil.

The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to breakdown of insulators and even destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC: } k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{or in AC: } k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and the generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.

| For contactors | Rated control circuit voltage U_c | | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|-------------------------------------|----|----|--------------|------------|---------|----------------------|
| | V | AC | DC | | | | |
| EK550, EK1000 | 48...110 | ● | – | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 24...125 | – | ● | RC-EH800/110 | SK829007-C | 1 | 0.015 |
| EK550, EK1000 | 220...600 | ● | – | RC-EH800/600 | SK829007-D | 1 | 0.015 |

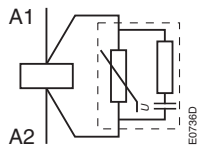
Surge suppressors for contactor coils

Technical data

| Varistor + RC | RC-EH800/110 | RC-EH800/600 |
|--|--|----------------|
| Rated control circuit voltage U _c | 48...110 V AC | 220...600 V AC |
| | 24...125 V DC | - |
| Residual overvoltage (clipping voltage) | 205 V AC | 1100 V AC |
| | 205 V DC | - |
| Opening time growth factor | 1.1 ... 1.15 | |
| Operating temperature | -20 ... +70 °C | |
| Connection to the coil terminals (parallel mounting) | Flexible, accessible leads, equipped with forked lugs | |
| Fixing | Glued to the top part of the contactor base | |
| Advantages | <ul style="list-style-type: none"> - High energy absorption: good damping - Unpolarized system - The RC system damps the voltage front under the U_{vdr} (1) threshold. | |

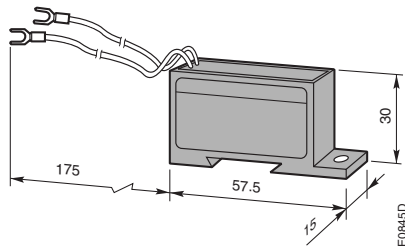
(1) U_{vdr} = Varistor operating (voltage dependant resistor), tolerance ±10 %.

Wiring diagrams



Varistor + RC

Main dimensions mm



RC-EH

Main contact sets

Arc chutes



KZK

1SFC586473F0304

Main contact sets

The contact sets for 4-pole contactors consist of eight fixed contacts, four moving contacts, springs and the necessary screws. In addition, the sets include four moving arcing contacts for EK550, EK1000 contactors.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|---------|------------|---------|-------------------|
| EK550 | KZK550 | SK827204-B | 1 | 2.400 |
| EK1000 | KZK1000 | SK827204-F | 1 | 3.000 |

Arc chutes

The arc chutes sets for EK 4-pole contactors contain 8 pieces.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|---------|------------|---------|-------------------|
| EK550 | KWK550 | 5223351-Z | 1 | 3.170 |
| EK1000 | KWK1000 | 5223351-AN | 1 | 3.170 |

Contactor coils



KH800

1SFC27813 F0302

For AC operated coil

Coils for EK550, EK1000 - AC operated.

| For contactors | Rated control circuit voltage Uc (1) | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--|-----------|-------|-------------|---------|-----------------------------|
| | V 50 Hz | V 60 Hz | | | | |
| EK550, EK1000 | 220 | 220...240 | KH800 | SK828100-EL | 1 | 0.950 |
| | 220...230 | 230...255 | KH800 | SK828100-EM | 1 | 0.950 |
| | 380...400 | 400...440 | KH800 | SK828100-ER | 1 | 0.950 |
| | 400...415 | - | KH800 | SK828100-AR | 1 | 0.950 |

(1) Other control voltages, see voltage code table.

For DC operated coil

Coils for EK550, EK1000 - DC operated with sets including a DC coil, an economy resistor and a insertion contact.

| For contactors | Rated control circuit voltage Uc (1) | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|--|--|-------|-------------|---------|-----------------------------|
| | V DC | | | | | |
| EK550, EK1000 | 110 | | KP800 | SK828150-DE | 1 set | 1.060 |
| | 125 | | KP800 | SK828150-DU | 1 set | 1.060 |
| | 220 | | KP800 | SK828150-DF | 1 set | 1.060 |

(1) Other control voltages, see voltage code table.

—
Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes. The grid covers most of the page below the 'Notes' header.



Contactors and contactor relays

Terminal marking and positioning, Dimensions

Terminal marking and positioning

- 3/340** AF, AF..K, AFS 3-pole contactors
- 3/344** AF, EK 4-pole contactors
- 3/348** UA, UA ... RA contactors
- 3/350** NF contactor relays

Dimensions

- 3/352** AF, AFS, AF ... K 3-pole contactors
- 3/398** AF, EK 4-pole contactors
- 3/403** GA, GAF contactors
- 3/410** UA, UA ... RA contactors
- 3/413** NF contactor relays



For direct product details information, use product type or order code, ex:

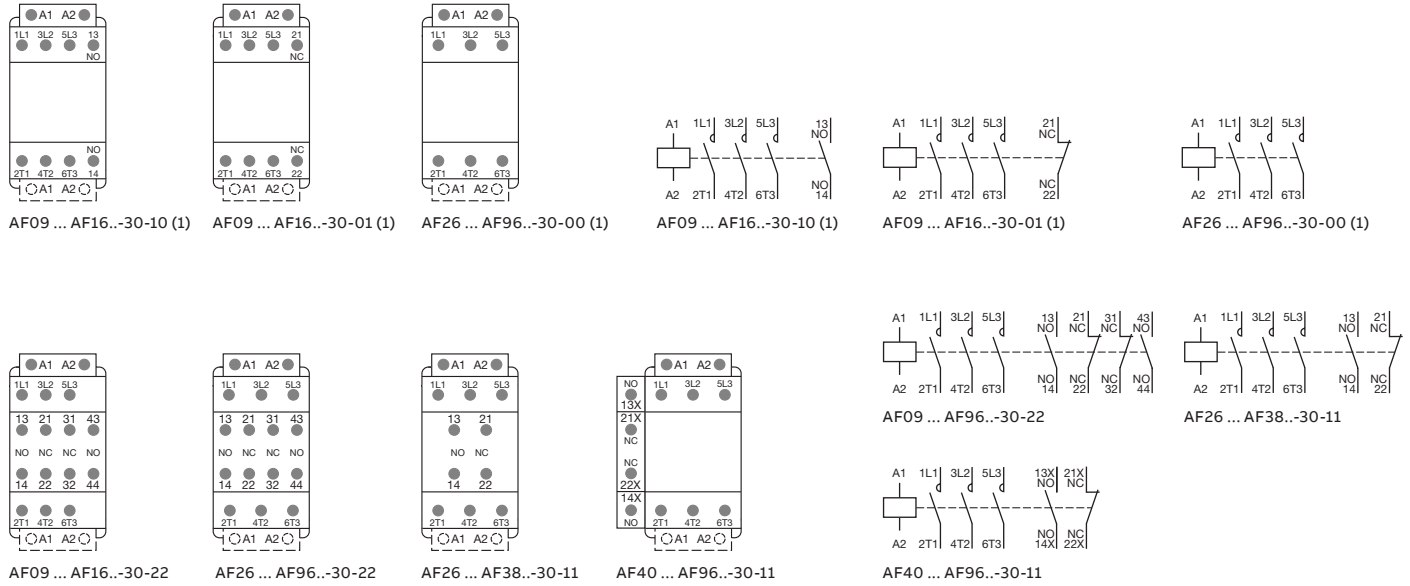
- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

AF09 ... AF96 3-pole contactors

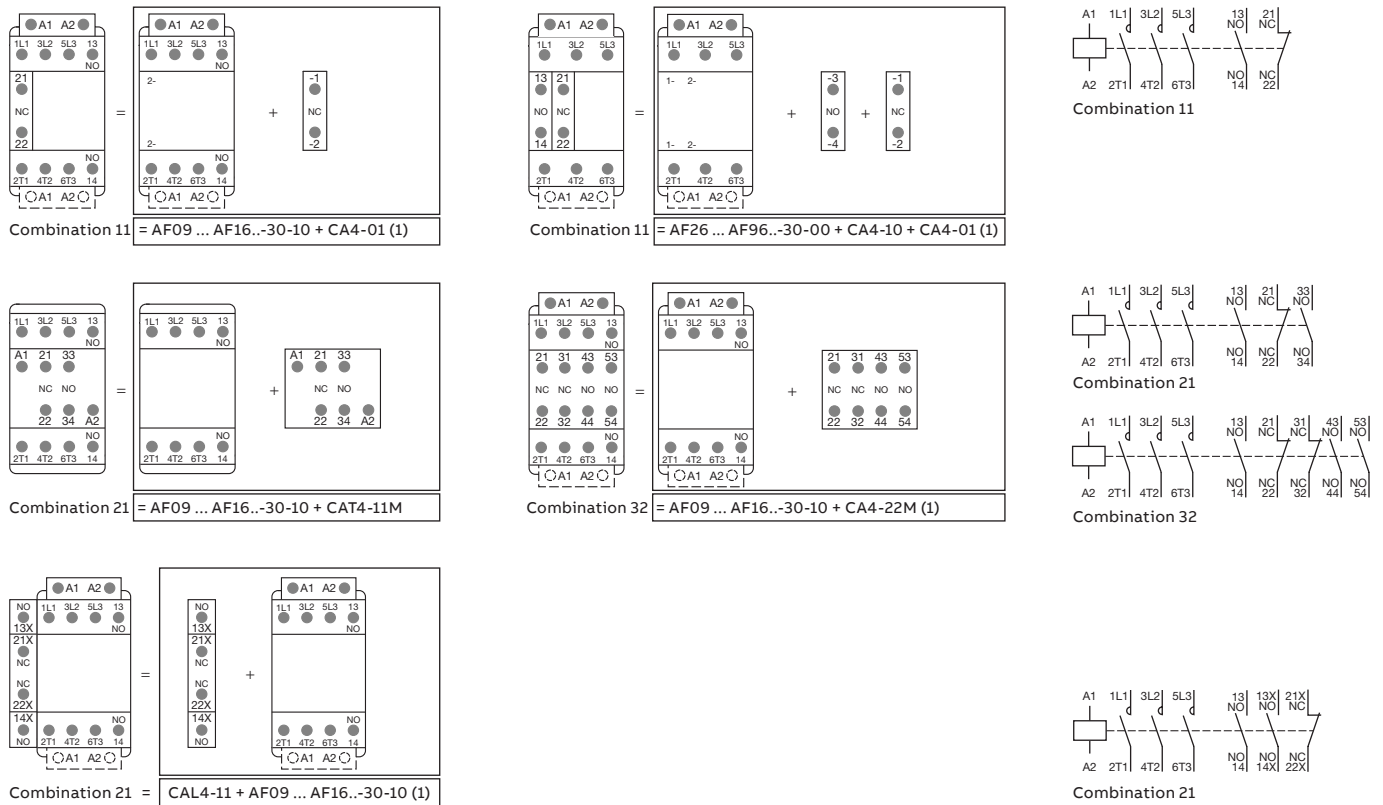
Terminal marking and positioning

AF09 ... AF96 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts



Other possible contact combinations with auxiliary contacts added by the user



Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

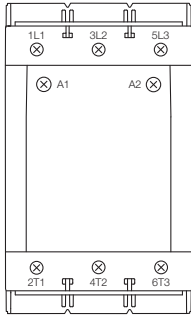
(1) For AF09...K ... AF38...K contactors with Push-in Spring terminals, terminal marking and positioning are the same.

AF116 ... AF370 3-pole contactors

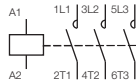
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

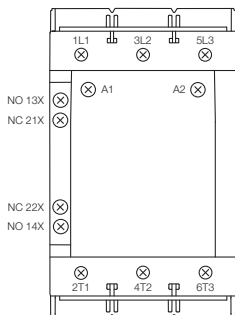


AF116 ... AF370-30-00

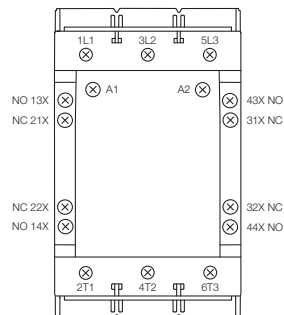


AF116 ... AF370-30-00

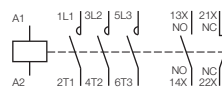
Standard devices with factory mounted auxiliary contacts



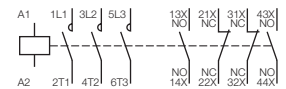
AF116 ... AF370-30-11



AF116 ... AF370-30-22



AF116 ... AF370-30-11



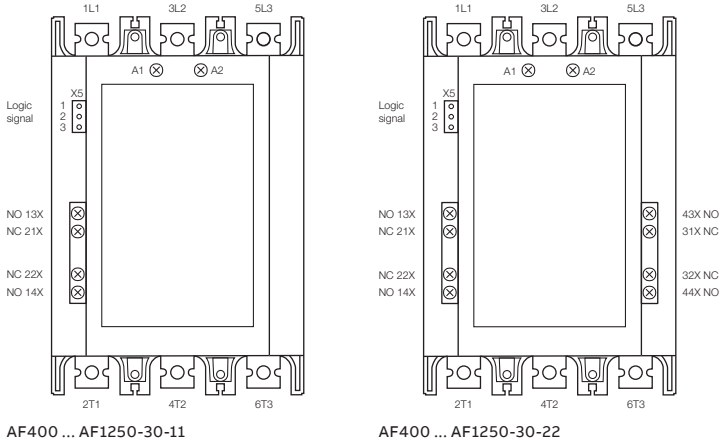
AF116 ... AF370-30-22

AF400 ... AF2850 3-pole contactors

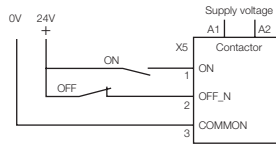
Terminal marking and positioning

AF400 ... AF1250 contactors - AC / DC operated

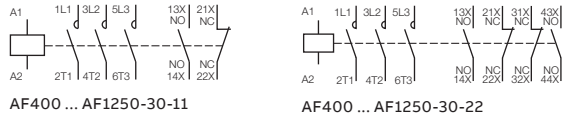
Standard devices with factory mounted auxiliary contacts



Control with logic signal

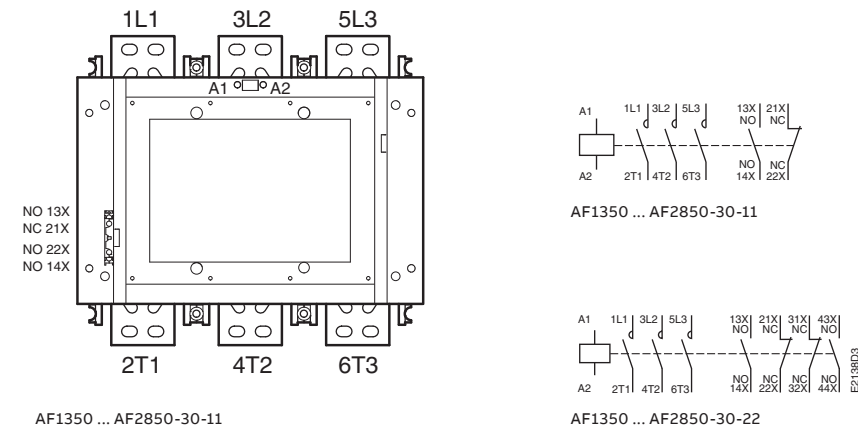


AF400 ... AF1250-30-11, AF400 ... AF1250-30-22

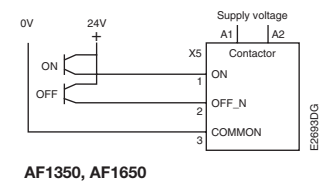


AF1350 ... AF2850 contactors - AC / DC operated

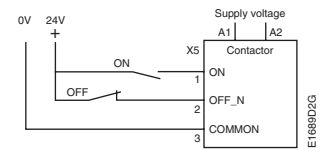
Standard devices with factory mounted auxiliary contacts



Wiring diagrams when used with transistor output



when used with transistor output

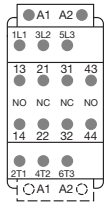


AFS09 ... AFS750 3-pole contactors for safety applications

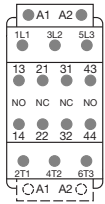
Terminal marking and positioning

AFS09 ... AFS96 contactors - AC / DC operated

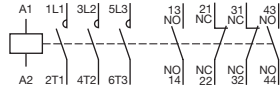
Standard devices



AFS09 ... AFS16...-30-22



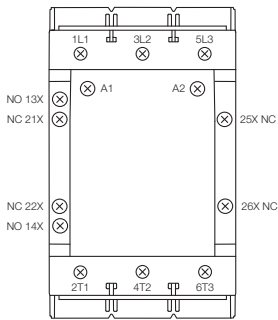
AFS26 ... AFS96...-30-22



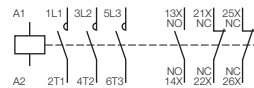
AFS09 ... AFS96...-30-22

AFS116 ... AFS370 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts



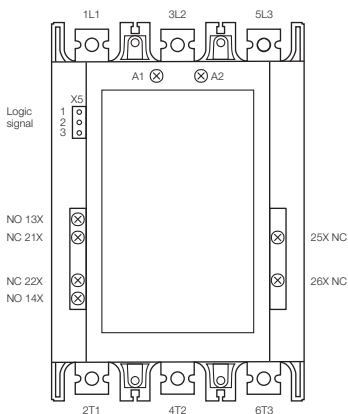
AFS116 ... AFS370-30-12



AFS116 ... AFS370-30-12

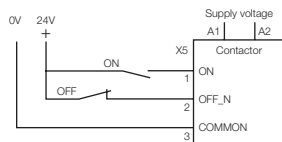
AFS400 ... AFS750 contactors - AC / DC operated

Standard devices with factory mounted auxiliary contacts

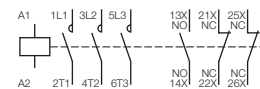


AFS400 ... AFS750-30-12

Control with logic signal



AFS400 ... AFS750-30-12



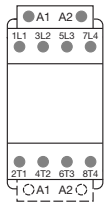
AFS400 ... AFS750-30-12

AF09 ... AF80 4-pole contactors

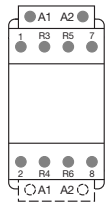
Terminal marking and positioning

AF09 ... AF38 contactors - AC / DC operated

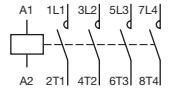
Standard devices without addition of auxiliary contacts



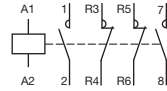
AF09 ... AF80...-40-00



AF09 ... AF40...-22-00
AF80-22-00

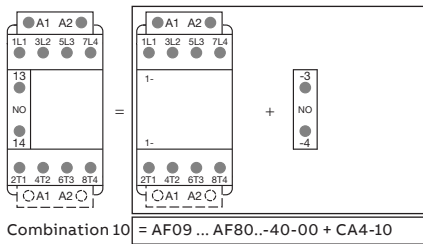


AF09 ... AF80...-40-00

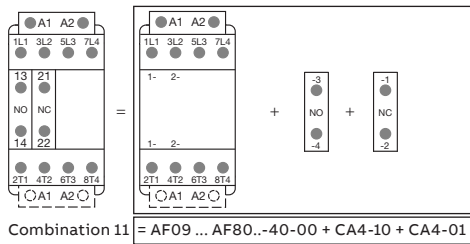


AF09 ... AF40...-22-00
AF80-22-00

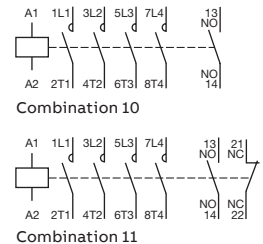
Other possible contact combinations with auxiliary contacts added by the user



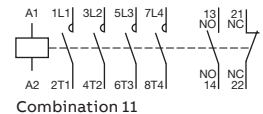
Combination 10 = AF09 ... AF80...-40-00 + CA4-10



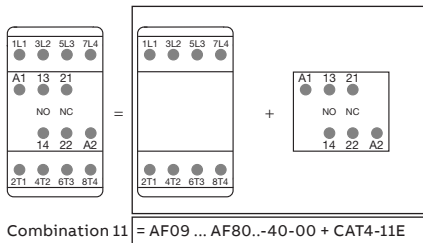
Combination 11 = AF09 ... AF80...-40-00 + CA4-10 + CA4-01



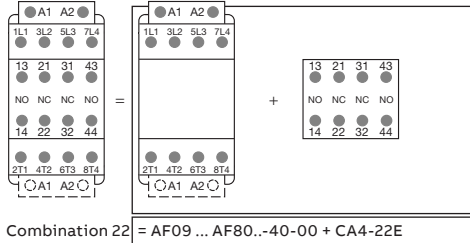
Combination 10



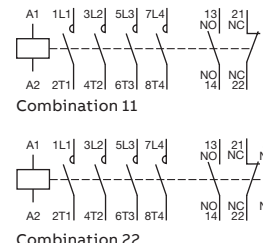
Combination 11



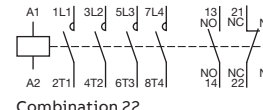
Combination 11 = AF09 ... AF80...-40-00 + CAT4-11E



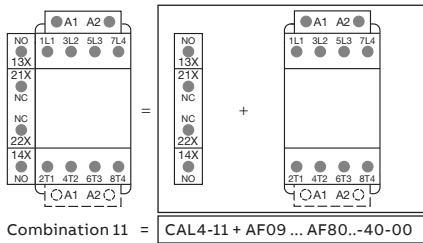
Combination 22 = AF09 ... AF80...-40-00 + CA4-22E



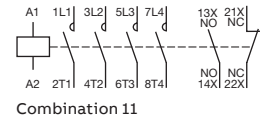
Combination 11



Combination 22



Combination 11 = CAL4-11 + AF09 ... AF80...-40-00



Combination 11

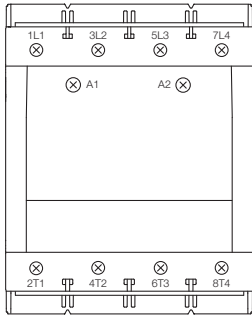
Note: only AF..Z contactor with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

AF116 ... AF370 4-pole contactors

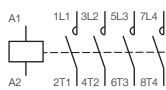
Terminal marking and positioning

AF116 ... AF370 contactors - AC / DC operated

Standard devices without addition of auxiliary contacts

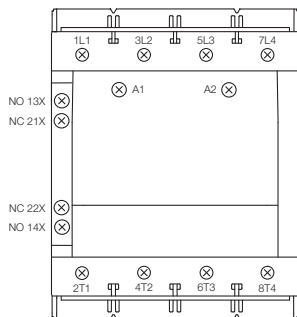


AF116 ... AF370-40-00

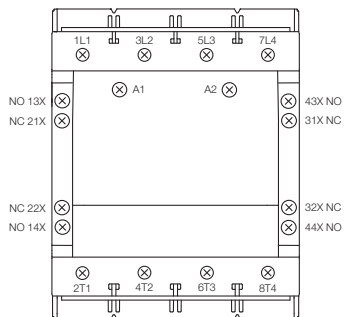


AF116 ... AF370-40-00

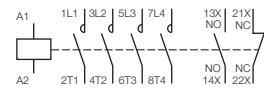
Standard devices with factory mounted auxiliary contacts



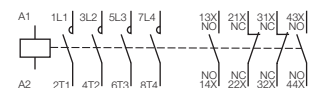
AF116 ... AF370-40-11



AF116 ... AF370-40-22



AF116 ... AF370-40-11

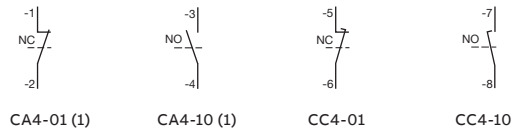


AF116 ... AF370-40-22

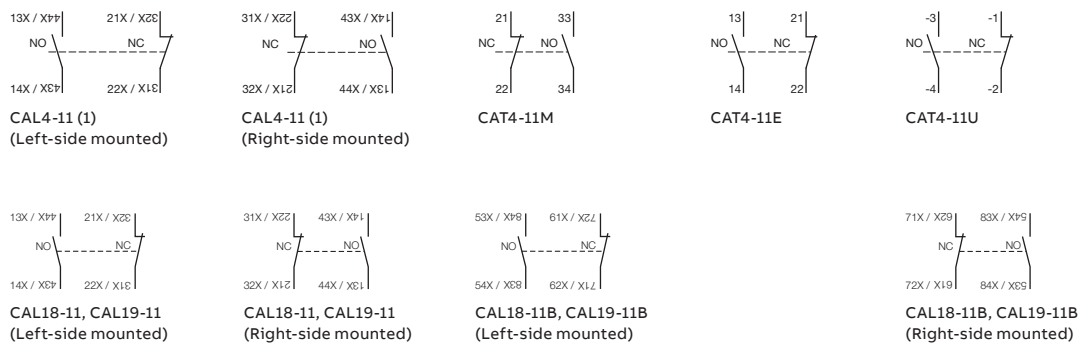
Add-on auxiliary contacts for AF09 ... AF370 contactors

Terminal marking and positioning

1-pole auxiliary contacts



2-pole auxiliary contacts



4-pole auxiliary contacts



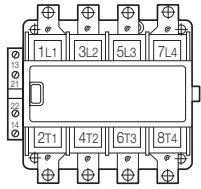
(1) available with Push-in Spring terminals

EK 4-pole contactors

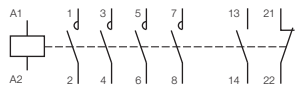
Terminal marking and positioning

EK550, EK1000 contactors - AC operated

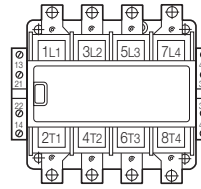
Standard devices



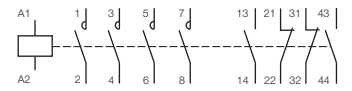
EK550, EK1000-40-11



EK550, EK1000-40-11

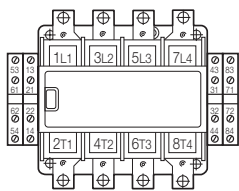


EK550, EK1000-40-22

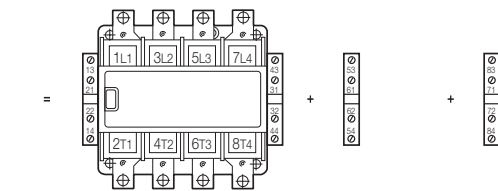


EK550, EK1000-40-22

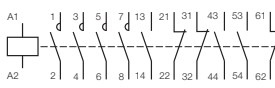
Other possible contact combinations with auxiliary contacts added by the user



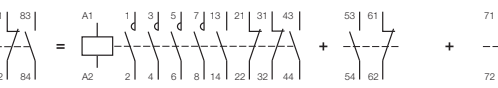
Combination 44



EK550, EK1000-40-22 + CAL16-11C + CAL16-11D



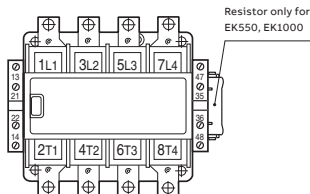
Combination 44



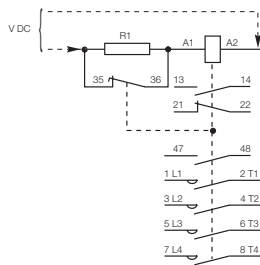
EK550, EK1000-40-22 + CAL16-11C + CAL16-11D

EK550, EK1000 contactors - with multifrequency coil or DC operated

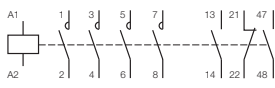
Standard devices



EK550, EK1000-40-21

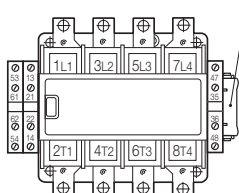


EK550, EK1000 DC operated

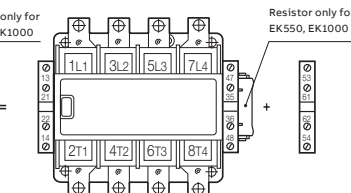


EK550, EK1000-40-21

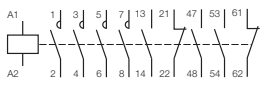
Other possible contact combinations with auxiliary contacts added by the user



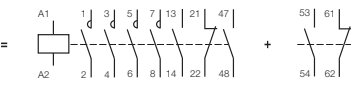
Combination 32



EK550, EK1000-40-21 + CAL16-11C



Combination 32



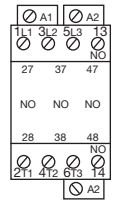
EK550, EK1000-40-21 + CAL16-11C

UA..RA contactors

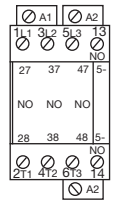
Terminal marking and positioning

UA..RA contactors - AC operated

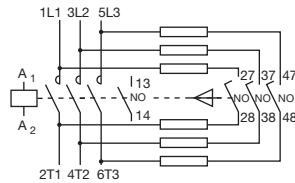
Standard devices without addition of auxiliary contacts



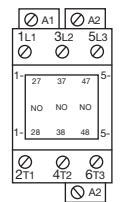
UA16-30-10 RA
UA26-30-10 RA



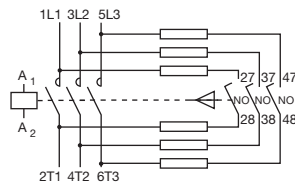
UA30-30-10 RA



UA16 ... 30-30-10 RA



UA50 ... 110-30-00 RA



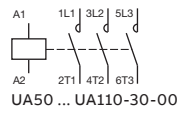
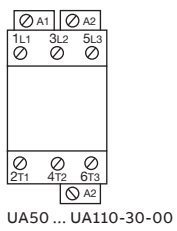
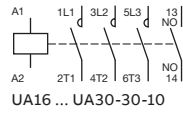
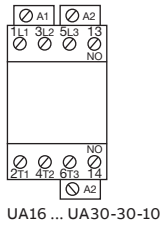
UA50 ... 110-30-00 RA

UA... contactors

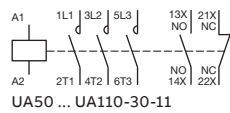
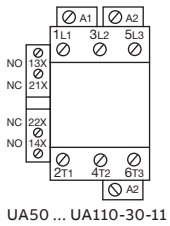
Terminal marking and positioning

UA... contactors - AC operated

Standard devices without addition of auxiliary contacts



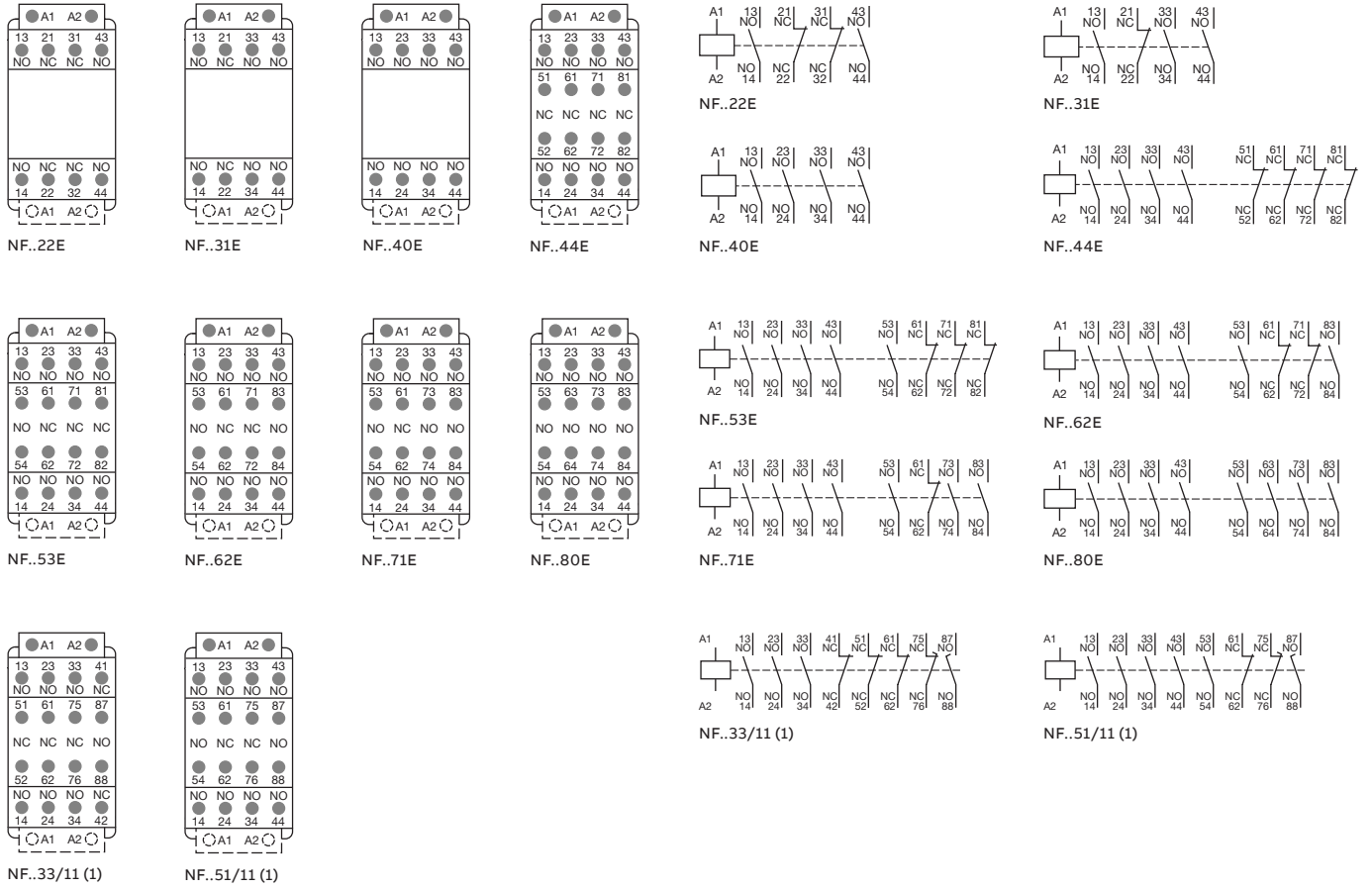
Standard devices with factory mounted auxiliary contacts



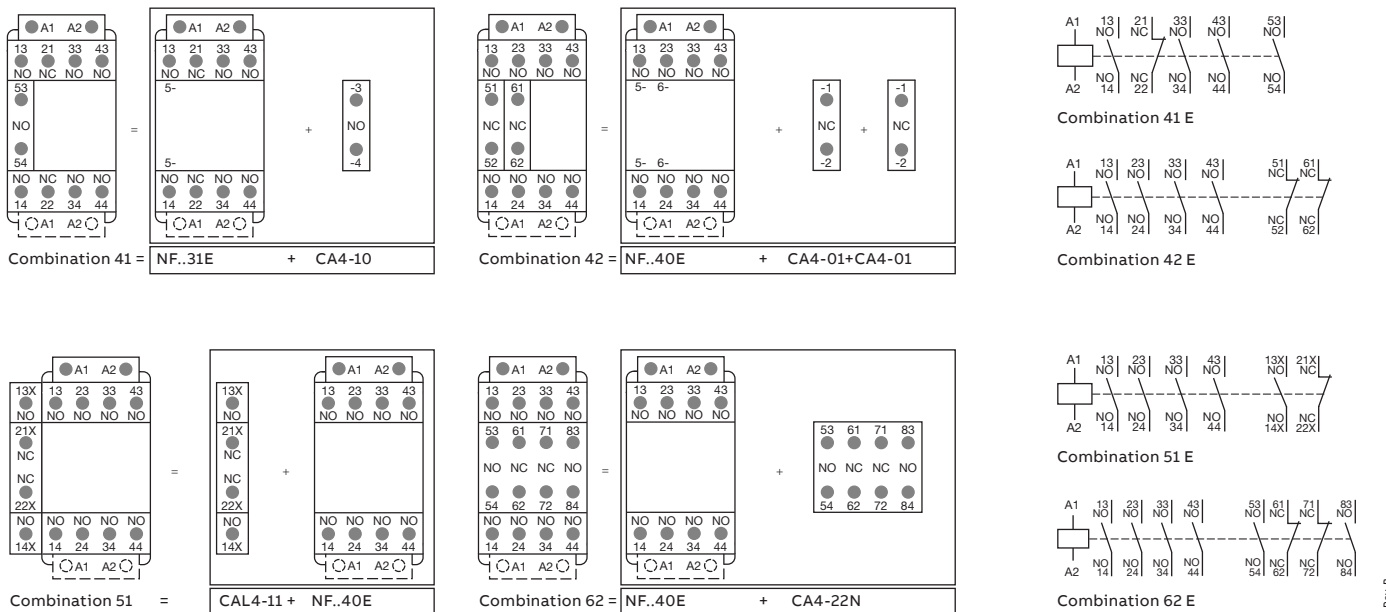
NF contactor relays

Terminal marking and positioning

Standard devices without addition of auxiliary contacts



Other possible contact combinations with auxiliary contacts added by the user



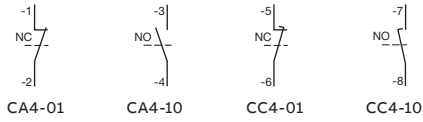
Note: only NFZ contactor relays with DC control voltages 12...20 V DC (coil 20) and 24 V DC (coil 30) need to respect the connection polarities indicated close to the coil terminals: A1+ for the positive pole and A2- for the negative pole.

(1) Not available with Contactor relays with Push-in Spring terminals.

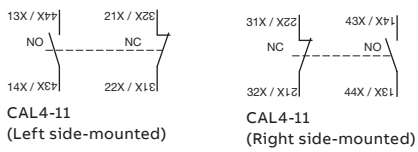
NF add-on auxiliary contacts

Terminal marking and positioning

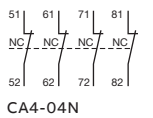
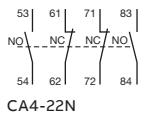
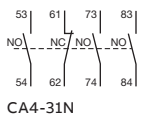
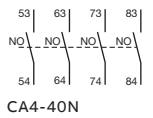
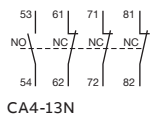
1-pole auxiliary contacts



2-pole auxiliary contacts

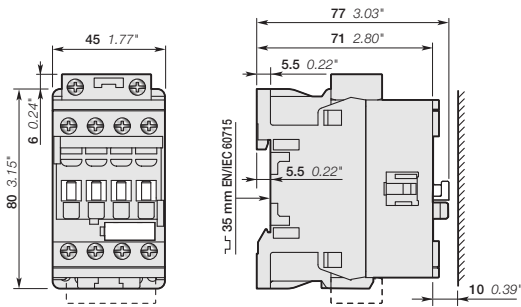


4-pole auxiliary contacts

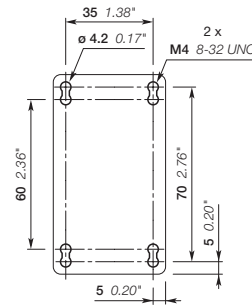


AF09, AF12, AF16 3-pole contactors

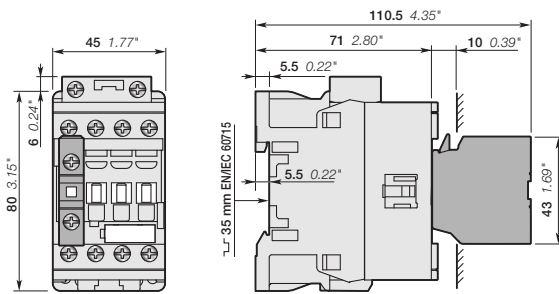
Dimensions



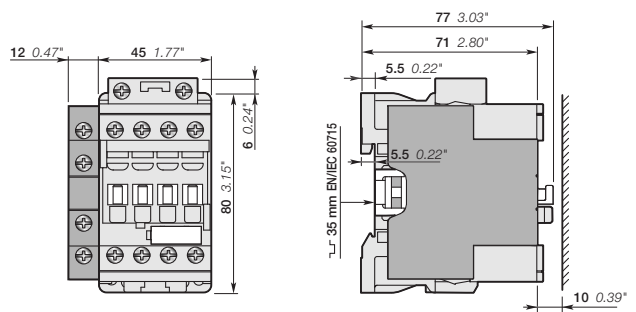
AF09, AF12, AF16



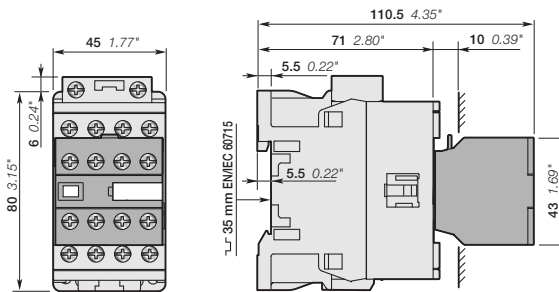
AF09, AF12, AF16



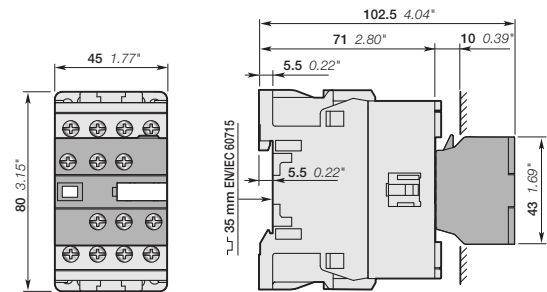
AF09, AF12, AF16
+ CA4, CC4 1-pole auxiliary contact block



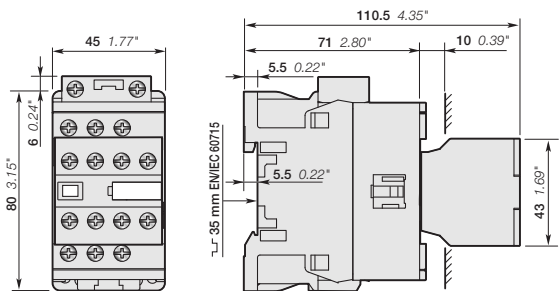
AF09, AF12, AF16
+ CAL4-11 2-pole auxiliary contact block



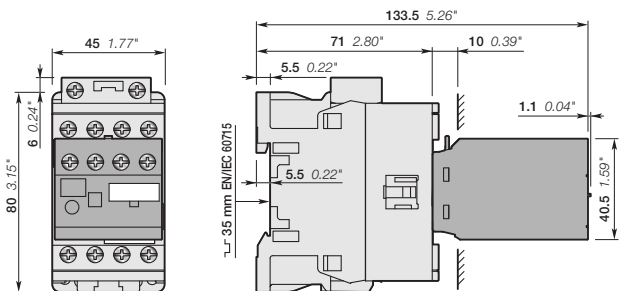
AF09, AF12, AF16
+ CA4 4-pole auxiliary contact block



AF09, AF12, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block



AF09, AF12, AF16...-30-22

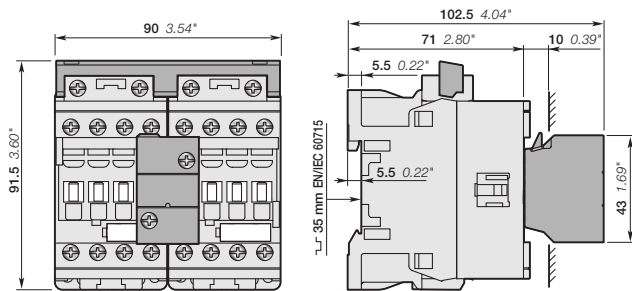


AF09, AF12, AF16
+ TEF4 electronic timer

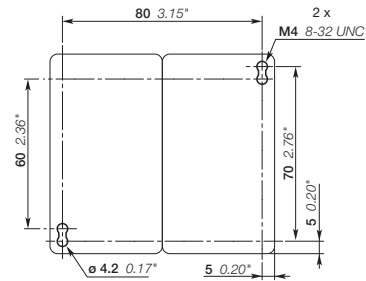
(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

AF09, AF12, AF16 3-pole contactors

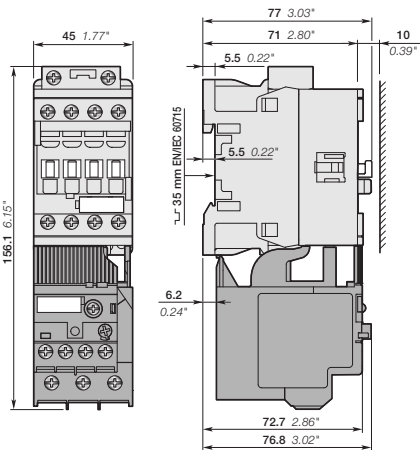
Dimensions



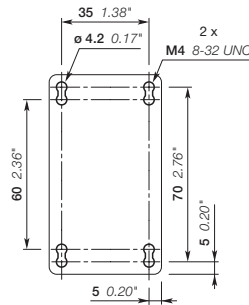
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



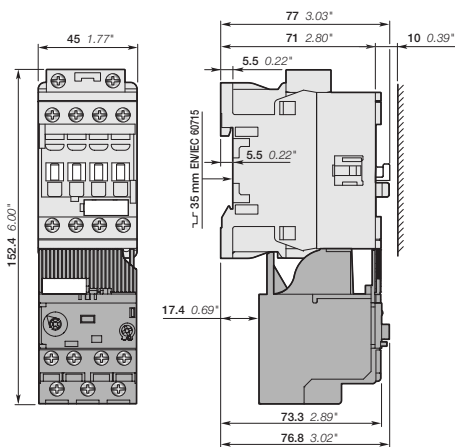
AF09, AF12, AF16
+ VEM4 mechanical and electrical interlock set



AF09, AF12, AF16
+ TF42 thermal overload relay



AF09, AF12, AF16
+ TF42, EF19



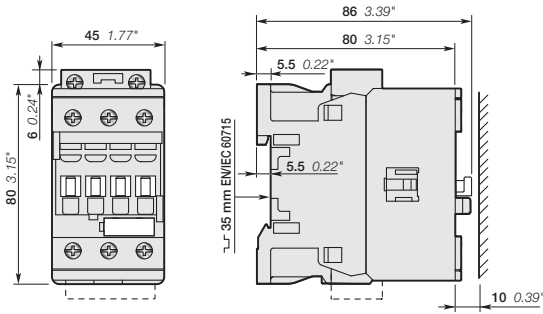
AF09, AF12, AF16 3-pole contactors
+ EF19 electronic overload relay

(1) Note: For AF09 ... AF16 contactors, lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm + 0.79".

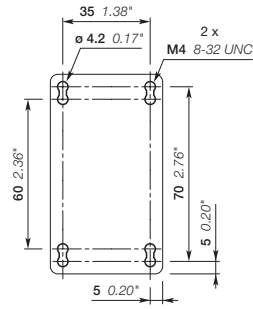
AF26, AF30, AF38 3-pole contactors

Dimensions

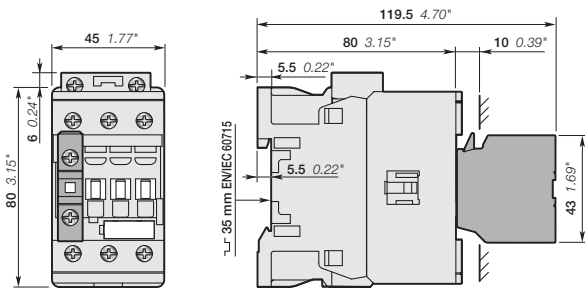
E0



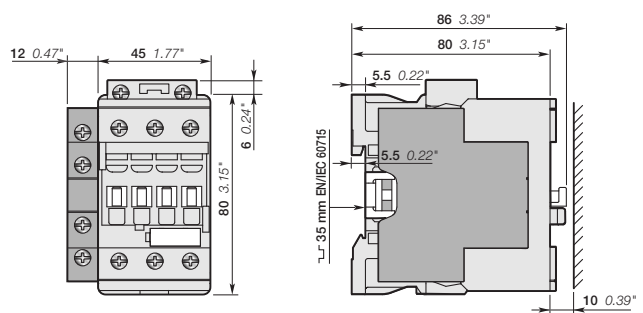
AF26, AF30, AF38



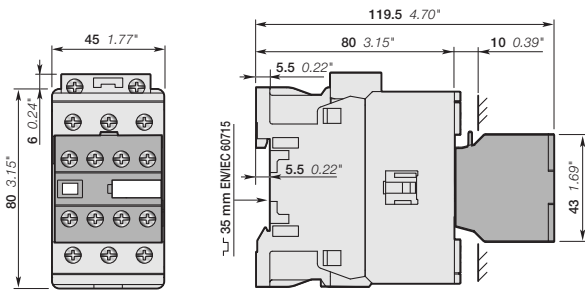
AF26, AF30, AF38



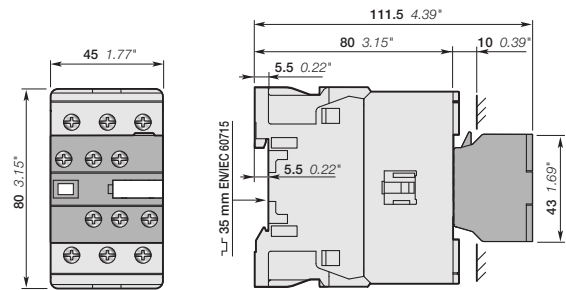
AF26, AF30, AF38
+ CA4, CC4 1-pole auxiliary contact block



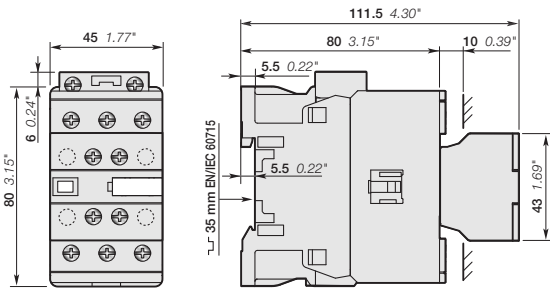
AF26, AF30, AF38
+ CAL4-11 2-pole auxiliary contact block



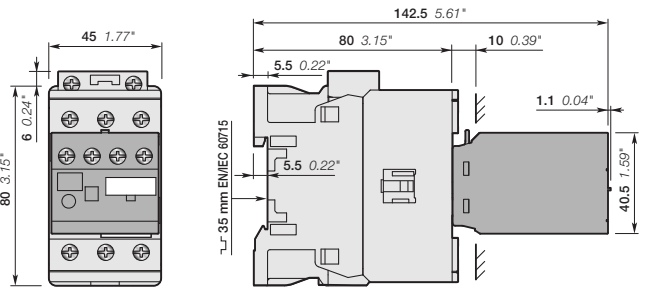
AF26, AF30, AF38
+ CA4 4-pole auxiliary contact block



AF26, AF30, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block



AF26, AF30, AF38...-30-11
AF26, AF30, AF38...-30-22

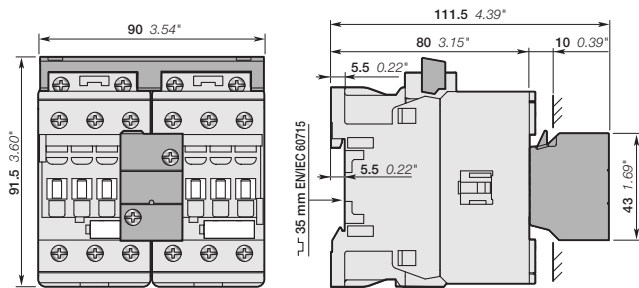


AF26, AF30, AF38
+ TEF4 electronic timer

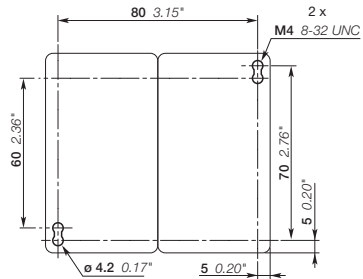
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min. 24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

AF26, AF30, AF38 3-pole contactors

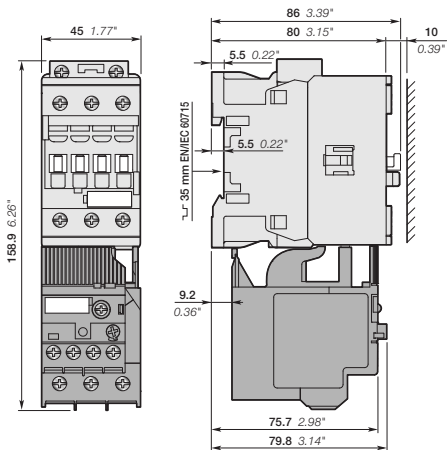
Dimensions



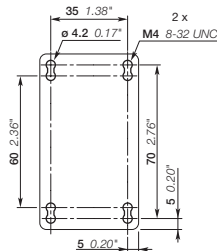
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



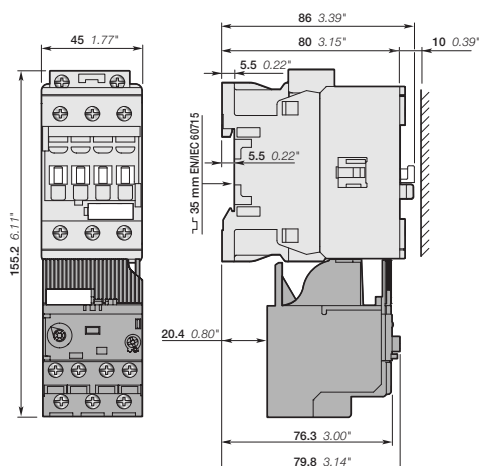
AF26, AF30, AF38
+ VEM4 mechanical and electrical interlock set



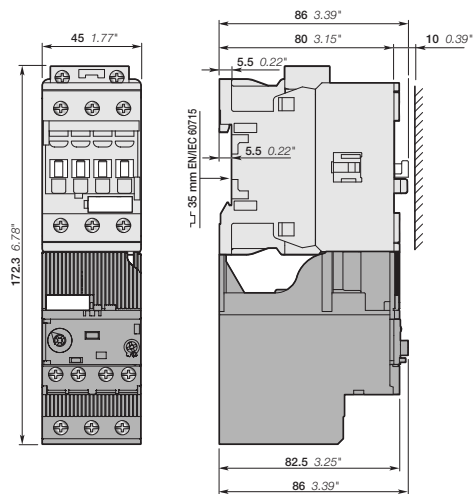
AF26, AF30, AF38
+ TF42 thermal overload relay



AF26, AF30, AF38
+ TF42, EF19, EF45



AF26 3-pole contactors
+ EF19 electronic overload relay

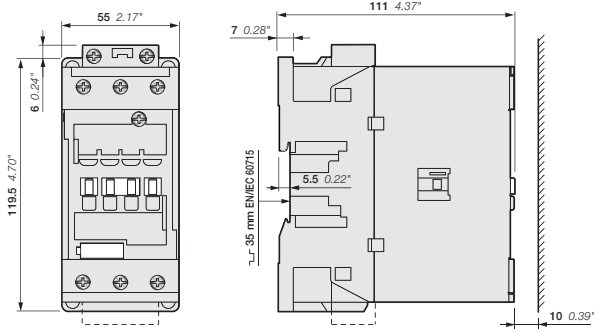


AF26, AF30, AF38 3-pole contactors
+ EF45 electronic overload relay

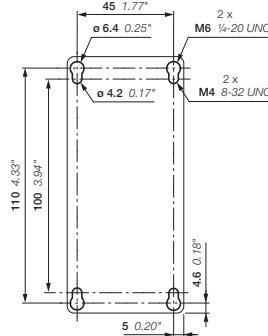
(1) Note: For AF26 ... AF38 contactors, lateral distance to grounded component 2 mm (0.08") min.
24 V DC operated contactor (coil 30) depth + 20 mm (+ 0.79").

AF40 ... AF65 3-pole contactors

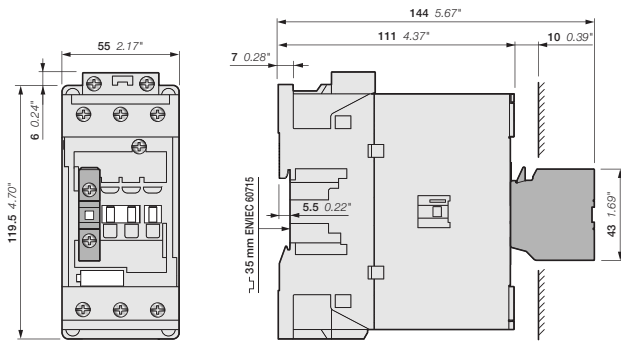
Dimensions



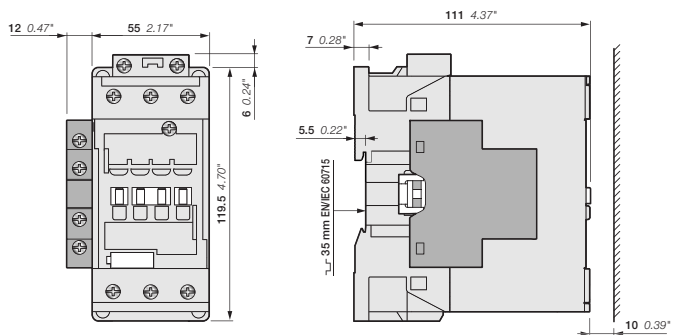
AF40, AF52, AF65



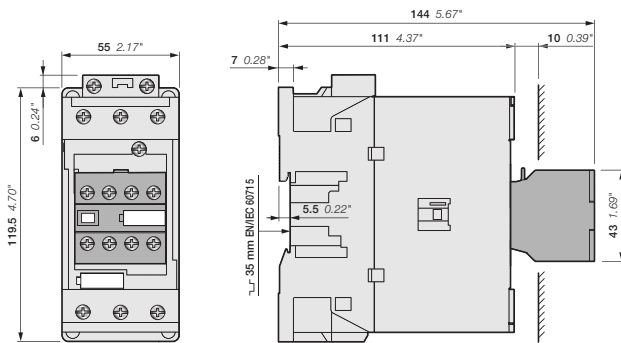
AF40, AF52, AF65



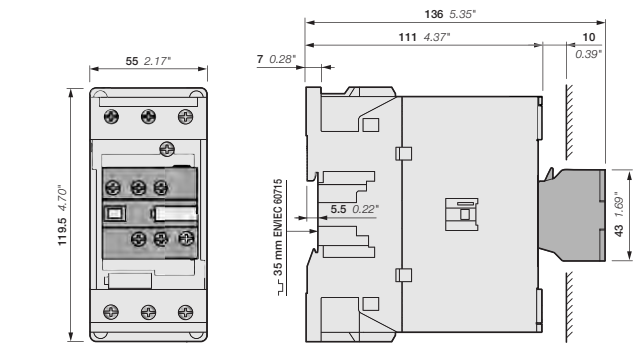
AF40, AF52, AF65
+ CA4, CC4 1-pole auxiliary contact block



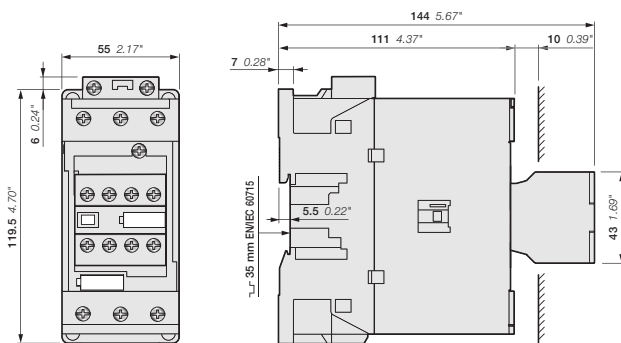
AF40, AF52, AF65-30-00 + CAL4-11 2-pole auxiliary contact block
AF40, AF52, AF65-30-11



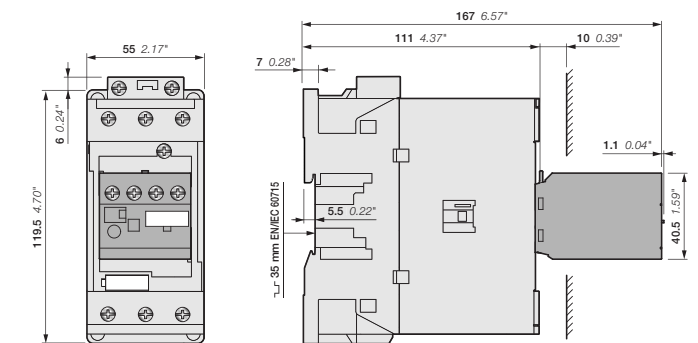
AF40, AF52, AF65
+ CA4 4-pole auxiliary contact block



AF40, AF52, AF65
+ CAT4 2-pole auxiliary contact and coil terminal block



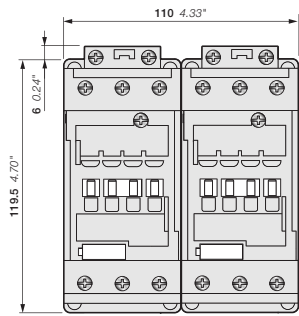
AF40, AF52, AF65...-30-22



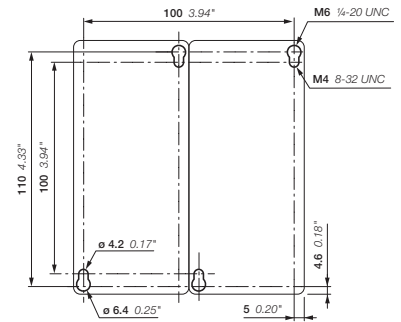
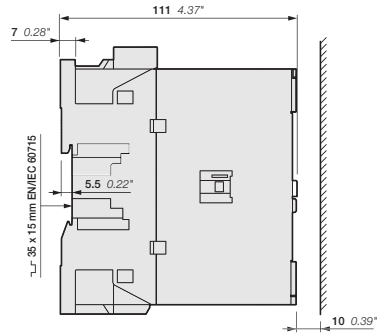
AF40, AF52, AF65
+ TEF4 electronic timer

AF40 ... AF65 3-pole contactors

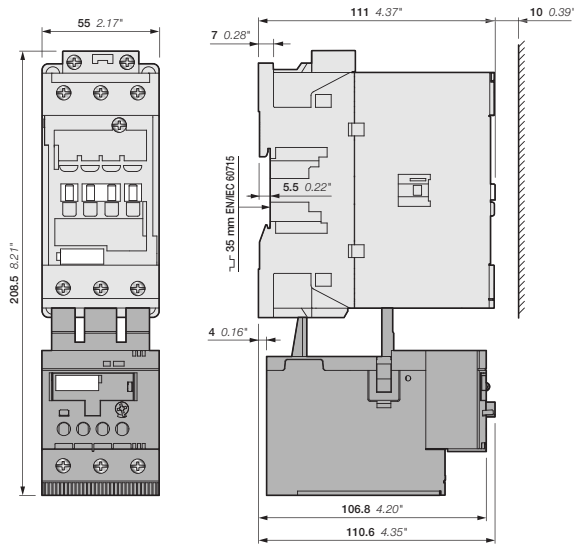
Dimensions



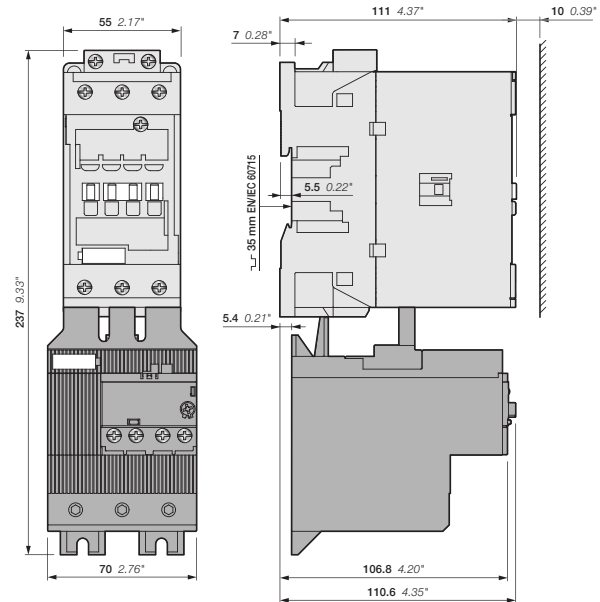
AF40, AF52, AF65
+ VM96-4 mechanical interlock unit



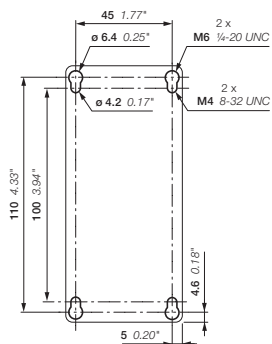
AF40, AF52, AF65
+ VM96-4 mechanical interlock set



AF40, AF52, AF65
+ TF65 thermal overload relay



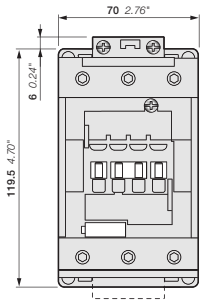
AF40, AF52, AF65
+ EF65 electronic overload relay



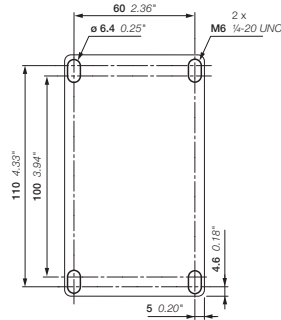
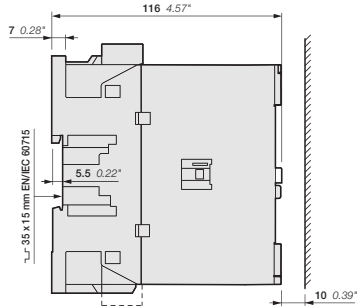
AF40, AF52, AF65
+ TF65, EF65

AF80 ... AF96 3-pole contactors

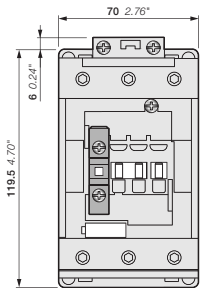
Dimensions



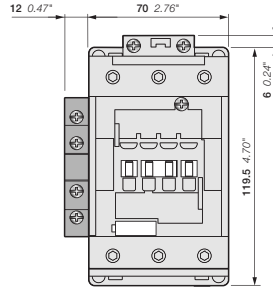
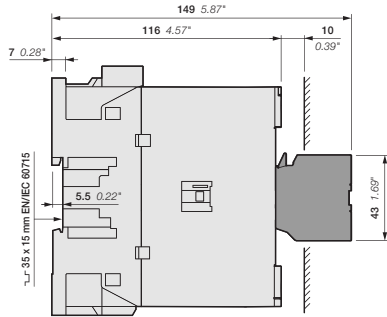
AF80, AF96



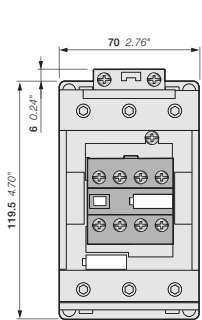
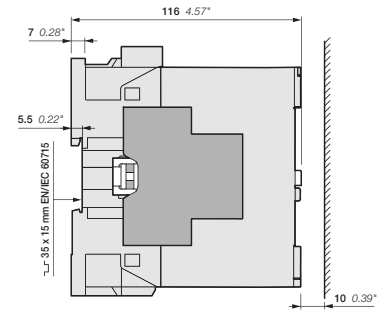
AF80, AF96



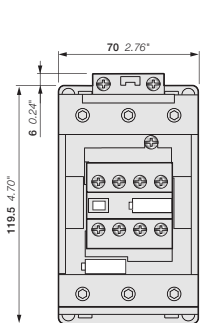
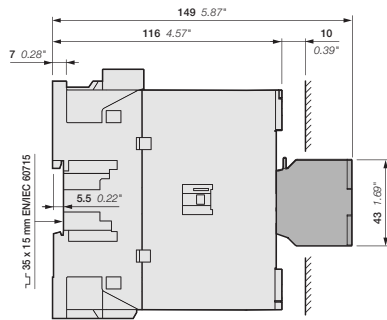
AF80, AF96
+ CA4, CC4 1-pole auxiliary contact block



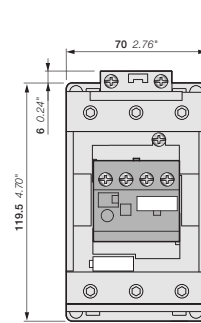
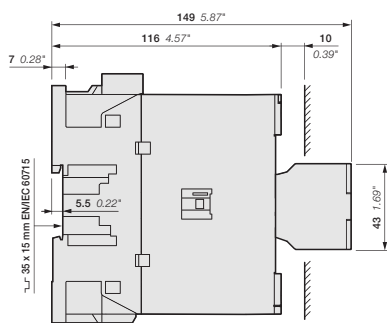
AF80, AF96-30-00 + CAL4-11 2-pole auxiliary contact block
AF80, AF96-30-11



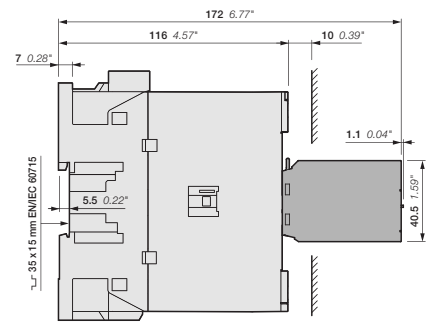
AF80, AF96
+ CA4 4-pole auxiliary contact block



AF80, AF96...-30-22

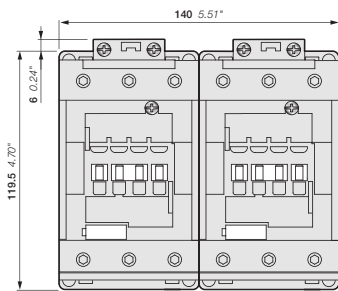


AF80, AF96
+ TEF4 electronic timer

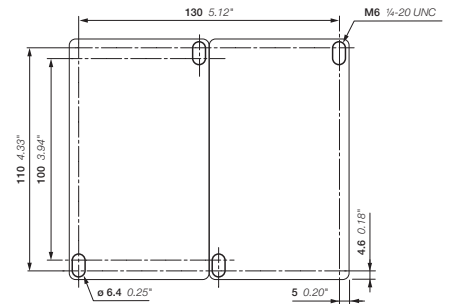
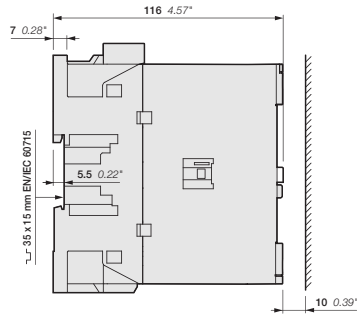


AF80 ... AF96 3-pole contactors

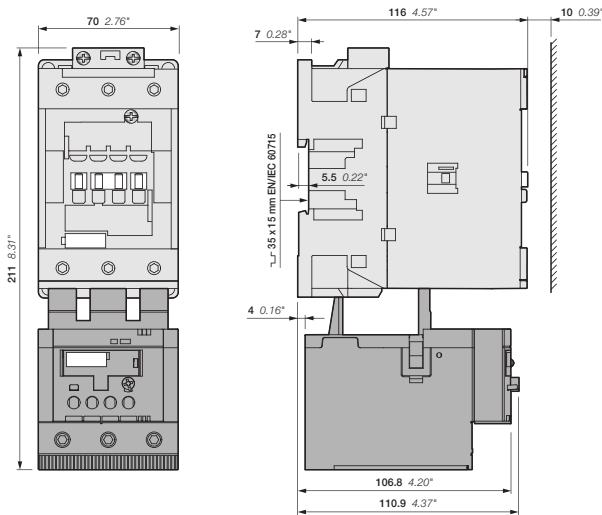
Dimensions



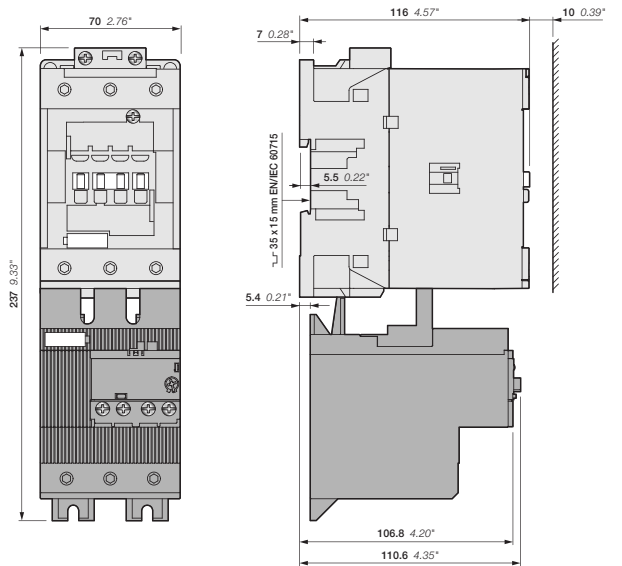
AF80, AF96
+ VM96-4 mechanical interlock unit



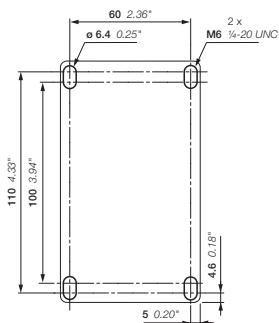
AF80, AF96
+ VM96-4 mechanical interlock set



AF80, AF96
+ TF96 thermal overload relay



AF80, AF96
+ EF96 electronic overload relay

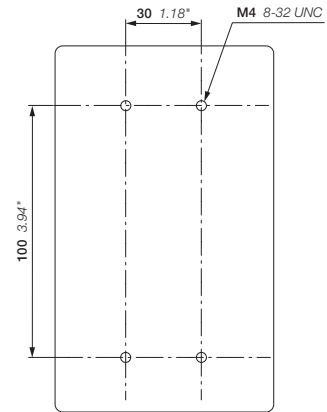
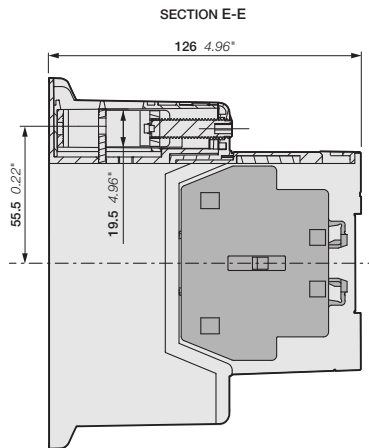
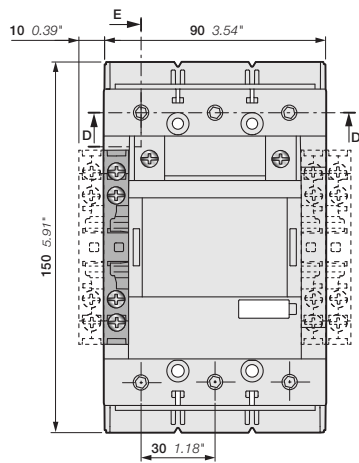
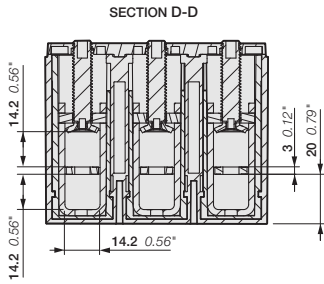


AF80, AF96
+ TF96, EF96

AF116, AF140, AF146 3-pole contactors

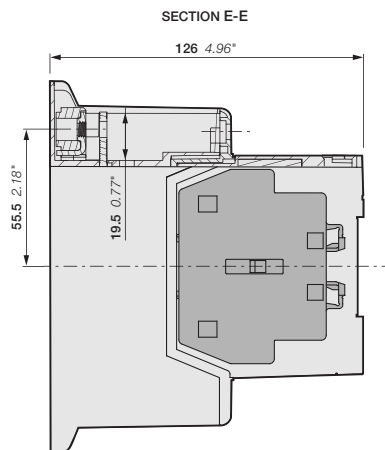
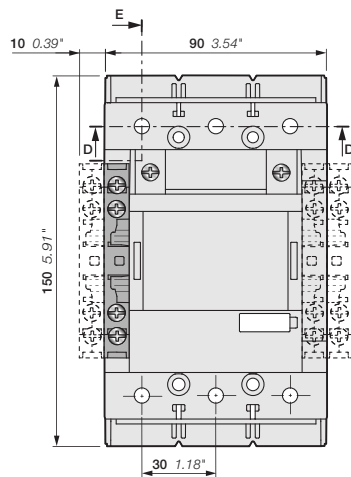
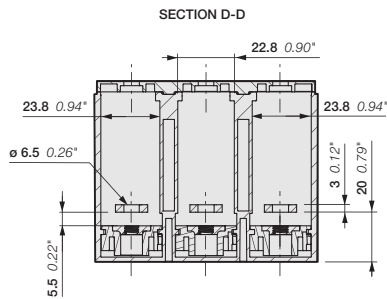
Dimensions

E0



AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

AF116, AF140, AF146-30-..(B)

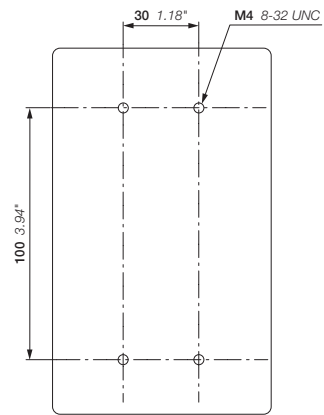
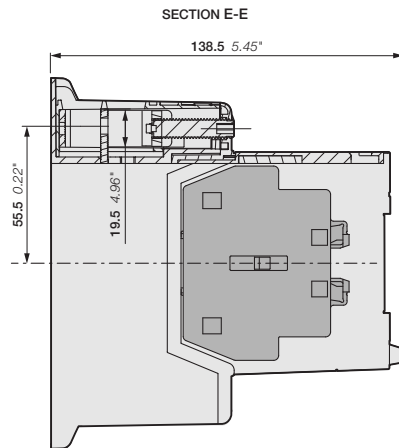
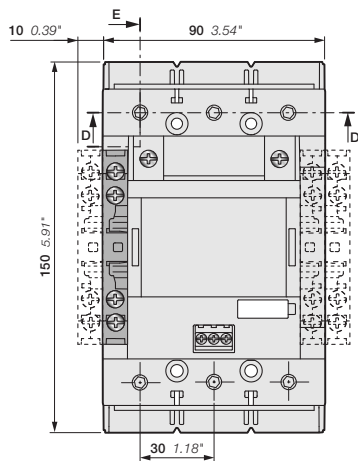
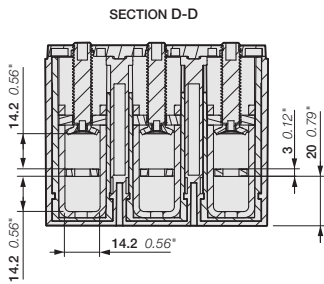


AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

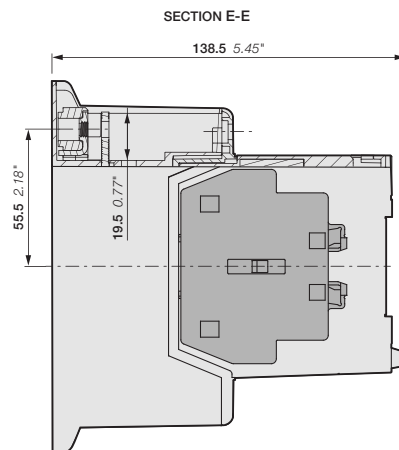
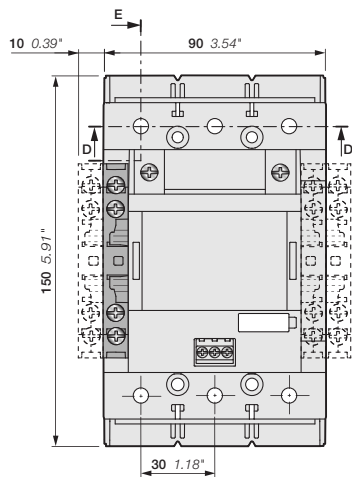
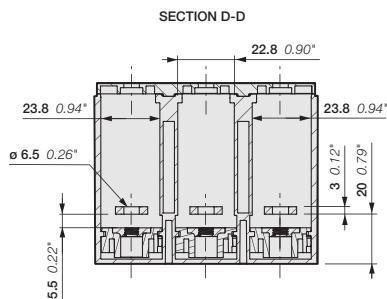
AF116, AF140, AF146 3-pole contactors With built-in PLC interface (coil code 33, 34)

Dimensions



AF116, AF140, AF146-30-00 + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11

AF116, AF140, AF146-30...(B)



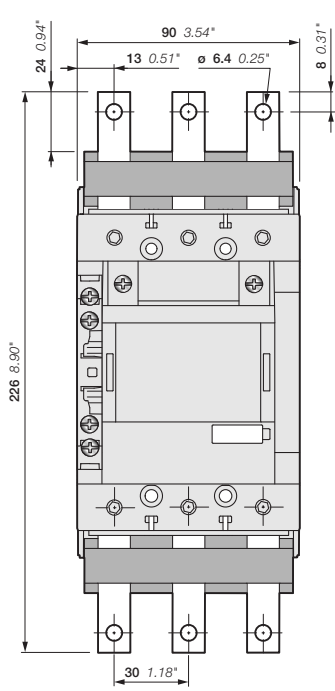
AF116, AF140, AF146-30-00B + CAL19 2-pole auxiliary contact block
AF116, AF140, AF146-30-11B

Main dimensions mm, inches

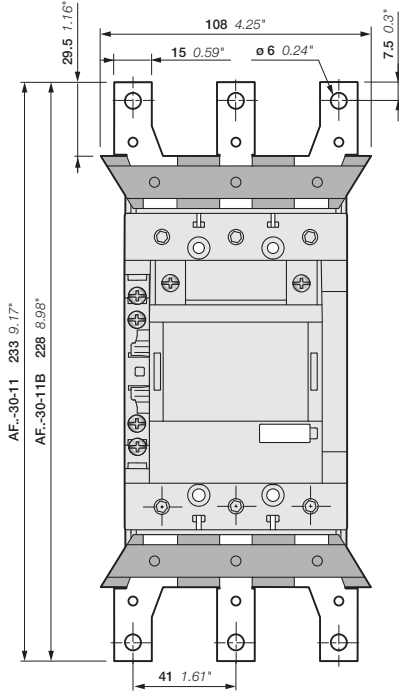
AF116, AF140, AF146 3-pole contactors

Dimensions

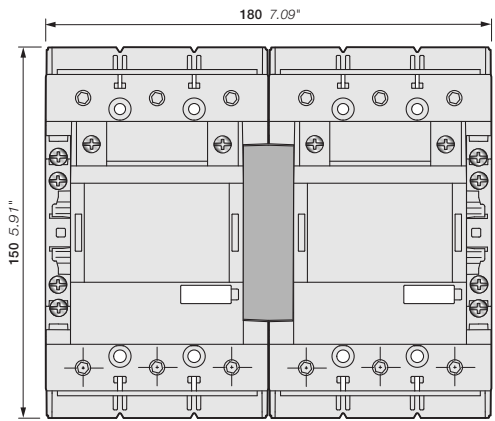
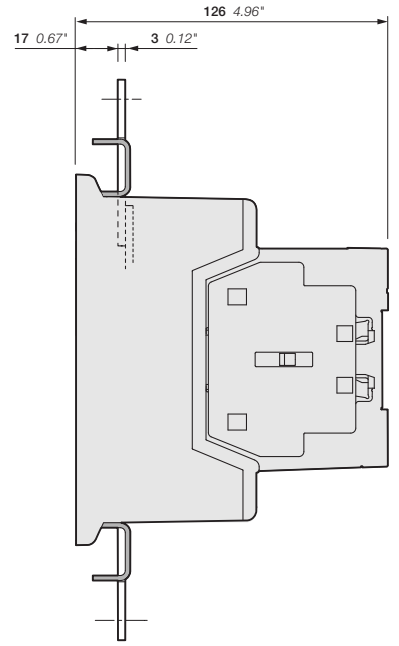
E0



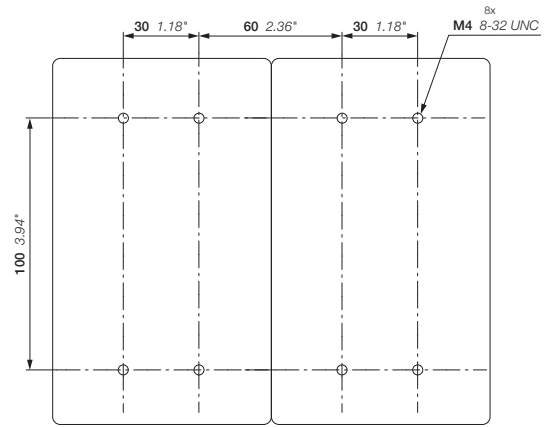
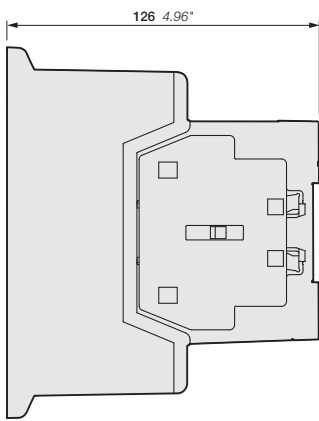
AF116, AF140, AF146-30-11
+ LX140 terminal extension



AF116, AF140, AF146-30-11(B)
+ LW140(B) terminal enlargement



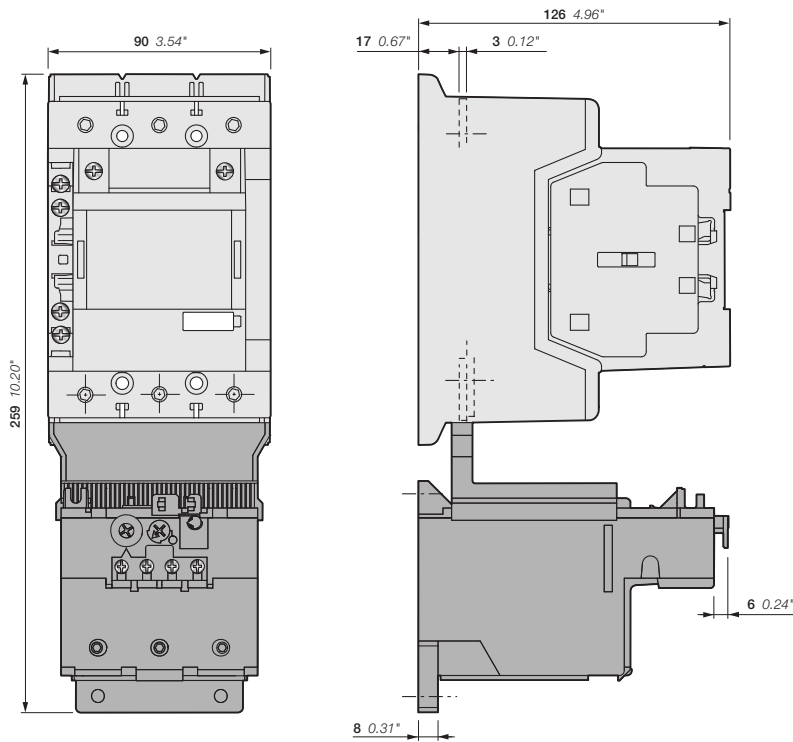
AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit



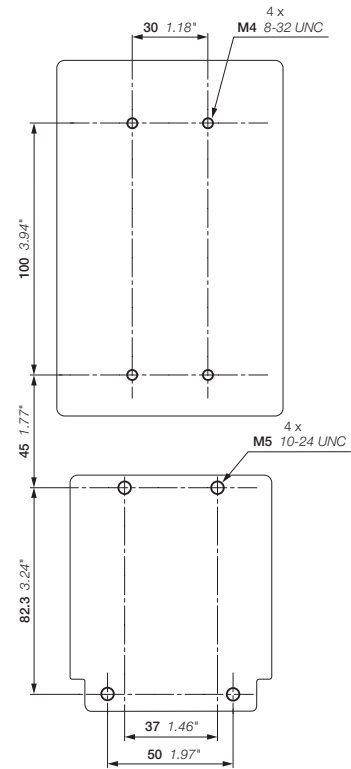
AF116, AF140, AF146-30-11(B)
+ VM19 mechanical interlocking unit

AF116, AF140, AF146 3-pole contactors

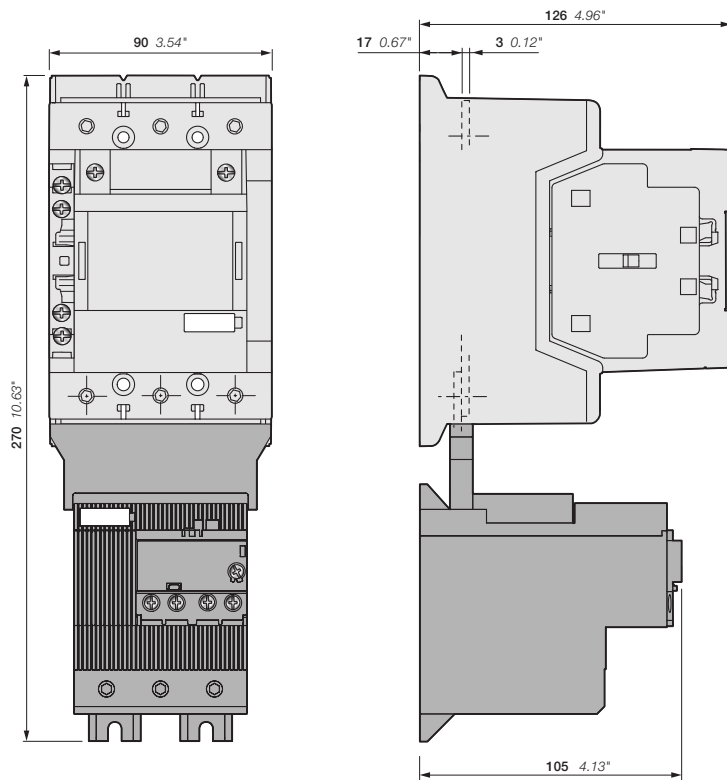
Dimensions



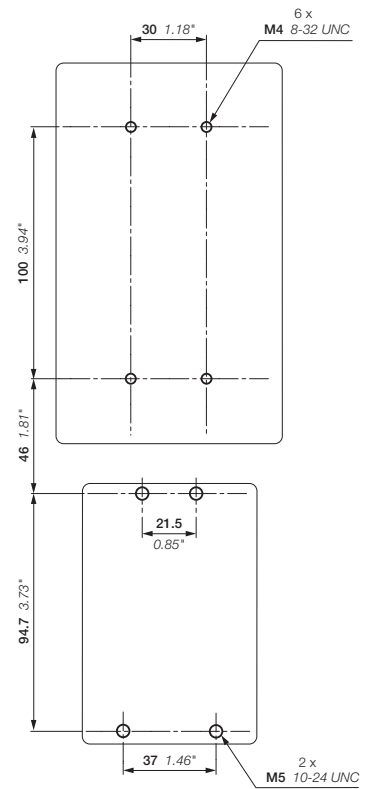
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



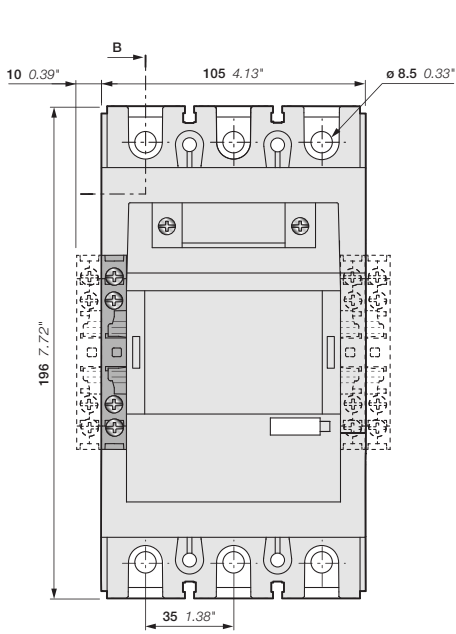
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay

Main dimensions mm, inches

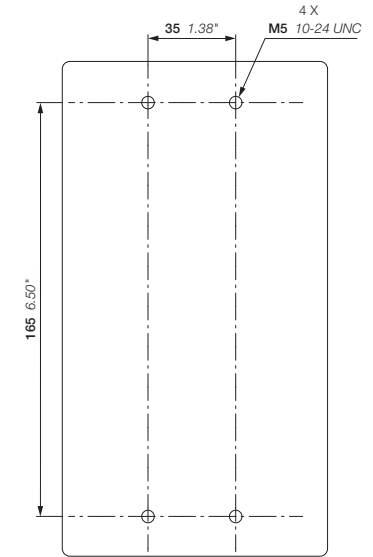
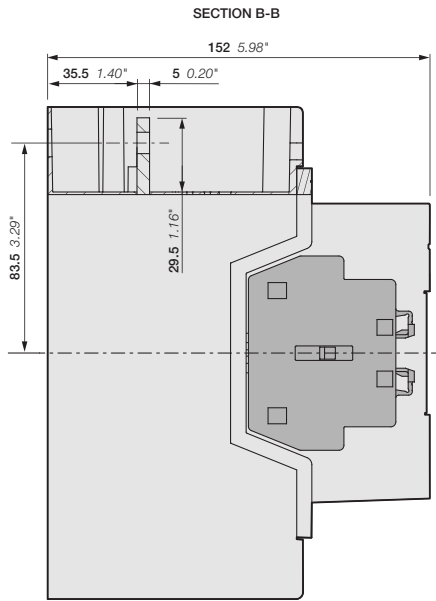
AF190, AF205 3-pole contactors

Dimensions

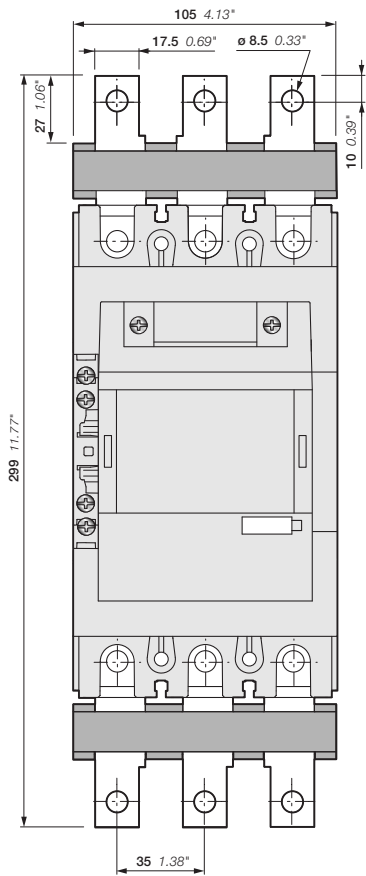
EO



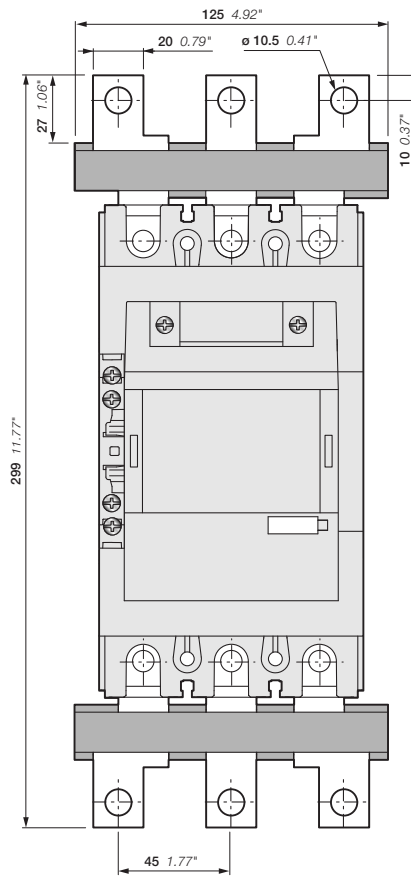
AF190, AF205-30-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-30-11



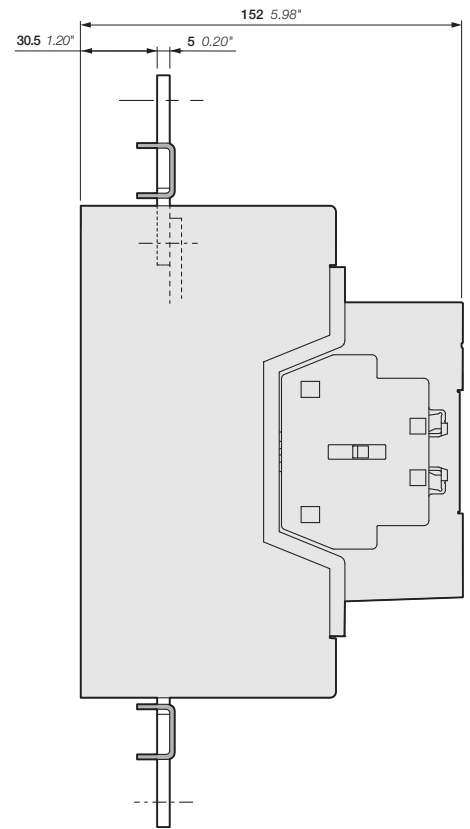
AF190, AF205



AF190, AF205-30-11
+ LX205 terminal extension

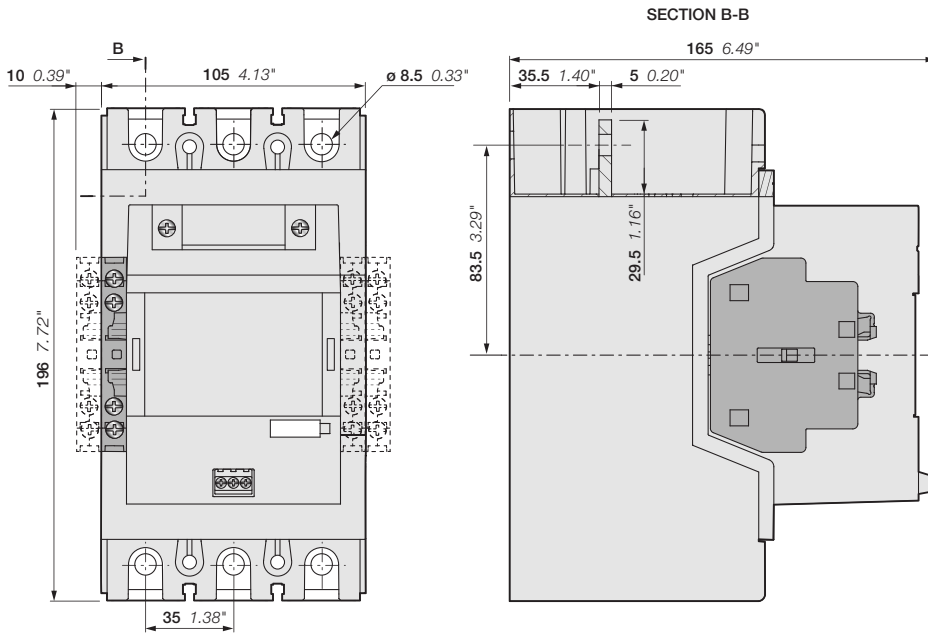


AF190, AF205-30-11
+ LW205 terminal enlargement

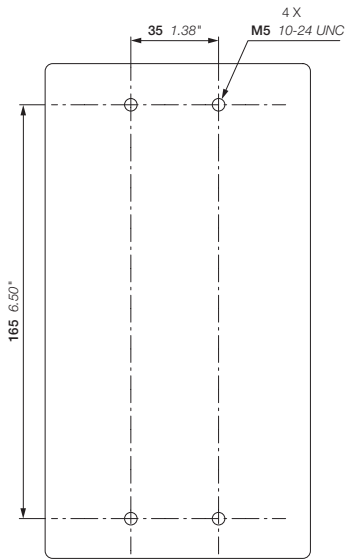


AF190, AF205 3-pole contactors With built-in PLC interface (coil code 33, 34)

Dimensions



AF190, AF205-30-00 + CAL19 2-pole auxiliary contact block
 AF190, AF205-30-11

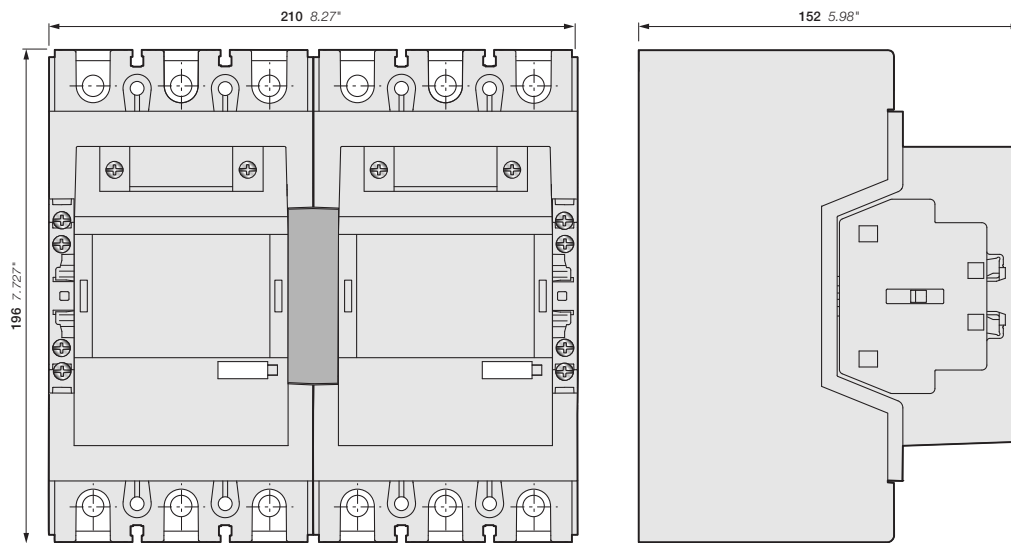


AF190, AF205

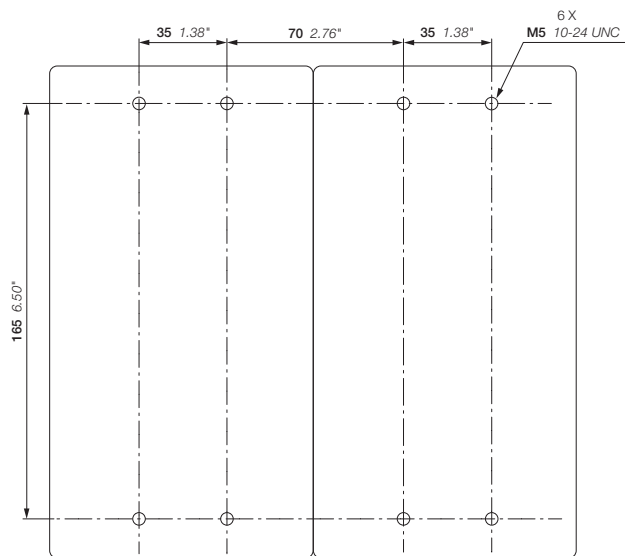
Main dimensions mm, inches

AF190, AF205 3-pole contactors

Dimensions



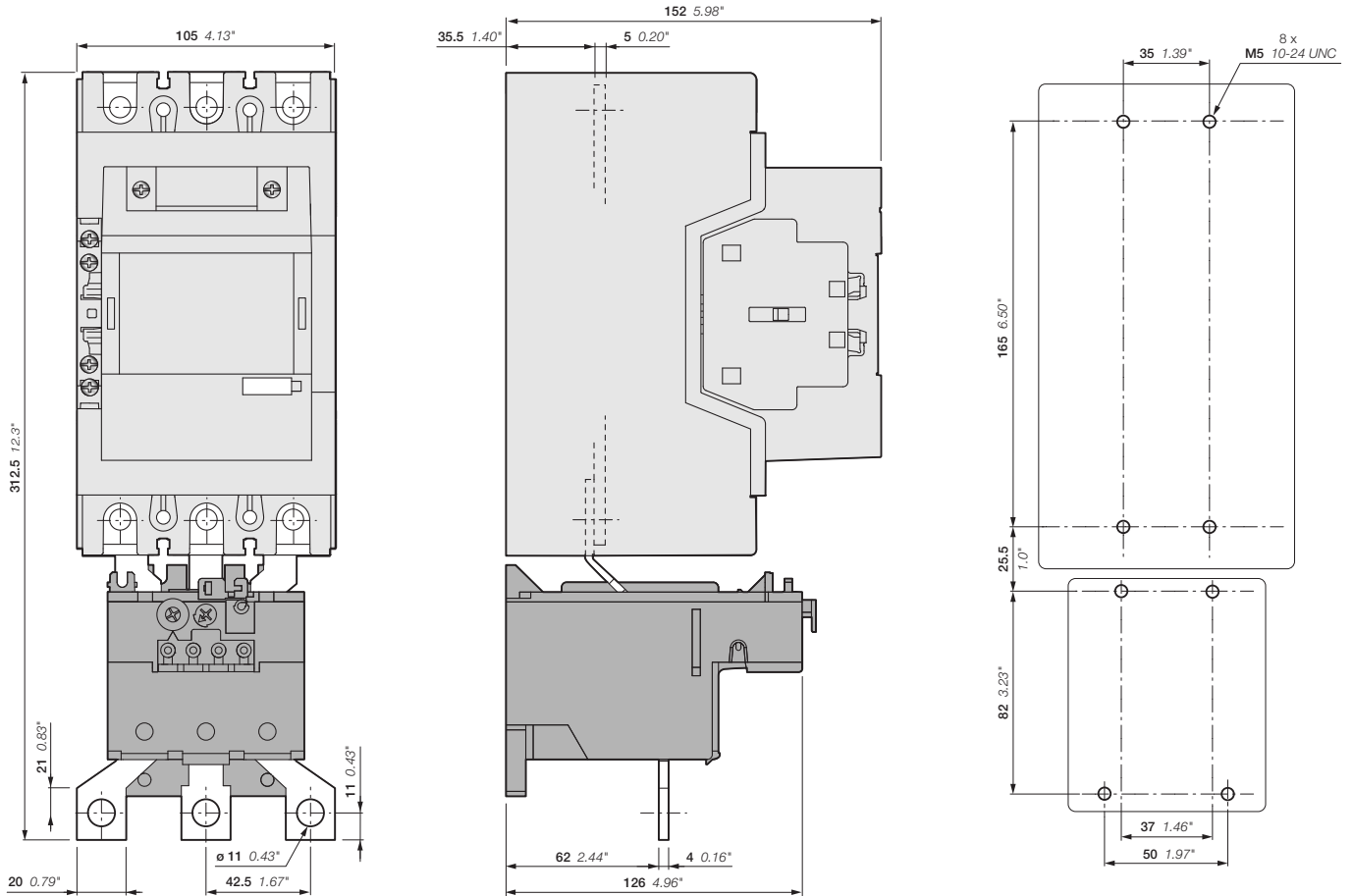
AF190, AF205-30-11
+ VM19 mechanical interlocking unit



AF190, AF205
+ VM19 mechanical interlocking unit

AF190, AF205 3-pole contactors

Dimensions

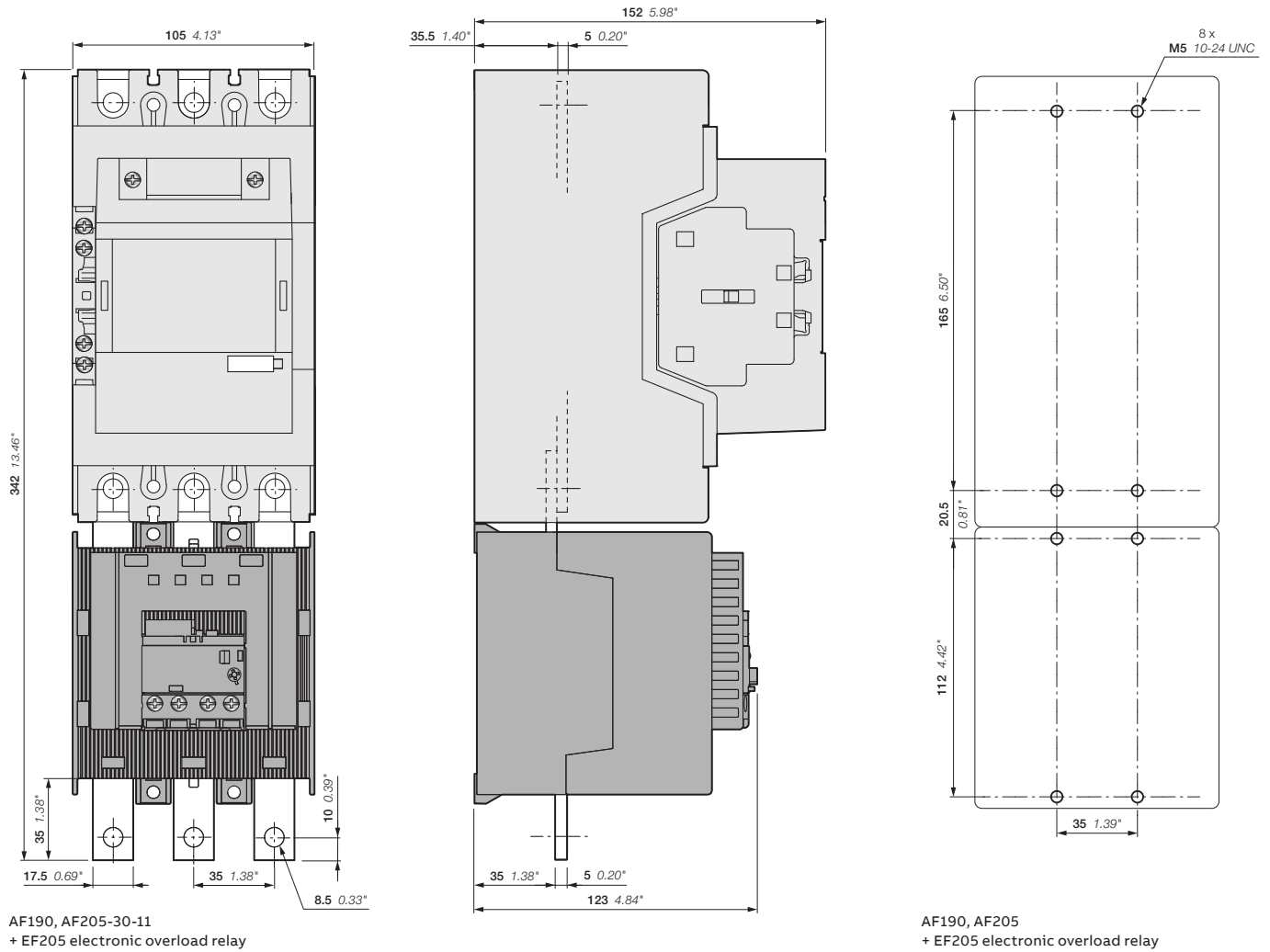


AF190, AF205-30-11
+ TA200DU thermal overload relay

AF190, AF205
+ TA200DU thermal overload relay

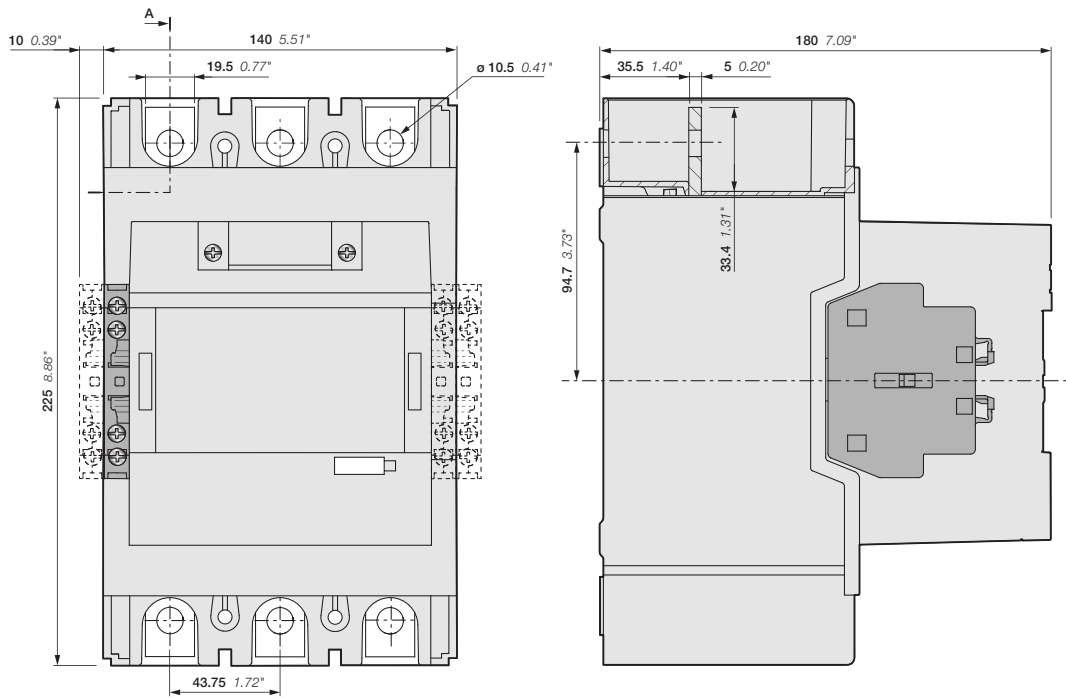
AF190, AF205 3-pole contactors

Dimensions

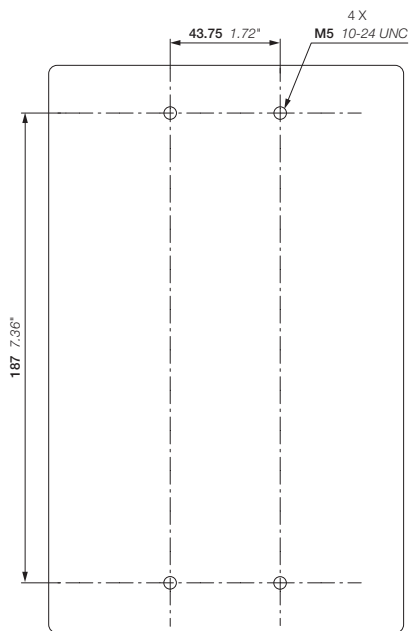


AF265, AF305, AF370 3-pole contactors

Dimensions



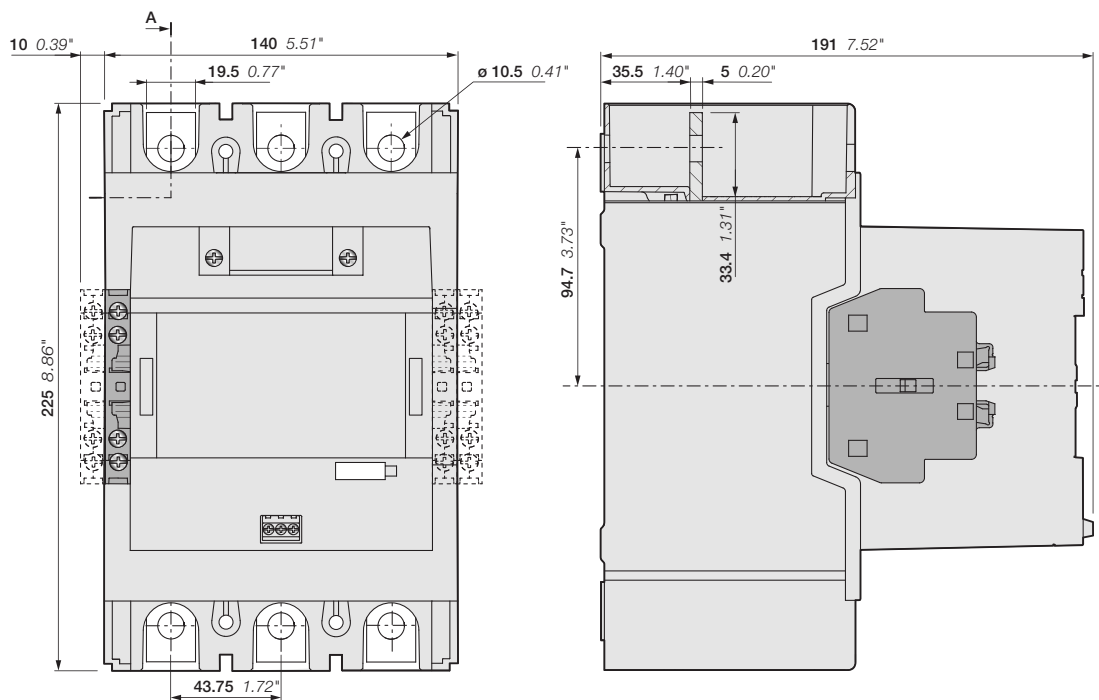
AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
 AF265, AF305, AF370-30-11



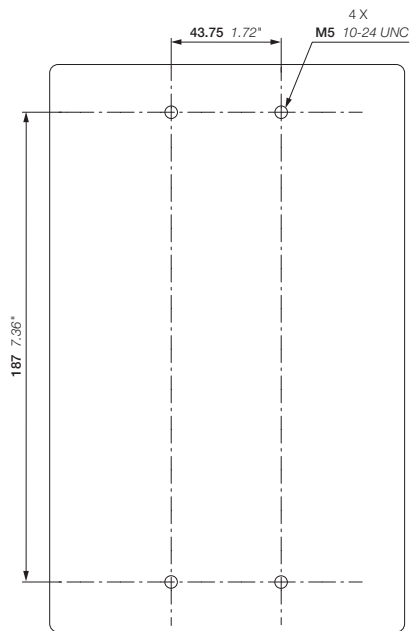
AF265, AF305, AF370

AF265, AF305, AF370 3-pole contactors with built-in PLC interface (coil code 33, 34)

Dimensions



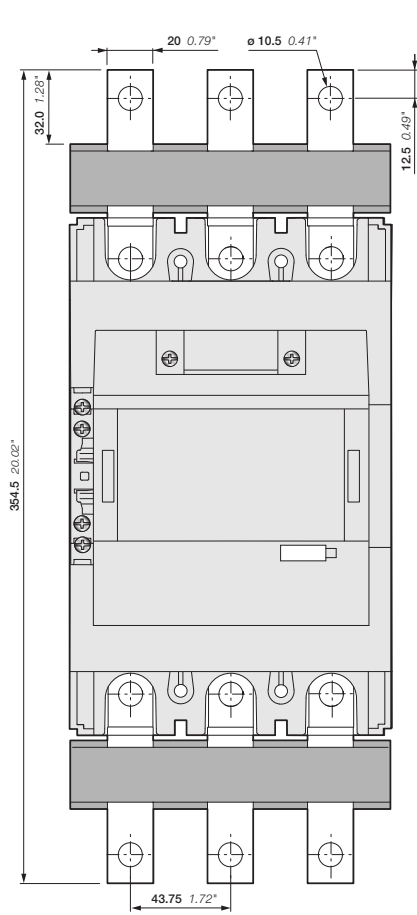
AF265, AF305, AF370-30-00 + CAL19 2-pole contact block
 AF265, AF305, AF370-30-11



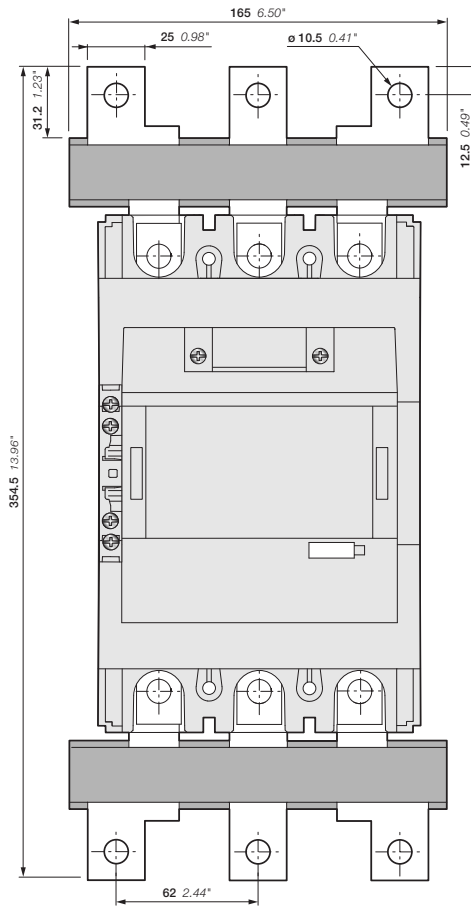
AF265, AF305, AF370

AF265, AF305, AF370 3-pole contactors

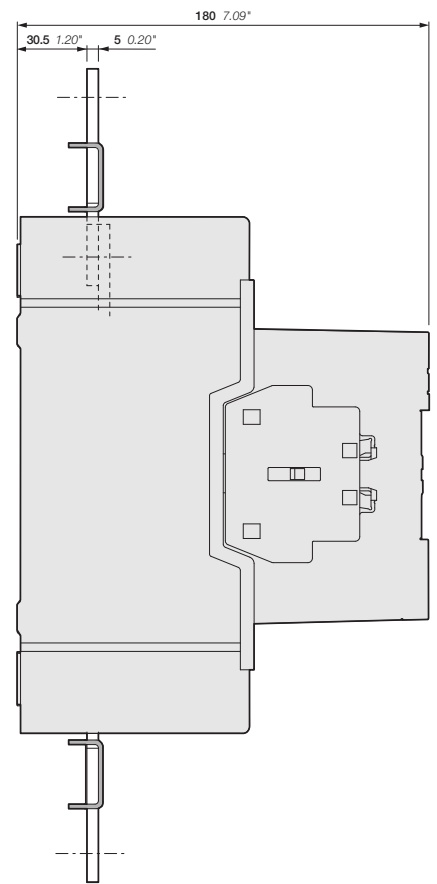
Dimensions



AF265, AF305, AF370-30-11
+ LX370 terminal extension



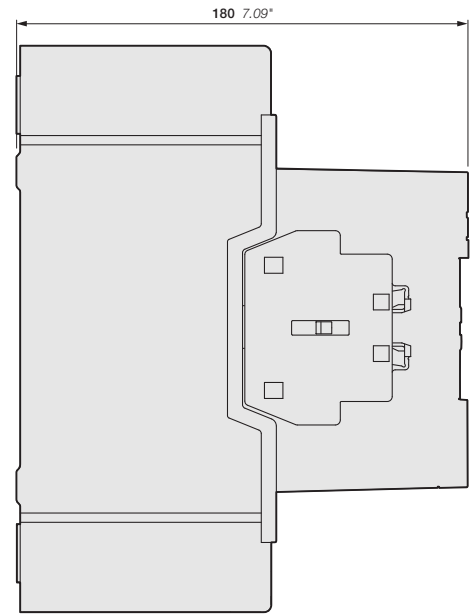
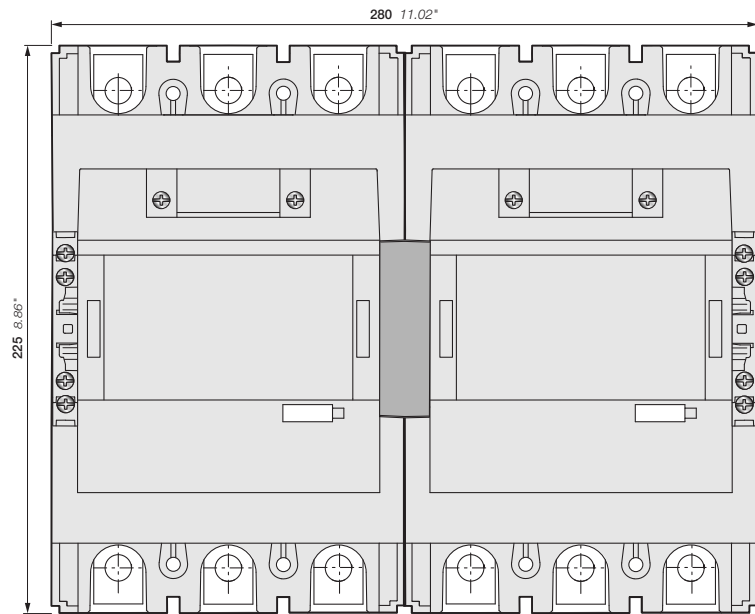
AF265, AF305, AF370-30-11
+ LW370 terminal enlargement



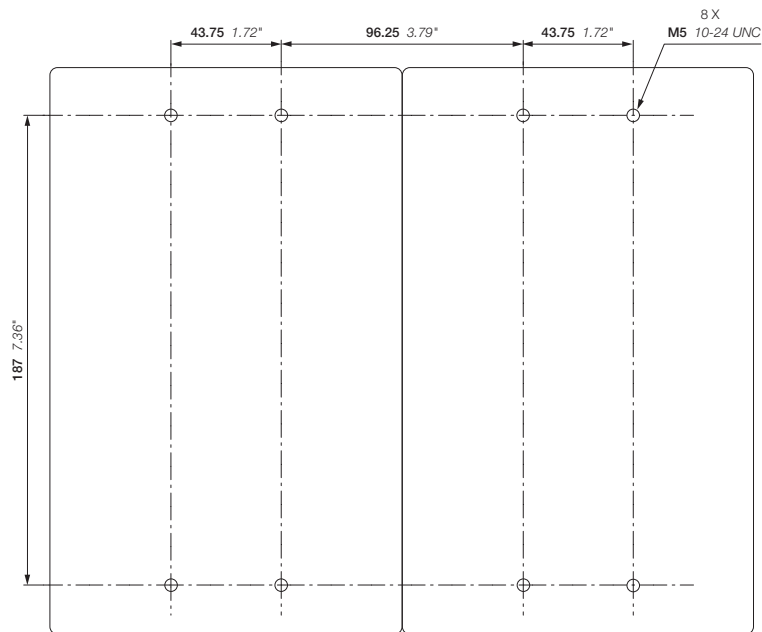
AF265, AF305, AF370 3-pole contactors

Dimensions

EO



AF265, AF305, AF370-30-11
+ VM19 mechanical interlocking unit

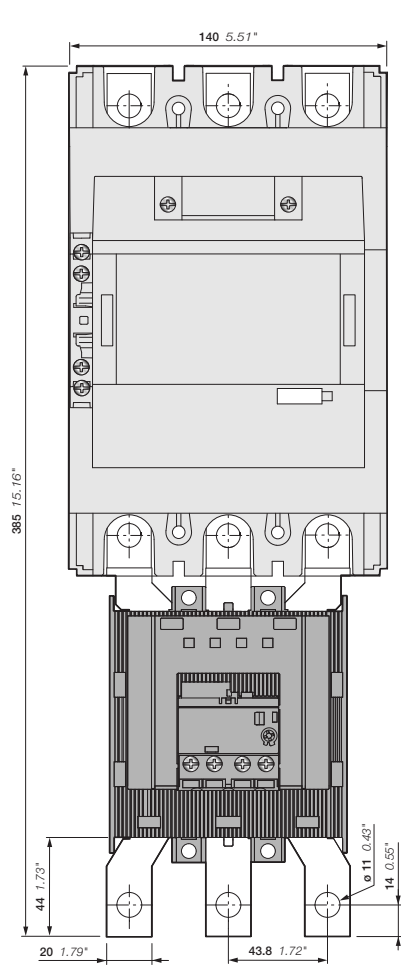


AF265, AF305, AF370
+ VM19 mechanical interlocking unit

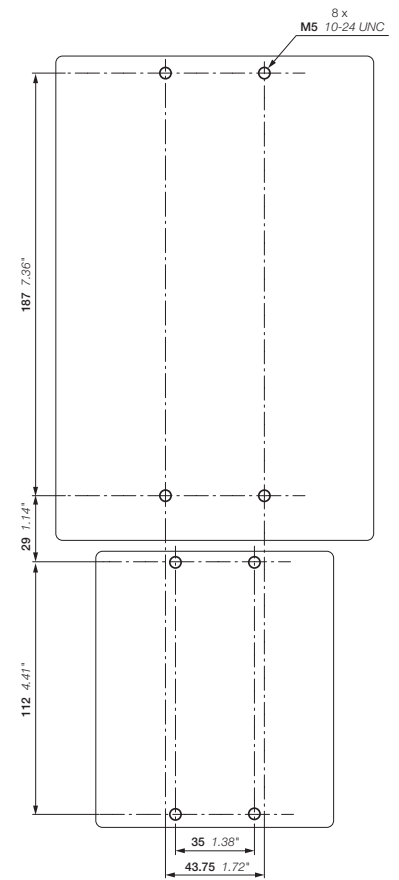
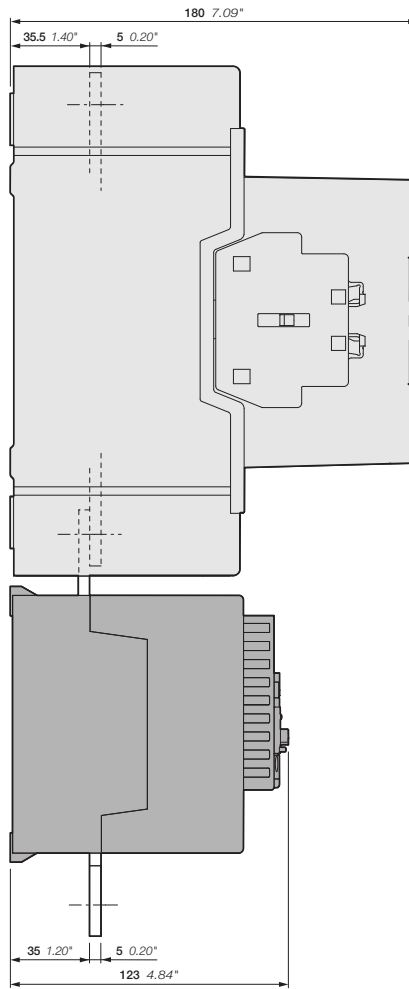
Main dimensions mm, inches

AF265, AF305, AF370 3-pole contactors

Dimensions



AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

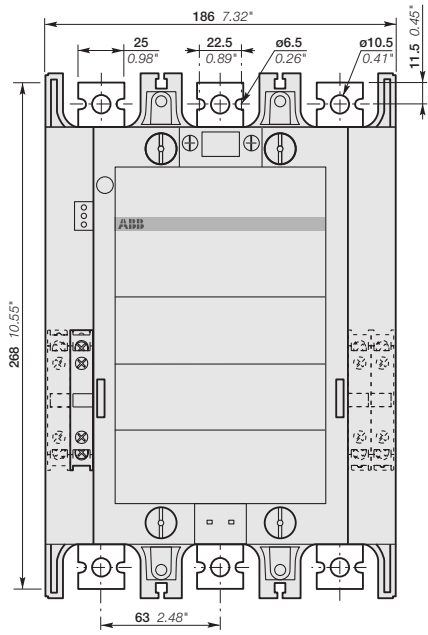


AF265, AF305, AF370
+ EF370 electronic overload relay

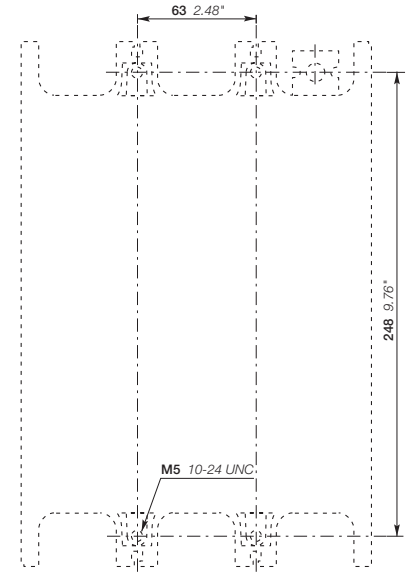
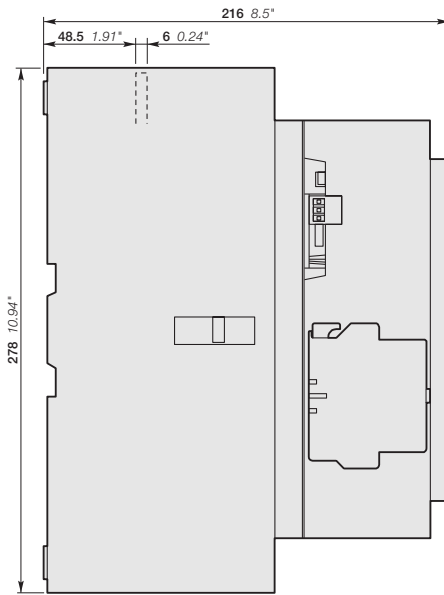
AF400 and AF460 3-pole contactors

Dimensions

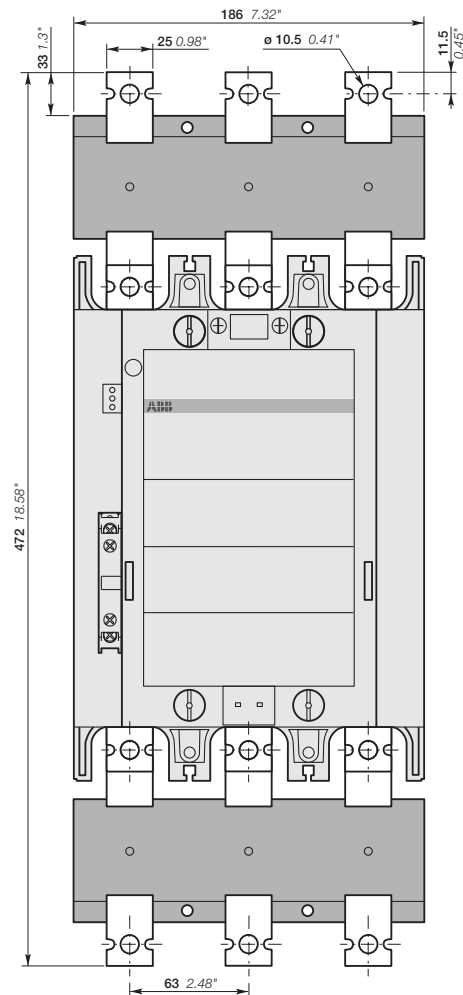
E0



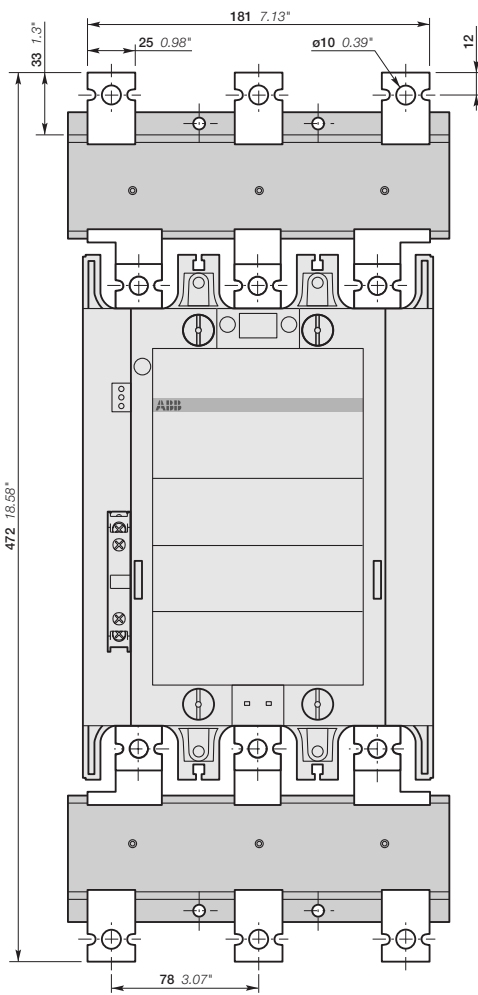
AF400, AF460-30-11



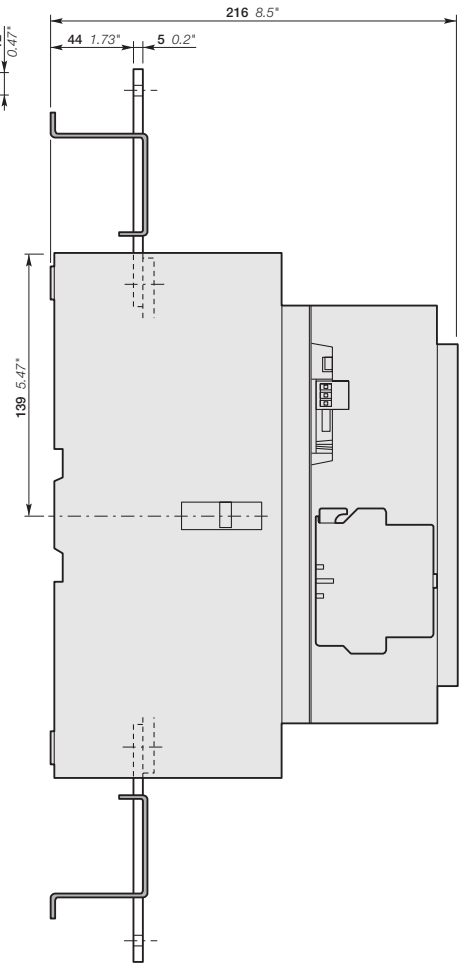
AF400, AF460



AF400, AF460-30-11
+ LX460 terminal extension



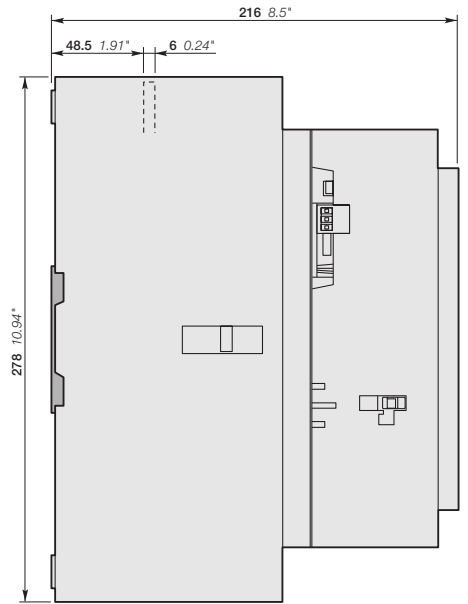
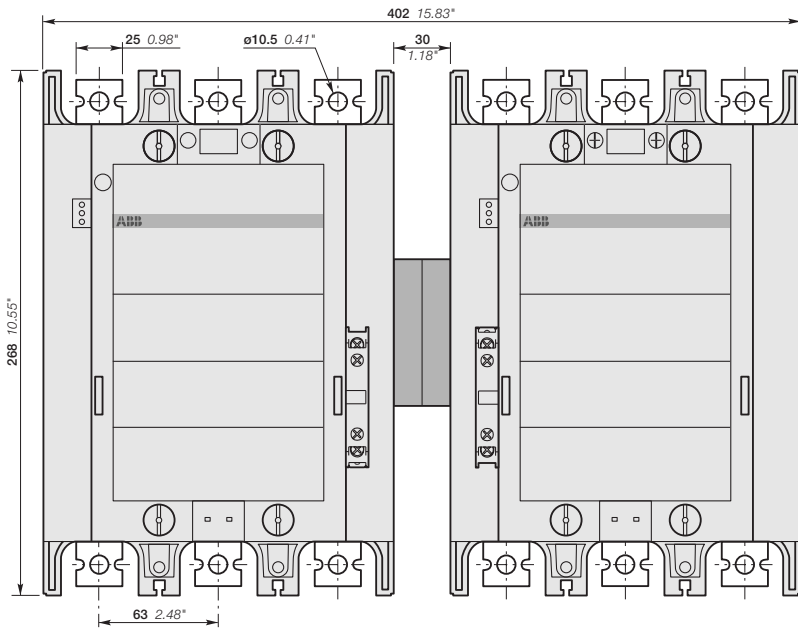
AF400, AF460-30-11
+ LW460 terminal enlargement



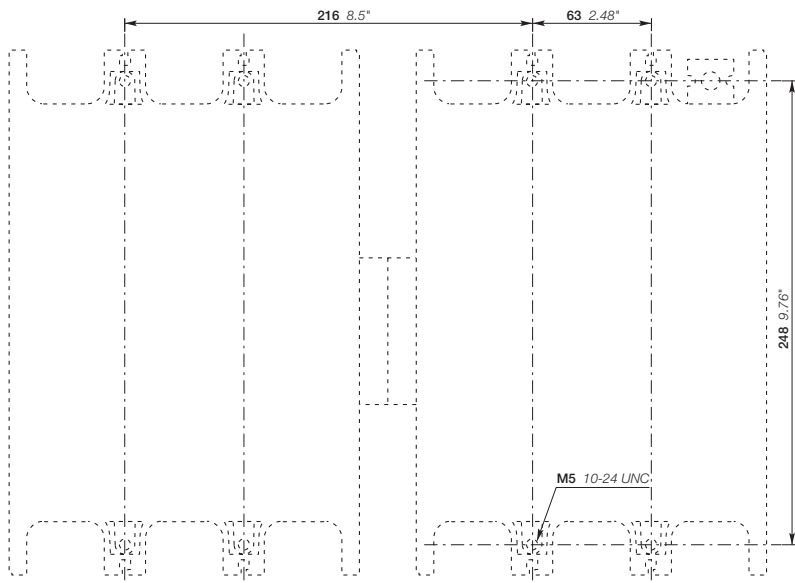
Main dimensions mm, inches

AF400 and AF460 3-pole contactors

Dimensions



AF400, AF460-30-11
+ VM750H mechanical interlock unit

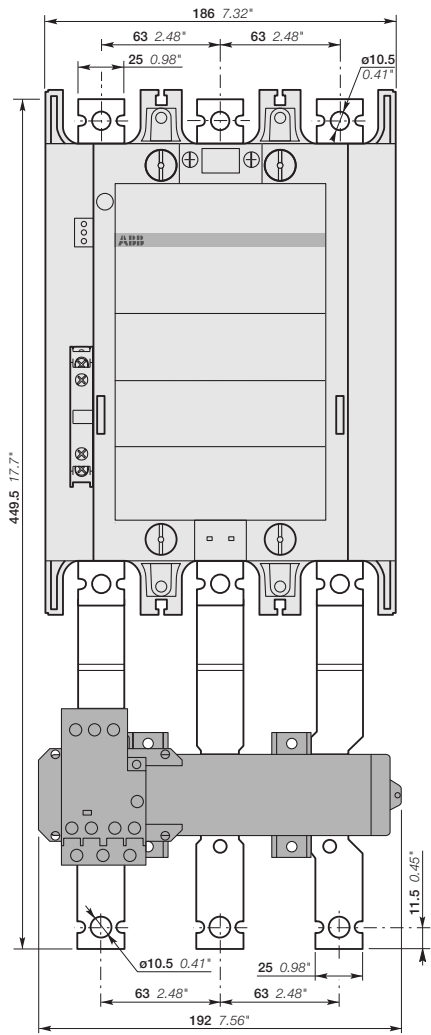


AF400, AF460
+ VM750H mechanical interlock unit

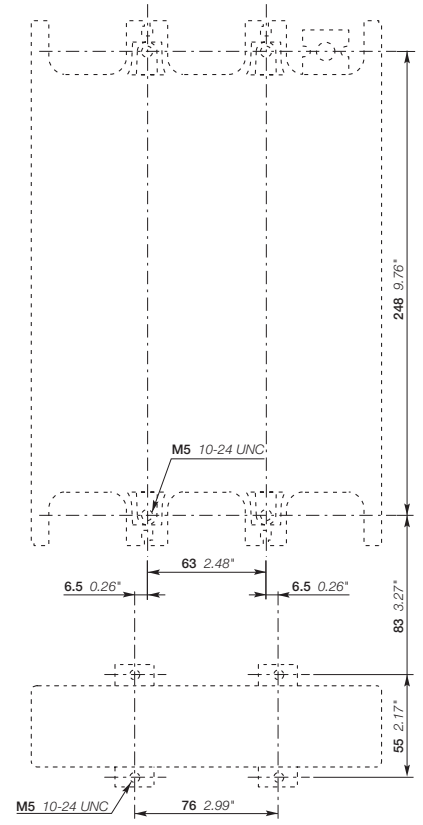
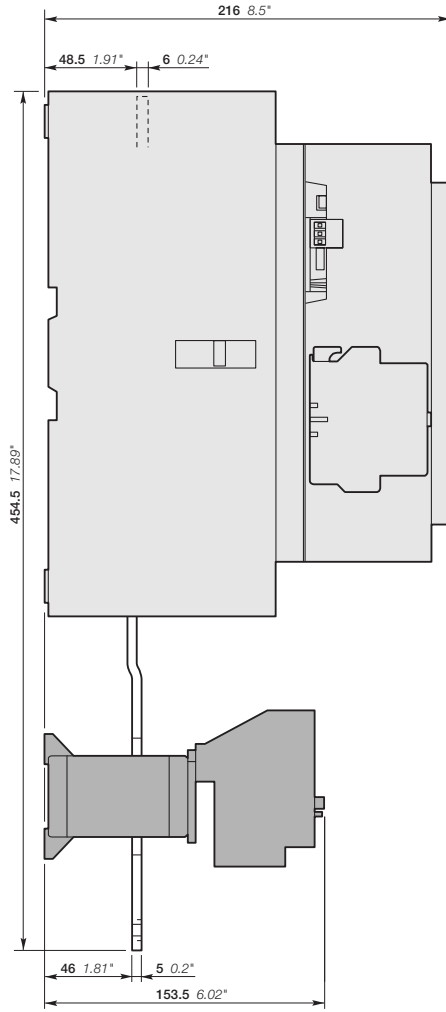
AF400 and AF460 3-pole contactors

Dimensions

EO



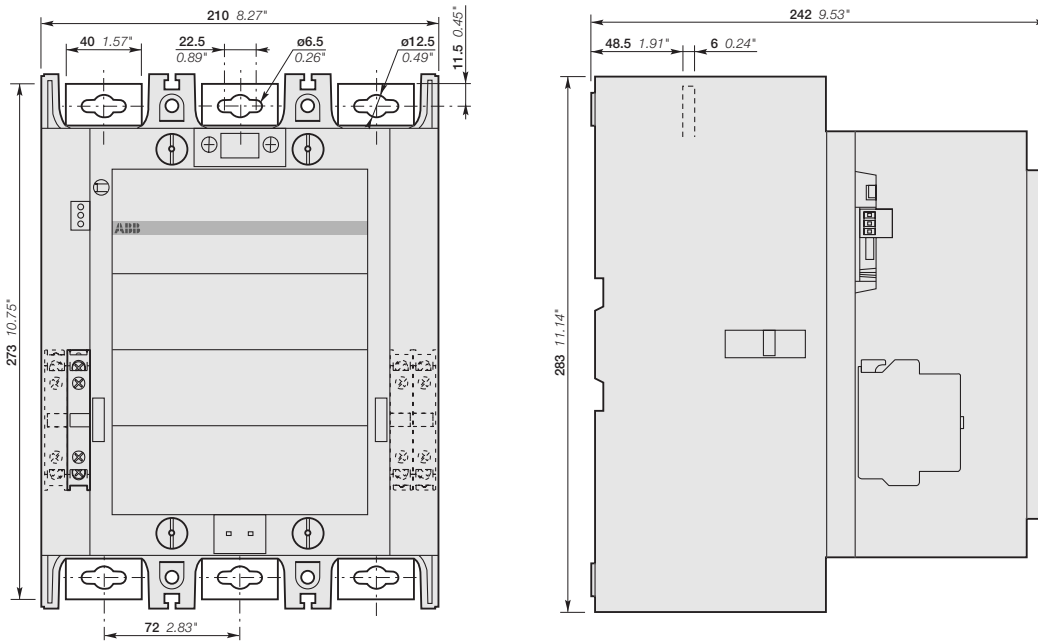
AF400, AF460-30-11
+ EF460 electronic O/L relay



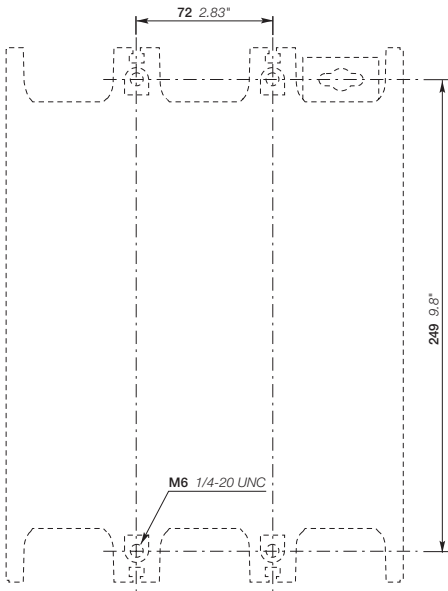
AF400, AF460
+ EF460 electronic O/L relay

AF580 and AF750 3-pole contactors

Dimensions



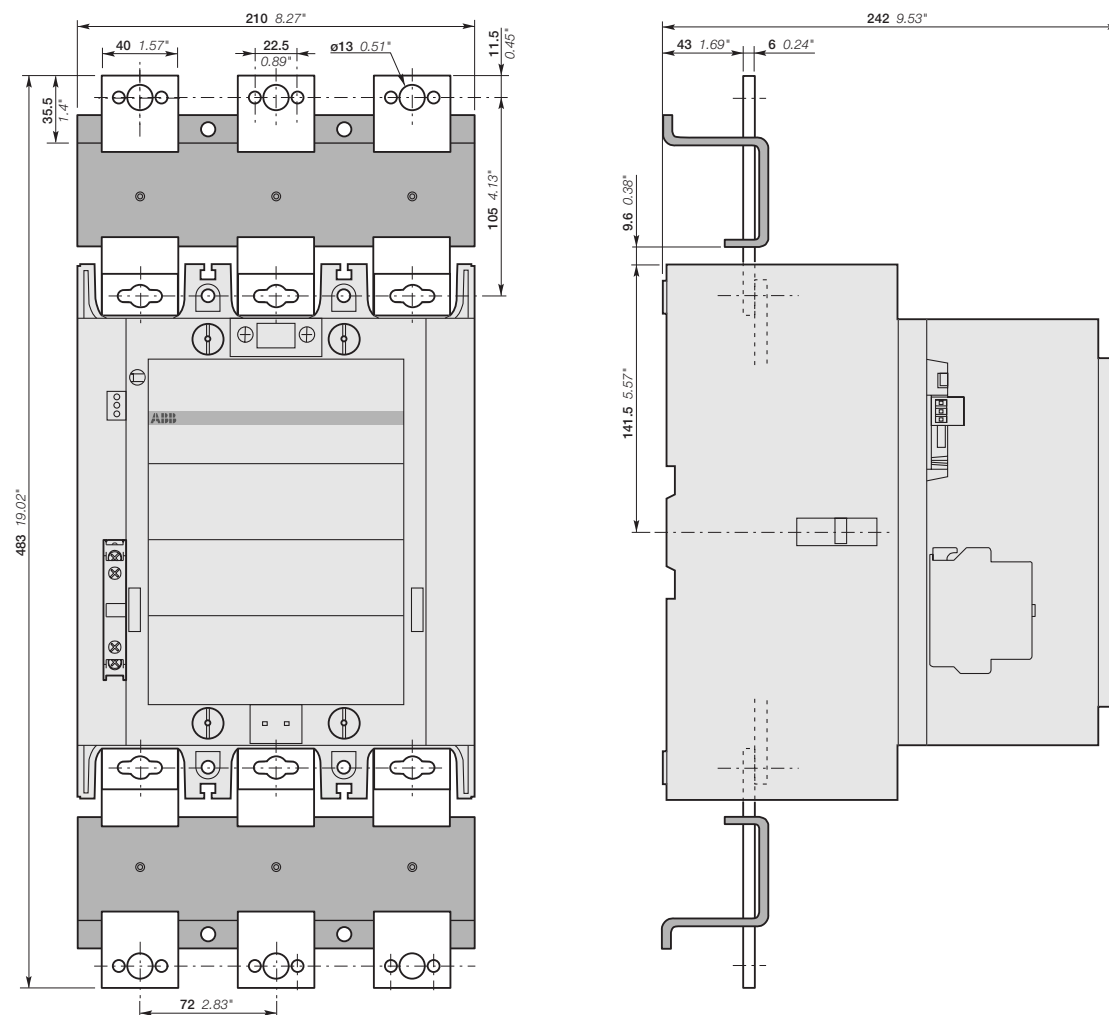
AF580 and AF750-30-11



AF580 and AF750

AF580 and AF750 3-pole contactors

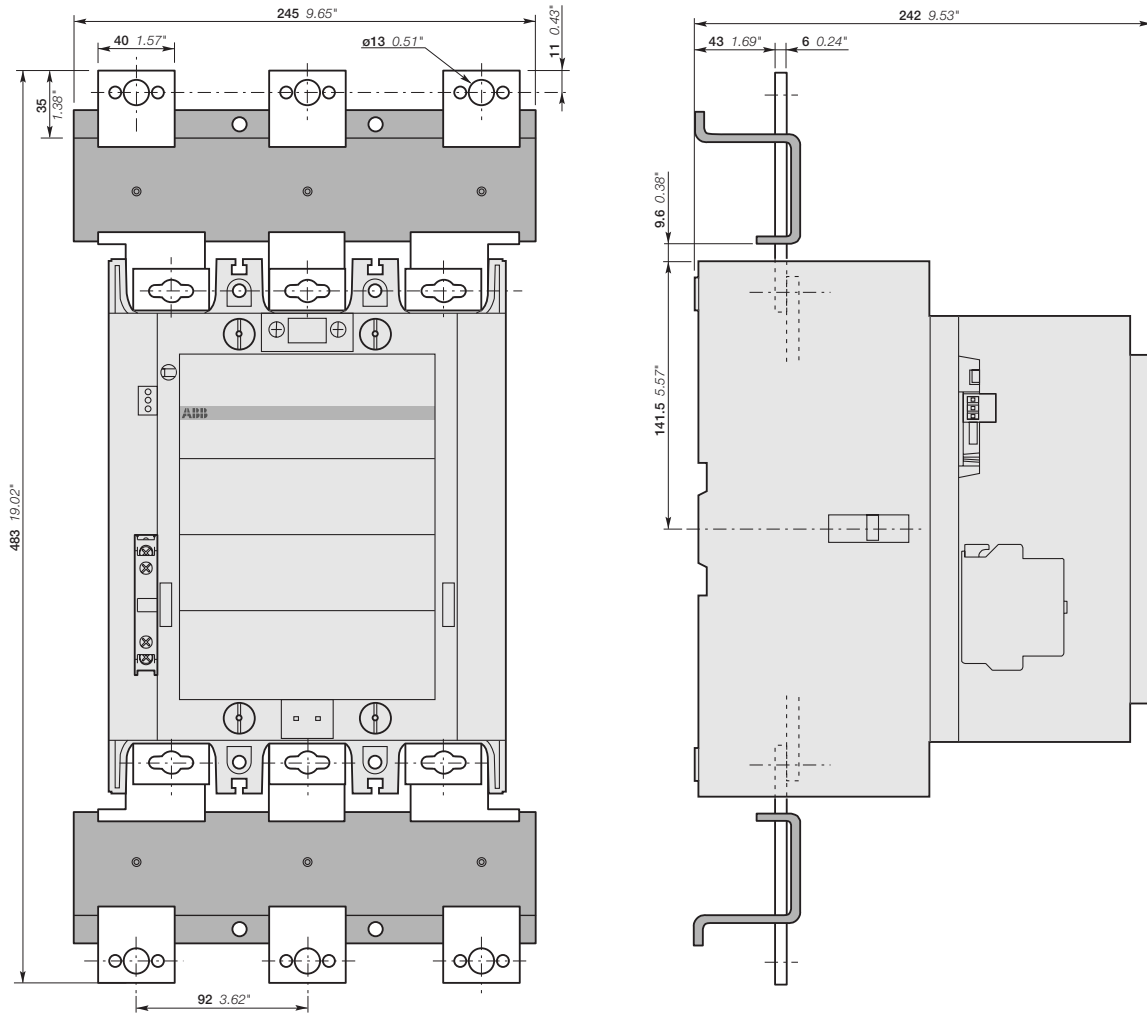
Dimensions



AF580 and AF750-30-11
+ LX750 terminal extension

AF580 and AF750 3-pole contactors

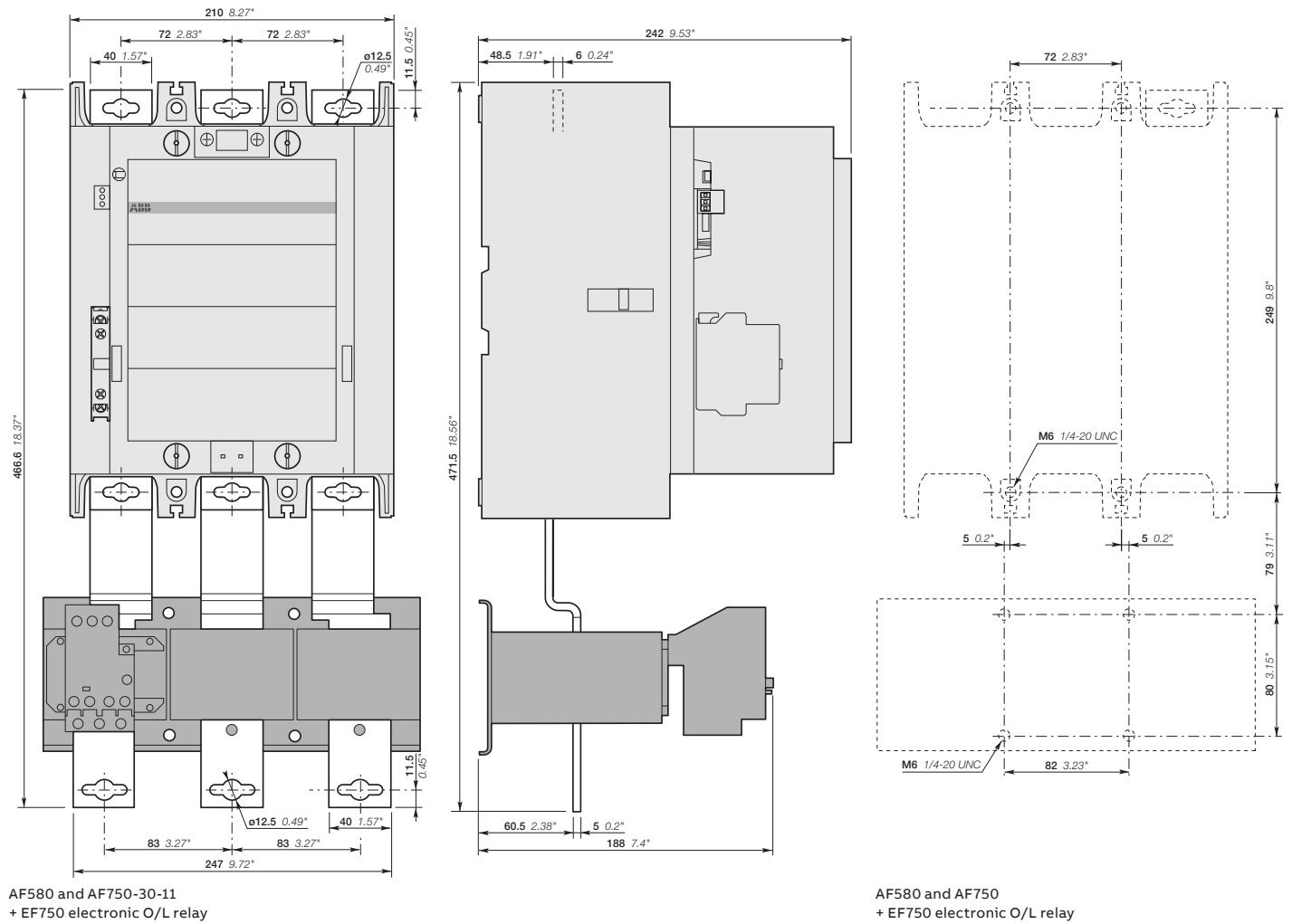
Dimensions



AF580 and AF750-30-11
+ LW750 terminal enlargement

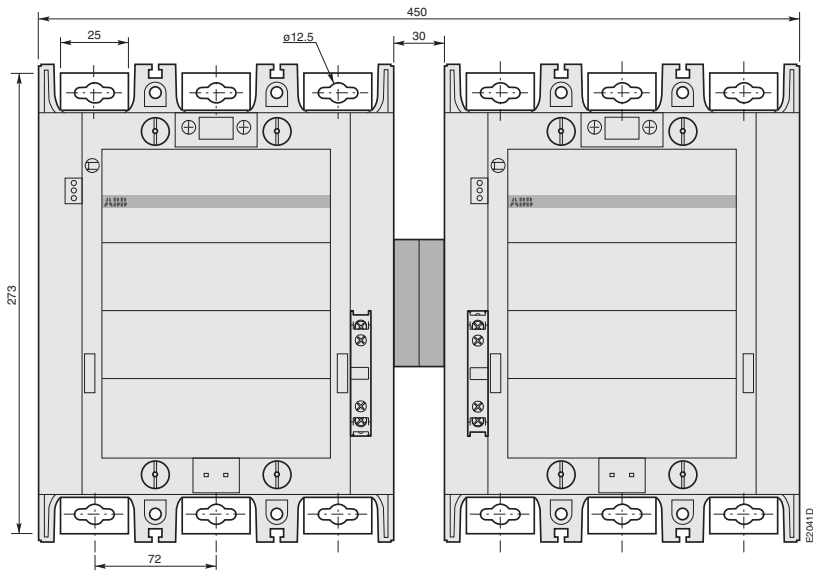
AF580 and AF750 3-pole contactors

Dimensions

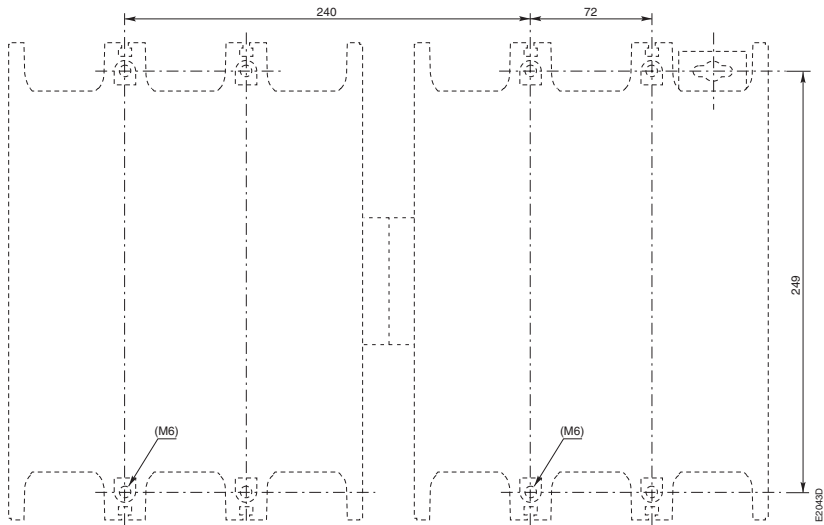
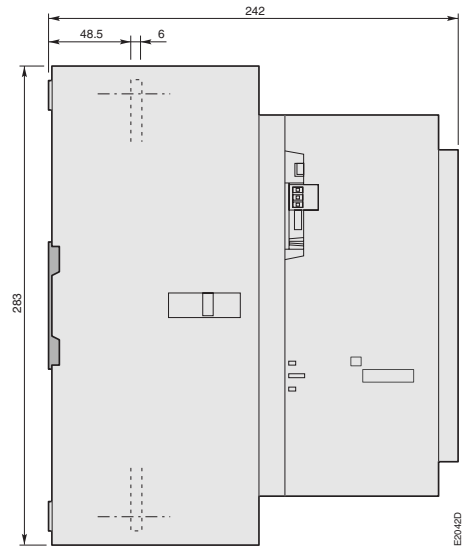


AF580 and AF750 3-pole contactors

Dimensions



AF580 and AF750-30-11
+ VM 750H mechanical interlock unit

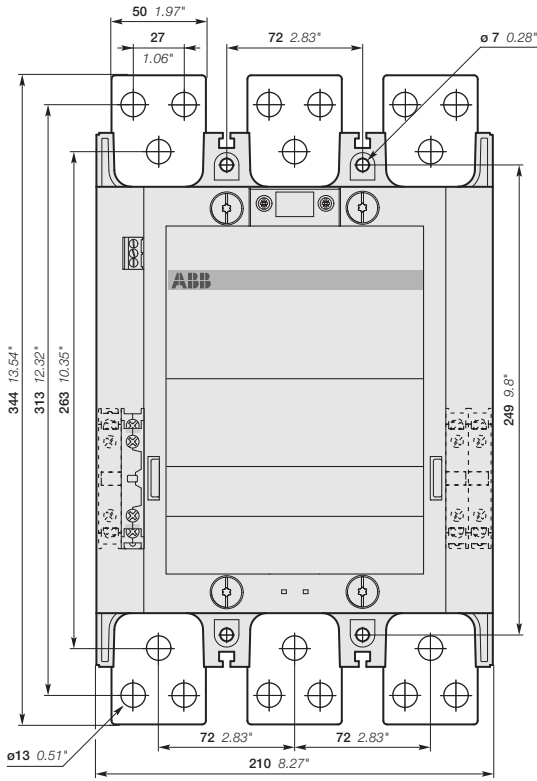


AF580 and AF750
+ VM 750H mechanical interlock unit

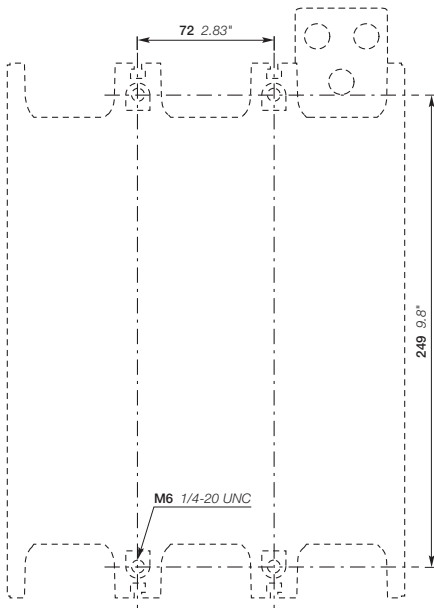
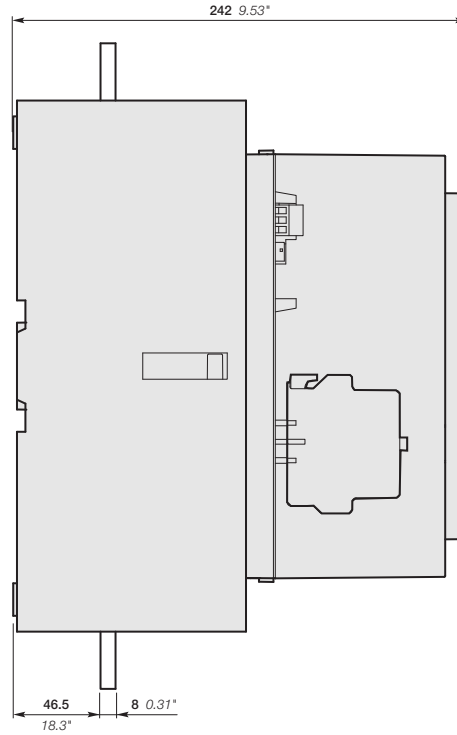
AF1250 3-pole contactors

Dimensions

EO



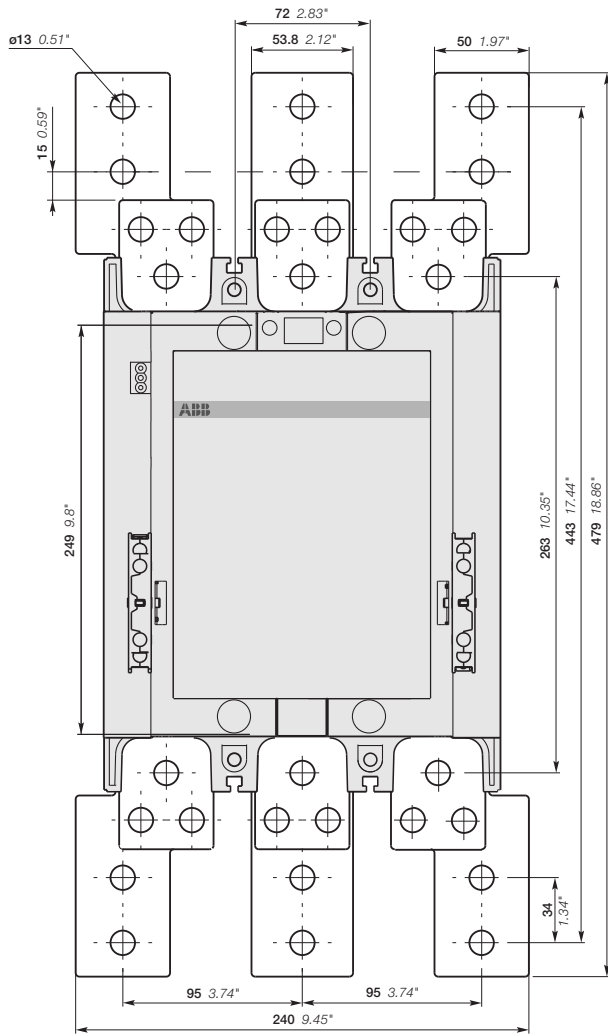
AF1250-30-11



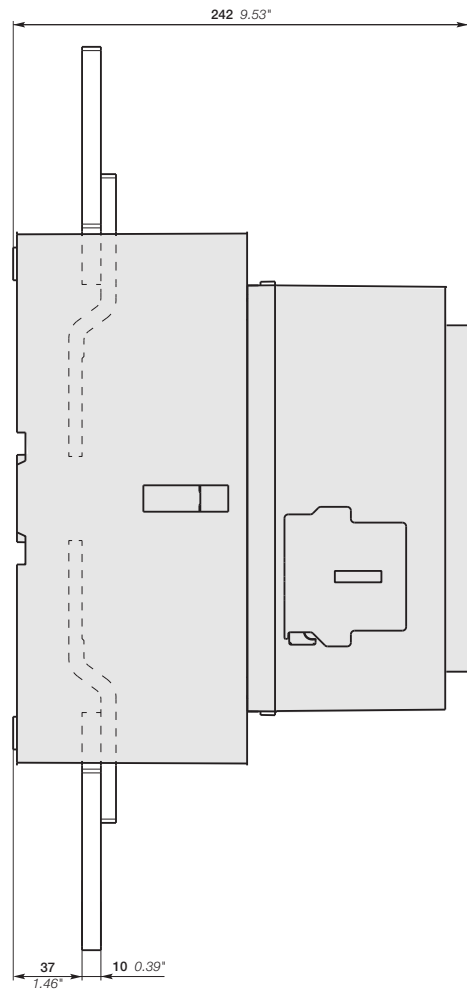
AF1250

AF1250 3-pole contactors

Dimensions



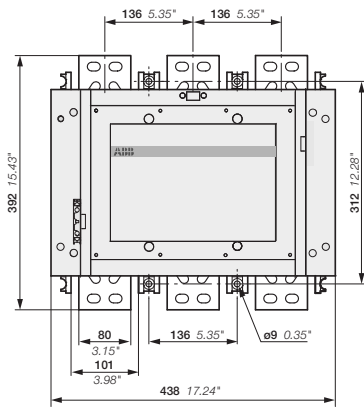
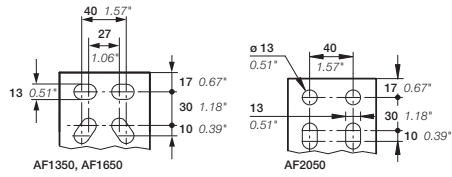
AF1250-30-11
+ LW1250 terminal enlargement



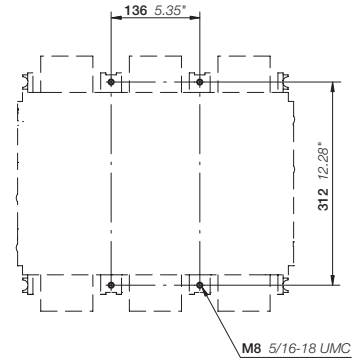
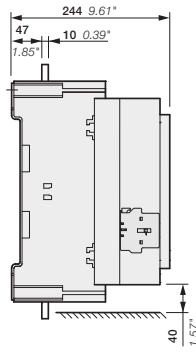
AF1350, AF1650, AF2050 and AF2850 3-pole contactors

Dimensions

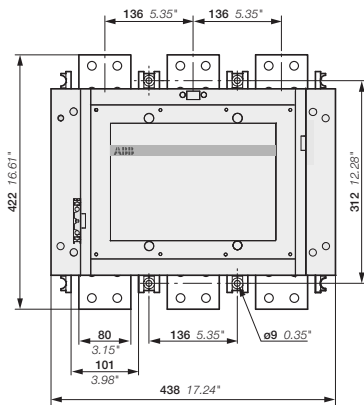
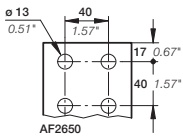
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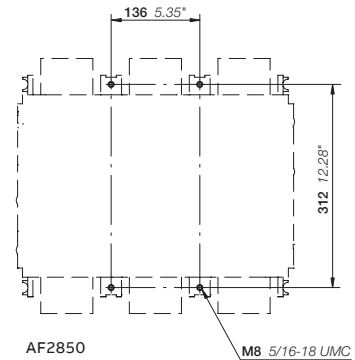
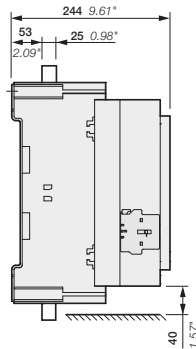
AF1350, AF1650, AF2050-30-11



AF1350, AF1650, AF2050



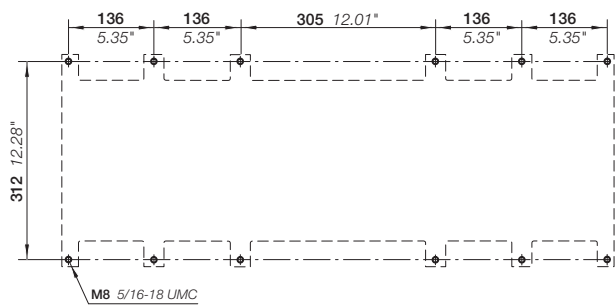
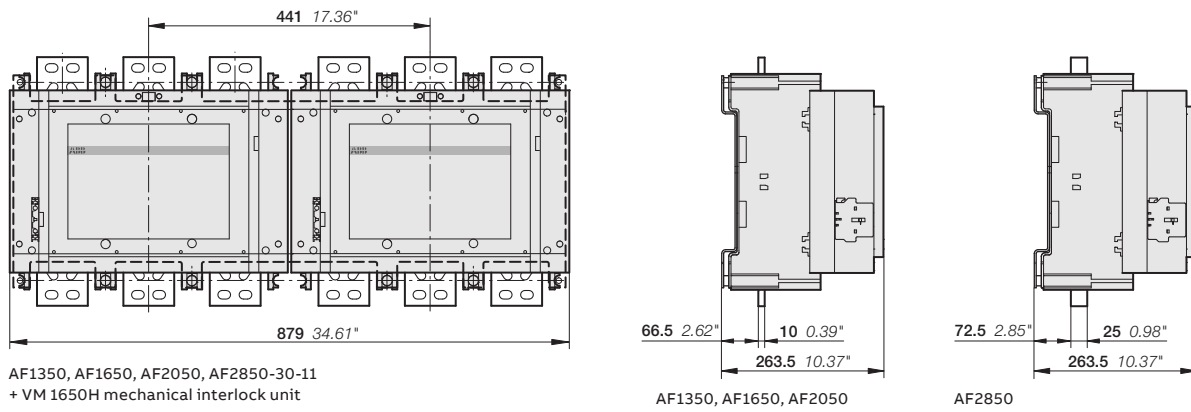
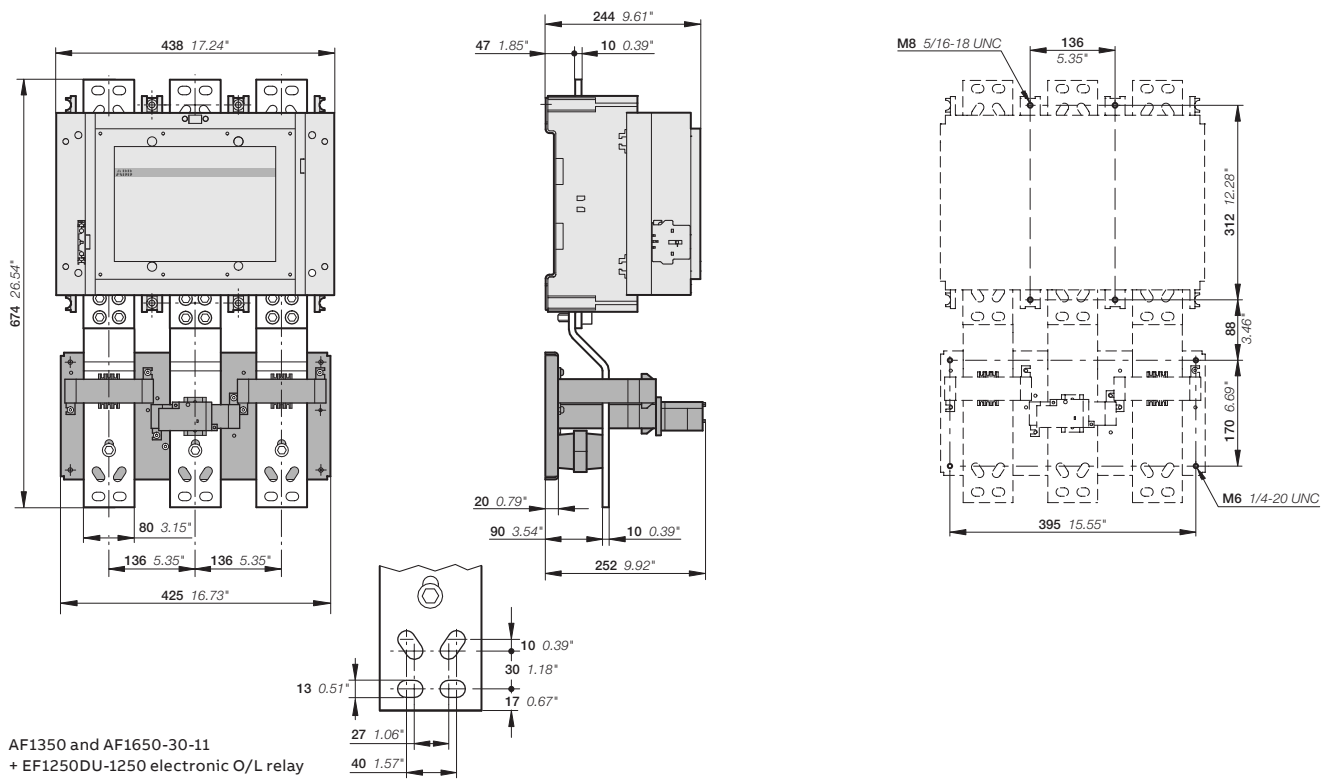
AF2850-30-11



AF2850

AF1350, AF1650, AF2050 and AF2850 3-pole contactors

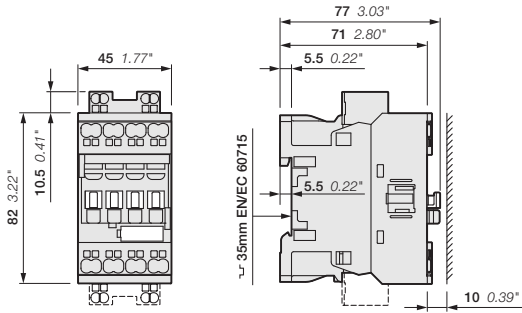
Dimensions



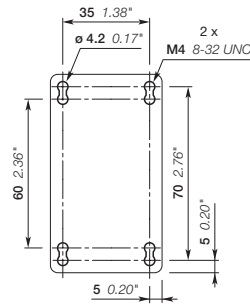
Main dimensions mm, inches

AF09..K, AF12..K, AF16..K 3-pole contactors - with Push-in Spring terminals

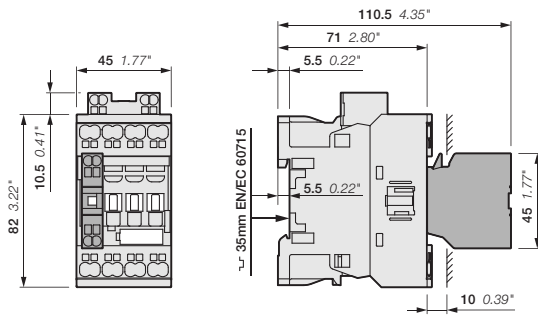
Dimensions



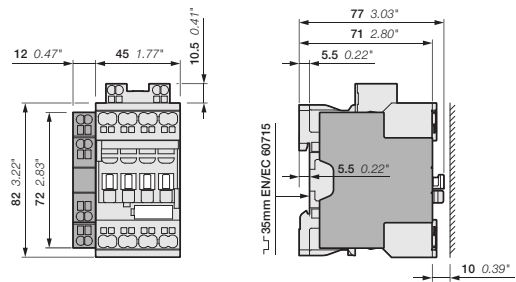
AF09..K, AF12..K, AF16..K



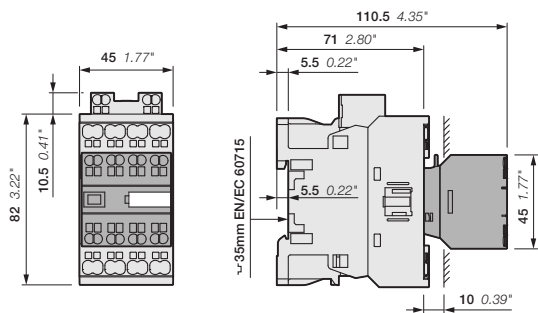
AF09..K, AF12..K, AF16..K



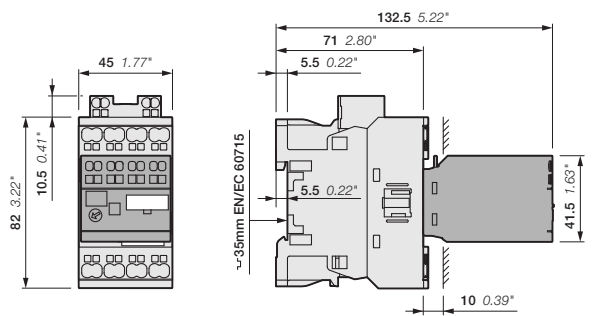
AF09..K, AF12..K, AF16..K
+ CA4..K 1-pole auxiliary contact block



AF09..K, AF12..K, AF16..K
+ CAL4-11K 2-pole auxiliary contact block



AF09..K, AF12..K, AF16..K
+ CA4..K 4-pole auxiliary contact block

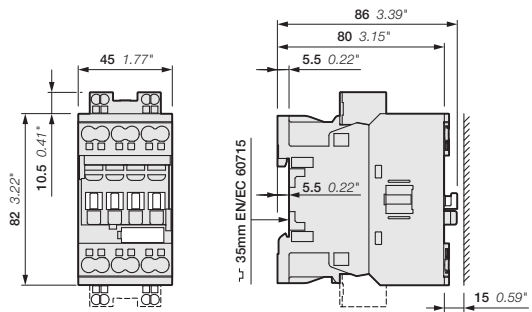


AF09..K, AF12..K, AF16..K
+ TEF45 electronic timer

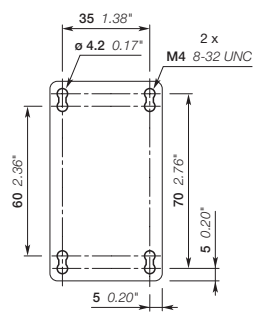
Note: For AF09..K ... AF16..K contactors, lateral distance to grounded component 2 mm 0.08" min 24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

AF26..K, AF30..K, AF38..K 3-pole contactors - with Push-in Spring terminals

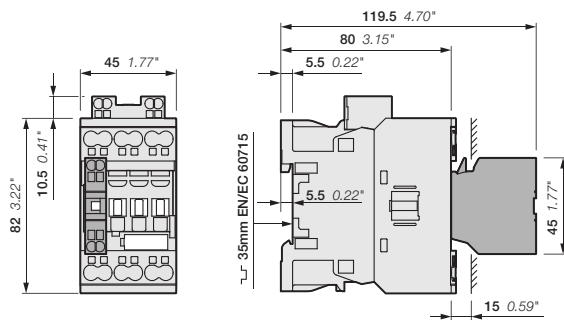
Dimensions



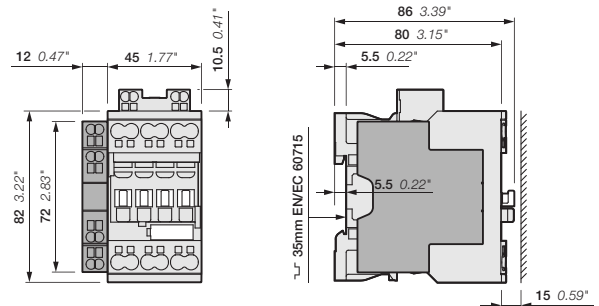
AF26..K, AF30..K, AF38..K



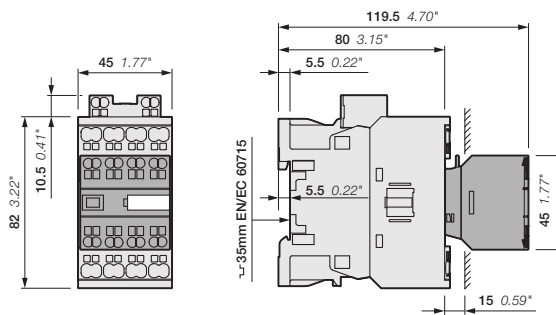
AF26..K, AF30..K, AF38..K



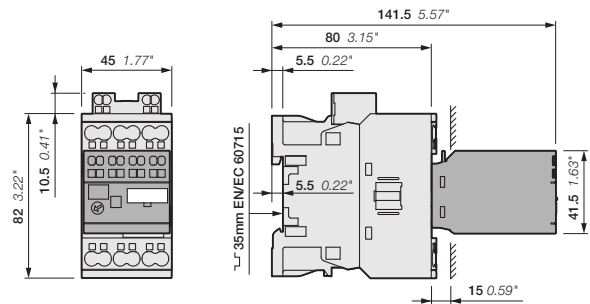
AF26..K, AF30..K, AF38..K
+ CA4..K 1-pole auxiliary contact block



AF26..K, AF30..K, AF38..K
+ CAL4-11K 2-pole auxiliary contact block



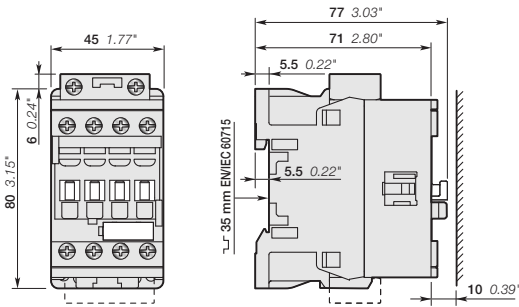
AF26..K, AF30..K, AF38..K
+ CA4..K 4-pole auxiliary contact block



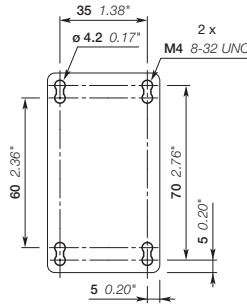
AF26..K, AF30..K, AF38..K
+ TEF4S electronic timer

Note: For AF26..K ... AF38..K contactors, lateral distance to grounded component 2 mm 0.08" min
24 V DC operated contactor (coil 30) depth + 20 mm (0.79").

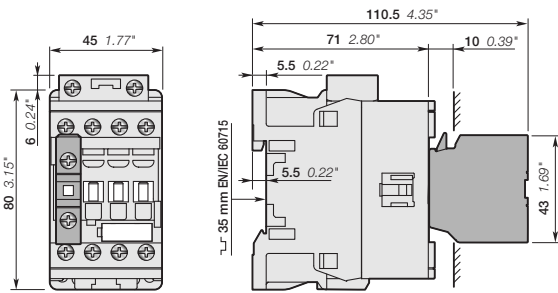
AF09, AF16 4-pole contactors



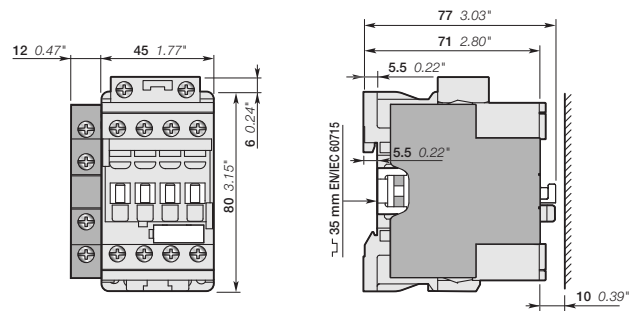
AF09, AF16



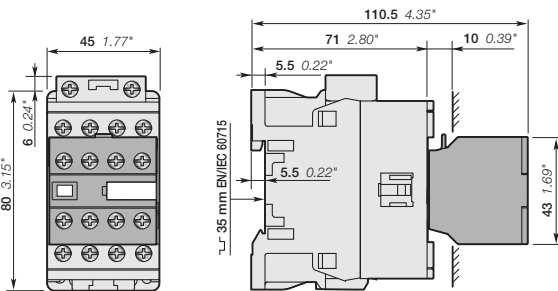
AF09, AF16



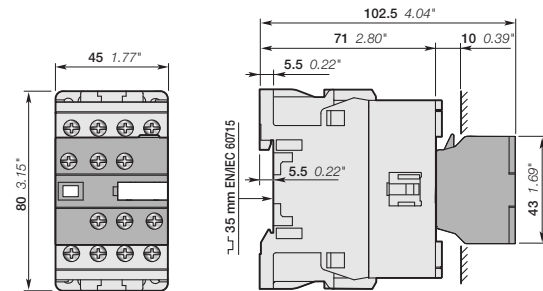
AF09, AF16
+ CA4, CC4 1-pole auxiliary contact block



AF09, AF16
+ CAL4-11 2-pole auxiliary contact block



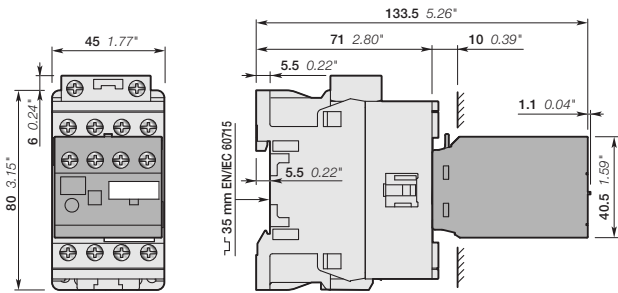
AF09, AF16
+ CA4 4-pole auxiliary contact block



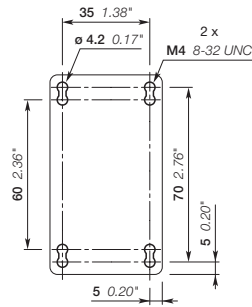
AF09, AF16
+ CAT4 2-pole auxiliary contact and coil terminal block

(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

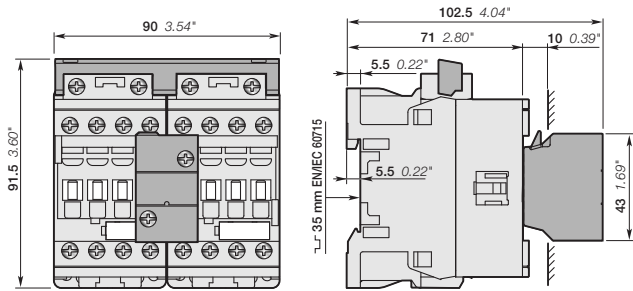
AF09, AF16 4-pole contactors



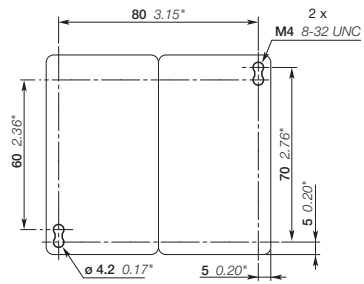
AF09, AF16
+ TEF4 electronic timer



AF09, AF16



AF09...-40-00, AF16...-40-00
+ VEM4 mechanical and electrical interlock set



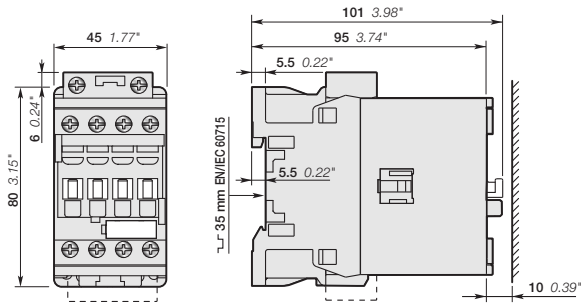
AF09...-40-00, AF16...-40-00
+ VEM4 mechanical and electrical interlock set

(1) Note: contactor lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor (coil 30) depth + 20 mm 0.79".

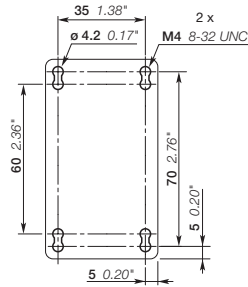
AF26, AF38 4-pole contactors

Dimensions

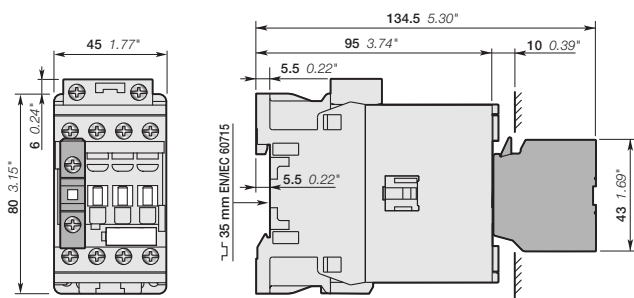
EO



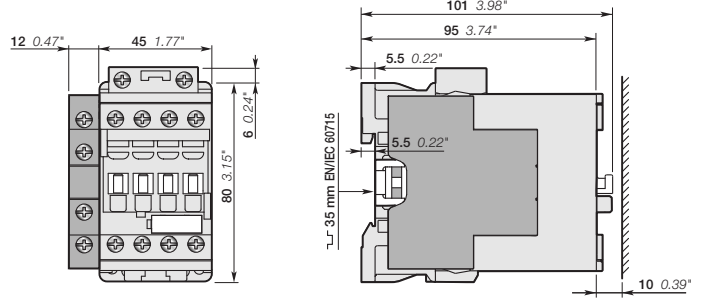
AF26, AF38



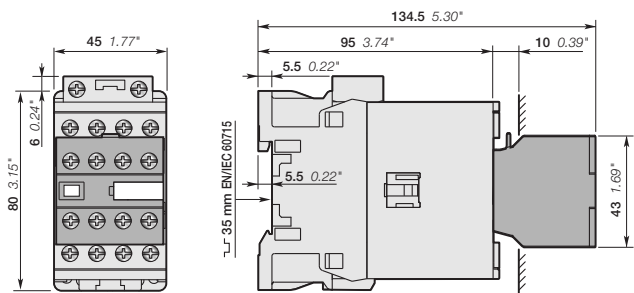
AF26, AF38



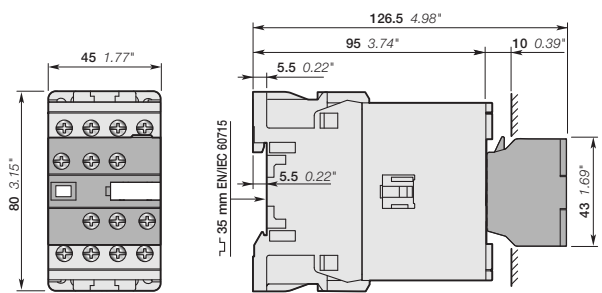
AF26, AF38
+ CA4, CC4 1-pole auxiliary contact block



AF26, AF38
+ CAL4-11 2-pole auxiliary contact block



AF26, AF38
+ CA4 4-pole auxiliary contact block

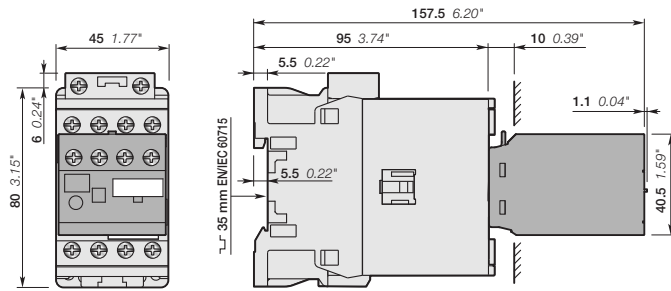


AF26, AF38
+ CAT4 2-pole auxiliary contact and coil terminal block

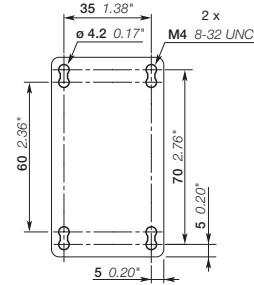
Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.

AF26, AF38 4-pole contactors

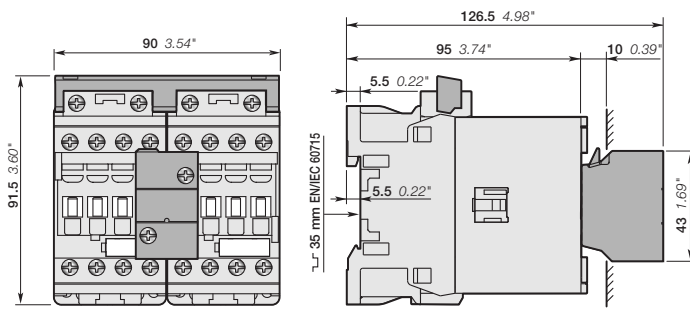
Dimensions



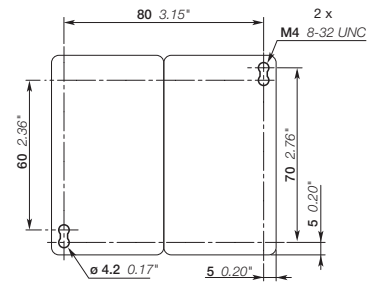
AF26, AF38
+ TEF4 electronic timer



AF26, AF38



AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set



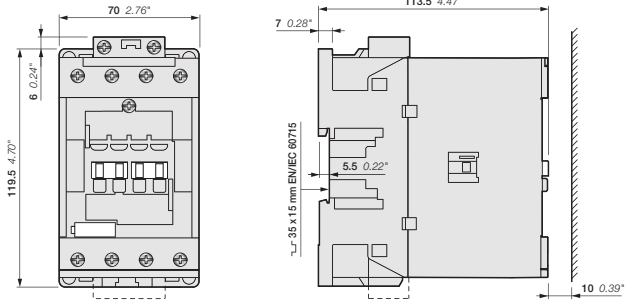
AF26..-40-00, AF38..-40-00
+ VEM4 mechanical and electrical interlock set

(1) Note: For AF26 and AF38 contactors, lateral distance to grounded component 2 mm 0.08" min.

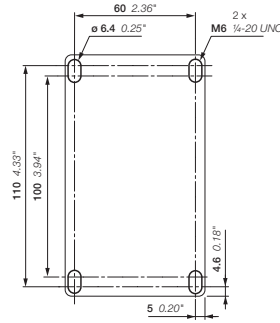
AF40, AF52 4-pole contactors

Dimensions

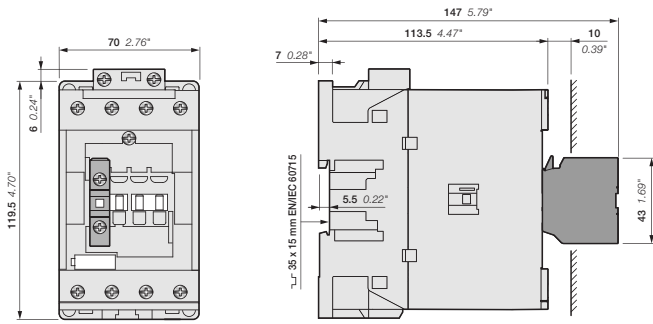
E0



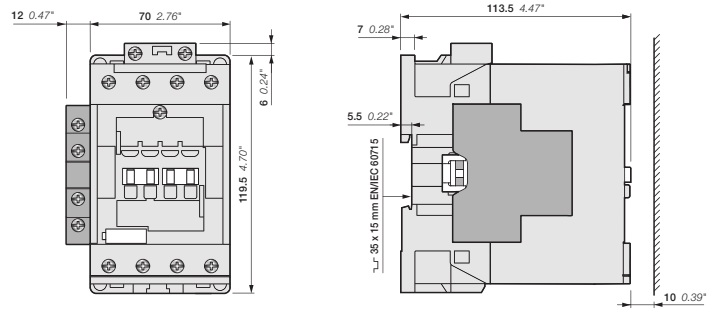
AF40, AF52



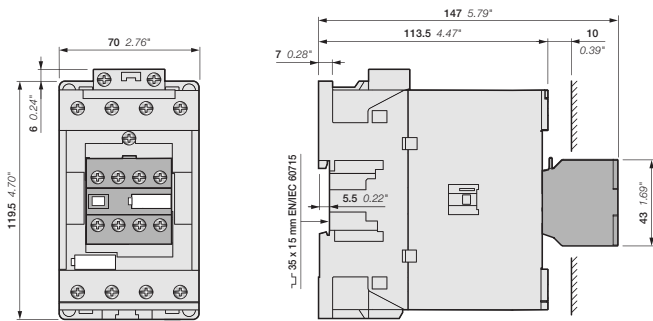
AF40, AF52



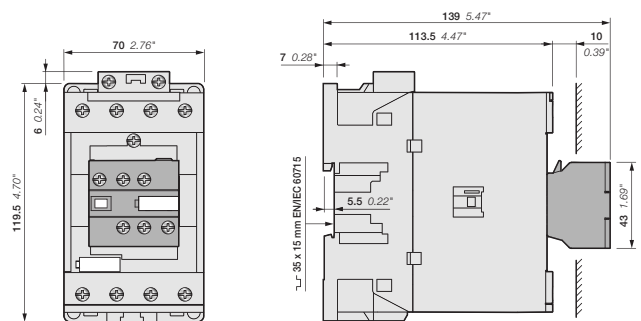
AF40, AF52
+ CA4, CC4 1-pole auxiliary contact block



AF40, AF52
+ CAL4-11 2-pole auxiliary contact block



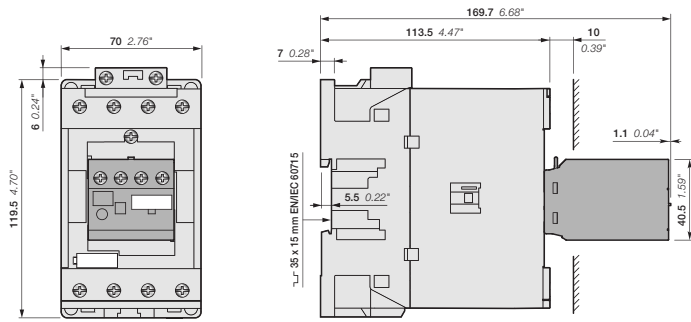
AF40, AF52
+ CA4 4-pole auxiliary contact block



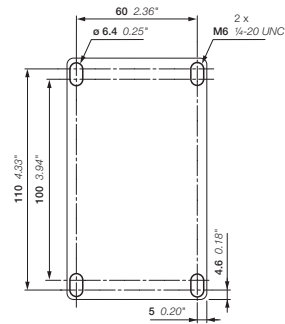
AF40, AF52
+ CAT4 2-pole auxiliary contact and coil terminal block

AF40, AF52 4-pole contactors

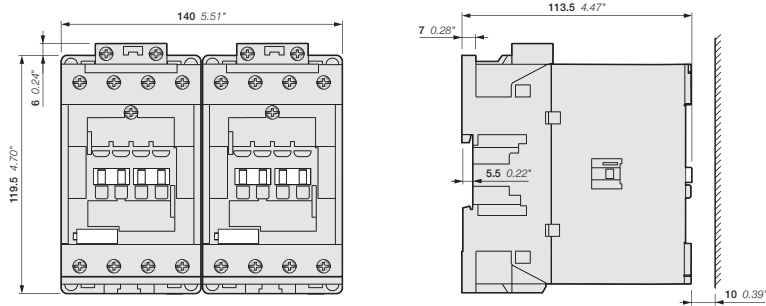
Dimensions



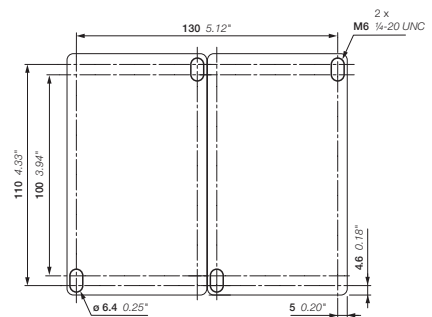
AF40, AF52
+ TEF4 electronic timer



AF40, AF52



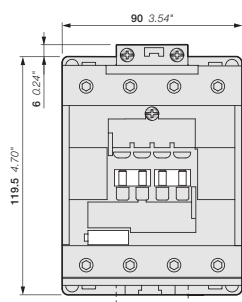
AF40, AF52
+ VM96-4 mechanical interlock unit



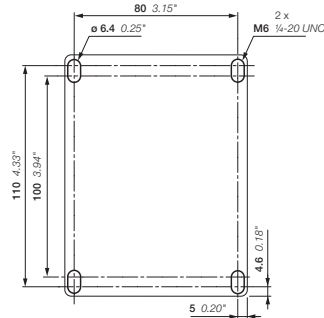
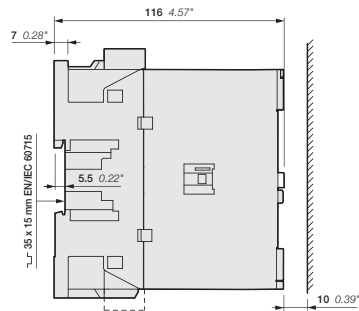
AF40, AF52
+ VM96-4 mechanical interlock unit

AF80 4-pole contactors

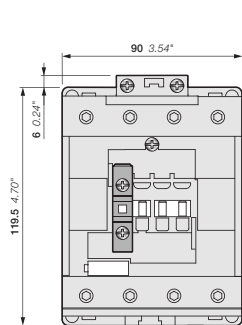
Dimensions



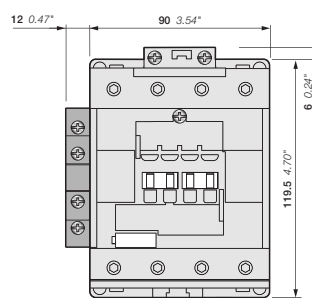
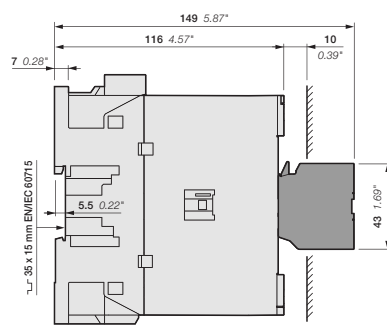
AF80



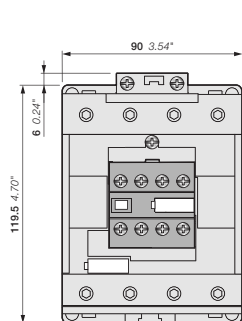
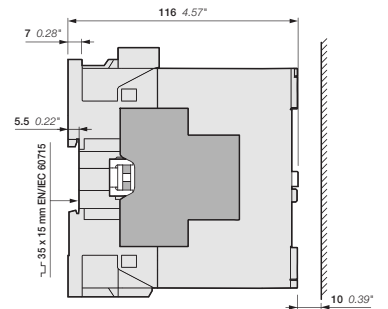
AF80



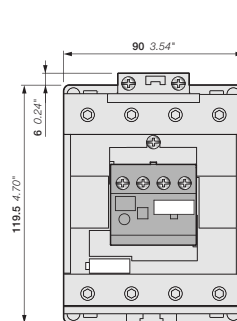
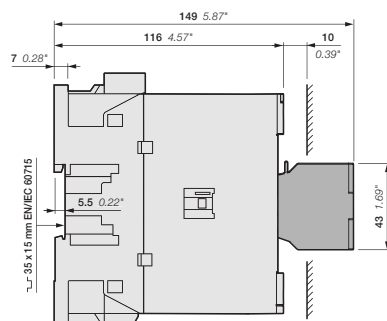
AF80
+ CA4, CC4 1-pole auxiliary contact block



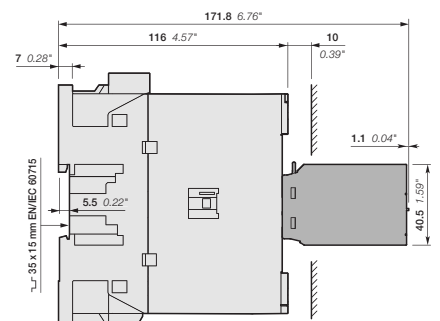
AF80
+ CAL4-11 2-pole auxiliary contact block



AF80
+ CA4 4-pole auxiliary contact block

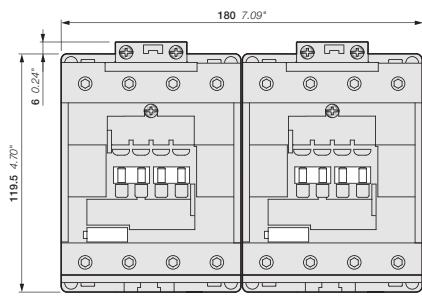


AF80
+ TEF4 Electronic timer

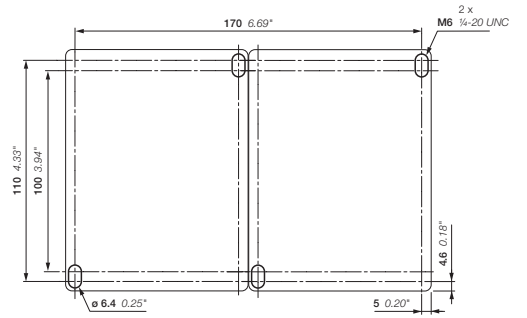
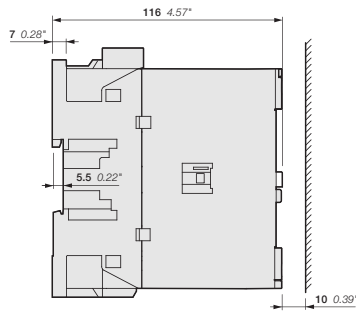


AF80 4-pole contactors

Dimensions



AF80
+ CA4, CC4 1-pole auxiliary contact block

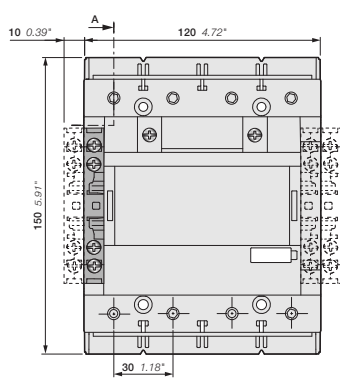


AF80
+ VM96-4 mechanical interlock unit

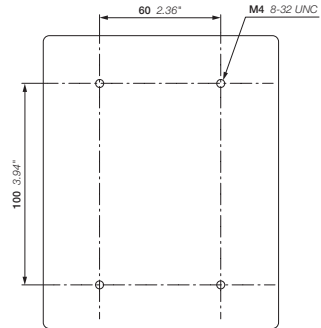
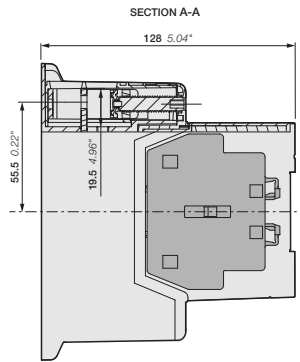
AF116, AF140 4-pole contactors

Dimensions

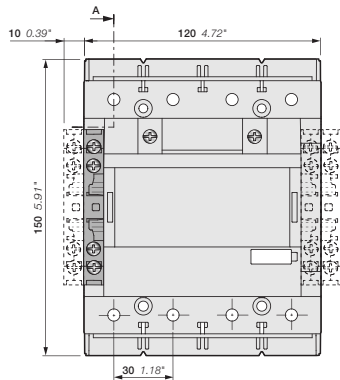
E0



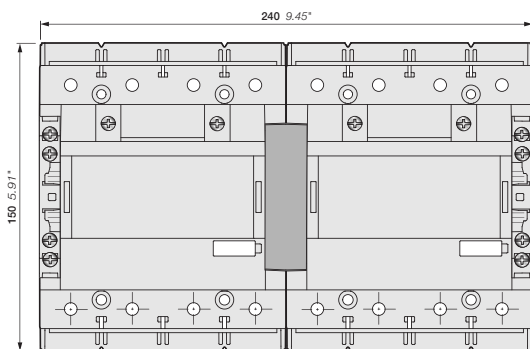
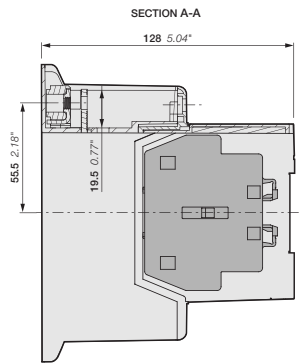
AF116, AF140-40-00 + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11



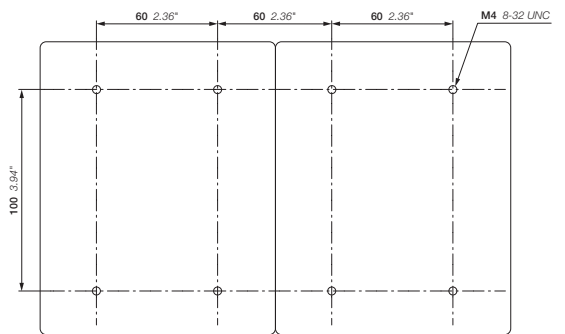
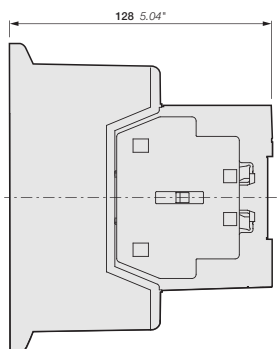
AF116, AF140-40-..(B)



AF116, AF140-40-00B + CAL19 2-pole auxiliary contact block
AF116, AF140-40-11B



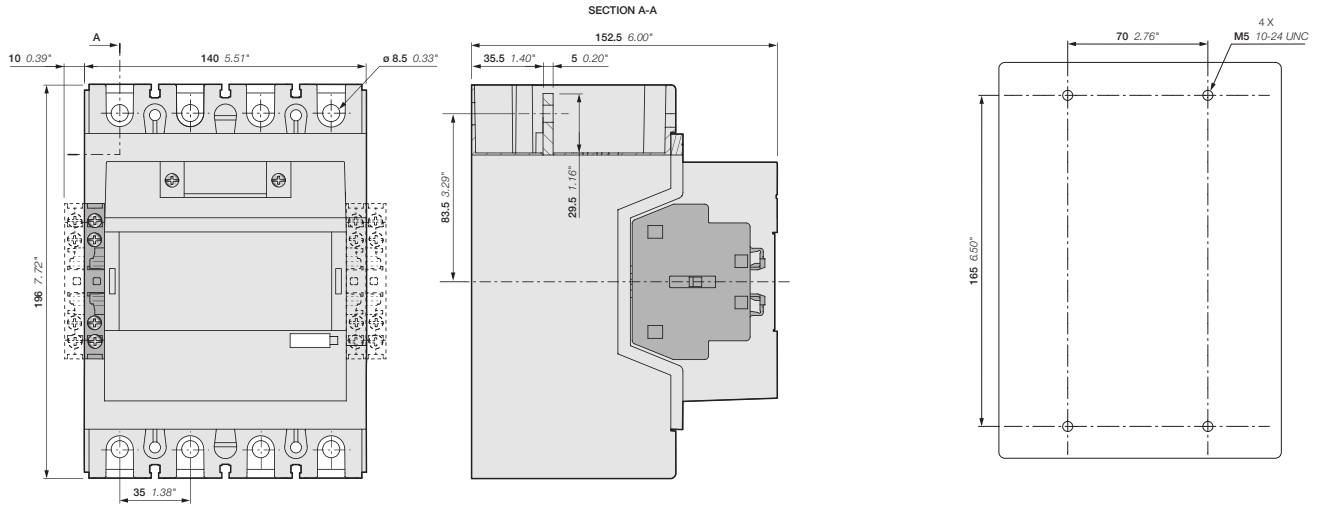
AF116, AF140-40-11
+ VM19 mechanical interlocking unit



AF116, AF140
+ VM19 mechanical interlocking unit

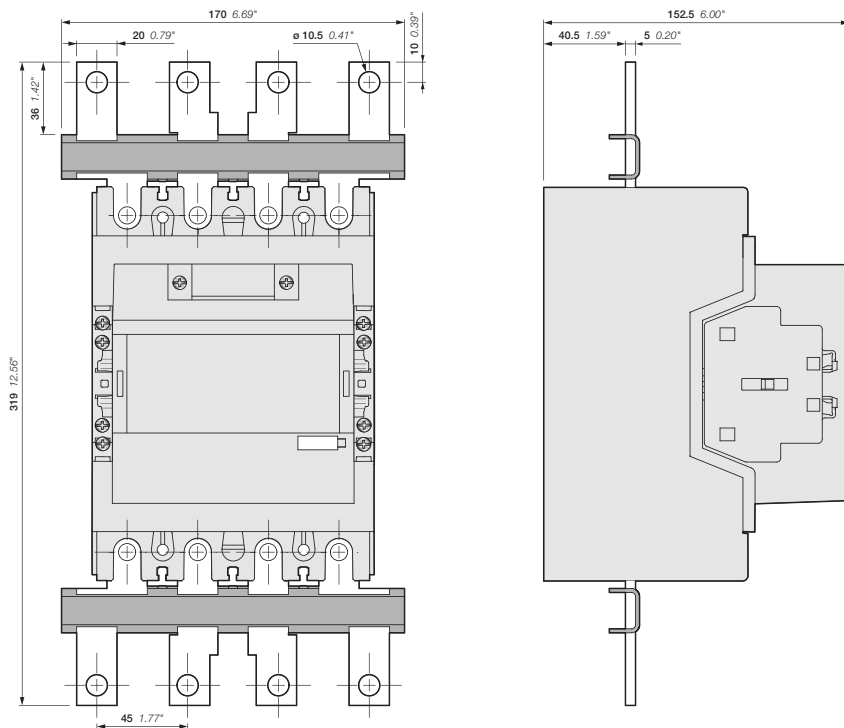
AF190, AF205 4-pole contactors

Dimensions



AF190, AF205-40-00 + CAL19 2-pole auxiliary contact block
AF190, AF205-40-11

AF190, AF205-40

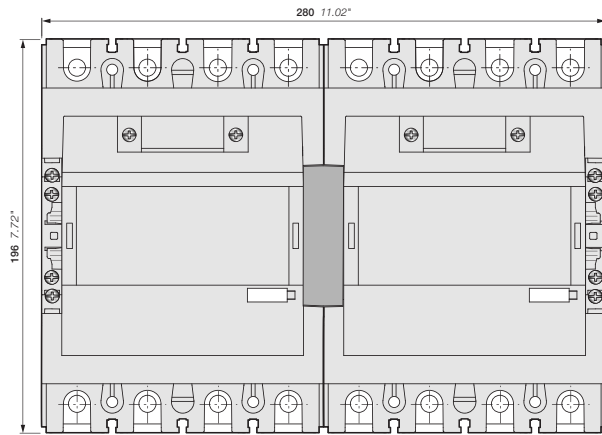


AF190, AF205-40-11
+ LW205-40 terminal enlargement

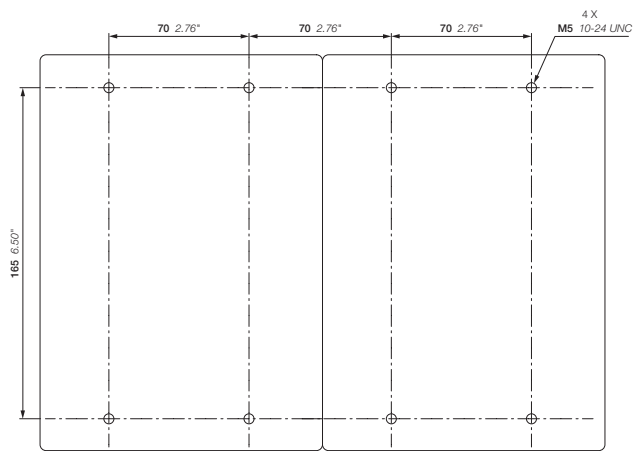
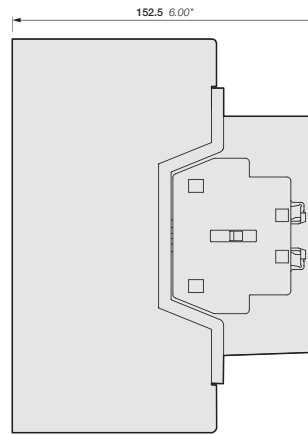
Main dimensions mm, inches

AF190, AF205 4-pole contactors

Dimensions



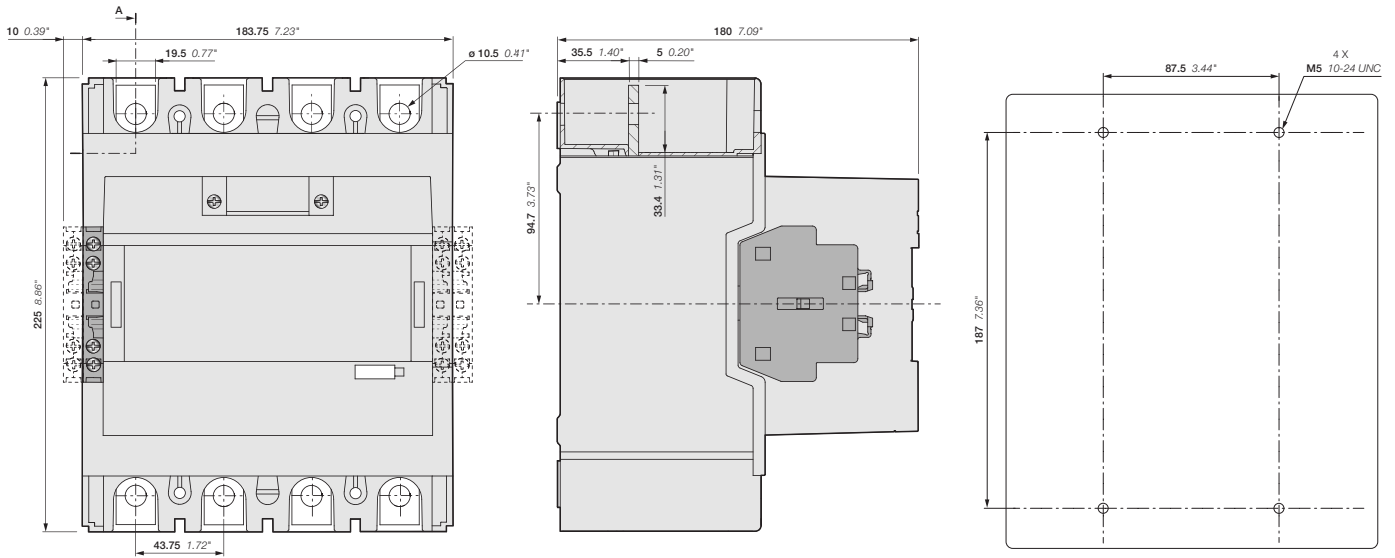
AF190, AF205-40-11
+ VM19 mechanical interlocking unit



AF190, AF205
+ VM19 mechanical interlocking unit

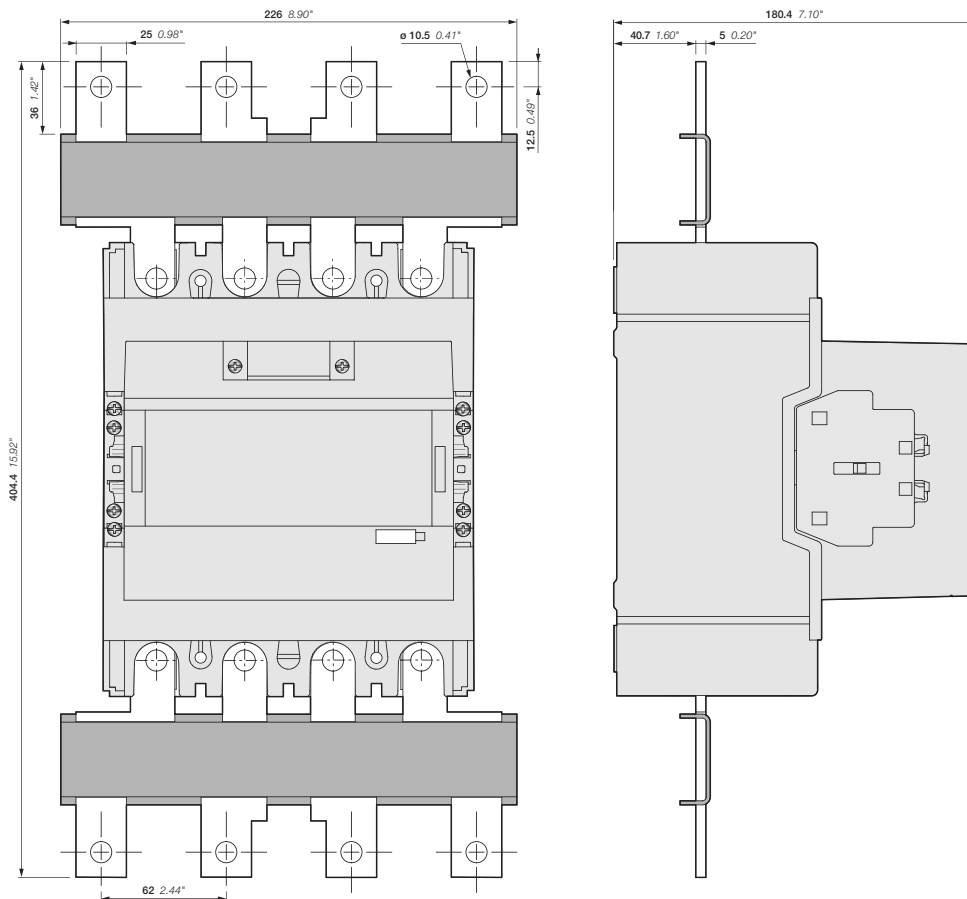
AF265, AF305, AF370 4-pole contactors

Dimensions



AF265, AF305, AF370-40-00 + CAL19 2-pole auxiliary contact block
AF265, AF305, AF370-40-11

AF265, AF305, AF370



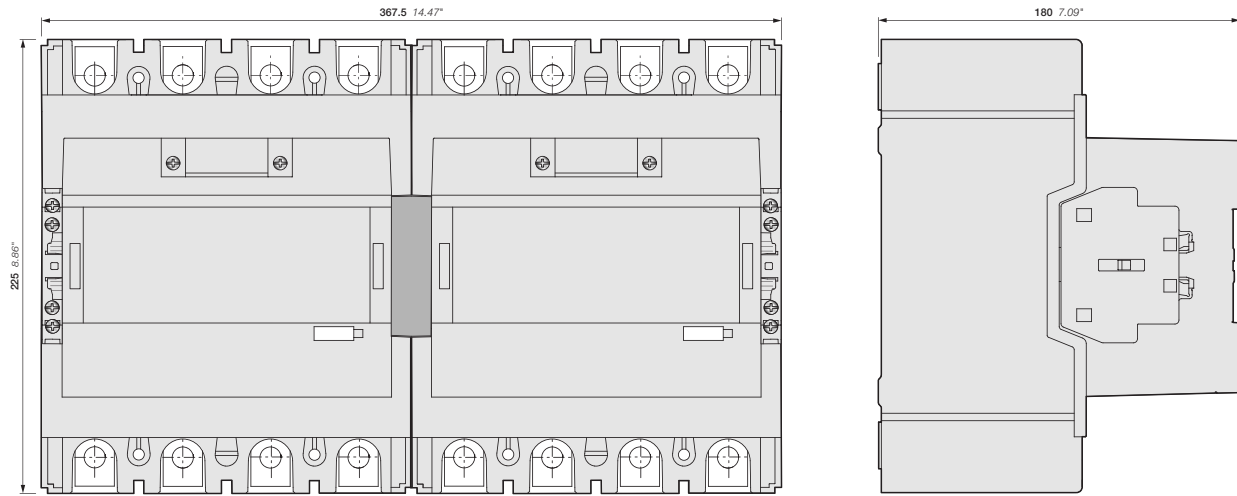
AF265, AF305, AF370-40-11
+ LW370-40 terminal enlargement

Main dimensions mm, inches

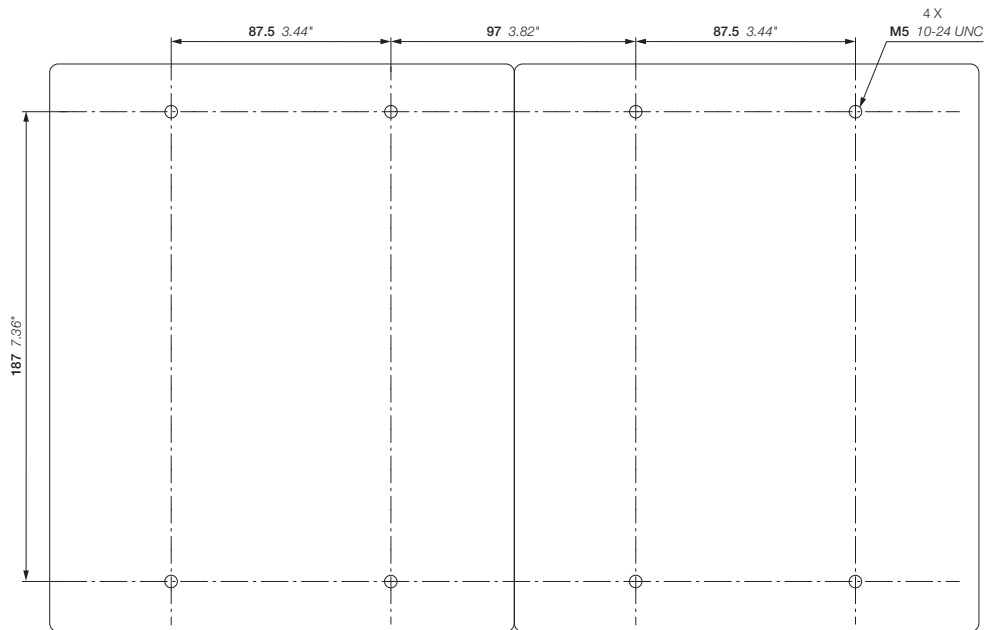
AF265, AF305, AF370 4-pole contactors

Dimensions

E0



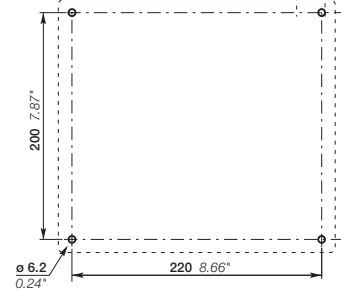
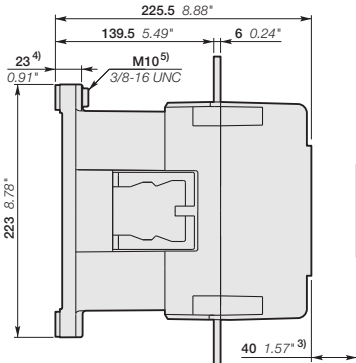
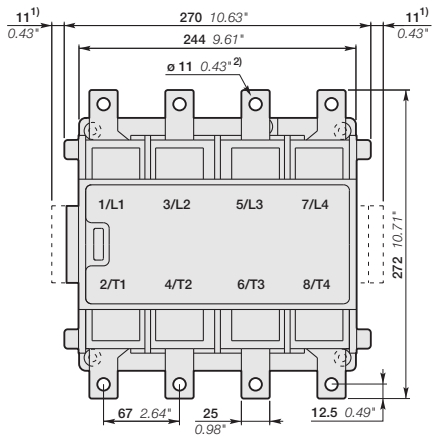
AF265, AF305, AF370-40-11
+ VM19 mechanical interlocking unit



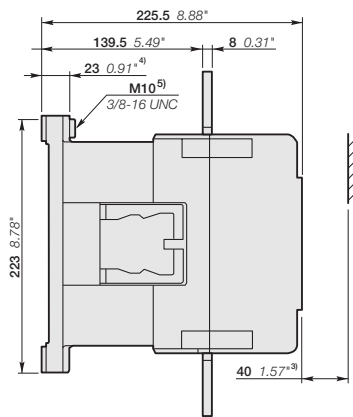
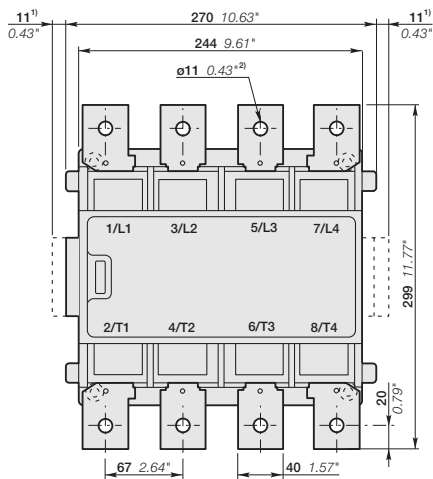
AF265, AF305, AF370
+ VM19 mechanical interlocking unit

EK550, EK1000 4-pole contactors AC operated

Dimensions

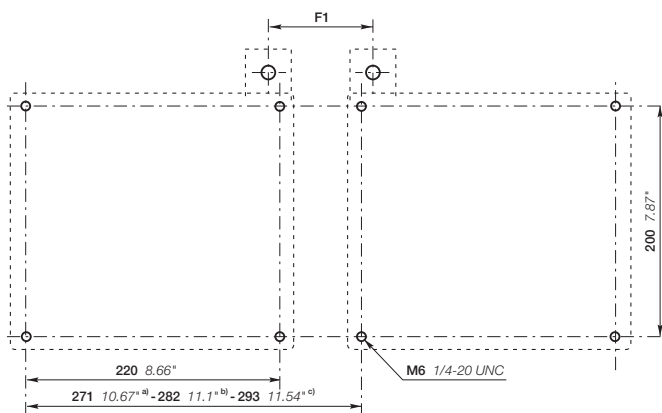


EK550



- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw

EK1000

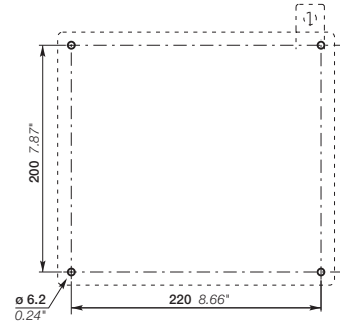
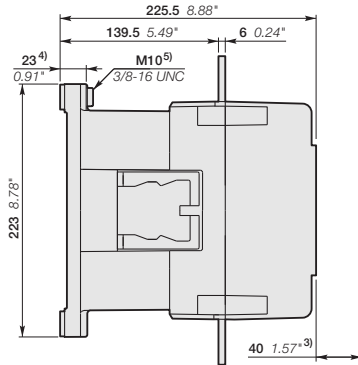
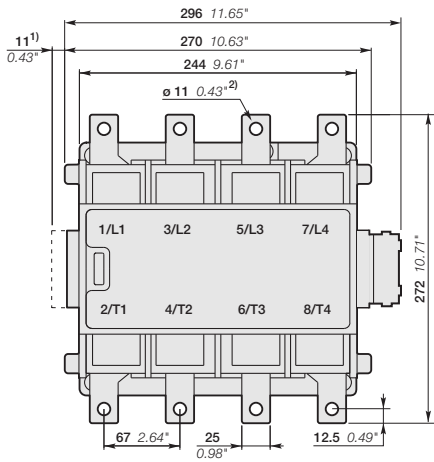


- a) Min. dim Makes distance F1 = 70
- b) Includes space for three auxiliary contact blocks between the contactors
- c) Includes space for four auxiliary contact blocks between the contactors

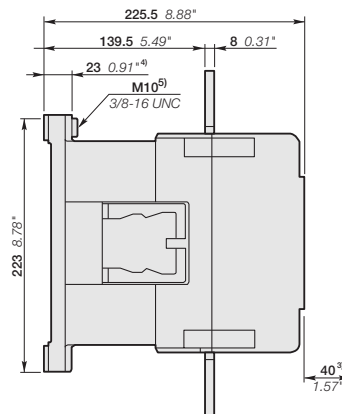
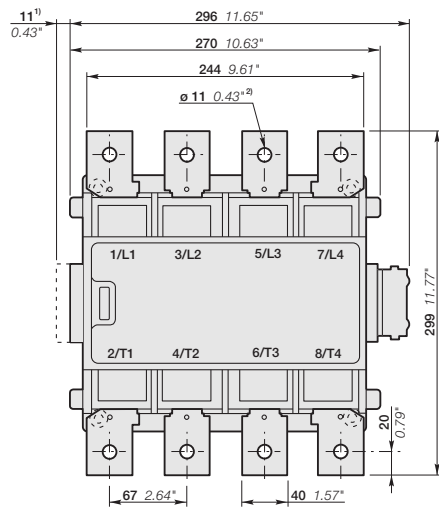
EK1000

EK550, EK1000 4-pole contactors DC operated

Dimensions

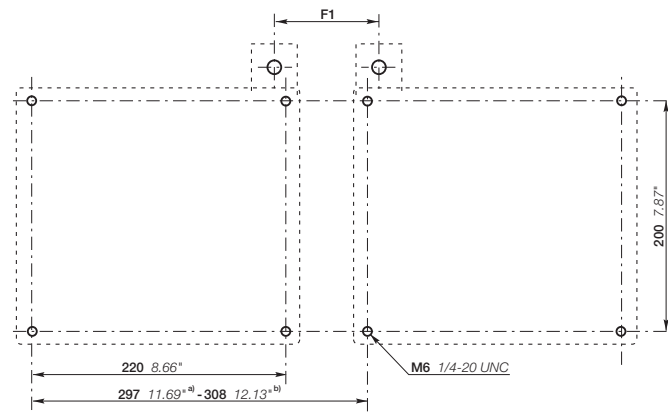


EK550



EK1000

- 1) Dimension for extra auxiliary contact block
- 2) Screw, nut and washer by-packed
- 3) Min. distance to uninsulated wall
- 4) Damping elements are included
- 5) Earthing screw



EK1000

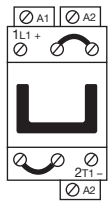
- a) Min. dim.
- b) Includes space for two auxiliary contact blocks and the dc-unit between the contactors

GA75 ... GAF2050 contactors

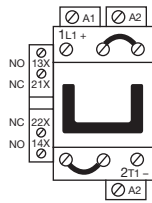
Terminal marking and positioning

GA75 contactors - AC operated

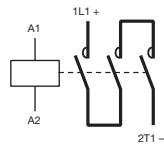
Standard devices without addition of auxiliary contacts



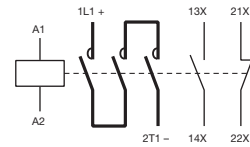
GA75-10-00



GA75-10-11



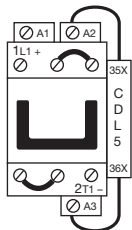
GA75-10-00



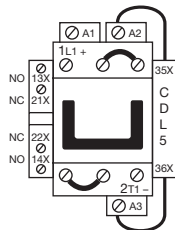
GA75-10-11

GAE75 contactors - DC operated

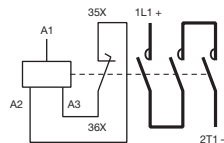
Standard devices without addition of auxiliary contacts



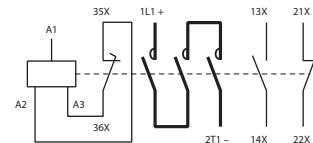
GAE75-10-00



GAE75-10-11

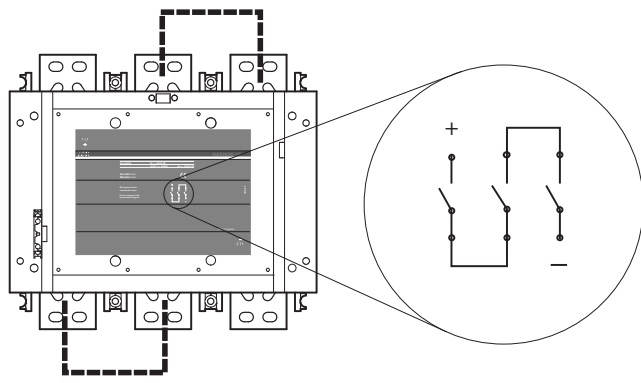


GAE75-10-00

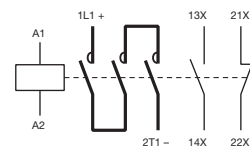


GAE75-10-11

GAF185 ... GAF2050 contactors - AC / DC operated



GAF185 ... GAF2050-10-11

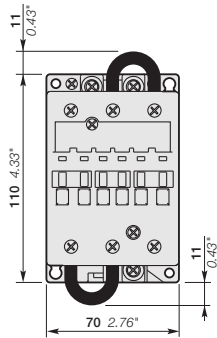


GAF185 ... GAF2050-10-11

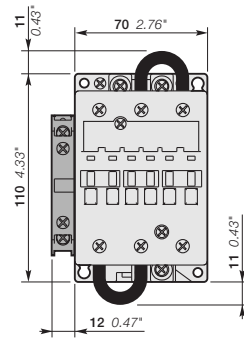
GA75, GAE75 1-pole contactor

Dimensions

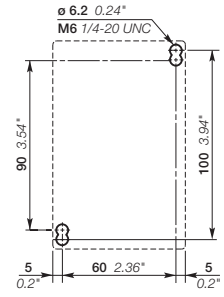
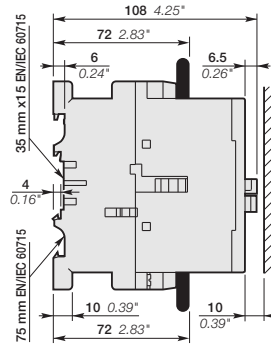
EO



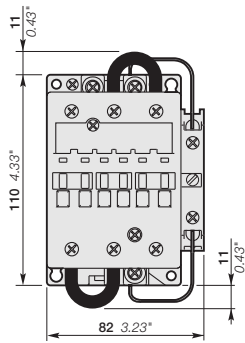
GA75-10-00



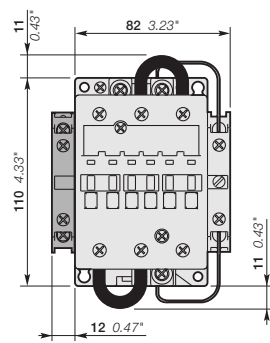
GA75-10-11



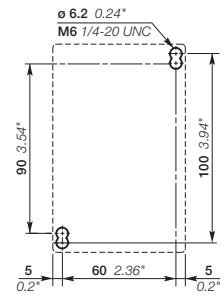
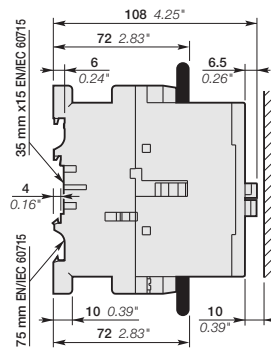
GA75



GAE75-10-00



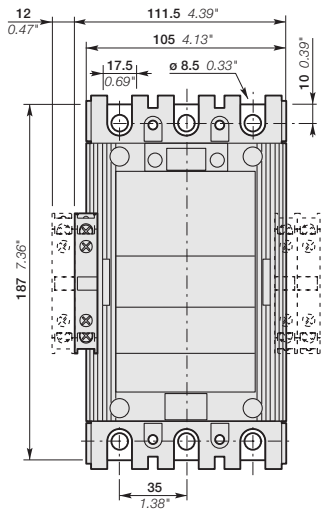
GAE75-10-11



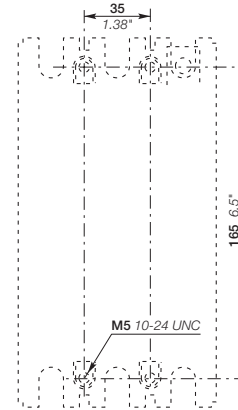
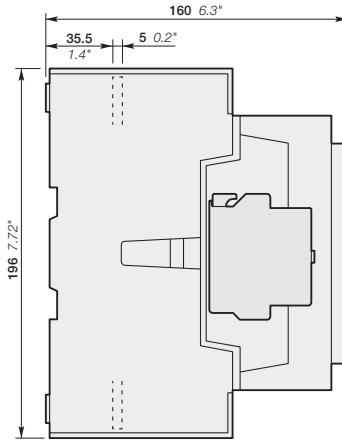
GAE75

GAF185, GAF300 3-pole contactor

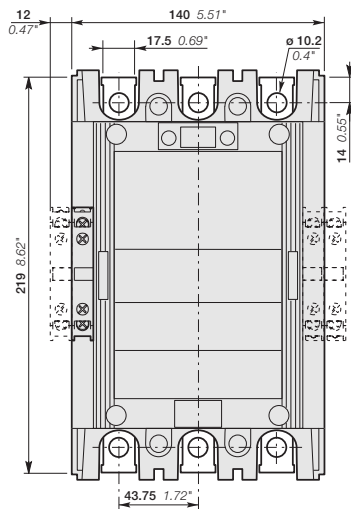
Dimensions



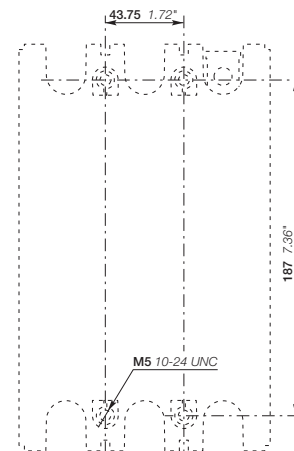
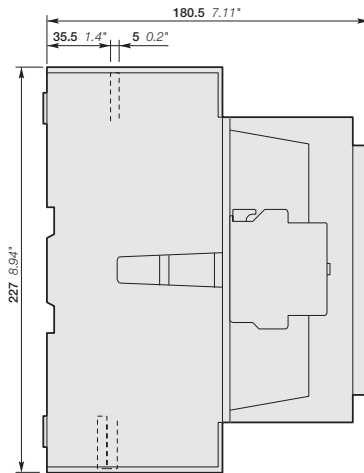
GAF185-30-11



GAF185-30-11



GAF300-30-11

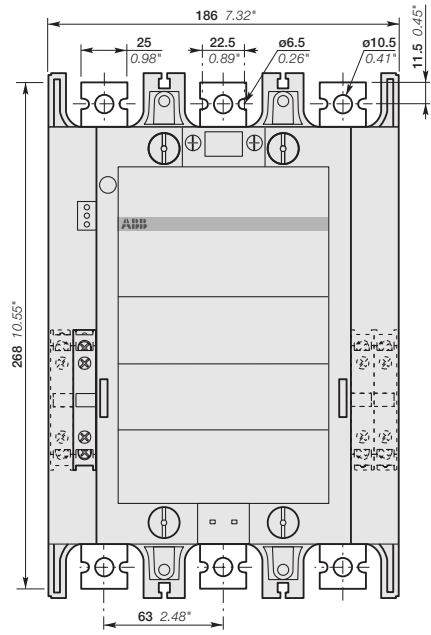


GAF300-30-11

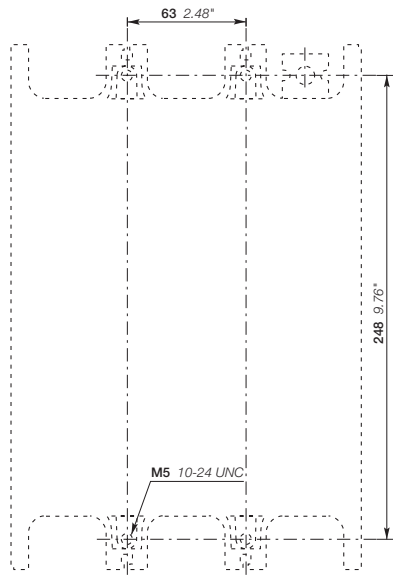
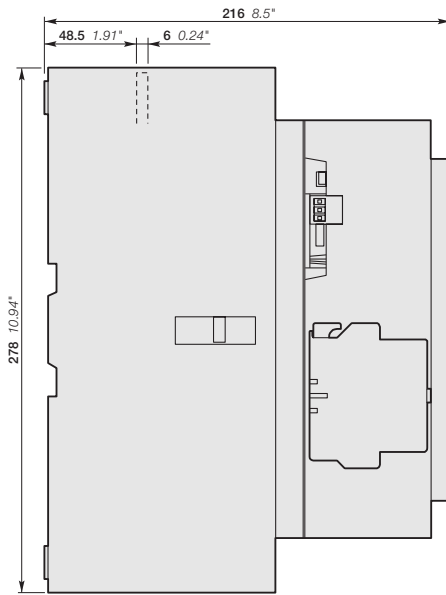
GAF460 3-pole contactor

Dimensions

EO

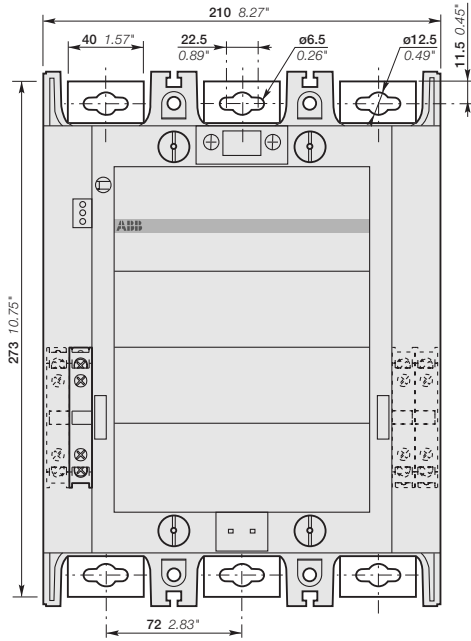


GAF460-30-11

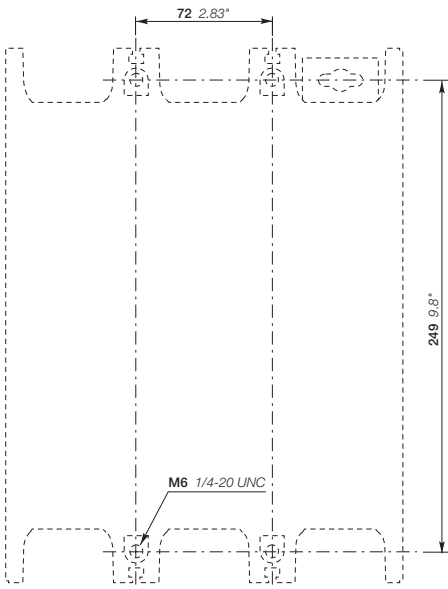
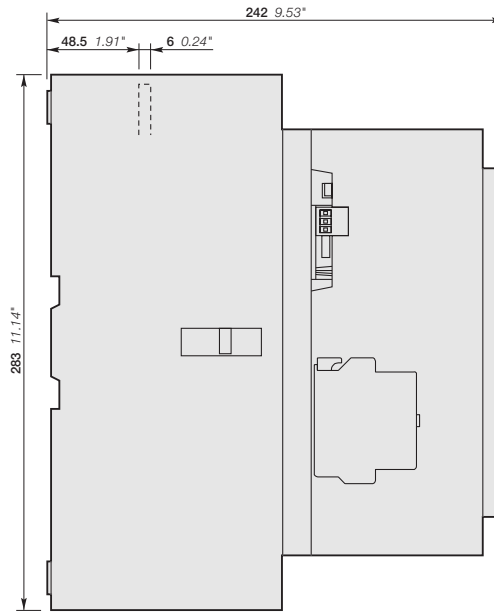


GAF750 3-pole contactor

Dimensions

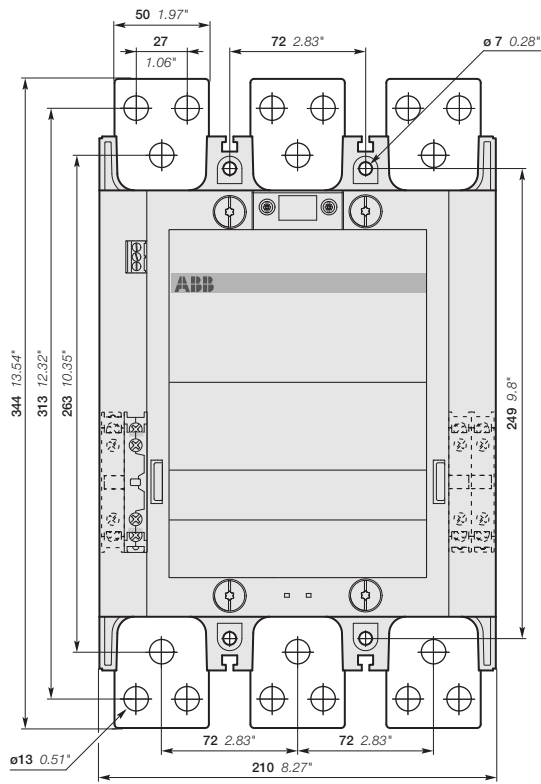


GAF750-30-11

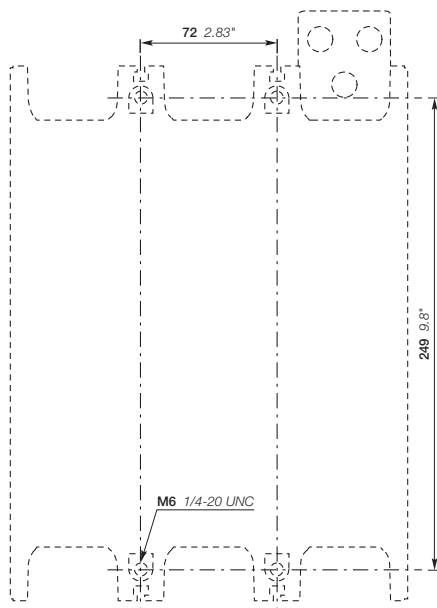
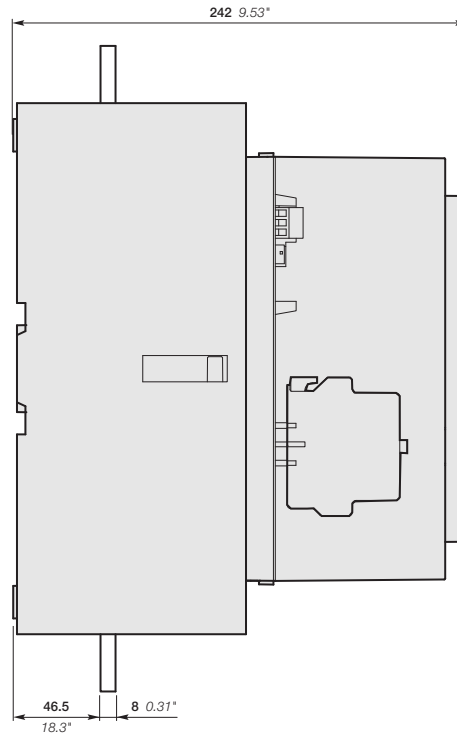


GAF1250 3-pole contactor

Dimensions

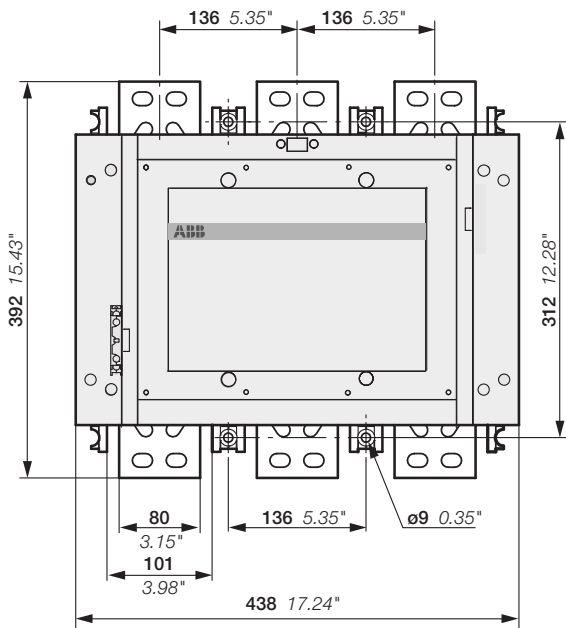
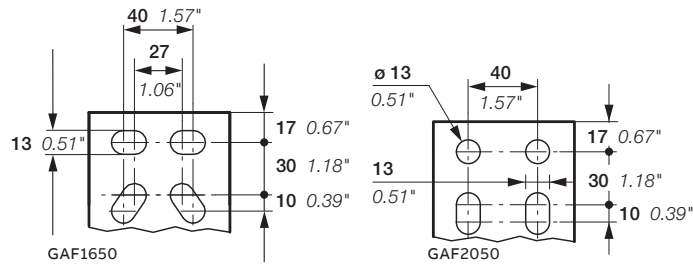


GAF1250-30-11

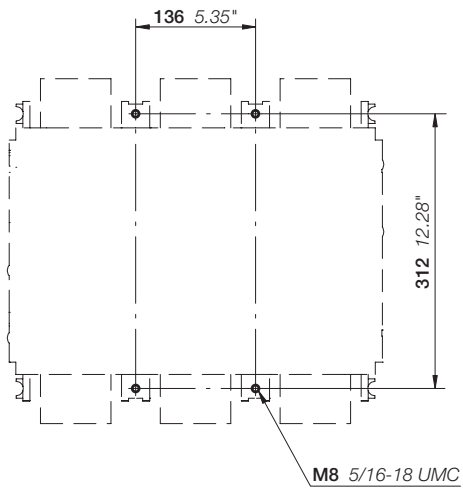
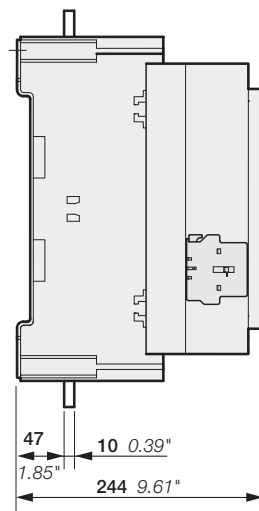


GAF1650, GAF2050 3-pole contactor

Dimensions



GAF1650, GAF2050-30-11

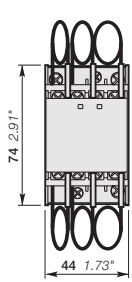


Main dimensions mm, inches

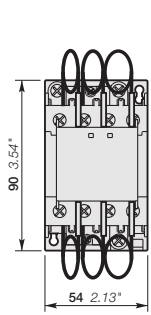
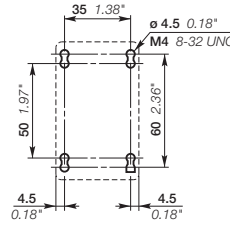
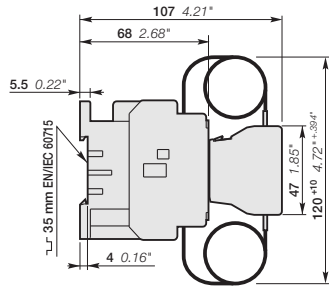
UA..RA 3-pole contactors for capacitor switching

Unlimited peak current \hat{I}

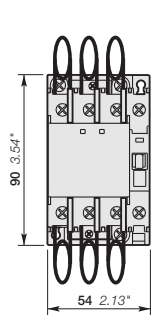
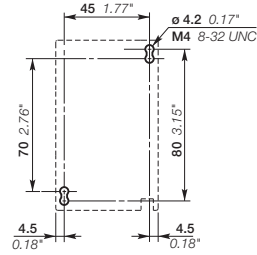
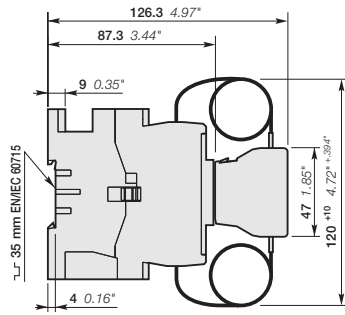
EO



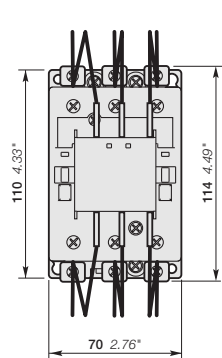
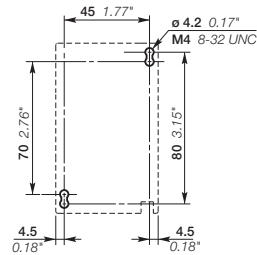
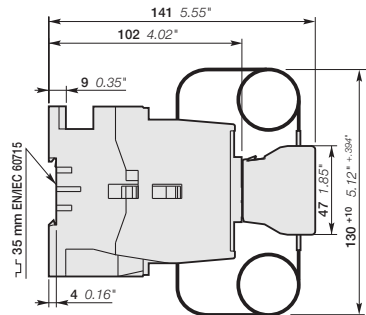
UA16..RA



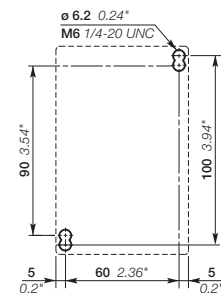
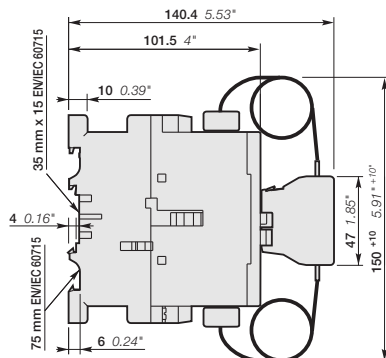
UA26..RA



UA30..RA



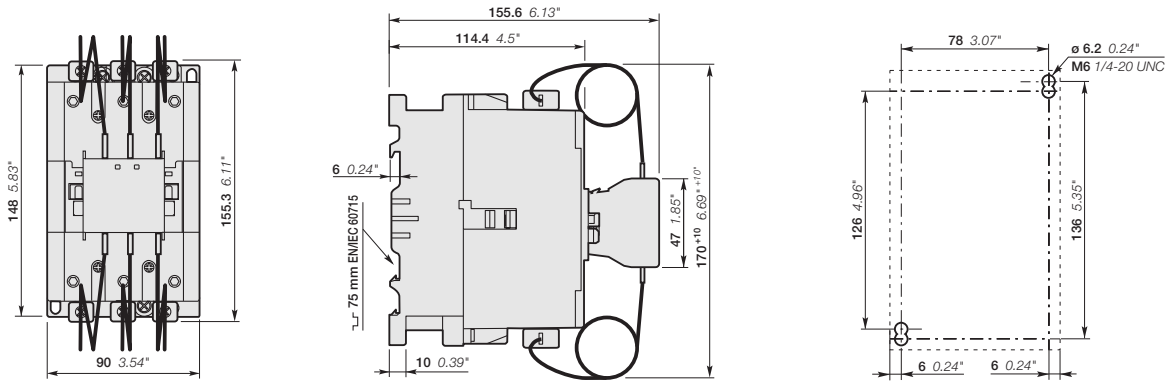
UA50..RA, UA63..RA, UA75..RA



Main dimensions mm, inches

UA..RA 3-pole contactors for capacitor switching

Unlimited peak current \hat{I}

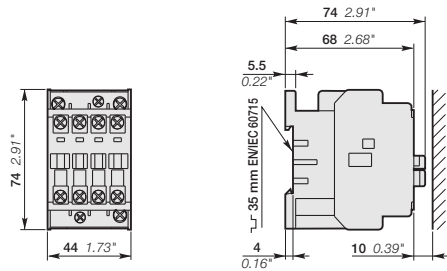


UA95..RA, UA110..RA

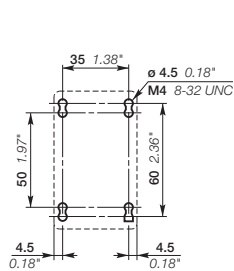
UA.. 3-pole contactors for capacitor switching

Dimensions

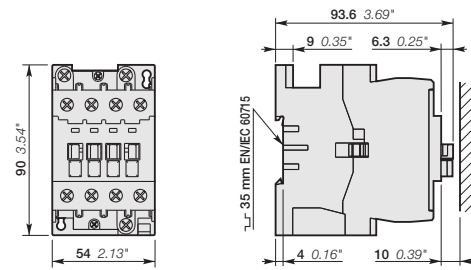
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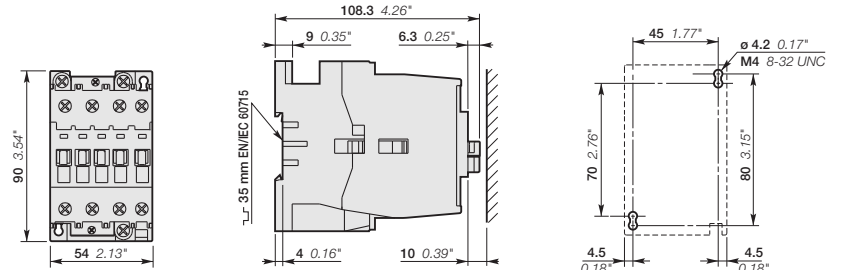
UA16



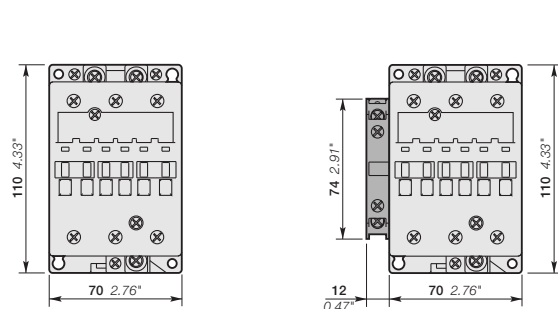
UA16 drilling plan



UA26

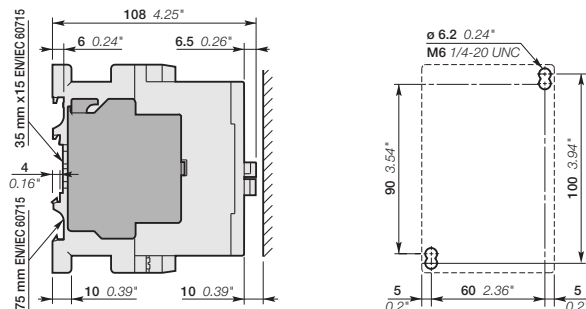


UA26, UA30 drilling plan

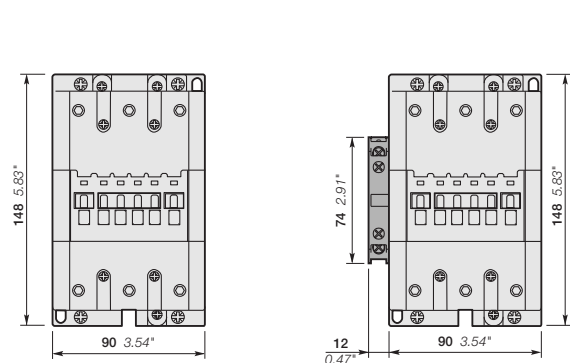


UA50, UA63, UA75-30-00

UA50, UA63, UA75-30-11

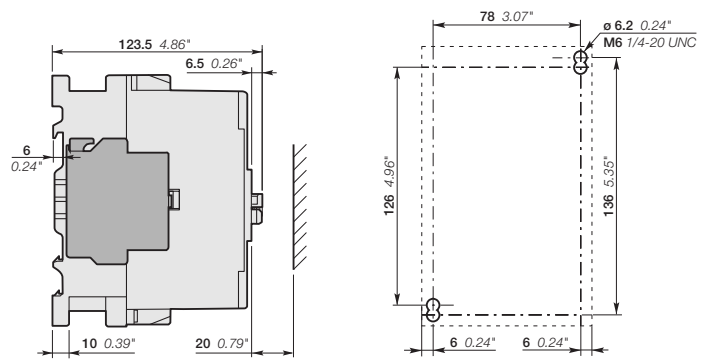


Drilling plan



UA95, UA110-30-00

UA95, UA110-30-11

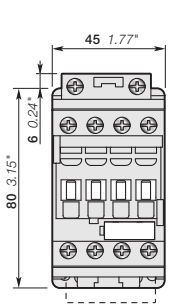


Drilling plan

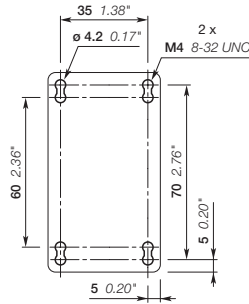
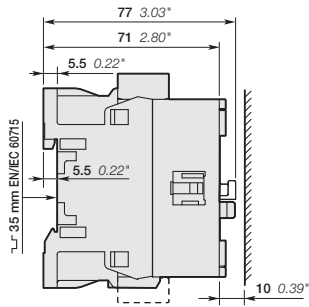
Main dimensions mm, inches

NF contactor relays

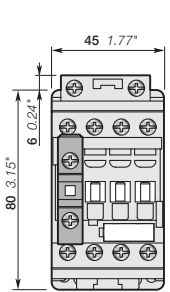
Dimensions



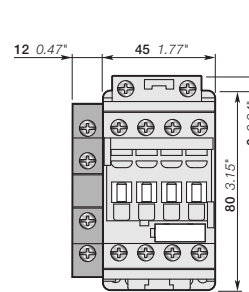
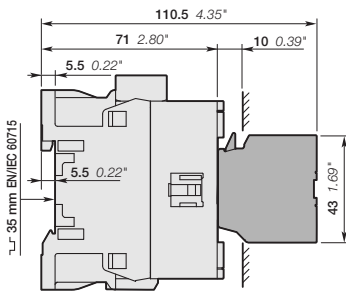
NF..22E, NF..31E, NF..40E



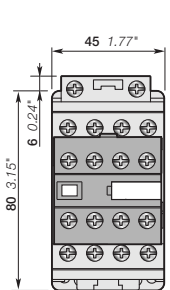
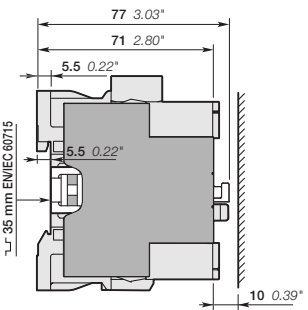
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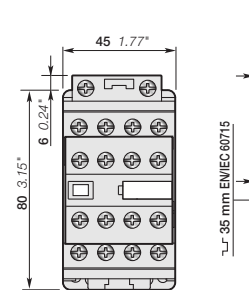
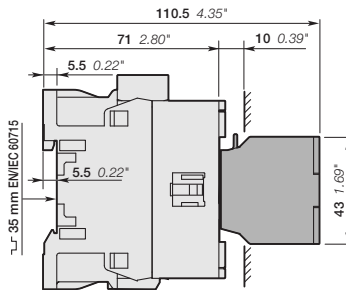
NF..22E, NF..31E, NF..40E
+ CA4, CC4 1-pole auxiliary contact block



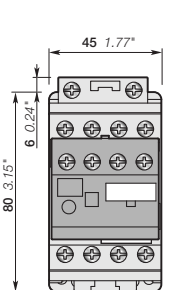
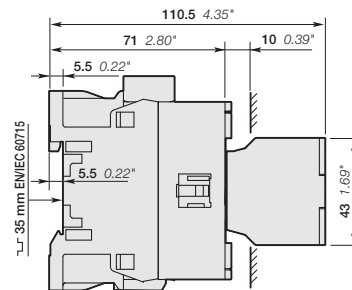
NF..22E, NF..31E, NF..40E
+ CAL4-11 2-pole auxiliary contact block



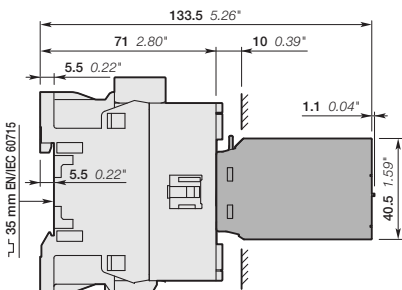
NF..22E, NF..31E, NF..40E
+ CA4 4-pole auxiliary contact block



NF..44E, NF..53E, NF..62E, NF..71E, NF..80E, NF..33/11, NF..51/11



NF..22E, NF..31E, NF..40E
+ TEFA4 electronic timer



(1) Note: contactor relay lateral distance to grounded component 2 mm 0.08" min.
24 V DC operated contactor relay (coil 30) depth + 20 mm 0.79".



Other contactor application data

Contactor selection

- 3/416** Control of three-phase slip-ring motors
- 3/418** Autotransformer starters
- 3/419** Three-phase transformer switching
- 3/421** Lighting circuit switching
- 3/430** Parallel connection of main poles
- 3/431** Temporary or intermittent duty
- 3/432** Influence of the length of conductors used in contactor control circuit

3/434 Voltage code table

3/440 Questionnaire for product specifications



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

Control of three-phase slip-ring motors

Contactors selection

General

Three kinds of contactors are used to control three-phase slip-ring motors: the stator contactor, the acceleration contactor(s) and the rotor short-circuit contactor. Refer to the diagram opposite.

The selection tables below concern complete smooth starting, excluding specific cases, such as: intermittent operation, regenerative current, controlled slipping, etc. for which you need to consult our specialised departments.

The starting and breaking technical data for slip-ring motors are defined in standard IEC 60947-4-1 in the AC-2 utilization category. The load factor is defined by the equation:

$$\text{L.F. (\%)} = \frac{\text{Operating cycle}}{\text{Cycle time (Operating cycle + Rest cycle)}} \times 100$$

Stator contactor

Closing of the starting current, conditioned by the value of the rotor resistances: it may reach 1.5 to 4 times rated motor operational current.

Breaking of the rated operational current, or of the starting current, with possible regenerative current.

The following table gives the permissible values of the I_e / AC-2 rated operational stator current, as a function of load factor.

Temperature of 60 °C for AF09 ... AF370 and 55 °C for AF400 ... AF1650 maximum near the contactor.

Maximum switching frequency and electrical durability in AC-2 category: see "Technical data".

| Contactor types | | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | |
|---|------|--------------|---|------|------|------|------|------|------|------|------|------|------|------|----|
| Load factor | 15 % | I_e / AC-2 | A | 18 | 24 | 33 | 52 | 64 | 76 | 79 | 106 | 124 | 154 | 184 | |
| | 25 % | I_e / AC-2 | A | 15 | 20 | 31 | 44 | 54 | 65 | 68 | 90 | 111 | 136 | 163 | |
| | 40 % | I_e / AC-2 | A | 13 | 17 | 26 | 38 | 46 | 55 | 58 | 77 | 94 | 116 | 139 | |
| | 60 % | I_e / AC-2 | A | 11 | 14 | 22 | 31 | 38 | 46 | 48 | 64 | 78 | 96 | 115 | |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | | A | 9 | 12 | 18 | 26 | 32 | 38 | 40 | 53 | 65 | 80 | 96 |

Acceleration contactors

The sizing of these contactors is based on the AC-1 rated operational current (see "Technical data") that we recall below for the maximum ambient temperature of 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650.

The table below lists the factors to be applied to the AC-1 current of the contactors in order to obtain the maximal permissible value of the rotor current after contactor closing for star connection. If delta connection is used, increase by 50 % this current. This table takes into account the number of cycles an hour (without inching) and the current flow time per cycle, in the contactor.

| Number of cycles an hour | 1 | 3 | 6 | 12 | 20 | 30 | 60 | 120 |
|-----------------------------|------------------------------------|-----|-----|-----|-----|-----|-----|-----|
| Current flow time per cycle | Factors applicable to I_e / AC-1 | | | | | | | |
| 5 s | 5.2 | 4.9 | 4.7 | 4.3 | 4.0 | 3.7 | 3.4 | 2.8 |
| 10 s | 3.8 | 3.6 | 3.4 | 3.1 | 3.0 | 2.8 | 2.6 | 2.2 |
| 20 s | 2.8 | 2.7 | 2.6 | 2.5 | 2.4 | 2.2 | 2.0 | 1.6 |
| 30 s | 2.4 | 2.3 | 2.2 | 2.1 | 2.1 | 1.9 | 1.7 | - |
| 40 s | 2.2 | 2.1 | 2.0 | 1.9 | 1.9 | 1.7 | 1.5 | - |
| 60 s | 1.9 | 1.8 | 1.8 | 1.7 | 1.7 | 1.5 | - | - |

| Contactors | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 |
|--|------|------|------|------|------|------|------|------|------|------|------|
| Rated operational current I_e / AC-1 for air temperature near the contactor \leq 60 °C | A 25 | 28 | 30 | 40 | 42 | 42 | 60 | 80 | 90 | 100 | 105 |

Rotor short-circuit contactor

The duty of this contactor is characterized by small closing stresses. The decisive factor is the thermal stress. Delta connection of the contactor is considered (reduce currents by 35 % if star connection is used).

The following table gives the permissible values of the rated operational rotor current, as a function of load factor.

Temperature: 60 °C for AF09 to AF370 and 55 °C for AF400 to AF1650 maximum near the contactor.

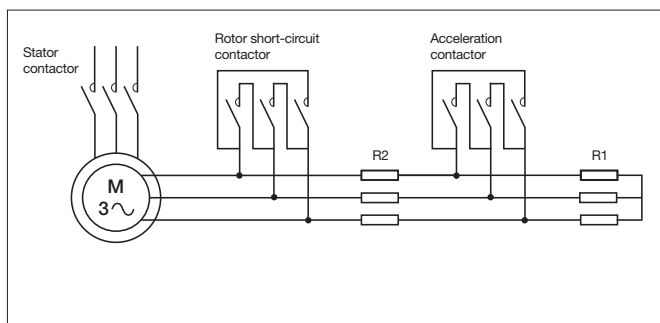
| Contactor types | | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | |
|---|------|-------|---|------|--------------------------------|------|------|------|------|------|------|------|--------------------------------|------|-----|
| Load factor | 15 % | I_e | A | 63 | 71 | 76 | 102 | 107 | 107 | 152 | 203 | 228 | 254 | 266 | |
| | 25 % | I_e | A | 57 | 64 | 69 | 92 | 96 | 96 | 137 | 183 | 206 | 229 | 241 | |
| | 40 % | I_e | A | 49 | 55 | 59 | 78 | 82 | 82 | 117 | 157 | 176 | 196 | 206 | |
| | 60 % | I_e | A | 43 | 48 | 51 | 68 | 72 | 72 | 103 | 137 | 154 | 171 | 180 | |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | | A | 36 | 41 | 44 | 58 | 61 | 61 | 87 | 116 | 131 | 145 | 152 |
| Rated operational rotor voltage: | | | | | | | | | | | | | | | |
| - Maximum values for starting and breaking | | | | V | 1380 (1600 in star connection) | | | | | | | | 2000 (2300 in star connection) | | |
| - Maximum values for starting and electrical braking | | | | V | 690 (730 in star connection) | | | | | | | | 690 (730 in star connection) | | |

Control of three-phase slip-ring motors

Contactor selection

Example of a three-stroke starter

- The first stroke corresponds to energization of the motor by the stator contactor: all the resistances are operational in the rotor circuit
- At the second stroke, the acceleration contactor short-circuits the first resistance stack
- At the third stroke, the rotor short-circuit contactor is activated by eliminating the last resistance stack, thus completing the starting period.



| Contactor types | | | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 | |
|---|------|-----------|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|------|
| Load factor | 15 % | le / AC-2 | A | 220 | 335 | 360 | 425 | 530 | 625 | 750 | 850 | 950 | 1150 | 1500 | 1720 | 2100 | |
| | 25 % | le / AC-2 | A | 185 | 270 | 300 | 350 | 440 | 515 | 620 | 680 | 780 | 975 | 1250 | 1430 | 1750 | |
| | 40 % | le / AC-2 | A | 150 | 215 | 250 | 300 | 370 | 430 | 515 | 580 | 650 | 800 | 1050 | 1200 | 1470 | |
| | 60 % | le / AC-2 | A | 135 | 180 | 220 | 255 | 315 | 370 | 430 | 480 | 550 | 700 | 900 | 1030 | 1250 | |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | | A | 116 | 140 | 190 | 210 | 265 | 305 | 370 | 400 | 460 | 580 | 750 | 860 | 1050 |

| Contactors | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 |
|--|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|
| Rated operational current I_e / AC-1 for air temperature near the contactor $\leq 60^\circ\text{C}$ (AF116-AF370) $\leq 55^\circ\text{C}$ (AF400-AF1650) | A | 145 | 175 | 250 | 300 | 350 | 400 | 500 | 500 | 600 | 700 | 800 | 1150 | 1450 |

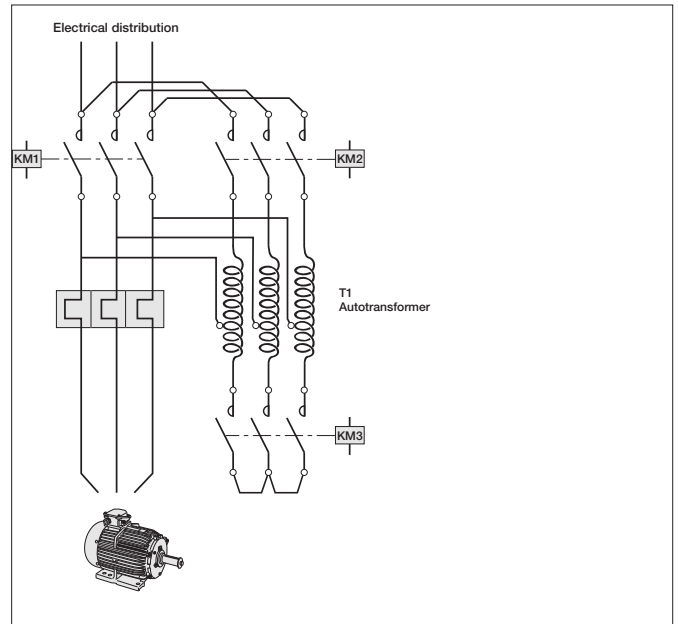
| Contactor types | | | | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 | |
|---|------|--------------------------------|---|-------|-------|-------|-------|--------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|------|
| Load factor | 15 % | le | A | 330 | 540 | 580 | 750 | 830 | 950 | 1050 | 1200 | 1400 | 1650 | 1900 | 2400 | 2800 | |
| | 25 % | le | A | 300 | 490 | 530 | 650 | 725 | 830 | 915 | 1050 | 1250 | 1450 | 1650 | 2100 | 2500 | |
| | 40 % | le | A | 260 | 425 | 460 | 575 | 630 | 720 | 800 | 950 | 1100 | 1300 | 1450 | 1850 | 2200 | |
| | 60 % | le | A | 230 | 375 | 400 | 500 | 575 | 650 | 700 | 810 | 975 | 1150 | 1300 | 1650 | 1950 | |
| S7 acc. to IEC 60034-1: periodical continuous duty with electrical breaking | | | | A | 200 | 300 | 350 | 380 | 480 | 550 | 640 | 700 | 840 | 980 | 1150 | 1500 | 1800 |
| Rated operational rotor voltage: | | | | | | | | | | | | | | | | | |
| - Maximum values for starting and breaking | V | 2200 (2600 in star connection) | | | | | | 3000 (3600 in star connection) | | | | | | | | | |
| - Maximum values for starting and electrical braking | V | 690 (730 in star connection) | | | | | | | | | | | | | | | |

Autotransformer starters

Contactor selection

General

An autotransformer starter allows to start a squirrel cage motor with a reduced starting current due to the reduced voltage within the accelerating duration. Unlike the star-delta wiring, this autotransformer starting method needs three wires and three terminals on the motor. At the starting period, the motor is wired to the autotransformer taps: the star contactor "KM3" and the autotransformer contactor "KM2" are closed, the motor is under reduced voltage. Consequently, the torque is reduced as the square of the applied voltage. The autotransformers are generally equipped of three taps at each phase in order to adapt the starting parameters to the field requirements. When the motor reaches 80...95 % of its nominal speed, the star contactor opens. Then, the line contactor "KM1" is making and the autotransformer contactor is opening. This starting process is done without any network interruption.



Selection Table (I_d starting current / I_n nominal current < 8 - Acceleration time ≤ 20s - 30 cycles / h max.)

| kW motor ratings 50/60 Hz | | | | | Contactors | | | | | |
|---------------------------|-----------|-------|-------|-------|-------------|------------------------------|-------|-------|-------------|-------|
| | | | | | KM1 line | KM2 autotransformer taps: | | | KM3 star | |
| 220/240 V | 380/400 V | 415 V | 440 V | 690 V | | 90 % | 80 % | 70 % | 60 % | |
| 4 | 7.5 | 7.5 | 7.5 | 9 | AF16 | AF16 | AF12 | AF09 | AF09 | AF09 |
| 6.5 | 11 | 11 | 11 | 15 | AF26 | AF26 | AF16 | AF16 | AF09 | AF16 |
| 11 | 18.5 | 18.5 | 18.5 | 22 | AF38 | AF30 | AF26 | AF26 | AF16 | AF26 |
| 15 | 22 | 30 | 30 | 30 | AF52 | AF52 | AF38 | AF30 | AF26 | AF30 |
| 18.5 | 30 | 37 | 37 | 37 | AF65 | AF52 | AF40 | AF30 | AF26 | AF38 |
| 22 | 37 | 45 | 45 | 45 | AF80 | AF65 | AF52 | AF40 | AF30 | AF40 |
| 25 | 45 | 55 | 55 | 55 | AF96 | AF80 | AF65 | AF52 | AF38 | AF52 |
| 30 | 55 | 55 | 75 | 55 | AF116 | AF116 | AF80 | AF65 | AF52 | AF65 |
| 37 | 75 | 75 | 90 | 75 | AF140 | AF140 | AF96 | AF80 | AF65 | AF65 |
| 45 | 75 | 75 | 90 | 90 | AF146 | AF140 | AF96 | AF80 | AF65 | AF65 |
| 55 | 90 | 90 | 110 | 132 | AF190 | AF146 | AF116 | AF96 | AF65 | AF80 |
| 55 | 110 | 110 | 132 | 160 | AF205 | AF190 | AF140 | AF116 | AF80 | AF96 |
| 75 | 132 | 132 | 160 | 200 | AF265 | AF265 | AF190 | AF140 | AF96 | AF116 |
| 90 | 160 | 160 | 160 | 250 | AF305 | AF265 | AF205 | AF190 | AF116 | AF140 |
| 110 | 200 | 200 | 200 | 315 | AF370 | AF370 | AF265 | AF190 | AF140 | AF190 |
| 132 | 250 | 250 | 250 | 355 | AF460 | AF400 | AF305 | AF265 | AF190 | AF205 |
| 160 | 315 | 355 | 355 | 500 | AF580 | AF580 | AF400 | AF305 | AF205 | AF305 |
| 220 | 400 | 425 | 450 | 600 | AF750 | AF750 | AF580 | AF400 | AF305 | AF400 |
| 257 | 475 | 500 | 560 | 900 | AF1350 | AF750 | AF580 | AF460 | AF400 | AF460 |
| 315 | 560 | 600 | 670 | 1000 | AF1650 | AF1350 | AF750 | AF580 | AF460 | AF580 |

Three-phase transformer switching

Contactors selection

AC-6a Utilization category according to IEC 60947-4-1

General

Switching the primary of 3-phase transformers, on energization of the transformer, is characterized by high current peaks due to the magnetization phenomena.

Selection Table

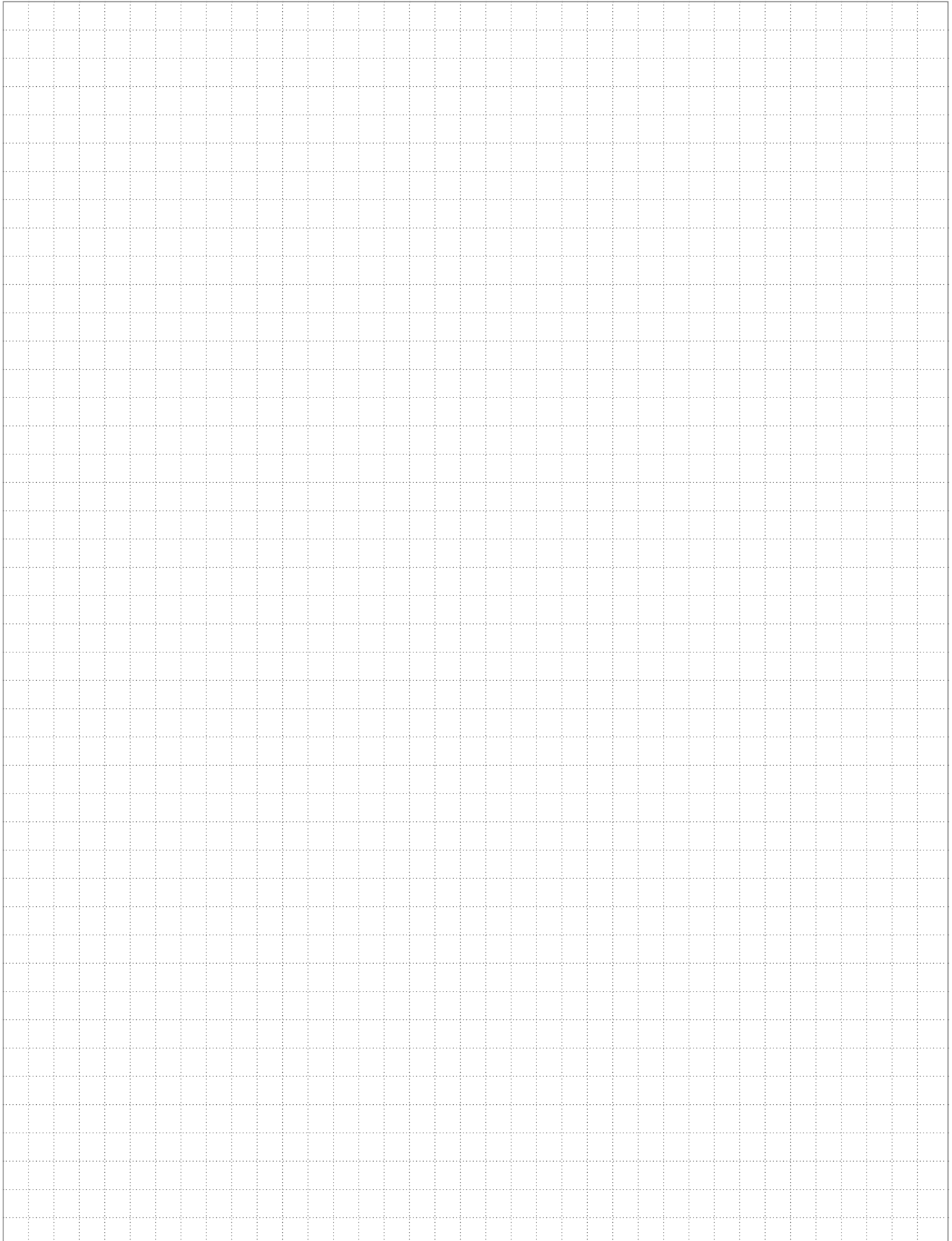
The tables below show the operational ratings for:

- current peaks up to 20 to 30 times the transformer nominal current
- maximum switching frequency of 60 operating cycles per hour
- air ambient temperature ≤ 40 °C.

| AC / DC operated contactors | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Operational power at Ue: 50/60 Hz - according to AC-6a | | | | | | | | | | | | |
| 220 / 240 V | kVA | 4 | 5 | 6 | 10 | 13 | 14 | 15 | 19 | 21 | 23 | 25 |
| 380 / 400 V | kVA | 7 | 8 | 10 | 17 | 22 | 25 | 26 | 33 | 36 | 39 | 44 |
| 415 / 440 V | kVA | 8 | 9 | 11 | 18 | 24 | 27 | 28.5 | 36 | 40 | 43 | 48 |
| 500 V | kVA | 9 | 11 | 13 | 22 | 28 | 32 | 34.5 | 43 | 48 | 52 | 57 |
| 660 / 690 V | kVA | 12.5 | 14 | 18 | 29 | 37 | 43 | 45.5 | 57 | 64 | 68 | 75 |
| Max. permissible \hat{I}_{peak} | A | 350 | 400 | 500 | 800 | 1000 | 1200 | 1250 | 1550 | 1750 | 1900 | 2100 |

| AC / DC operated contactors | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1350 | AF1650 | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|-----|
| Operational power at Ue: 50/60 Hz - according to AC-6a | | | | | | | | | | | | | | |
| 220 / 240 V | kVA | 26 | 30 | 42 | 45 | 55 | 63 | 76 | 95 | 100 | 110 | 130 | 160 | 190 |
| 380 / 400 V | kVA | 46 | 52 | 73 | 75 | 94 | 108 | 132 | 165 | 170 | 190 | 240 | 275 | 350 |
| 415 / 440 V | kVA | 50 | 57 | 80 | 80 | 103 | 118 | 144 | 180 | 190 | 210 | 270 | 325 | 390 |
| 500 V | kVA | 60 | 68 | 96 | 100 | 124 | 143 | 173 | 220 | 230 | 250 | 320 | – | – |
| 660 / 690 V | kVA | 80 | 90 | 127 | 130 | 164 | 188 | 228 | 290 | 300 | 310 | 410 | – | – |
| Max. permissible \hat{I}_{peak} | A | 2100 | 2400 | 3300 | 3500 | 4300 | 4900 | 6000 | 7700 | 8400 | 9300 | 12000 | – | – |

—
Notes



Lighting circuit switching

Contactor selection

General

Contactor selection criteria for control of lighting circuits are as follows:

- type, power rating and number of lamps
- connection mode
- current values on closing and in steady state
- power factor
- presence or not of correction capacitors.

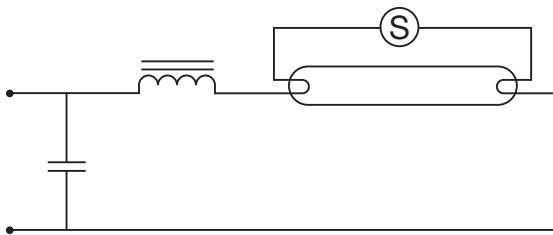
Lighting circuits

In a given circuit, the number and power rating of lamps are defined and cannot result in overload. Only short-circuit protection has to be provided. gG fuses or modular circuit-breakers will be chosen for this purpose.

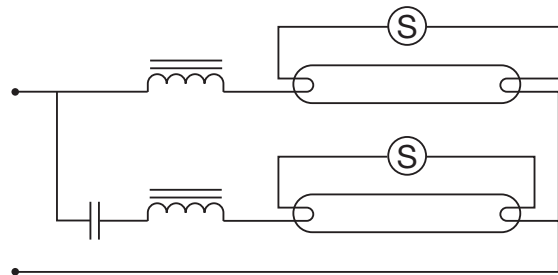
The lamps have very specific technical data, according to their construction type.

- Incandescent lamps have a very high current on closing: more than 15 times nominal current. They do not introduce a large phase displacement between current and voltage
- Fluorescent tubes are equipped with a ballast whose purpose is two-fold: contribute to ignition and limit current to nominal value once steady state is reached. This ballast is a reactor that considerably lowers the power factor. It may or may not be compensated.

Individual compensation
(parallel compensation)



Serial compensation in dual mounting



Selection of contactors

The following tables indicate, for each contactor type, the maximum permissible number of lamps per phase. Air temperature, near the contactor, must be limited to 60 °C. Numbers are given for a 230 V voltage distributed between phase and neutral: single-phase (phase + neutral) or three-phase (3 phases + neutral) distribution, lamps are wired in star connection. In the case of a three-phase supply without neutral, 230 V phase-to-phase, the permissible number of lamps per phase will be that given in the tables multiplied by 0.58.

Example:

120 x 100 W / 230 V incandescent lamps - 400 V three-phase network with distributed neutral.

Calculate the number of lamps per phase: $120 : 3 = 40$. On the 100 W line of the incandescent lamp table, contactor AF09 is limited to 38 lamps per phase, you must thus select contactor AF12 which accepts up to 43 lamps per phase.

Lighting circuit switching

Contactors selection AF09 ... AF146 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|------------------------------------|---|----|---|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | □F | | | | | | | | | | | | | | |

Incandescent and halogen lamps

according to AC-5b

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 60 | 0.27 | - | 64 | 72 | 77 | 103 | 129 | 148 | 177 | 207 | 233 | 259 | 277 | 430 | 519 | 541 |
| 100 | 0.45 | - | 38 | 43 | 46 | 62 | 77 | 89 | 106 | 124 | 140 | 155 | 166 | 258 | 311 | 324 |
| 200 | 0.91 | - | 19 | 21 | 23 | 30 | 38 | 44 | 52 | 61 | 69 | 77 | 82 | 127 | 154 | 160 |
| 300 | 1.37 | - | 12 | 14 | 15 | 20 | 25 | 29 | 35 | 41 | 46 | 51 | 54 | 85 | 102 | 107 |
| 500 | 2.28 | - | 7 | 8 | 9 | 12 | 15 | 17 | 21 | 24 | 27 | 30 | 33 | 51 | 61 | 64 |
| 1000 | 4.55 | - | 3 | 4 | 4 | 6 | 7 | 8 | 10 | 12 | 13 | 15 | 16 | 25 | 31 | 32 |

Fluorescent lamps without compensation - Fluorescent lamps with electronic starter

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|---|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| 20 | 0.38 | - | 46 | 51 | 55 | 73 | 84 | 92 | 126 | 147 | 157 | 184 | 210 | 305 | 368 | 384 |
| 40 | 0.45 | - | 38 | 43 | 46 | 62 | 71 | 77 | 106 | 124 | 133 | 155 | 177 | 258 | 311 | 324 |
| 65 | 0.70 | - | 25 | 27 | 30 | 40 | 45 | 50 | 68 | 80 | 85 | 100 | 114 | 166 | 200 | 209 |
| 80 | 0.80 | - | 21 | 24 | 26 | 35 | 40 | 43 | 60 | 70 | 75 | 87 | 100 | 145 | 175 | 183 |
| 100 | 1.15 | - | 15 | 16 | 18 | 24 | 27 | 30 | 41 | 48 | 52 | 60 | 69 | 101 | 122 | 127 |
| 110 | 1.20 | - | 14 | 16 | 17 | 23 | 26 | 29 | 40 | 46 | 50 | 58 | 66 | 97 | 117 | 122 |

Fluorescent lamps with parallel compensation

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 20 | 0.18 | 5 | 53 | 53 | 53 | 155 | 168 | 176 | 266 | 309 | 325 | 388 | 444 | 644 | 778 | 811 |
| 40 | 0.26 | 5 | 53 | 53 | 53 | 107 | 123 | 134 | 184 | 215 | 230 | 269 | 307 | 446 | 538 | 562 |
| 65 | 0.42 | 7 | 37 | 37 | 37 | 66 | 76 | 83 | 114 | 133 | 142 | 166 | 190 | 276 | 333 | 348 |
| 80 | 0.52 | 7 | 33 | 37 | 37 | 53 | 61 | 67 | 92 | 107 | 115 | 134 | 153 | 223 | 269 | 281 |
| 100 | 0.65 | 16 | 16 | 16 | 16 | 43 | 49 | 53 | 73 | 86 | 92 | 107 | 123 | 178 | 215 | 225 |
| 110 | 0.70 | 18 | 14 | 14 | 14 | 40 | 45 | 49 | 68 | 80 | 85 | 100 | 114 | 166 | 200 | 209 |

Fluorescent lamps in dual mounting

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|---------|----------|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 2 x 20 | 2 x 0.14 | - | 62 | 69 | 75 | 100 | 114 | 125 | 171 | 200 | 214 | 250 | 285 | 414 | 500 | 521 |
| 2 x 40 | 2 x 0.25 | - | 35 | 39 | 42 | 56 | 64 | 70 | 96 | 112 | 120 | 140 | 160 | 232 | 280 | 292 |
| 2 x 65 | 2 x 0.40 | - | 21 | 24 | 26 | 35 | 40 | 43 | 60 | 70 | 75 | 87 | 100 | 145 | 175 | 183 |
| 2 x 80 | 2 x 0.48 | - | 18 | 20 | 21 | 29 | 33 | 36 | 50 | 58 | 62 | 72 | 83 | 121 | 146 | 152 |
| 2 x 100 | 2 x 0.60 | - | 14 | 16 | 17 | 23 | 26 | 29 | 40 | 46 | 50 | 58 | 66 | 97 | 117 | 122 |
| 2 x 110 | 2 x 0.65 | - | 13 | 15 | 16 | 21 | 24 | 26 | 36 | 43 | 46 | 53 | 61 | 89 | 108 | 112 |

Compact fluorescent lamps

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|----|-------|---|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|
| 5 | 0.045 | - | 388 | 433 | 466 | 622 | 711 | 777 | 1066 | 1244 | 1333 | 1555 | 1777 | 2578 | 3111 | 3244 |
| 7 | 0.075 | - | 233 | 260 | 280 | 373 | 426 | 466 | 640 | 746 | 800 | 933 | 1066 | 1547 | 1867 | 1947 |
| 11 | 0.105 | - | 166 | 185 | 200 | 266 | 304 | 333 | 457 | 533 | 571 | 666 | 761 | 1105 | 1333 | 1390 |
| 15 | 0.135 | - | 129 | 144 | 155 | 207 | 237 | 259 | 355 | 414 | 444 | 518 | 592 | 859 | 1037 | 1081 |
| 20 | 0.160 | - | 109 | 121 | 131 | 175 | 200 | 218 | 300 | 350 | 375 | 437 | 500 | 725 | 875 | 913 |
| 23 | 0.180 | - | 97 | 108 | 116 | 155 | 177 | 194 | 266 | 311 | 333 | 388 | 444 | 644 | 778 | 811 |

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|------------------------------------|---|----|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | □F | | | | | | | | | | | | | | |

Incandescent and halogen lamps

according to AC-5b

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| 60 | 0.27 | - | 704 | 759 | 981 | 1130 | 1370 | 1481 | 1704 | 2148 | 2778 | 3009 | 3250 | 3972 | 4935 | 6380 |
| 100 | 0.45 | - | 422 | 456 | 589 | 678 | 822 | 889 | 1022 | 1289 | 1667 | 1806 | 1950 | 2383 | 2961 | 3828 |
| 200 | 0.91 | - | 209 | 225 | 291 | 335 | 407 | 440 | 505 | 637 | 824 | 893 | 964 | 1179 | 1464 | 1893 |
| 300 | 1.37 | - | 139 | 150 | 193 | 223 | 270 | 292 | 336 | 423 | 547 | 593 | 641 | 783 | 973 | 1257 |
| 500 | 2.28 | - | 83 | 90 | 116 | 134 | 162 | 175 | 202 | 254 | 329 | 356 | 385 | 470 | 584 | 755 |
| 1000 | 4.55 | - | 42 | 45 | 58 | 67 | 81 | 88 | 101 | 127 | 165 | 179 | 193 | 236 | 293 | 379 |

Fluorescent lamps without compensation - Fluorescent lamps with electronic starter

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|---|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|
| 20 | 0.38 | - | 500 | 539 | 697 | 803 | 974 | 1053 | 1211 | 1526 | 1974 | 2138 | 2309 | 2822 | 3507 | 4533 |
| 40 | 0.45 | - | 422 | 456 | 589 | 678 | 822 | 889 | 1022 | 1289 | 1667 | 1806 | 1950 | 2383 | 2961 | 3828 |
| 65 | 0.70 | - | 271 | 293 | 379 | 436 | 529 | 571 | 657 | 829 | 1071 | 1161 | 1254 | 1532 | 1904 | 2461 |
| 80 | 0.80 | - | 238 | 256 | 331 | 381 | 463 | 500 | 575 | 725 | 938 | 1016 | 1097 | 1341 | 1666 | 2153 |
| 100 | 1.15 | - | 165 | 178 | 230 | 265 | 322 | 348 | 400 | 504 | 652 | 707 | 763 | 933 | 1159 | 1498 |
| 110 | 1.20 | - | 158 | 171 | 221 | 254 | 308 | 333 | 383 | 483 | 625 | 677 | 731 | 894 | 1110 | 1435 |

Fluorescent lamps with parallel compensation

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 20 | 0.18 | 5 | 1056 | 1139 | 1472 | 1694 | 2056 | 2222 | 2556 | 3222 | 4167 | 4514 | 4875 | 5958 | 7403 | 9569 |
| 40 | 0.26 | 5 | 731 | 788 | 1019 | 1173 | 1423 | 1538 | 1769 | 2231 | 2885 | 3125 | 3375 | 4125 | 5125 | 6625 |
| 65 | 0.42 | 7 | 452 | 488 | 631 | 726 | 881 | 952 | 1095 | 1381 | 1786 | 1935 | 2089 | 2554 | 3173 | 4101 |
| 80 | 0.52 | 7 | 365 | 394 | 510 | 587 | 712 | 769 | 885 | 1115 | 1442 | 1563 | 1688 | 2063 | 2563 | 3313 |
| 100 | 0.65 | 16 | 292 | 315 | 408 | 469 | 569 | 615 | 708 | 892 | 1154 | 1250 | 1350 | 1650 | 2050 | 2650 |
| 110 | 0.70 | 18 | 271 | 293 | 379 | 436 | 529 | 571 | 657 | 829 | 1071 | 1161 | 1254 | 1532 | 1904 | 2461 |

Fluorescent lamps in dual mounting

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|---------|----------|---|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| 2 x 20 | 2 x 0.14 | - | 679 | 732 | 946 | 1089 | 1321 | 1429 | 1643 | 2071 | 2679 | 2902 | 3134 | 3830 | 4759 | 6152 |
| 2 x 40 | 2 x 0.25 | - | 380 | 410 | 530 | 610 | 740 | 800 | 920 | 1160 | 1500 | 1625 | 1755 | 2145 | 2665 | 3445 |
| 2 x 65 | 2 x 0.40 | - | 238 | 256 | 331 | 381 | 463 | 500 | 575 | 725 | 938 | 1016 | 1097 | 1341 | 1666 | 2153 |
| 2 x 80 | 2 x 0.48 | - | 198 | 214 | 276 | 318 | 385 | 417 | 479 | 604 | 781 | 846 | 914 | 1117 | 1388 | 1794 |
| 2 x 100 | 2 x 0.60 | - | 158 | 171 | 221 | 254 | 308 | 333 | 383 | 483 | 625 | 677 | 731 | 894 | 1110 | 1435 |
| 2 x 110 | 2 x 0.65 | - | 146 | 158 | 204 | 235 | 285 | 308 | 354 | 446 | 577 | 625 | 675 | 825 | 1025 | 1325 |

Compact fluorescent lamps

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|----|-------|---|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|
| 5 | 0.045 | - | 4222 | 4556 | 5889 | 6778 | 8222 | 8889 | 10222 | 12889 | 16667 | 18056 | 19500 | 23833 | 29611 | 38278 |
| 7 | 0.075 | - | 2533 | 2733 | 3533 | 4067 | 4933 | 5333 | 6133 | 7733 | 10000 | 10833 | 11700 | 14300 | 17767 | 22967 |
| 11 | 0.105 | - | 1810 | 1952 | 2524 | 2905 | 3524 | 3810 | 4381 | 5524 | 7143 | 7738 | 8357 | 10214 | 12690 | 16405 |
| 15 | 0.135 | - | 1407 | 1519 | 1963 | 2259 | 2741 | 2963 | 3407 | 4296 | 5556 | 6019 | 6500 | 7944 | 9870 | 12759 |
| 20 | 0.160 | - | 1188 | 1281 | 1656 | 1906 | 2313 | 2500 | 2875 | 3625 | 4688 | 5078 | 5484 | 6703 | 8328 | 10766 |
| 23 | 0.180 | - | 1056 | 1139 | 1472 | 1694 | 2056 | 2222 | 2556 | 3222 | 4167 | 4514 | 4875 | 5958 | 7403 | 9569 |

Lighting circuit switching

Contactors selection AF09 ... AF146 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|------------------------------------|---|----|---|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

Low pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 35 | 1.4 | - | 9 | 10 | 12 | 15 | 15 | 16 | 23 | 31 | 35 | 39 | 42 | 70 | 85 | 89 |
| 55 | 1.4 | - | 9 | 10 | 12 | 15 | 15 | 16 | 23 | 31 | 35 | 39 | 42 | 70 | 85 | 89 |
| 90 | 2.1 | - | 6 | 7 | 8 | 10 | 10 | 10 | 15 | 20 | 23 | 26 | 28 | 47 | 57 | 59 |
| 135 | 3.1 | - | 4 | 4 | 5 | 6 | 7 | 7 | 10 | 14 | 15 | 17 | 19 | 32 | 38 | 40 |
| 180 | 3.1 | - | 4 | 4 | 5 | 6 | 7 | 7 | 10 | 14 | 15 | 17 | 19 | 32 | 38 | 40 |

Low pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 35 | 0.6 | 20 | 12 | 12 | 12 | 35 | 36 | 38 | 55 | 73 | 81 | 91 | 100 | 164 | 198 | 207 |
| 55 | 0.6 | 20 | 12 | 12 | 12 | 35 | 36 | 38 | 55 | 73 | 81 | 91 | 100 | 164 | 198 | 207 |
| 90 | 0.9 | 25 | 10 | 10 | 10 | 23 | 24 | 25 | 36 | 48 | 55 | 61 | 66 | 110 | 132 | 138 |
| 135 | 0.9 | 45 | 5 | 5 | 5 | 18 | 18 | 19 | 34 | 34 | 36 | 57 | 59 | 110 | 132 | 138 |
| 180 | 0.9 | 45 | 5 | 5 | 5 | 18 | 18 | 19 | 34 | 34 | 36 | 57 | 59 | 110 | 132 | 138 |

High pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 150 | 1.8 | - | 7 | 8 | 9 | 11 | 12 | 12 | 18 | 24 | 27 | 30 | 33 | 45 | 54 | 57 |
| 250 | 3.0 | - | 4 | 5 | 5 | 7 | 7 | 7 | 11 | 14 | 16 | 18 | 20 | 27 | 33 | 34 |
| 400 | 4.4 | - | 3 | 3 | 3 | 4 | 5 | 5 | 7 | 10 | 11 | 12 | 13 | 18 | 22 | 23 |
| 600 | 6.2 | - | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 7 | 8 | 9 | 13 | 16 | 16 |
| 1000 | 10.3 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 8 | 10 | 10 |

High pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|-----|-----|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|
| 150 | 1.0 | 20 | 12 | 12 | 12 | 21 | 22 | 23 | 33 | 43 | 49 | 55 | 60 | 93 | 112 | 117 |
| 250 | 1.5 | 36 | 7 | 7 | 7 | 14 | 14 | 15 | 22 | 29 | 33 | 36 | 40 | 62 | 75 | 78 |
| 400 | 2.5 | 48 | 5 | 5 | 5 | 8 | 8 | 9 | 13 | 17 | 19 | 22 | 24 | 37 | 45 | 47 |
| 600 | 3.3 | 65 | 3 | 3 | 3 | 6 | 6 | 6 | 10 | 13 | 15 | 16 | 18 | 28 | 34 | 35 |
| 1000 | 6.2 | 100 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 7 | 8 | 9 | 15 | 18 | 19 |

High pressure mercury vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|
| 50 | 0.60 | - | 22 | 25 | 28 | 35 | 36 | 38 | 55 | 73 | 82 | 91 | 100 | 152 | 190 | 214 |
| 80 | 0.80 | - | 16 | 18 | 21 | 26 | 27 | 28 | 41 | 55 | 61 | 68 | 75 | 114 | 143 | 160 |
| 125 | 1.15 | - | 11 | 13 | 14 | 18 | 19 | 20 | 28 | 38 | 43 | 47 | 52 | 79 | 99 | 112 |
| 250 | 2.15 | - | 6 | 6 | 7 | 9 | 10 | 10 | 15 | 20 | 23 | 25 | 27 | 42 | 53 | 60 |
| 400 | 3.25 | - | 4 | 4 | 5 | 6 | 6 | 7 | 10 | 13 | 15 | 16 | 18 | 28 | 35 | 39 |
| 700 | 5.40 | - | 2 | 2 | 3 | 3 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 17 | 21 | 24 |
| 1000 | 7.50 | - | 1 | 2 | 2 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 12 | 15 | 17 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|
| 2000 | 8.00 | - | 1 | 1 | 2 | 2 | 2 | 2 | 4 | 5 | 6 | 6 | 7 | 11 | 14 | 16 |
|------|------|---|---|---|---|---|---|---|---|---|---|---|---|----|----|----|

High pressure mercury vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|
| 50 | 0.28 | 7 | 36 | 36 | 36 | 75 | 78 | 82 | 117 | 157 | 176 | 196 | 214 | 326 | 407 | 458 |
| 80 | 0.43 | 8 | 31 | 31 | 31 | 48 | 51 | 53 | 76 | 102 | 115 | 127 | 139 | 212 | 265 | 298 |
| 125 | 0.66 | 10 | 20 | 22 | 25 | 31 | 33 | 34 | 50 | 66 | 75 | 83 | 90 | 138 | 173 | 194 |
| 250 | 1.28 | 18 | 10 | 11 | 13 | 16 | 17 | 17 | 25 | 34 | 38 | 42 | 46 | 71 | 89 | 100 |
| 400 | 2.05 | 25 | 6 | 7 | 8 | 10 | 10 | 11 | 16 | 21 | 24 | 26 | 29 | 44 | 56 | 63 |
| 700 | 3.55 | 40 | 3 | 4 | 4 | 5 | 6 | 6 | 9 | 12 | 13 | 15 | 16 | 26 | 32 | 36 |
| 1000 | 4.83 | 60 | 2 | 3 | 3 | 4 | 4 | 4 | 6 | 9 | 10 | 11 | 12 | 19 | 24 | 27 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|
| 2000 | 5.45 | 35 | 2 | 2 | 3 | 3 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 17 | 21 | 24 |
|------|------|----|---|---|---|---|---|---|---|---|---|----|----|----|----|----|

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|------------------------------------|---|----|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

Low pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 35 | 1.4 | - | 115 | 124 | 161 | 185 | 225 | 243 | 279 | 352 | 455 | 493 | 533 | 651 | 809 | 1046 |
| 55 | 1.4 | - | 115 | 124 | 161 | 185 | 225 | 243 | 279 | 352 | 455 | 493 | 533 | 651 | 809 | 1046 |
| 90 | 2.1 | - | 77 | 83 | 107 | 123 | 150 | 162 | 186 | 235 | 304 | 329 | 355 | 434 | 539 | 697 |
| 135 | 3.1 | - | 52 | 56 | 73 | 84 | 101 | 110 | 126 | 159 | 206 | 223 | 241 | 294 | 365 | 472 |
| 180 | 3.1 | - | 52 | 56 | 73 | 84 | 101 | 110 | 126 | 159 | 206 | 223 | 241 | 294 | 365 | 472 |

Low pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| 35 | 0.6 | 20 | 269 | 290 | 375 | 432 | 524 | 567 | 652 | 822 | 1063 | 1151 | 1243 | 1519 | 1888 | 2440 |
| 55 | 0.6 | 20 | 269 | 290 | 375 | 432 | 524 | 567 | 652 | 822 | 1063 | 1151 | 1243 | 1519 | 1888 | 2440 |
| 90 | 0.9 | 25 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |
| 135 | 0.9 | 45 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |
| 180 | 0.9 | 45 | 179 | 194 | 250 | 288 | 349 | 378 | 434 | 548 | 708 | 767 | 829 | 1013 | 1258 | 1627 |

High pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 150 | 1.8 | - | 74 | 80 | 103 | 119 | 144 | 156 | 179 | 226 | 292 | 313 | 338 | 413 | 513 | 663 |
| 250 | 3.0 | - | 44 | 48 | 62 | 71 | 86 | 93 | 107 | 135 | 175 | 188 | 203 | 248 | 308 | 398 |
| 400 | 4.4 | - | 30 | 33 | 42 | 49 | 59 | 64 | 73 | 92 | 119 | 128 | 138 | 169 | 210 | 271 |
| 600 | 6.2 | - | 21 | 23 | 30 | 34 | 42 | 45 | 52 | 65 | 85 | 91 | 98 | 120 | 149 | 192 |
| 1000 | 10.3 | - | 13 | 14 | 18 | 21 | 25 | 27 | 31 | 39 | 51 | 55 | 59 | 72 | 90 | 116 |

High pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 150 | 1.0 | 20 | 152 | 164 | 212 | 244 | 296 | 320 | 368 | 464 | 600 | 625 | 675 | 825 | 1025 | 1325 |
| 250 | 1.5 | 36 | 101 | 109 | 141 | 163 | 197 | 213 | 245 | 309 | 400 | 417 | 450 | 550 | 683 | 883 |
| 400 | 2.5 | 48 | 61 | 66 | 85 | 98 | 118 | 128 | 147 | 186 | 240 | 250 | 270 | 330 | 410 | 530 |
| 600 | 3.3 | 65 | 46 | 50 | 64 | 74 | 90 | 97 | 112 | 141 | 182 | 189 | 205 | 250 | 311 | 402 |
| 1000 | 6.2 | 100 | 25 | 26 | 34 | 39 | 48 | 52 | 59 | 75 | 97 | 101 | 109 | 133 | 165 | 214 |

High pressure mercury vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 50 | 0.60 | - | 261 | 333 | 380 | 475 | 570 | 570 | 665 | 760 | 998 | 1188 | 1283 | 1568 | 1948 | 2518 |
| 80 | 0.80 | - | 196 | 249 | 285 | 356 | 428 | 428 | 499 | 570 | 748 | 891 | 962 | 1176 | 1461 | 1888 |
| 125 | 1.15 | - | 136 | 173 | 198 | 248 | 297 | 297 | 347 | 397 | 520 | 620 | 669 | 818 | 1016 | 1313 |
| 250 | 2.15 | - | 73 | 93 | 106 | 133 | 159 | 159 | 186 | 212 | 278 | 331 | 358 | 437 | 543 | 703 |
| 400 | 3.25 | - | 48 | 61 | 70 | 88 | 105 | 105 | 123 | 140 | 184 | 219 | 237 | 289 | 360 | 465 |
| 700 | 5.40 | - | 29 | 37 | 42 | 53 | 63 | 63 | 74 | 84 | 111 | 132 | 143 | 174 | 216 | 280 |
| 1000 | 7.50 | - | 21 | 27 | 30 | 38 | 46 | 46 | 53 | 61 | 80 | 95 | 103 | 125 | 156 | 201 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| 2000 | 8.00 | - | 20 | 25 | 29 | 36 | 43 | 43 | 50 | 57 | 75 | 89 | 96 | 118 | 146 | 189 |
|------|------|---|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|

High pressure mercury vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|
| 50 | 0.28 | 7 | 560 | 713 | 814 | 1018 | 1221 | 1221 | 1425 | 1629 | 2138 | 2545 | 2748 | 3359 | 4173 | 5395 |
| 80 | 0.43 | 8 | 365 | 464 | 530 | 663 | 795 | 795 | 928 | 1060 | 1392 | 1657 | 1790 | 2187 | 2717 | 3513 |
| 125 | 0.66 | 10 | 238 | 302 | 345 | 432 | 518 | 518 | 605 | 691 | 907 | 1080 | 1166 | 1425 | 1770 | 2289 |
| 250 | 1.28 | 18 | 122 | 156 | 178 | 223 | 267 | 267 | 312 | 356 | 468 | 557 | 601 | 735 | 913 | 1180 |
| 400 | 2.05 | 25 | 76 | 97 | 111 | 139 | 167 | 167 | 195 | 222 | 292 | 348 | 375 | 459 | 570 | 737 |
| 700 | 3.55 | 40 | 44 | 56 | 64 | 80 | 96 | 96 | 112 | 128 | 169 | 201 | 217 | 265 | 329 | 425 |
| 1000 | 4.83 | 60 | 32 | 41 | 47 | 59 | 71 | 71 | 83 | 94 | 124 | 148 | 159 | 195 | 242 | 313 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| 2000 | 5.45 | 35 | 29 | 37 | 42 | 52 | 63 | 63 | 73 | 84 | 110 | 131 | 141 | 173 | 214 | 277 |
|------|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|

Lighting circuit switching

Contactor selection AF09 ... AF146 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF09 | AF12 | AF16 | AF26 | AF30 | AF38 | AF40 | AF52 | AF65 | AF80 | AF96 | AF116 | AF140 | AF146 |
|------------------------------------|---|----|---|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

Metal halide vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 250 | 3 | - | 4 | 5 | 5 | 7 | 7 | 7 | 11 | 14 | 16 | 18 | 20 | 27 | 33 | 38 |
| 400 | 4 | - | 3 | 3 | 4 | 5 | 5 | 5 | 8 | 11 | 12 | 13 | 15 | 20 | 25 | 28 |
| 1000 | 9.5 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 8 | 11 | 12 |
| 2000 | 16.5 | - | 0 | 0 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 3 | 5 | 6 | 7 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|
| 2000 | 10.5 | - | 1 | 1 | 1 | 2 | 2 | 2 | 3 | 4 | 4 | 5 | 5 | 8 | 10 | 11 |
|------|------|---|---|---|---|---|---|---|---|---|---|---|---|---|----|----|

Metal halide vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|-----|---|---|---|----|----|----|----|----|----|----|----|----|----|----|
| 250 | 1.32 | 33 | 7 | 7 | 7 | 15 | 16 | 17 | 25 | 33 | 37 | 41 | 45 | 69 | 86 | 97 |
| 400 | 2.22 | 45 | 5 | 5 | 5 | 9 | 9 | 10 | 14 | 19 | 22 | 24 | 27 | 41 | 51 | 58 |
| 1000 | 5.14 | 85 | 2 | 2 | 3 | 4 | 4 | 4 | 6 | 8 | 9 | 10 | 11 | 18 | 22 | 25 |
| 2000 | 11.5 | 148 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 4 | 5 | 8 | 10 | 11 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|---|---|---|---|---|---|---|---|---|---|---|----|----|----|
| 2000 | 6.10 | 60 | 2 | 2 | 2 | 3 | 3 | 3 | 5 | 7 | 8 | 9 | 9 | 15 | 19 | 21 |
|------|------|----|---|---|---|---|---|---|---|---|---|---|---|----|----|----|

Lighting circuit switching

Contactor selection AF190 ... AF2650 3-pole contactors

Selection table

| 3-pole AC / DC operated contactors | | | AF190 | AF205 | AF265 | AF305 | AF370 | AF400 | AF460 | AF580 | AF750 | AF1250 | AF1350 | AF1650 | AF2050 | AF2650 |
|------------------------------------|---|----|---|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

Metal halide vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 250 | 3 | - | 46 | 58 | 67 | 83 | 100 | 100 | 117 | 133 | 175 | 208 | 225 | 275 | 342 | 442 |
| 400 | 4 | - | 34 | 44 | 50 | 63 | 75 | 75 | 88 | 100 | 131 | 156 | 169 | 206 | 256 | 331 |
| 1000 | 9.5 | - | 14 | 18 | 21 | 26 | 32 | 32 | 37 | 42 | 55 | 66 | 71 | 87 | 108 | 139 |
| 2000 | 16.5 | - | 8 | 11 | 12 | 15 | 18 | 18 | 21 | 24 | 32 | 38 | 41 | 50 | 62 | 80 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 2000 | 10.5 | - | 13 | 17 | 19 | 24 | 29 | 29 | 33 | 38 | 50 | 60 | 64 | 79 | 98 | 126 |
|------|------|---|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|

Metal halide vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| 250 | 1.32 | 33 | 119 | 151 | 173 | 216 | 259 | 259 | 302 | 345 | 453 | 540 | 583 | 713 | 885 | 1144 |
| 400 | 2.22 | 45 | 71 | 90 | 103 | 128 | 154 | 154 | 180 | 205 | 270 | 321 | 347 | 424 | 526 | 680 |
| 1000 | 5.14 | 85 | 30 | 39 | 44 | 55 | 67 | 67 | 78 | 89 | 116 | 139 | 150 | 183 | 227 | 294 |
| 2000 | 11.5 | 148 | 14 | 17 | 20 | 25 | 30 | 30 | 35 | 40 | 52 | 62 | 67 | 82 | 102 | 131 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 2000 | 6.10 | 60 | 26 | 33 | 37 | 47 | 56 | 56 | 65 | 75 | 98 | 117 | 126 | 154 | 192 | 248 |
|------|------|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|

Lighting circuit switching

Contactors selection AF09 ... AF370 4-pole contactors

Selection table

| 4-pole AC / DC operated contactors | | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|------------------------------------|---|----|---|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

Incandescent and halogen lamps

according to AC-5b

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 60 | 0.27 | - | 64 | 77 | 103 | 114 | 177 | 207 | 259 | 430 | 519 | 704 | 759 | 981 | 1130 | 1370 |
| 100 | 0.45 | - | 38 | 46 | 62 | 68 | 106 | 124 | 155 | 258 | 311 | 422 | 456 | 589 | 678 | 822 |
| 200 | 0.91 | - | 19 | 23 | 30 | 34 | 52 | 61 | 77 | 127 | 154 | 209 | 225 | 291 | 335 | 407 |
| 300 | 1.37 | - | 12 | 15 | 20 | 22 | 35 | 41 | 51 | 85 | 102 | 139 | 150 | 193 | 223 | 270 |
| 500 | 2.28 | - | 7 | 9 | 12 | 13 | 21 | 24 | 30 | 51 | 61 | 83 | 90 | 116 | 134 | 162 |
| 1000 | 4.55 | - | 3 | 4 | 6 | 6 | 10 | 12 | 15 | 25 | 31 | 42 | 45 | 58 | 67 | 81 |

Fluorescent lamps without compensation - Fluorescent lamps with electronic starter

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|---|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 20 | 0.38 | - | 46 | 55 | 73 | 81 | 126 | 147 | 184 | 305 | 368 | 500 | 539 | 697 | 803 | 974 |
| 40 | 0.45 | - | 38 | 46 | 62 | 68 | 106 | 124 | 155 | 258 | 311 | 422 | 456 | 589 | 678 | 822 |
| 65 | 0.70 | - | 25 | 30 | 40 | 44 | 68 | 80 | 100 | 166 | 200 | 271 | 293 | 379 | 436 | 529 |
| 80 | 0.80 | - | 21 | 26 | 35 | 38 | 60 | 70 | 87 | 145 | 175 | 238 | 256 | 331 | 381 | 463 |
| 100 | 1.15 | - | 15 | 18 | 24 | 26 | 41 | 48 | 60 | 101 | 122 | 165 | 178 | 230 | 265 | 322 |
| 110 | 1.20 | - | 14 | 17 | 23 | 25 | 40 | 46 | 58 | 97 | 117 | 158 | 171 | 221 | 254 | 308 |

Fluorescent lamps with parallel compensation

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|------|----|----|----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| 20 | 0.18 | 5 | 53 | 53 | 110 | 110 | 266 | 309 | 309 | 644 | 778 | 1056 | 1139 | 1472 | 1694 | 2056 |
| 40 | 0.26 | 5 | 53 | 53 | 107 | 110 | 184 | 215 | 269 | 446 | 538 | 731 | 788 | 1019 | 1173 | 1423 |
| 65 | 0.42 | 7 | 37 | 37 | 66 | 73 | 114 | 133 | 166 | 276 | 333 | 452 | 488 | 631 | 726 | 881 |
| 80 | 0.52 | 7 | 33 | 37 | 53 | 59 | 92 | 107 | 134 | 223 | 269 | 365 | 394 | 510 | 587 | 712 |
| 100 | 0.65 | 16 | 16 | 16 | 34 | 34 | 73 | 86 | 96 | 178 | 215 | 292 | 315 | 408 | 469 | 569 |
| 110 | 0.70 | 18 | 14 | 14 | 30 | 30 | 68 | 80 | 86 | 166 | 200 | 271 | 293 | 379 | 436 | 529 |

Fluorescent lamps in dual mounting

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|---------|----------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 2 x 20 | 2 x 0.14 | - | 62 | 75 | 100 | 110 | 171 | 200 | 250 | 414 | 500 | 679 | 732 | 946 | 1089 | 1321 |
| 2 x 40 | 2 x 0.25 | - | 35 | 42 | 56 | 62 | 96 | 112 | 140 | 232 | 280 | 380 | 410 | 530 | 610 | 740 |
| 2 x 65 | 2 x 0.40 | - | 21 | 26 | 35 | 38 | 60 | 70 | 87 | 145 | 175 | 238 | 256 | 331 | 381 | 463 |
| 2 x 80 | 2 x 0.48 | - | 18 | 21 | 29 | 32 | 50 | 58 | 72 | 121 | 146 | 198 | 214 | 276 | 318 | 385 |
| 2 x 100 | 2 x 0.60 | - | 14 | 17 | 23 | 25 | 40 | 46 | 58 | 97 | 117 | 158 | 171 | 221 | 254 | 308 |
| 2 x 110 | 2 x 0.65 | - | 13 | 16 | 21 | 23 | 36 | 43 | 53 | 89 | 108 | 146 | 158 | 204 | 235 | 285 |

Compact fluorescent lamps

according to AC-5a

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|----|-------|---|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|
| 5 | 0.045 | - | 388 | 466 | 622 | 688 | 1066 | 1244 | 1555 | 2578 | 3111 | 4222 | 4556 | 5889 | 6778 | 8222 |
| 7 | 0.075 | - | 233 | 280 | 373 | 413 | 640 | 746 | 933 | 1547 | 1867 | 2533 | 2733 | 3533 | 4067 | 4933 |
| 11 | 0.105 | - | 166 | 200 | 266 | 295 | 457 | 533 | 666 | 1105 | 1333 | 1810 | 1952 | 2524 | 2905 | 3524 |
| 15 | 0.135 | - | 129 | 155 | 207 | 229 | 355 | 414 | 518 | 859 | 1037 | 1407 | 1519 | 1963 | 2259 | 2741 |
| 20 | 0.160 | - | 109 | 131 | 175 | 193 | 300 | 350 | 437 | 725 | 875 | 1188 | 1281 | 1656 | 1906 | 2313 |
| 23 | 0.180 | - | 97 | 116 | 155 | 172 | 266 | 311 | 388 | 644 | 778 | 1056 | 1139 | 1472 | 1694 | 2056 |

Low pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|---|---|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 35 | 1.4 | - | 9 | 12 | 15 | 16 | 23 | 31 | 39 | 70 | 85 | 115 | 124 | 161 | 185 | 225 |
| 55 | 1.4 | - | 9 | 12 | 15 | 16 | 23 | 31 | 39 | 70 | 85 | 115 | 124 | 161 | 185 | 225 |
| 90 | 2.1 | - | 6 | 8 | 10 | 10 | 15 | 20 | 26 | 47 | 57 | 77 | 83 | 107 | 123 | 150 |
| 135 | 3.1 | - | 4 | 5 | 6 | 7 | 10 | 14 | 17 | 32 | 38 | 52 | 56 | 73 | 84 | 101 |
| 180 | 3.1 | - | 4 | 5 | 6 | 7 | 10 | 14 | 17 | 32 | 38 | 52 | 56 | 73 | 84 | 101 |

Low pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|-----|-----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| 35 | 0.6 | 20 | 12 | 12 | 27 | 27 | 55 | 73 | 77 | 164 | 198 | 269 | 290 | 375 | 432 | 524 |
| 55 | 0.6 | 20 | 12 | 12 | 27 | 27 | 55 | 73 | 77 | 164 | 198 | 269 | 290 | 375 | 432 | 524 |
| 90 | 0.9 | 25 | 10 | 10 | 22 | 22 | 36 | 48 | 61 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |
| 135 | 0.9 | 45 | 5 | 5 | 12 | 12 | 34 | 34 | 34 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |
| 180 | 0.9 | 45 | 5 | 5 | 12 | 12 | 34 | 34 | 34 | 110 | 132 | 179 | 194 | 250 | 288 | 349 |

Lighting circuit switching

Contactors selection AF09 ... AF370 4-pole contactors

Selection table

| 4-pole AC / DC operated contactors | | | AF09 | AF16 | AF26 | AF38 | AF40 | AF52 | AF80 | AF116 | AF140 | AF190 | AF205 | AF265 | AF305 | AF370 |
|------------------------------------|---|----|---|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Lamp characteristics | | | Maximum permissible number of lamps per phase | | | | | | | | | | | | | |
| W | A | μF | | | | | | | | | | | | | | |

High pressure sodium vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|----|----|----|----|----|----|----|----|----|-----|-----|-----|
| 150 | 1.8 | - | 7 | 9 | 11 | 12 | 18 | 24 | 30 | 45 | 54 | 74 | 80 | 103 | 119 | 144 |
| 250 | 3.0 | - | 4 | 5 | 7 | 7 | 11 | 14 | 18 | 27 | 33 | 44 | 48 | 62 | 71 | 86 |
| 400 | 4.4 | - | 3 | 3 | 4 | 5 | 7 | 10 | 12 | 18 | 22 | 30 | 33 | 42 | 49 | 59 |
| 600 | 6.2 | - | 2 | 2 | 3 | 3 | 5 | 7 | 8 | 13 | 16 | 21 | 23 | 30 | 34 | 42 |
| 1000 | 10.3 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 10 | 13 | 14 | 18 | 21 | 25 |

High pressure sodium vapour lamps with parallel compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|-----|-----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| 150 | 1.0 | 20 | 12 | 12 | 21 | 23 | 33 | 43 | 55 | 93 | 112 | 152 | 164 | 212 | 244 | 296 |
| 250 | 1.5 | 36 | 7 | 7 | 14 | 15 | 22 | 29 | 36 | 62 | 75 | 101 | 109 | 141 | 163 | 197 |
| 400 | 2.5 | 48 | 5 | 5 | 8 | 9 | 13 | 17 | 22 | 37 | 45 | 61 | 66 | 85 | 98 | 118 |
| 600 | 3.3 | 65 | 3 | 3 | 6 | 6 | 10 | 13 | 16 | 28 | 34 | 46 | 50 | 64 | 74 | 90 |
| 1000 | 6.2 | 100 | 2 | 2 | 3 | 3 | 5 | 7 | 8 | 15 | 18 | 25 | 26 | 34 | 39 | 48 |

High pressure mercury vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| 50 | 0.60 | - | 22 | 28 | 35 | 38 | 55 | 73 | 91 | 152 | 190 | 261 | 333 | 380 | 475 | 570 |
| 80 | 0.80 | - | 16 | 21 | 26 | 28 | 41 | 55 | 68 | 114 | 143 | 196 | 249 | 285 | 356 | 428 |
| 125 | 1.15 | - | 11 | 14 | 18 | 20 | 28 | 38 | 47 | 79 | 99 | 136 | 173 | 198 | 248 | 297 |
| 250 | 2.15 | - | 6 | 7 | 9 | 10 | 15 | 20 | 25 | 42 | 53 | 73 | 93 | 106 | 133 | 159 |
| 400 | 3.25 | - | 4 | 5 | 6 | 7 | 10 | 13 | 16 | 28 | 35 | 48 | 61 | 70 | 88 | 105 |
| 700 | 5.40 | - | 2 | 3 | 3 | 4 | 6 | 8 | 10 | 17 | 21 | 29 | 37 | 42 | 53 | 63 |
| 1000 | 7.50 | - | 1 | 2 | 2 | 3 | 4 | 5 | 7 | 12 | 15 | 21 | 27 | 30 | 38 | 46 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 2000 | 8 | - | 1 | 2 | 2 | 2 | 4 | 5 | 6 | 11 | 14 | 20 | 25 | 29 | 36 | 43 |
|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|

High pressure mercury vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| 50 | 0.28 | 7 | 36 | 36 | 75 | 79 | 117 | 157 | 196 | 326 | 407 | 560 | 713 | 814 | 1018 | 1221 |
| 80 | 0.43 | 8 | 31 | 31 | 48 | 53 | 76 | 102 | 127 | 212 | 265 | 365 | 464 | 530 | 663 | 795 |
| 125 | 0.66 | 10 | 20 | 25 | 31 | 34 | 50 | 66 | 83 | 138 | 173 | 238 | 302 | 345 | 432 | 518 |
| 250 | 1.28 | 18 | 10 | 13 | 16 | 17 | 25 | 34 | 42 | 71 | 89 | 122 | 156 | 178 | 223 | 267 |
| 400 | 2.05 | 25 | 6 | 8 | 10 | 11 | 16 | 21 | 26 | 44 | 56 | 76 | 97 | 111 | 139 | 167 |
| 700 | 3.55 | 40 | 3 | 4 | 5 | 6 | 9 | 12 | 15 | 26 | 32 | 44 | 56 | 64 | 80 | 96 |
| 1000 | 4.83 | 60 | 2 | 3 | 4 | 4 | 6 | 9 | 11 | 19 | 24 | 32 | 41 | 47 | 59 | 71 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| 2000 | 5.45 | 35 | 2 | 3 | 3 | 4 | 6 | 8 | 10 | 17 | 21 | 29 | 37 | 42 | 52 | 63 |
|------|------|----|---|---|---|---|---|---|----|----|----|----|----|----|----|----|

Metal halide vapour lamps without compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|---|----|----|----|----|----|----|----|----|----|-----|
| 250 | 3 | - | 4 | 5 | 7 | 7 | 11 | 14 | 18 | 27 | 33 | 46 | 58 | 67 | 83 | 100 |
| 400 | 4 | - | 3 | 4 | 5 | 5 | 8 | 11 | 13 | 20 | 25 | 34 | 44 | 50 | 63 | 75 |
| 1000 | 9.5 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 11 | 14 | 18 | 21 | 26 | 32 |
| 2000 | 16.5 | - | 0 | 1 | 1 | 1 | 2 | 2 | 3 | 5 | 6 | 8 | 11 | 12 | 15 | 18 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|
| 2000 | 10.5 | - | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 8 | 10 | 13 | 17 | 19 | 24 | 29 |
|------|------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|

Metal halide vapour lamps with compensation

Voltage: 220/240 V AC

| | | | | | | | | | | | | | | | | |
|------|------|-----|---|---|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|
| 250 | 1.32 | 33 | 7 | 7 | 15 | 16 | 25 | 33 | 41 | 69 | 86 | 119 | 151 | 173 | 216 | 259 |
| 400 | 2.22 | 45 | 5 | 5 | 9 | 10 | 14 | 19 | 24 | 41 | 51 | 71 | 90 | 103 | 128 | 154 |
| 1000 | 5.14 | 85 | 2 | 3 | 4 | 4 | 6 | 8 | 10 | 18 | 22 | 30 | 39 | 44 | 55 | 67 |
| 2000 | 11.5 | 148 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 8 | 10 | 14 | 17 | 20 | 25 | 30 |

Voltage: 380/415 V AC

| | | | | | | | | | | | | | | | | |
|------|------|----|---|---|---|---|---|---|---|----|----|----|----|----|----|----|
| 2000 | 6.10 | 60 | 2 | 2 | 3 | 3 | 5 | 7 | 9 | 15 | 19 | 26 | 33 | 37 | 47 | 56 |
|------|------|----|---|---|---|---|---|---|---|----|----|----|----|----|----|----|

Parallel connection of main poles

General

Purpose: Increasing the AC resistive load by wiring connection of main poles in parallel.

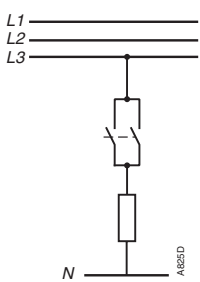
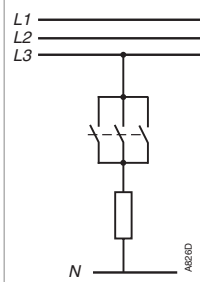
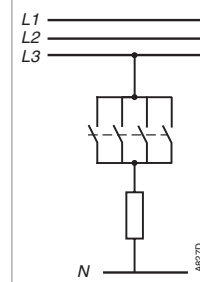
Remarks:

- Parallel connection of main poles to increase the DC resistive load is not acceptable
- Parallel connection of main poles does not increase the breaking capacity.

The table below shows the uprating factor for I_e / AC-1 max. in relation to the number of poles wired connected in parallel and for a maximum switching frequency.

Note: The poles can be connected in parallel via following connecting strips. See details and permissible current in "Accessory" part.

- LP, LH, LY and LF for parallel connection of 2 or 3 poles
- LG for parallel connection of 4 poles.

| | | |  |  |  |
|--------------------------|-------------------|------------|--|--|---|
| | | | 2 poles in parallel | 3 poles in parallel | 4 poles in parallel |
| Contactors | | | Factor to be applied to the rated operational current I_e / AC-1 to obtain the permissible current I_e / AC-1 with "n" poles in parallel | | |
| AC operated | DC operated | Cycles / h | | | |
| 3-pole contactors | | | | | |
| AF09 ... AF96 | AF09 ... AF96 | 600 | 1.6 | 2.2 | - |
| AF116 ... AF1250 | AF116 ... AF1250 | 300 | 1.6 | 2.2 | - |
| AF1350 ... AF2650 | AF1350 ... AF2650 | 30 | 1.6 | 2.2 | - |
| 4-pole contactors | | | | | |
| AF09 ... AF38 | AF09 ... AF38 | 600 | 1.6 | 2.2 | 2.6 |
| A45 ... A75 | AE45 ... AE75 | 300 | 1.6 | 2.2 | 2.6 |
| AF45 ... AF75 | TAE45 ... TAE75 | | | | |
| | AF45 ... AF75 | | | | |
| EK | EK | 300 | 1.6 | 2.2 | 2.8 |

Temporary or intermittent duty

Utilization of contactors for temporary / intermittent duty

The table below shows the factor (known as "On-load factor") to be applied to the rated operational current I_e / AC-1 to obtain the permissible operational current I_e / AC-1 in relation to the switching frequency and the current flow time per cycle.

| Operating cycles per hour | 1 | 2 | 3 | 6 | 12 | 20 | 30 | 60 | 120 | |
|---|------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Preferred classes acc. to IEC 60947-4-1 | 1 | - | 3 | - | 12 | - | 30 | - | 120 | |
| Current flow time per cycle | Factors applicable to I_e / AC-1 | | | | | | | | | |
| 5 s | 5.2 | 5 | 4.9 | 4.7 | 4.3 | 4.0 | 3.7 | 3.4 | 2.8 | |
| 10 s | 3.8 | 3.7 | 3.6 | 3.4 | 3.1 | 3.0 | 2.8 | 2.6 | 2.2 | |
| 20 s | 2.8 | 2.7 | 2.7 | 2.6 | 2.5 | 2.4 | 2.2 | 2.0 | 1.5 | |
| 30 s | 2.4 | 2.3 | 2.3 | 2.2 | 2.1 | 2.1 | 1.9 | 1.7 | - | |
| 40 s | 2.2 | 2.1 | 2.1 | 2.0 | 1.9 | 1.9 | 1.7 | 1.5 | - | |
| 60 s | 1.9 | 1.8 | 1.8 | 1.8 | 1.7 | 1.7 | 1.5 | - | - | |

Example:

AF09 contactor (intermittent duty, resistive load)

Rated operational current I_e / AC-1 at 60 °C

(see "Technical data: main pole utilization characteristics") 25 A

Switching frequency 2 operating cycles/h

Current flow time per cycle 20 s

Factor to be applied to the current I_e / AC-1 2.7

Permissible current: $2.7 \times 25 = 67$ A

Influence of the length of conductors used in contactor control circuit



AF40-30-00



AF370-30-11

Under certain conditions the excessive length of the control circuit conductors may prevent the contactor from carrying out closing and opening orders.

- **no closing:** due to excessive voltage drop (in AC or DC)
- **no opening:** due to excessive capacitance (in AC).

Contactor Closing (contactor with AC or DC operated coil).

The voltage drop is due to the pull-in current (pull-in power) and to the resistance of the control circuit conductors.

The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:

- the coil pull-in consumption.
- the supply voltage.
- the connecting wire cross-sectional area.

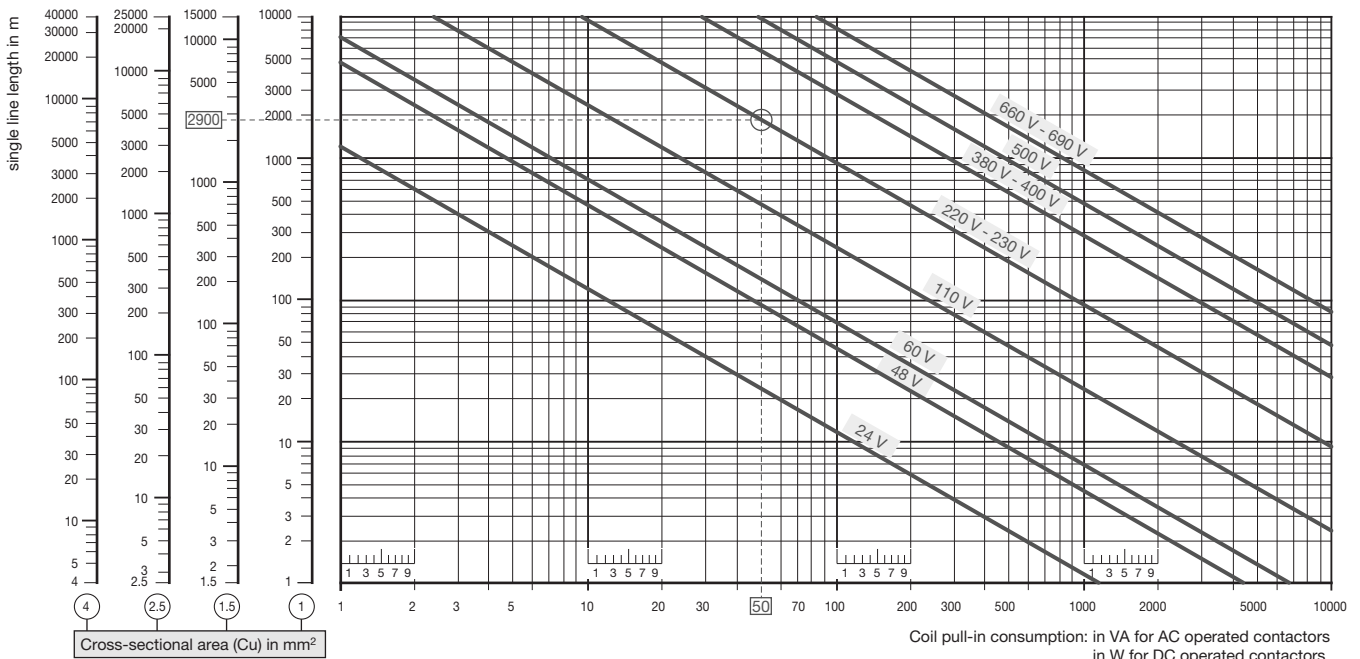
The graph has been drawn for a max. line voltage drop of 5 %.

Coil pull-in consumption (average value)

| 3-pole contactors | AC control supply 50/60 Hz | DC control supply | 4-pole contactors | AC control supply 50/60 Hz | DC control supply |
|--|-------------------------------|-------------------|----------------------------|-------------------------------|-------------------|
| AF09, AF12, AF16, AF26, AF30, AF38 | 50 VA | 50 W | AF09, AF16, AF26, AF38 | 50 VA | 50 W |
| AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z | 20 VA | 20 W | AF09Z, AF16Z, AF26Z, AF38Z | 20 W | 20 W |
| AF40, AF52, AF65 | 25 VA | 25 W | AF40, AF52, AF80 | 40 VA | 40 W |
| AF80, AF96 | 40 VA | 40 W | AF116, AF140 | 185 VA | 170 W |
| AF116, AF140, AF146 | 180 VA | 170 W | AF190, AF205 | 190 VA | 180 W |
| AF190, AF205 | 195 VA | 185 W | AF265, AF305, AF370 | 405 VA | 445 W |
| AF265, AF305, AF370 | 405 VA | 465 W | | | |
| AF400, AF460 | 1005 VA | 960 W | | | |
| AF580, AF750, AF1250 | 940 VA | 900 W | | | |
| AF1350, AF1650, AF2050, AF2650 | 2450 VA | 2290 W | | | |

Permissible single length for the control circuit conductors on contactor closing:

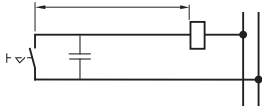
Depending on the coil pull-in power consumption on the supply voltage and on the control circuit conductor cross-sectional area.



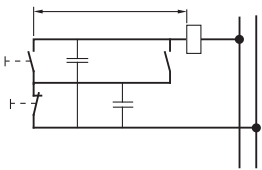
Example AF09 contactor: Coil voltage: 230 V 50 Hz, contactor coil pull-in power consumption: 50 VA, control circuit conductor cross-sectional area: Cu 1.5 mm². Max. permissible length: 2900 m.

Influence of the length of conductors used in contactor control circuit

Single control line length



Wiring diagram A
Via maintained pushbutton and 2-core cable (with a capacity of 0.2 µF/km, for example).



Wiring diagram B
Via momentary pushbutton plus hold-in contact and 3-core cable (with a capacity of 2 x 0.2 = 0.4 µF/km, for example).

Contactor Opening (contactor with AC operated coil)

Under certain conditions, an AC operated contactor does not open when the control circuit is de-energized.

This is due to a critical capacity of the excessively long control circuit line and the type of contactor coil control layout (see diagrams A and B opposite). This may be caused by the following factors:

- high control voltage
- low coil holding consumption
- low contactor drop-out voltage (according to IEC 60947-4-1: 0.2 to 0.75 x U_c).

If lines longer than those indicated are required, the following measures must be taken:

- select a contactor with a higher rating
- select a lower control voltage
- connect "Rp" resistance in parallel with the contactor coil:

$$R_P = \frac{103}{C} \quad (\text{with } C \text{ in } \mu\text{F})$$

The table and graph below can be used to determine the single length of line feeders (distance between the control device and the contactor coil) in relation to:

- the coil holding consumption VA
- the supply voltage
- the capacity in µF/km (depending on the control layout).

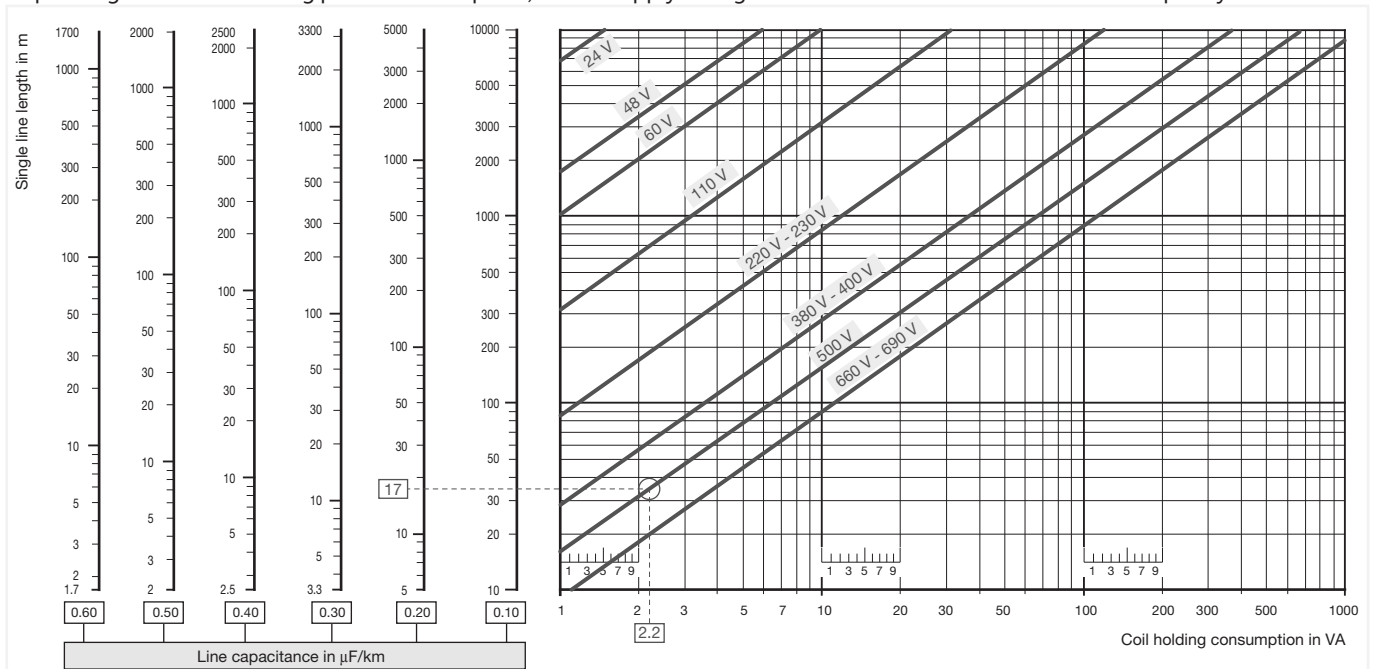
Wiring diagrams A and B opposite show two supply and coil control wiring examples.

Coil holding consumption (average value)

| 3-pole contactors | AC control supply | 4-pole contactors | AC control supply |
|--|-------------------|----------------------------|-------------------|
| | 50/60 Hz | | 50/60 Hz |
| AF09, AF12, AF16, AF26, AF30, AF38 | 2.2 VA | AF09, AF16, AF26, AF38 | 2.2 VA |
| AF09Z, AF12Z, AF16Z, AF26Z, AF30Z, AF38Z | 1.7 VA | AF09Z, AF16Z, AF26Z, AF38Z | 1.7 VA |
| AF40, AF52, AF65, AF80, AF96 | 4 VA | AF40, AF52, AF80 | 4 VA |
| AF116, AF140, AF146 | 8.9 VA | AF116, AF140, AF190, AF205 | 8 VA |
| AF190, AF205 | 9.3 VA | AF265, AF305, AF370 | 16 VA |
| AF265, AF305, AF370 | 16.6 VA | | |
| AF400, AF460, AF580, AF750, AF1250 | 12 VA | | |
| AF1350, AF1650, AF2050, AF2650 | 48 VA | | |

Permissible single length for the control circuit conductors on contactor opening:

Depending on the coil holding power consumption, on the supply voltage and on the control circuit conductor capacity.



Example AF16 contactor: Coil voltage U_c = 500 V, 50 Hz, 2.2 VA contactor coil holding consumption, control type: diagram A, via maintained pushbutton, and 2-core cable with a capacity of 0.2 µF/km. Max. permissible length: 17 m.

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give the order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the order code according to the table below. Example: for contactor AF400-30-11 and coil 100...250 V 50/60 Hz, the order code is: 1SFL577001R7011.

AF09 ... AF370 3-pole contactors

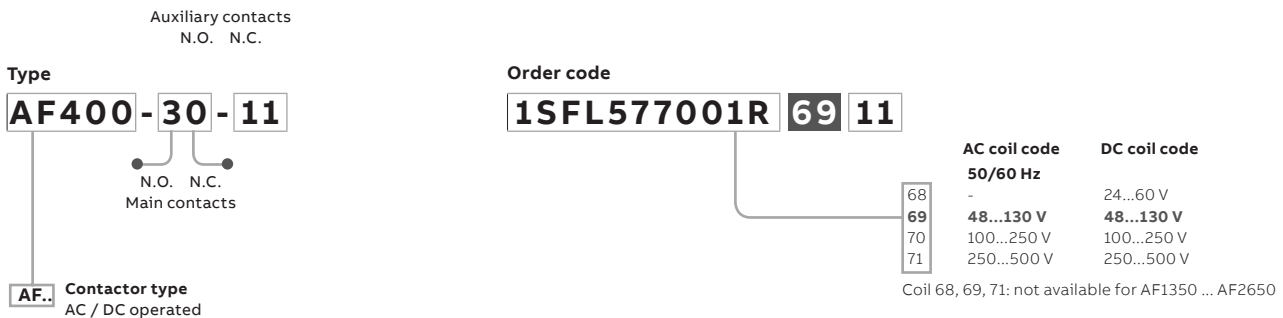
AF09 ... AF370 4-pole contactors



AF116 ... AF370 3-pole contactors with built-in PLC interface

| | AC coil code 50/60 Hz | DC coil code |
|----|-----------------------|--------------|
| 33 | 100...250 V | 100...250 V |
| 34 | 250...500 V | 250...500 V |

AF400 ... AF2650 3-pole contactors

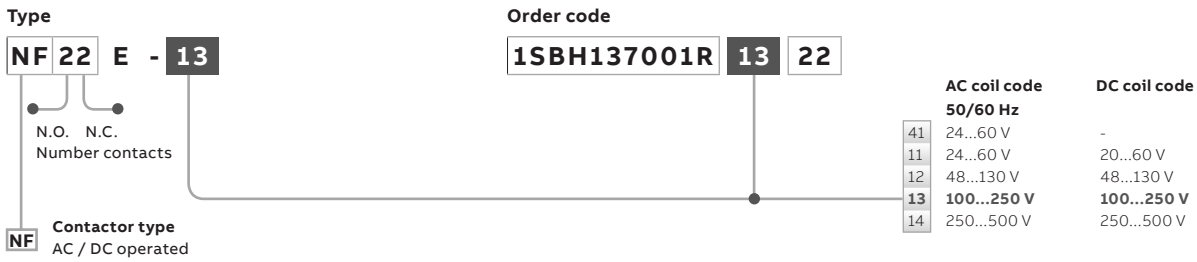


AF09 ... AF38 3- and 4-pole contactors - low consumption

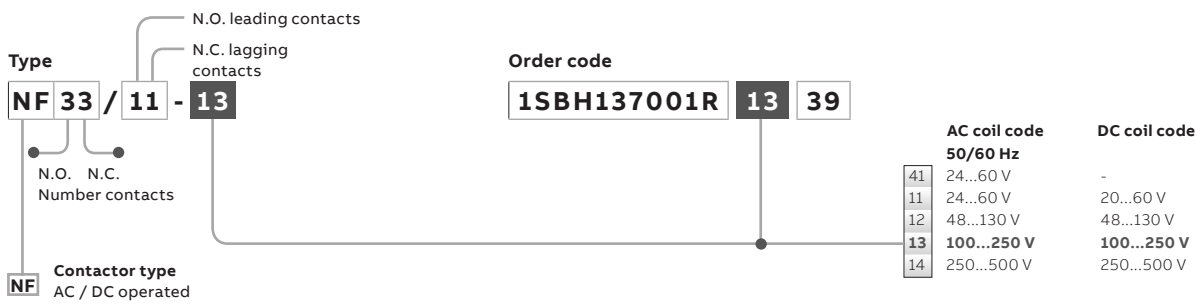


Voltage code table

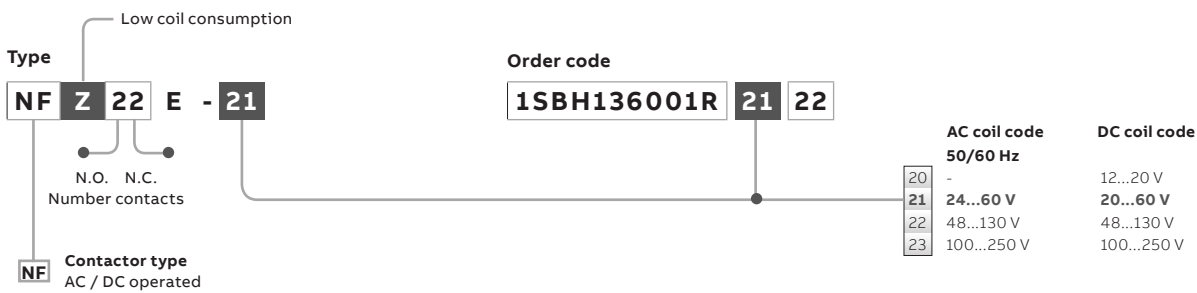
NF contactor relays



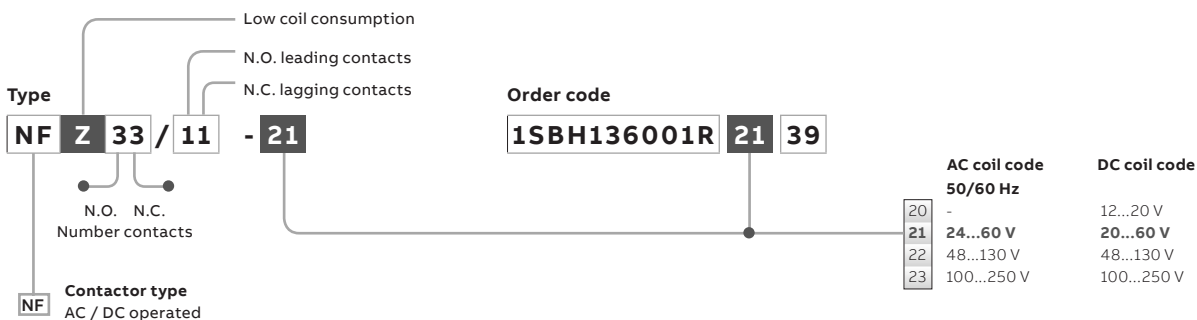
NF contactor relays with overlapping of lagging / leading contacts



NF contactor relays - low consumption



NF contactor relays with overlapping of lagging / leading contacts - low consumption



Voltage code table

GA contactors

Type

GA75 - 10 - 00

GA
GAE

Contactor type
DC switching - AC operated
DC switching - DC operated

Order code

1SBL411025R 80 00

Contactors: GA
AC coil code

| | 50 Hz | 60 Hz |
|----|-------------|-------------|
| 81 | 24 V | 24 V |
| 82 | 42 V | 42 V |
| 83 | 48 V | 48 V |
| 84 | 110 V | 110...120 V |
| 89 | 110...115 V | 115...127 V |
| 80 | 220...230 V | 230...240 V |
| 88 | 230...240 V | 240...260 V |
| 42 | 230...240 V | 277 V |
| 85 | 380...400 V | 400...415 V |
| 86 | 400...415 V | 415...440 V |

Codes in bold for dual frequency coils.

Contactors: GAE
DC coil code

| | |
|----|-------|
| 80 | 12 V |
| 81 | 24 V |
| 83 | 48 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |
| 89 | 240 V |
| 38 | 250 V |

GAF185 ... GAF300 contactors

Type

GAF185 - 10 - 11

GAF

Contactor type
AC / DC operated

Order code

1SFL497025R 69 11

AC coil code

| | 50/60 Hz |
|----|-------------|
| 72 | - 20...60 V |
| 69 | 48...130 V |
| 70 | 100...250 V |

DC coil code

| |
|-------------|
| 48...130 V |
| 100...250 V |

GAF460 ... GAF1250 contactors

Type

GAF460 - 10 - 11

GAF

Contactor type
AC / DC operated

Order code

1SFL597025R 69 11

AC coil code

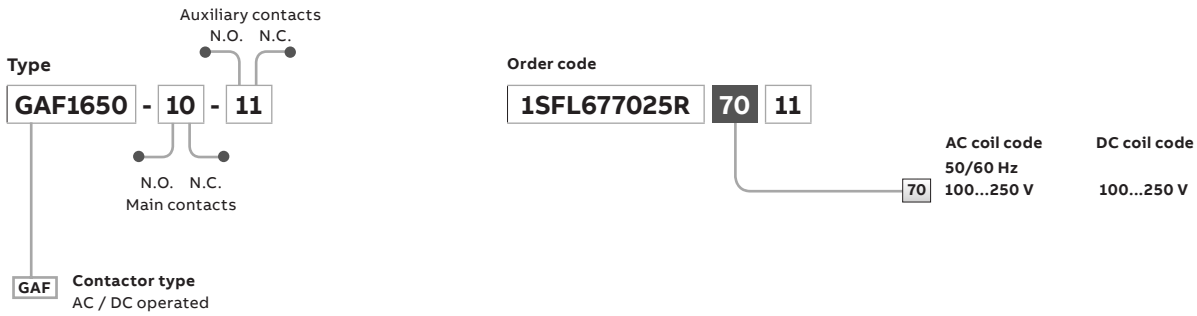
| | 50/60 Hz |
|----|-------------|
| 68 | - 24...60 V |
| 69 | 48...130 V |
| 70 | 100...250 V |
| 71 | 250...500 V |

DC coil code

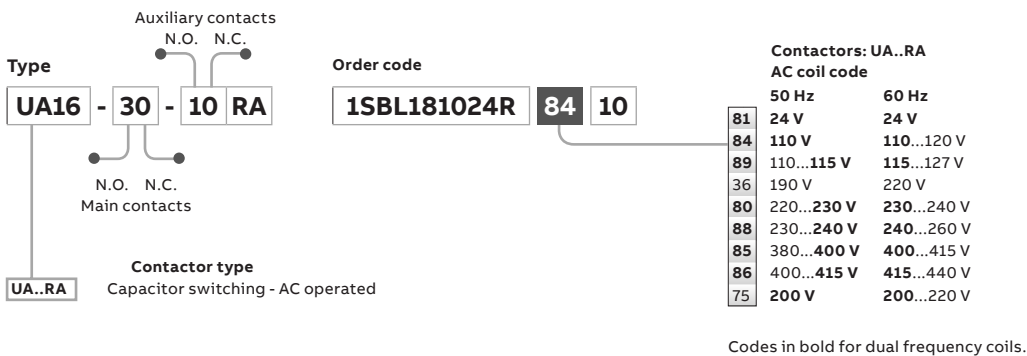
| |
|-------------|
| 48...130 V |
| 100...250 V |
| 250...500 V |

Voltage code table

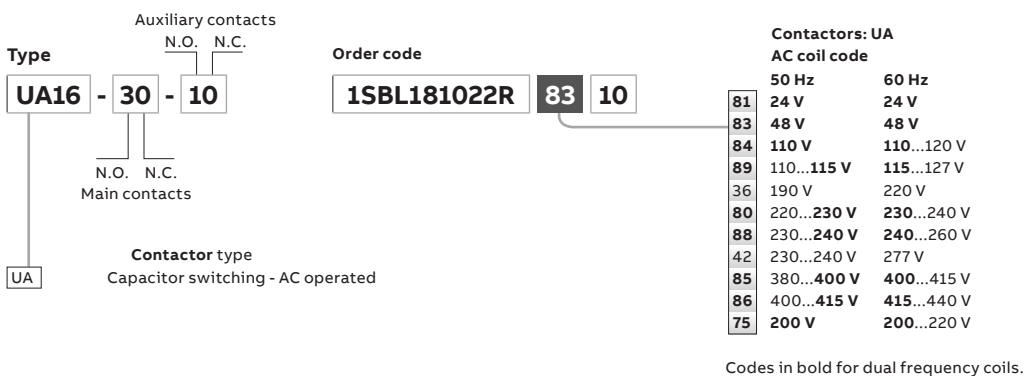
GAF1650, GAF2050 contactors



UA..RA contactors

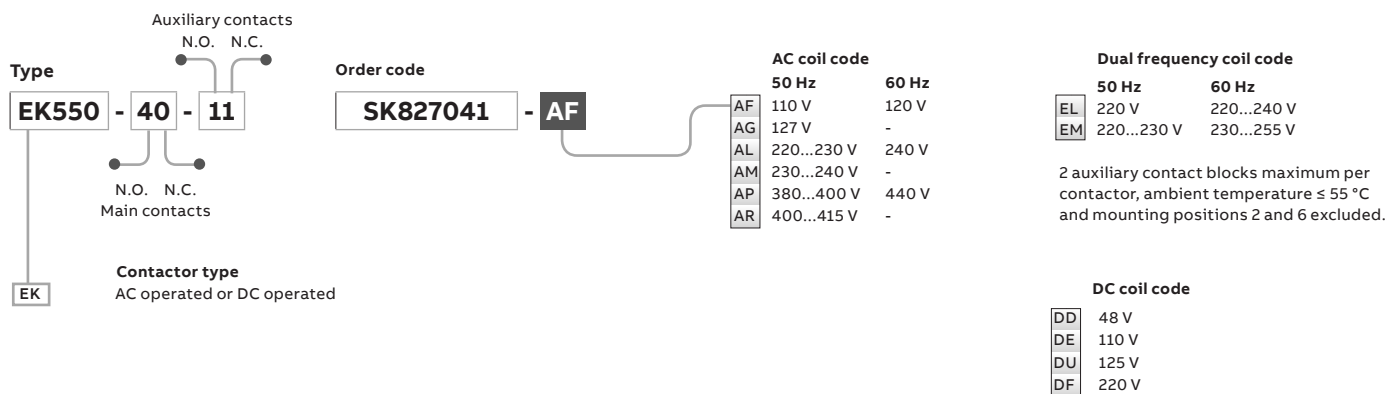


UA contactors



Voltage code table

EK550, EK1000 contactors



Questionnaire for product specifications: Block contactors

Tel.: e-mail:
Segments:

Tel.: e-mail:
Date:

Application

Type: No of phases:
Utilisation category (AC/DC): % AC4 if any:
Rated operational voltage Ue: V Cos φ:

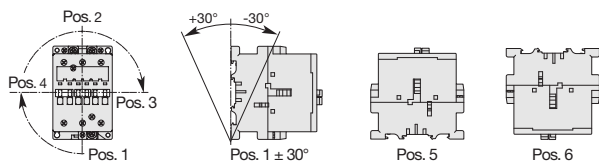
Frequency: Hz L/R: ms
Nominal current In: A
Making current: A Breaking current: A
Duty: continuous temporary intermittent
Load factor (% of ON time): %
Number of cycles per hour: or per year:
Expected durability: operating cycles
Number of main poles N.O.: N.C.:
Other information:

Control circuit

Rated control U_c voltage: V DC AC f: Hz
Minimum / maximum: V to V
Surge suppressor: type:
Interface with PLC: mA V DC
Accessories:
Number of auxiliary contacts: N.O.: N.C.:
Low level contacts: mA V DC AC

Installation

Ambient temperature:
Ambient environment:
Humidity: %
Chemical pollution:
Other:
Mounting position, see drawing below (Position 6:
please consult factory):



Wiring: Clamping screws or cage connectors
 Cable lugs (ring tongue)
Other: Cross section:
Additional comments:

Protection

Short circuit protection:
Type: Fuse Circuit breaker Manual motor starter
Max short circuit current: A
Motor protection: Overload relay Manual Motor Starter Electronic overload relay

Logistic and packaging

Quantity by batch:
Delivery order:
Expected quantity: per year
Expected first delivery date: and Qty:
Quantity on first 6 month: on first year:

Approvals and other requirements

Reference standards:
Required approvals:
Customer specifications:
Shock and vibrations:
Specific quality assurance clauses:
Other comments:

**Questionnaire for product specifications:
Block contactors**

Other comments:

.....

.....

.....

.....

.....

.....

.....

.....

03

User Guide for the questionnaire

This document is used to define the contactor specifications according to the complete information on the application. Do not hesitate to join some complementary documents if necessary (schemes, tables, customer specification...).

Please see below some definitions to help you :

Operating cycle

Includes one making operation and one breaking operation.

Electrical Durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the utilization category.

Mechanical Durability

Number of no-current operating cycles that the contactor is able to carry out

Load Factor

Ratio of the on-load operating time to the total cycle time x 100 (%).

Intermittent Duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Temporary Duty

Duty in which the main contacts of the contactor remain closed for periods insufficient to allow the equipment to reach stabilized temperature, the unload periods being separated by off-load periods of sufficient duration to restore the ambient temperature

Continuous Duty

Duty in which the main contacts of the contactor remain closed, with a continuous current during enough time to reach thermal stabilization, but no more than eight hours without interruption.

Ambient Temperature

Air temperature close to the contactor.

Mounting Position

Comply with the manufacturer's instructions. Restrictions could be taken into account for certain mounting positions.

A contactor's duty is characterized by the utilization category together with the rated operational voltage and current indicated:

Utilization categories for contactors according to IEC 60947-4-1

Utilization categories for contactor relays according to IEC 60947-5-1

See our catalog p7/8

Making and breaking current

Current at contactor closing or at contactor opening

Time constant L/R (for DC circuit)

Ratio of the inductance to the resistance (L/R = mH/Ω = ms)



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/BC6-30-10-07
www.abb.com/productdetails/GJL1213001R0107

B, M mini contactors **K, M mini contactor relays**

4/3 **B mini contactors**
K mini contactor relays

4/59 **M mini contactors**
M mini contactor relays



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For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/BC6-30-10-07
www.abb.com/productdetails/GJL1213001R0107

B mini contactors

K mini contactor relays

4/5 Presentation

4/8 Overview

With screw terminals

4/10 3-pole contactors AC and DC operated

4/12 3-pole reversing contactors AC and DC operated

4/16 3-pole interface contactors DC operated

4/17 4-pole contactors AC and DC operated

4/19 Contactor relays AC and DC operated

4/21 Interface contactor relays DC operated

With soldering pins

4/22 3-pole contactors AC and DC operated

4/24 3-pole reversing contactors AC and DC operated

4/28 3-pole interface contactors DC operated

4/29 Contactor relays AC and DC operated

4/31 Interface contactor relays DC operated

With flat pin connection

4/32 3-pole contactors AC and DC operated

4/34 3-pole reversing contactors AC and DC operated

4/38 3-pole interface contactors DC operated

4/39 Contactor relays AC and DC operated

4/41 Interface contactor relays DC operated

4/42 Technical data

4/49 Accessories

4/52 Terminal marking and positioning

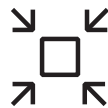
4/53 Dimension drawings

B mini contactors

Flexibility in small spaces



B mini contactors are ideally suited for applications where reliability is a must and space is at a premium. The dimensions, technical features and the variety of the assortment provide customers a high flexibility in a wide-range of applications.



Space-saving

Designed to be mini

This type of contactor is a specialist for applications in small spaces. It comes with three different terminal types. Side or front auxiliary contact blocks can be mounted to match the requirements of width or depth limitations.



Optimum interface

Great flexibility

B mini contactors offer many possibilities to adapt to any project. It offers screw terminals, soldering pins or flat pin connectors and different coil versions. This makes this contactor a perfect fit and simplifies the installation greatly.



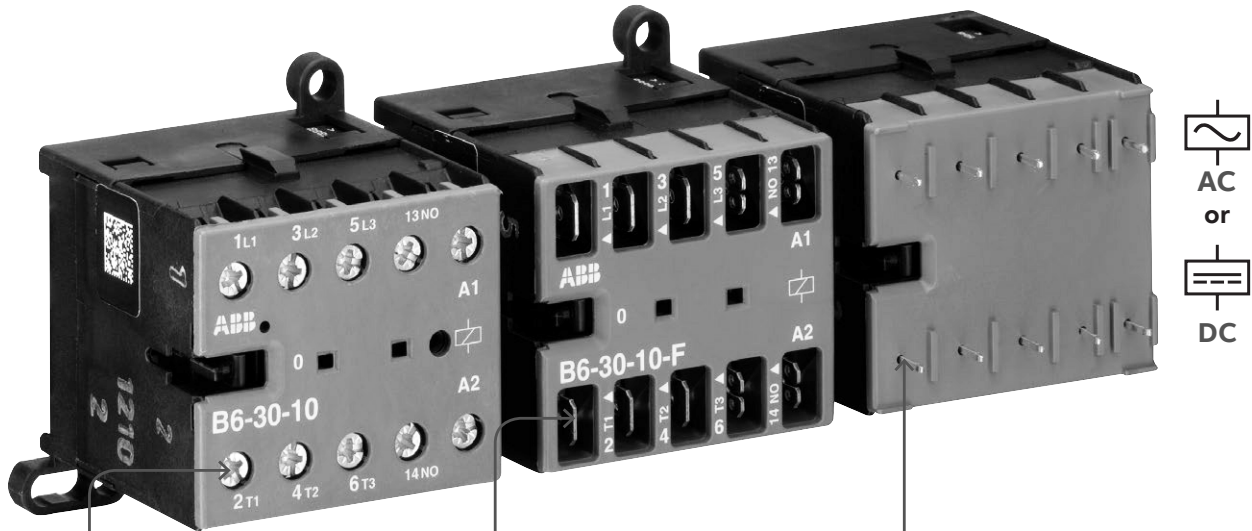
Speed up your projects

Simpler by design

You can easily combine a manual motor starter or overload relay with a mini contactor in order to create the solution of your choice. Reversing starters come pre-assembled from the factory, which saves time. With the right accessories, this range is simple to use.

B mini contactors

Smart - flexibility and diversity in a small size



Screw

Screw terminals

This conventional terminal type enables a quick connection to an installation using just a one size screwdriver. All terminal screws, from power to control, are aligned and accessible from the front for easy tightening.



Flat pins

Flat pin terminals

Thanks to really quick plug-in assembling, good reliability of the connection and low costs, the flat pin terminals are already the favorite choice in many industry sectors. The best option when high connection speed is required.



Soldering pins

Soldering pin terminals

This connection type allows an easy installation on PCB boards, where all components have to be soldered in place. The soldering pins sustain currents up to AC-1/AC-3 12 A.



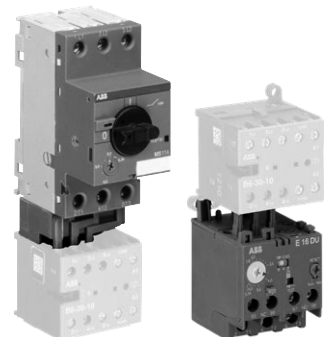
Mountable in just about any place

According to the available space, auxiliary contacts can be mounted on the front or at the side of the B mini. Also, additional surge protection can be fitted on any side of the contactor.



Save assembly time

This range offers reversing starters delivered as one piece from the factory. It avoids mounting mistakes and secures operation. It is also available with mechanical interlock for special demands.



Perfect fit

B mini contactors match manual motor starters or overload relays. This creates a space-saving and easy to install motor starting solution for a complete protection and control of your devices.

B mini contactors

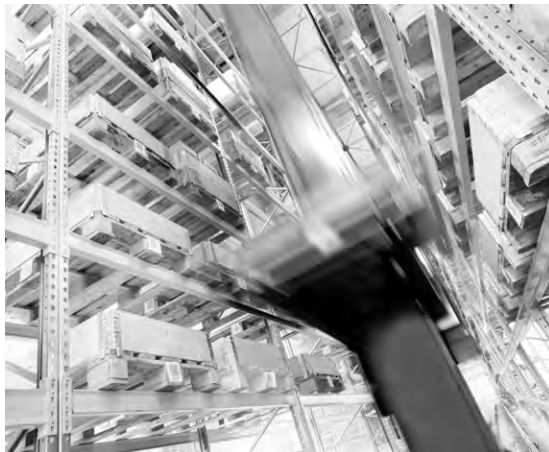
Compact - a tiny specialist for specific needs

Choose your specialist.

No matter what kind of application - The B mini contactors range includes contactors with low power consumption coils and integrated surge suppression for direct control by PLC. Dedicated relay versions for control functions or for small loads are also available.

Motors control

With a maximum rated operational power AC-3 of 5.5 kW at 400 V the B Mini Contactors are the best solution for controlling the small motors inside your products. If the both direction control is needed, the reversing contactors are always ready to help.



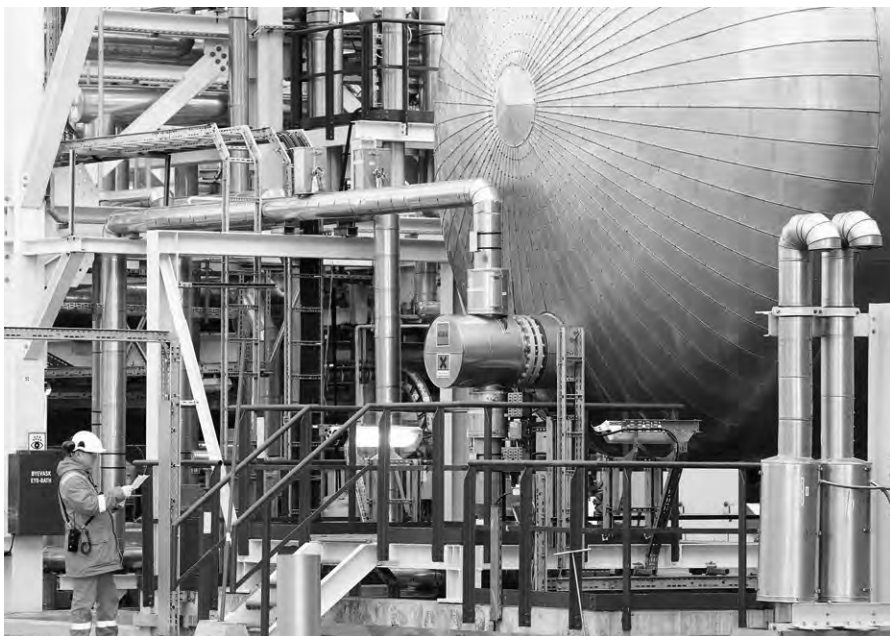
Resistive loads

Not only motors! The ABB Mini Contactors can be used for the activation of your AC-1 / DC-1 loads up to 20 A as well. Heaters, coffee machines and ovens are just examples of products in which it is possible to utilize this reliable and silent device as a component.





Extreme conditions

Manufactured with resistant and high performances materials, the B Mini Contactors can be precious allies even for applications in extreme conditions.



B mini contactors



| | | | | Screw terminals | | | |
|-----------------------------|--------------------------------|---|------|------------------------------|------------------------------|---------------------------------|---------------------------------|
| AC Control supply | |  | | | | | |
| 3-pole contactors | | Coil consumption 3.5 VA | Type | B6 | B7 | - | - |
| 3-pole reversing contactors | | Coil consumption 3.5 VA | Type | - | - | VB6 VB6A (2) | VB7 VB7A (2) |
| 4-pole contactors | | Coil consumption 3.5 VA | Type | B6 | B7 | (3) | (3) |
| DC Control supply | |  | | | | | |
| 3-pole contactors | | Coil consumption 3.5 W | Type | BC6 | BC7 B7D (1) | - | - |
| 3-pole reversing contactors | | Coil consumption 3.5 W | Type | - | - | VBC6 VBC6A (2) | VBC7 VBC7A (2) |
| 3-pole interface contactors | | Coil consumption 1.4 ... 2.8 W | Type | BC6 B6S (1) | BC7 B7S (1) | (3) | (3) |
| 4-pole contactors | | Coil consumption 3.5 W | Type | BC6 | B7D | (3) | (3) |
| IEC | Rated operational power AC-3 | 220-230-240 V | kW | 2.2 | 3 | 2.2 | 3 |
| | | 380-400 V | kW | 4 | 5.5 | 4 | 5.5 |
| | Rated operational current AC-1 | 400 V, $\theta \leq 40^\circ\text{C}$ | A | 20 | 20 | 20 | 20 |
| UL/CSA | 3-phase motor rating | 220-240 V AC | hp | 2 | 3 | 2 | 3 |
| | | 440-480 V AC | hp | 3 | 5 | 3 | 5 |
| | General use rating | | A | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) |

Main accessories

| | | | |
|--------------------------|--------------------------|---------|---|
| Auxiliary contact blocks | Front mounting | CAF6 | |
| | Side mounting | CA6 | - |
| Connection sets | For reversing contactors | BSM6-30 | |
| Surge suppressors | Varistor (AC/DC) | RV-BC6 | |

Overload relays



| | | | |
|--|---------------------|-------|--|
| Thermal overload relays | Class 10 | T16 | |
| Thermal and phase failure protection, with single setup possible | | | |
| Electronic overload relays | Class 10E, 20E, 30E | E16DU | |
| With single setup possible | | | |

Manual motor starters

| | | | |
|--|----------|--------------|--|
| Thermal / magnetic protection | Class 10 | MS116, MS132 | |
| Magnetic only types | | MO132 | |
| Connecting link to manual motor starters | | BEA7/132 | |

K mini contactor relays



| | | | | Screw terminals | | | |
|-----------------------------------|---------------------------------|---|------|---------------------|--|--|--|
| AC Control supply | |  | | | | | |
| 4-pole contactor relays | | Coil consumption 3.5 VA | Type | K6 | | | |
| DC Control supply | |  | | | | | |
| 4-pole contactor relays | | Coil consumption 3.5 W | Type | KC6 | | | |
| 4-pole interface contactor relays | | Coil consumption 1.4 ... 2.8 W | Type | KC6, K6S (1) | | | |
| IEC | Rated operational current AC-15 | 220-230-240 V | A | 4 | | | |
| | | 380-400 V | A | 3 | | | |
| | Rated operational current DC-13 | 24 V | A | 2.5 | | | |
| Main accessories | | | | | | | |
| Auxiliary contact blocks | Front mounting | CAF6 | | | | | |
| | Side mounting | CA6-11K | | | | | |

(1) With integrated surge suppressor

(2) With safety blocking function

(3) Please visit: <https://new.abb.com/low-voltage/products/motor-protection/3-pole-contactors-and-overload-relays-for-motor-starting/mini-contactors>



Soldering pins

Flat pins

| | | | | | | | |
|--------------|------------------------|---------------|---------------|--------------|------------------------|---------------|---------------|
| B6...P | B7...P | - | - | B6...F | B7...F | - | - |
| - | - | VB6...P | VB7...P | - | - | VB6...F | VB7...F |
| (3) | (3) | VB6A...P (2) | VB7A...P (2) | (3) | (3) | VB6A...F (2) | VB7A...F (2) |
| BC6...P | BC7...P B7D...P (1) | - | - | BC6...F | BC7...F B7D...F (1) | - | - |
| - | - | VBC6...P | VBC7...P | - | - | VBC6...F | VBC7...F |
| BC6...P | BC7...P | VBC6A...P (2) | VBC7A...P (2) | BC6...F | BC7...F | VBC6A...F (2) | VBC7A...F (2) |
| (3) | (3) | (3) | (3) | (3) | (3) | - | - |
| 2.2 | 3 | 2.2 | 3 | 2.2 | 3 | 2.2 | 3 |
| 4 | 5.5 | 4 | 5.5 | 4 | 5.5 | 4 | 5.5 |
| 12 | 12 | 12 | 12 | 20 | 20 | 20 | 20 |
| 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 |
| 3 | 5 | 3 | 5 | 3 | 5 | 3 | 5 |
| 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) | 12 (300 V) | 16 (600 V) |
| - | - | - | - | - | - | - | - |
| CA6-11K-P | - | - | - | CA6-11K-F | - | - | - |
| - | - | - | - | - | - | - | - |
| - | - | - | - | - | - | - | - |
| MS116, MS132 | - | - | - | MS116, MS132 | - | - | - |
| MO132 | - | - | - | MO132 | - | - | - |
| - | - | - | - | - | - | - | - |



Soldering pins

Flat pins

| | |
|-----------|-----------|
| K6...P | K6...F |
| KC6...P | KC6...F |
| KC6...P | KC6...F |
| 4 | 4 |
| 3 | 3 |
| 2.5 | 2.5 |
| - | - |
| CA6-11K-P | CA6-11K-F |

B6, B7 3-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated



B6-30-10

2CDC211001F0010



B7-30-10

2CDC211014F0011

B6, B7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|------------|-------------------------|--|-------------------------------|--------------------|---------------------------|------|------------|---------|----------------|
| | Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating | General use rating | | | | | |
| 400 V AC-3 | AC-1 | 480 V | 480 V | | | | | | kg |
| kW | A | hp | V AC | V AC | | | | | |

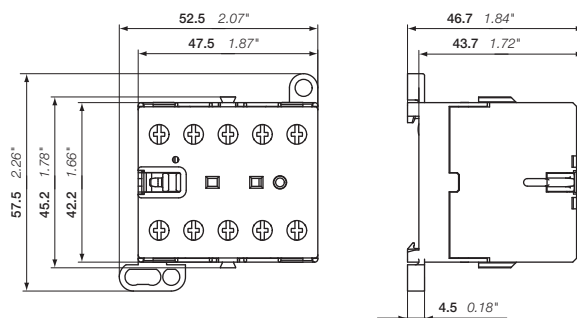
B6 mini contactors

| Rated power (kW) | Rated current (A) | Motor rating (hp) | UL/CSA (V) | Rated voltage (V) | Control voltage (V) | Control frequency (Hz) | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|--------------|-------------------|---------------------|------------------------|----------|-------------|-----------------|---------|-------------|
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | | 1 0 | B6-30-10-01 | GJL1211001R0101 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-01 | GJL1211001R0011 | 10 | 0.175 |
| | | | | 42 | 42 | | 1 0 | B6-30-10-02 | GJL1211001R0102 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-02 | GJL1211001R0012 | 10 | 0.175 |
| | | | | 48 | 48 | | 1 0 | B6-30-10-03 | GJL1211001R0103 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-03 | GJL1211001R0013 | 10 | 0.175 |
| | | | | 110 ... 127 | 110 ... 127 | | 1 0 | B6-30-10-84 | GJL1211001R8104 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-84 | GJL1211001R8014 | 10 | 0.175 |
| | | | | 220 ... 240 | 220 ... 240 | | 1 0 | B6-30-10-80 | GJL1211001R8100 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-80 | GJL1211001R8010 | 10 | 0.175 |
| | | | | 380 ... 415 | 380 ... 415 | | 1 0 | B6-30-10-85 | GJL1211001R8105 | 10 | 0.175 |
| | | | | | | | 0 1 | B6-30-01-85 | GJL1211001R8015 | 10 | 0.175 |

B7 mini contactors

| Rated power (kW) | Rated current (A) | Motor rating (hp) | UL/CSA (V) | Rated voltage (V) | Control voltage (V) | Control frequency (Hz) | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|--------------|-------------------|---------------------|------------------------|----------|-------------|-----------------|---------|-------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | | 1 0 | B7-30-10-01 | GJL1311001R0101 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-01 | GJL1311001R0011 | 10 | 0.175 |
| | | | | 42 | 42 | | 1 0 | B7-30-10-02 | GJL1311001R0102 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-02 | GJL1311001R0012 | 10 | 0.175 |
| | | | | 48 | 48 | | 1 0 | B7-30-10-03 | GJL1311001R0103 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-03 | GJL1311001R0013 | 10 | 0.175 |
| | | | | 110 ... 127 | 110 ... 127 | | 1 0 | B7-30-10-84 | GJL1311001R8104 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-84 | GJL1311001R8014 | 10 | 0.175 |
| | | | | 220 ... 240 | 220 ... 240 | | 1 0 | B7-30-10-80 | GJL1311001R8100 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-80 | GJL1311001R8010 | 10 | 0.175 |
| | | | | 380 ... 415 | 380 ... 415 | | 1 0 | B7-30-10-85 | GJL1311001R8105 | 10 | 0.175 |
| | | | | | | | 0 1 | B7-30-01-85 | GJL1311001R8015 | 10 | 0.175 |

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7, B7D 3-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated



BC6-30-10

2CDC21049F0011



BC7-30-10

2CDC21013F0011

BC6, BC7, B7D 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|-----------------------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | 3-phase motor rating θ ≤ 40 °C | General use rating | | | | | | |
| 400 V AC-3 | AC-1 | 480 V | VDC | | | | | kg |
| kW | A | hp | | | | | | |

BC6 mini contactors

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Control voltage (VDC) | Auxiliary contacts | Type | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|--------------|-----------------|-----------------|-------------|-------|
| 4 | 20 | 3 | 300 V / 12 A | 12 | 12 | 1 0 | BC6-30-10-07 | GJL1213001R0107 | 10 | 0.175 | |
| | | | | | | 0 1 | BC6-30-01-07 | GJL1213001R0017 | 10 | 0.175 | |
| | | | | | | 24 | 1 0 | BC6-30-10-01 | GJL1213001R0101 | 10 | 0.175 |
| | | | | | | | 0 1 | BC6-30-01-01 | GJL1213001R0011 | 10 | 0.175 |
| | | | | | | 48 | 1 0 | BC6-30-10-16 | GJL1213001R1106 | 10 | 0.175 |
| | | | | | | | 0 1 | BC6-30-01-16 | GJL1213001R1016 | 10 | 0.175 |
| | | | | | | 60 | 1 0 | BC6-30-10-03 | GJL1213001R0103 | 10 | 0.175 |
| | | | | | | | 0 1 | BC6-30-01-03 | GJL1213001R0013 | 10 | 0.175 |
| | | | | | | 110 ... 125 | 1 0 | BC6-30-10-04 | GJL1213001R0104 | 10 | 0.175 |
| | | | | | | | 0 1 | BC6-30-01-04 | GJL1213001R0014 | 10 | 0.175 |
| | | | | | | 220 ... 240 | 1 0 | BC6-30-10-05 | GJL1213001R0105 | 10 | 0.175 |
| | | | | | | | 0 1 | BC6-30-01-05 | GJL1213001R0015 | 10 | 0.175 |

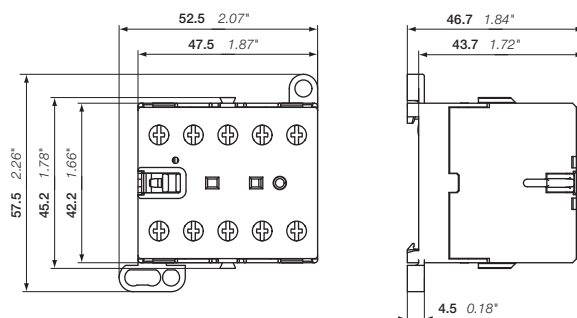
BC7 mini contactors

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Control voltage (VDC) | Auxiliary contacts | Type | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|--------------|-----------------|-----------------|-------------|-------|
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 12 | 1 0 | BC7-30-10-07 | GJL1313001R0107 | 10 | 0.175 | |
| | | | | | | 0 1 | BC7-30-01-07 | GJL1313001R0017 | 10 | 0.175 | |
| | | | | | | 24 | 1 0 | BC7-30-10-01 | GJL1313001R0101 | 10 | 0.175 |
| | | | | | | | 0 1 | BC7-30-01-01 | GJL1313001R0011 | 10 | 0.175 |
| | | | | | | 48 | 1 0 | BC7-30-10-16 | GJL1313001R1106 | 10 | 0.175 |
| | | | | | | | 0 1 | BC7-30-01-16 | GJL1313001R1016 | 10 | 0.175 |
| | | | | | | 60 | 1 0 | BC7-30-10-03 | GJL1313001R0103 | 10 | 0.175 |
| | | | | | | | 0 1 | BC7-30-01-03 | GJL1313001R0013 | 10 | 0.175 |
| | | | | | | 110 ... 125 | 1 0 | BC7-30-10-04 | GJL1313001R0104 | 10 | 0.175 |
| | | | | | | | 0 1 | BC7-30-01-04 | GJL1313001R0014 | 10 | 0.175 |
| | | | | | | 220 ... 240 | 1 0 | BC7-30-10-05 | GJL1313001R0105 | 10 | 0.175 |
| | | | | | | | 0 1 | BC7-30-01-05 | GJL1313001R0015 | 10 | 0.175 |

B7D mini contactors with integrated suppressor diode

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Control voltage (VDC) | Auxiliary contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|--------------------|--------------|-----------------|---------|-------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | B7D-30-10-01 | GJL1317001R0101 | 10 | 0.175 |
| | | | | | | 0 1 | B7D-30-01-01 | GJL1317001R0011 | 10 | 0.175 |
| | | | | 220 | 220 | 1 0 | B7D-30-10-05 | GJL1317001R0105 | 10 | 0.175 |
| | | | | | | 0 1 | B7D-30-01-05 | GJL1317001R0015 | 10 | 0.175 |

Other types on request



BC6, BC7, B7D

Main dimensions mm, inches

VB6, VB7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

AC operated



2CDC211006F0011

VB7-30-10

VB6, VB7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|------------|-------------------------|---------------------------|--|--------------------|---------------------------|------|------------|---------|----------------|
| | Rated operational power | 3-phase current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V AC-3 | AC-1 | 480 V | | | | | | | kg |
| kW | A | hp | VAC | VAC | | | | | |

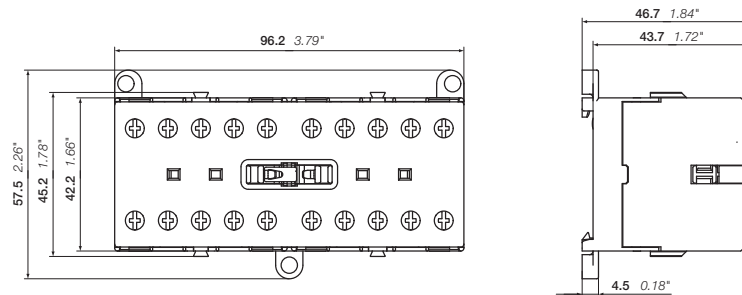
VB6 mini reversing contactors

| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | VB6-30-10-01 | GJL1211901R0101 | 5 | 0.355 |
|---|----|---|--------------|-------------|-------------|-----|--------------|-----------------|---|-------|
| | | | | 42 | 42 | 0 1 | VB6-30-01-01 | GJL1211901R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 0 1 | VB6-30-01-02 | GJL1211901R0012 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-10-03 | GJL1211901R0103 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 0 1 | VB6-30-01-03 | GJL1211901R0013 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-10-84 | GJL1211901R8104 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 0 1 | VB6-30-01-84 | GJL1211901R8014 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-10-80 | GJL1211901R8100 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 0 1 | VB6-30-01-80 | GJL1211901R8010 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-10-85 | GJL1211901R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB6-30-01-85 | GJL1211901R8015 | 5 | 0.355 |

VB7 mini reversing contactors

| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7-30-10-01 | GJL1311901R0101 | 5 | 0.355 |
|-----|----|---|--------------|-------------|-------------|-----|--------------|-----------------|---|-------|
| | | | | 42 | 42 | 0 1 | VB7-30-01-01 | GJL1311901R0011 | 5 | 0.355 |
| | | | | 48 | 48 | 0 1 | VB7-30-10-02 | GJL1311901R0102 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-02 | GJL1311901R0012 | 5 | 0.355 |
| | | | | 110 ... 127 | 110 ... 127 | 0 1 | VB7-30-10-03 | GJL1311901R0103 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-03 | GJL1311901R0013 | 5 | 0.355 |
| | | | | 220 ... 240 | 220 ... 240 | 0 1 | VB7-30-10-84 | GJL1311901R8104 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-84 | GJL1311901R8014 | 5 | 0.355 |
| | | | | 380 ... 415 | 380 ... 415 | 0 1 | VB7-30-10-80 | GJL1311901R8100 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-80 | GJL1311901R8010 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-10-85 | GJL1311901R8105 | 5 | 0.355 |
| | | | | | | 0 1 | VB7-30-01-85 | GJL1311901R8015 | 5 | 0.355 |

Other types on request



VB6, VB7

Main dimensions mm, inches

VBC6, VBC7 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated



VBC6-30-10

2CDC21042F0011



VBC7-30-10

2CDC21001F0011

VBC6, VBC7 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | 3-phase motor rating | General use rating | | | | | | |
| 400 V | 3-phase | 480 V | VDC | | | | | kg |
| AC-3 | AC-1 | | | | | | | |
| kW | A | hp | | | | | | |

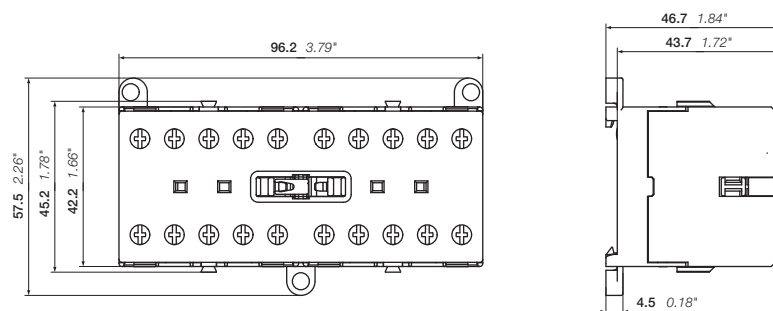
VBC6 mini reversing contactors

| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | VBC6-30-10-07 | GJL1213901R0107 | 5 | 0.355 |
|---|----|---|--------------|-------------|-----|---------------|-----------------|---|-------|
| | | | | | 0 1 | VBC6-30-01-07 | GJL1213901R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC6-30-10-01 | GJL1213901R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-01 | GJL1213901R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC6-30-10-16 | GJL1213901R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-16 | GJL1213901R1016 | 5 | 0.355 |
| | | | | 60 | 1 0 | VBC6-30-10-03 | GJL1213901R0103 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-03 | GJL1213901R0013 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC6-30-10-04 | GJL1213901R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-04 | GJL1213901R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC6-30-10-05 | GJL1213901R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC6-30-01-05 | GJL1213901R0015 | 5 | 0.355 |

VBC7 mini reversing contactors

| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7-30-10-07 | GJL1313901R0107 | 5 | 0.355 |
|-----|----|---|--------------|-------------|-----|---------------|-----------------|---|-------|
| | | | | | 0 1 | VBC7-30-01-07 | GJL1313901R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC7-30-10-01 | GJL1313901R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-01 | GJL1313901R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC7-30-10-16 | GJL1313901R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-16 | GJL1313901R1016 | 5 | 0.355 |
| | | | | 60 | 1 0 | VBC7-30-10-03 | GJL1313901R0103 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-03 | GJL1313901R0013 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC7-30-10-04 | GJL1313901R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-04 | GJL1313901R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC7-30-10-05 | GJL1313901R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC7-30-01-05 | GJL1313901R0015 | 5 | 0.355 |

Other types on request



VBC6, VBC7

Main dimensions mm, inches

VB6A, VB7A 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

AC operated – with safety blocking function



VB6A-30-10

2CDC211037F001



VB7A-30-10

2CDC211098F001

VB6A, VB7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|------------|-------------------------|--|----------------------------------|---------------------------|------|------------|---------|----------------|
| | Rated operational power | 3-phase motor current $\theta \leq 40^\circ\text{C}$ | | | | | | |
| 400 V AC-3 | AC-1 | 480 V | 50 Hz | | | | | kg |
| kW | A | hp | V AC | | V AC | | | |

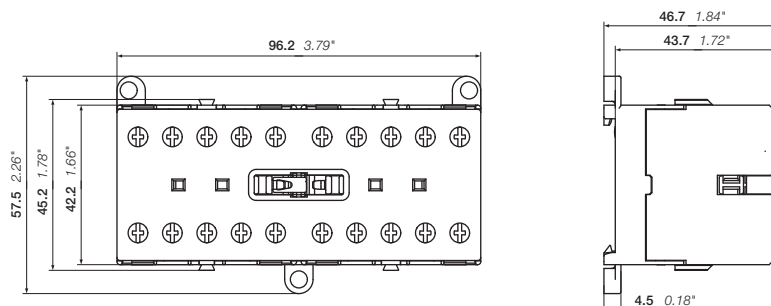
VB6A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | Rated voltage (V) | Rated voltage (V) | Coil voltage (V) | Order code | Pkg qty | Weight (1 pce) | | |
|------------------|-------------------|---------------------------|-------------------|-------------------|------------------|---------------|-----------------|-----------------|-------|-------|
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | VB6A-30-10-01 | GJL1211911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-01 | GJL1211911R0011 | 5 | 0.355 | |
| | | | | 42 | 42 | 1 0 | VB6A-30-10-02 | GJL1211911R0102 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-02 | GJL1211911R0012 | 5 | 0.355 | |
| | | | | 48 | 48 | 1 0 | VB6A-30-10-03 | GJL1211911R0103 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-03 | GJL1211911R0013 | 5 | 0.355 | |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB6A-30-10-84 | GJL1211911R8104 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-84 | GJL1211911R8014 | 5 | 0.355 | |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6A-30-10-80 | GJL1211911R8100 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-80 | GJL1211911R8010 | 5 | 0.355 | |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6A-30-10-85 | GJL1211911R8105 | 5 | 0.355 |
| | | | | | 0 1 | VB6A-30-01-85 | GJL1211911R8015 | 5 | 0.355 | |

VB7A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | Rated voltage (V) | Rated voltage (V) | Coil voltage (V) | Order code | Pkg qty | Weight (1 pce) | | |
|------------------|-------------------|---------------------------|-------------------|-------------------|------------------|---------------|-----------------|-----------------|-------|-------|
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7A-30-10-01 | GJL1311911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-01 | GJL1311911R0011 | 5 | 0.355 | |
| | | | | 42 | 42 | 1 0 | VB7A-30-10-02 | GJL1311911R0102 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-02 | GJL1311911R0012 | 5 | 0.355 | |
| | | | | 48 | 48 | 1 0 | VB7A-30-10-03 | GJL1311911R0103 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-03 | GJL1311911R0013 | 5 | 0.355 | |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7A-30-10-84 | GJL1311911R8104 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-84 | GJL1311911R8014 | 5 | 0.355 | |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7A-30-10-80 | GJL1311911R8100 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-80 | GJL1311911R8010 | 5 | 0.355 | |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7A-30-10-85 | GJL1311911R8105 | 5 | 0.355 |
| | | | | | 0 1 | VB7A-30-01-85 | GJL1311911R8015 | 5 | 0.355 | |

Other types on request



VB6A, VB7A

Main dimensions mm, inches

VBC6A, VBC7A 3-pole mini reversing contactors – with screw terminals

4 to 5.5 kW

DC operated – with safety blocking function



VBC6A-30-10

2CDC21104F001



VBC7A-30-10

2CDC21107F001

VBC6A, VBC7A 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for front mounting
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|------------------|----------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | current | 3-phase motor rating | | | | | | |
| 400 V AC-3 kW | θ ≤ 40 °C AC-1 A | 480 V hp | VDC | | | | | kg |

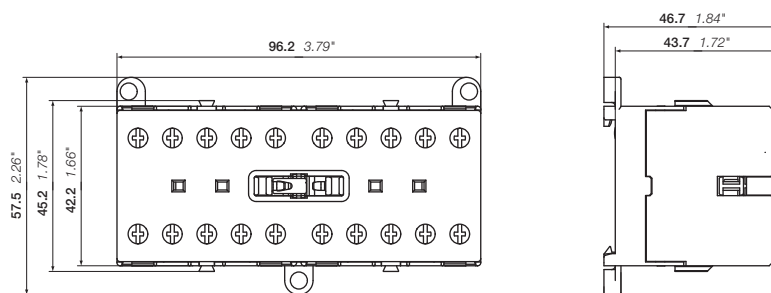
VBC6A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | Rated control circuit voltage (V) | Rated control circuit voltage (V) | Rated control circuit voltage (V) | Type | Order code | Pkg qty | Weight (1 pce) |
|------------------|-------------------|---------------------------|-----------------------------------|-----------------------------------|-----------------------------------|----------------|-----------------|---------|----------------|
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | VBC6A-30-10-07 | GJL1213911R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-07 | GJL1213911R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC6A-30-10-01 | GJL1213911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-01 | GJL1213911R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC6A-30-10-16 | GJL1213911R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-16 | GJL1213911R1016 | 5 | 0.355 |
| | | | | 60 | 1 0 | VBC6A-30-10-03 | GJL1213911R0103 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-03 | GJL1213911R0013 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC6A-30-10-04 | GJL1213911R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-04 | GJL1213911R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC6A-30-10-05 | GJL1213911R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC6A-30-01-05 | GJL1213911R0015 | 5 | 0.355 |

VBC7A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | Rated control circuit voltage (V) | Rated control circuit voltage (V) | Rated control circuit voltage (V) | Type | Order code | Pkg qty | Weight (1 pce) |
|------------------|-------------------|---------------------------|-----------------------------------|-----------------------------------|-----------------------------------|----------------|-----------------|---------|----------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7A-30-10-07 | GJL1313911R0107 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-07 | GJL1313911R0017 | 5 | 0.355 |
| | | | | 24 | 1 0 | VBC7A-30-10-01 | GJL1313911R0101 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-01 | GJL1313911R0011 | 5 | 0.355 |
| | | | | 48 | 1 0 | VBC7A-30-10-16 | GJL1313911R1106 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-16 | GJL1313911R0016 | 5 | 0.355 |
| | | | | 60 | 1 0 | VBC7A-30-10-03 | GJL1313911R0103 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-03 | GJL1313911R0013 | 5 | 0.355 |
| | | | | 110 ... 125 | 1 0 | VBC7A-30-10-04 | GJL1313911R0104 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-04 | GJL1313911R0014 | 5 | 0.355 |
| | | | | 220 ... 240 | 1 0 | VBC7A-30-10-05 | GJL1313911R0105 | 5 | 0.355 |
| | | | | | 0 1 | VBC7A-30-01-05 | GJL1313911R0015 | 5 | 0.355 |

Other types on request



VBC6A, VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated - low consumption



BC6-30-10

2CDC211040F0011



BC7-30-10

2CDC211013F0011

BC6, BC7 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|---------|----------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | current | 3-phase motor rating | General use rating | | | | | | |
| 400 V | AC-3 | θ ≤ 40 °C | 480 V | V DC | | | | | kg |
| kW | A | hp | | | | | | | |

DC operation 24 V / 1.4 W

| | | | | | | | | | |
|-----|----|---|--------------|----|-----|------------------|-----------------|----|-------|
| 4 | 20 | 3 | 300 V / 12 A | 24 | 1 0 | BC6-30-10-1.4-81 | GJL1213001R8101 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-1.4-81 | GJL1213001R8011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | BC7-30-10-1.4-81 | GJL1313001R8101 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-1.4-81 | GJL1313001R8011 | 10 | 0.175 |

DC operation 17 ... 32 V / 2.4 W

| | | | | | | | | | |
|-----|----|---|--------------|-----------|-----|------------------|-----------------|----|-------|
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | BC6-30-10-2.4-51 | GJL1213001R5101 | 10 | 0.175 |
| | | | | | 0 1 | BC6-30-01-2.4-51 | GJL1213001R5011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | BC7-30-10-2.4-51 | GJL1313001R5101 | 10 | 0.175 |
| | | | | | 0 1 | BC7-30-01-2.4-51 | GJL1313001R5011 | 10 | 0.175 |

Connection to PLCs with integrated protective circuit

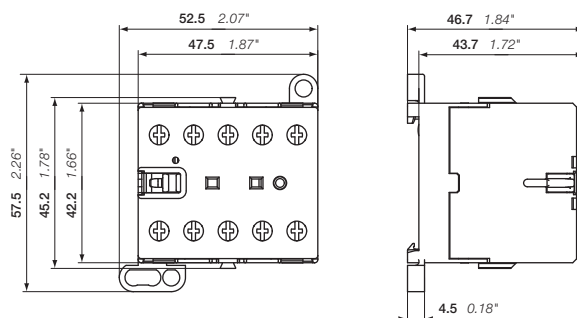
DC operation 24 V / 1.7 W

| | | | | | | | | | |
|-----|----|---|--------------|----|-----|------------------|-----------------|----|-------|
| 4 | 20 | 3 | 300 V / 12 A | 24 | 1 0 | B6S-30-10-1.7-71 | GJL1213001R7101 | 10 | 0.175 |
| | | | | | 0 1 | B6S-30-01-1.7-71 | GJL1213001R7011 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 1 0 | B7S-30-10-1.7-71 | GJL1313001R7101 | 10 | 0.175 |
| | | | | | 0 1 | B7S-30-01-1.7-71 | GJL1313001R7011 | 10 | 0.175 |

DC operation 17 ... 32 V / 2.8 W

| | | | | | | | | | |
|-----|----|---|--------------|-----------|-----|------------------|-----------------|----|-------|
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | B6S-30-10-2.8-72 | GJL1213001R7102 | 10 | 0.175 |
| | | | | | 0 1 | B6S-30-01-2.8-72 | GJL1213001R7012 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | B7S-30-10-2.8-72 | GJL1313001R7102 | 10 | 0.175 |
| | | | | | 0 1 | B7S-30-01-2.8-72 | GJL1313001R7012 | 10 | 0.175 |

Other types on request



BC6, BC7

Main dimensions mm, inches

B6, B7 4-pole mini contactors – with screw terminals

4 to 5.5 kW

AC operated



2CDC211028F0011

B6-22-00

B6, B7 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|--|--------------------|----------------------------------|---------------------------|------|------------|---------|----------------|
| Rated operational current $\theta \leq 40^\circ\text{C}$ AC-1 A | General use rating | 50/60 Hz V AC | | | | | kg |

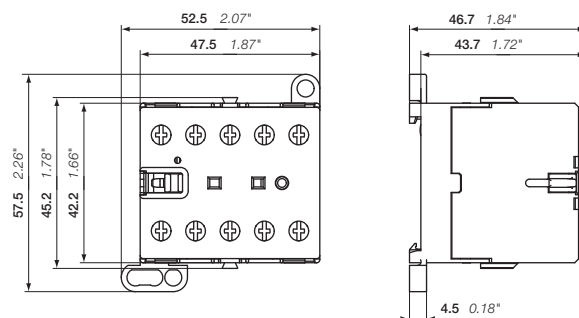
4 N.O. main poles

| | | | | | | | |
|----|--------------|-------------|-----|-------------|-----------------|----|-------|
| 20 | 300 V / 12 A | 24 | 0 0 | B6-40-00-01 | GJL1211201R0001 | 10 | 0.175 |
| | | 42 | 0 0 | B6-40-00-02 | GJL1211201R0002 | 10 | 0.175 |
| | | 48 | 0 0 | B6-40-00-03 | GJL1211201R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B6-40-00-84 | GJL1211201R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B6-40-00-80 | GJL1211201R8000 | 10 | 0.175 |
| 20 | 600 V / 16 A | 24 | 0 0 | B7-40-00-01 | GJL1311201R0001 | 10 | 0.175 |
| | | 42 | 0 0 | B7-40-00-02 | GJL1311201R0002 | 10 | 0.175 |
| | | 48 | 0 0 | B7-40-00-03 | GJL1311201R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B7-40-00-84 | GJL1311201R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B7-40-00-80 | GJL1311201R8000 | 10 | 0.175 |

2 N.O. + 2 N.C. main poles

| | | | | | | | |
|----|--------------|-------------|-----|-------------|-----------------|----|-------|
| 20 | 300 V / 12 A | 24 | 0 0 | B6-22-00-01 | GJL1211501R0001 | 10 | 0.175 |
| | | 42 | 0 0 | B6-22-00-02 | GJL1211501R0002 | 10 | 0.175 |
| | | 48 | 0 0 | B6-22-00-03 | GJL1211501R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B6-22-00-84 | GJL1211501R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B6-22-00-80 | GJL1211501R8000 | 10 | 0.175 |
| 20 | 600 V / 16 A | 24 | 0 0 | B7-22-00-01 | GJL1311501R0001 | 10 | 0.175 |
| | | 42 | 0 0 | B7-22-00-02 | GJL1311501R0002 | 10 | 0.175 |
| | | 48 | 0 0 | B7-22-00-03 | GJL1311501R0003 | 10 | 0.175 |
| | | 110 ... 127 | 0 0 | B7-22-00-84 | GJL1311501R8004 | 10 | 0.175 |
| | | 220 ... 240 | 0 0 | B7-22-00-80 | GJL1311501R8000 | 10 | 0.175 |

Other types on request



B6, B7

Main dimensions mm, inches

B6, B7, B7D 4-pole mini contactors – with screw terminals

4 to 5.5 kW

DC operated



BC6-22-00

2CDC211032F0011

B6, B7, B7D 4-pole mini contactors are compact control products mainly used for switching resistive loads up to 690 V AC.

These contactors are designed with 4 main poles:

- control circuit: DC operated, low coil consumption (3.5 W at pull-in and at holding)
- hum-free coil
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|--|--|--------------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power 400 V AC-3 kW | 3-phase motor rating 480 V AC-1 A | General use rating hp | V DC | | | | | kg |

4 N.O. main poles

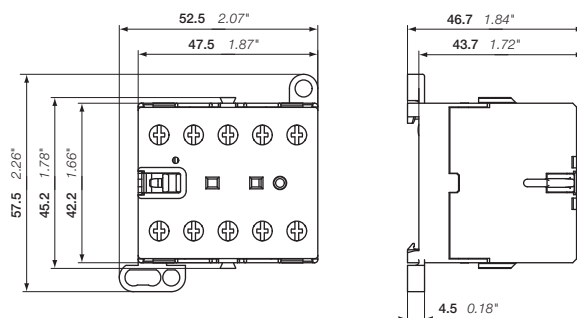
| Poles | U _c | I _{th} | I _{pn} | Main poles | | Type | Order code | Pkg qty | Weight (1 pce) |
|-------|----------------|-----------------|-----------------|----------------|-----------------|--------------|-----------------|---------|----------------|
| | | | | U _c | I _{pn} | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 0 0 | BC6-40-00-07 | GJL1213201R0007 | 10 | 0.175 |
| | | | | 24 | 0 0 | BC6-40-00-01 | GJL1213201R0001 | 10 | 0.175 |
| | | | | 48 | 0 0 | BC6-40-00-16 | GJL1213201R1006 | 10 | 0.175 |
| | | | | 60 | 0 0 | BC6-40-00-03 | GJL1213201R0003 | 10 | 0.175 |
| | | | | 110 ... 125 | 0 0 | BC6-40-00-04 | GJL1213201R0004 | 10 | 0.175 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 0 0 | BC7-40-00-07 | GJL1313201R0007 | 10 | 0.175 |
| | | | | 48 | 0 0 | BC7-40-00-16 | GJL1313201R1006 | 10 | 0.175 |
| | | | | 110 ... 125 | 0 0 | BC7-40-00-04 | GJL1313201R0004 | 10 | 0.175 |
| | | | | 220 ... 240 | 0 0 | BC7-40-00-05 | GJL1313201R0005 | 10 | 0.175 |

2 N.O. + 2 N.C. main poles

| Poles | U _c | I _{th} | I _{pn} | Main poles | | Type | Order code | Pkg qty | Weight (1 pce) |
|-------|----------------|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|---------|----------------|
| | | | | U _c | I _{pn} | | | | |
| 4 | 20 | 3 | 300 V / 12 A | 12 | 0 0 | BC6-22-00-07 | GJL1213501R0007 | 10 | 0.175 |
| | | | | 24 | 0 0 | BC6-22-00-01 | GJL1213501R0001 | 10 | 0.175 |
| | | | | 48 | 0 0 | BC6-22-00-16 | GJL1213501R1006 | 10 | 0.175 |
| | | | | 60 | 0 0 | BC6-22-00-03 | GJL1213501R0003 | 10 | 0.175 |
| | | | | 110 ... 125 | 0 0 | BC6-22-00-04 | GJL1213501R0004 | 10 | 0.175 |
| | | | 220 ... 240 | 0 0 | BC6-22-00-05 | GJL1213501R0005 | 10 | 0.175 | |

4 N.O. main poles with integrated suppressor diode

| Poles | U _c | I _{th} | I _{pn} | Main poles | | Type | Order code | Pkg qty | Weight (1 pce) |
|-------|----------------|-----------------|-----------------|----------------|-----------------|--------------|-----------------|---------|----------------|
| | | | | U _c | I _{pn} | | | | |
| 4 | 20 | 5 | 600 V | 24 | 0 0 | B7D-40-00-05 | GJL1317201R0005 | 10 | 0.175 |
| | | | | 220 ... 240 | 0 0 | B7D-40-00-01 | GJL1317201R0001 | 10 | 0.175 |



BC6, B7D

Main dimensions mm, inches

K6 4-pole mini contactor relays – with screw terminals

AC operated



K6-22Z

2CDC211012F0011



K6-31Z

2CDC211004F0010

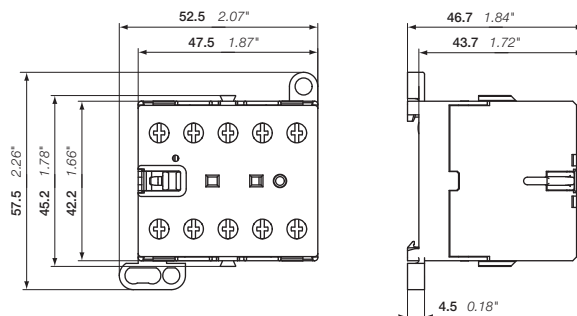
K6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| Rated control circuit voltage Uc | | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------------------|---------------|-----------|-----------------|------------|-------------------|
| 50 Hz V AC | 60 Hz V AC | | | | kg |
| 2 N.O. + 2 N.C. main pole | | | | | |
| 24 | 24 | K6-22Z-01 | GJH1211001R0221 | 10 | 0.175 |
| 42 | 42 | K6-22Z-02 | GJH1211001R0222 | 10 | 0.175 |
| 48 | 48 | K6-22Z-03 | GJH1211001R0223 | 10 | 0.175 |
| 110 ... 127 | 110 ... 127 | K6-22Z-84 | GJH1211001R8224 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-22Z-80 | GJH1211001R8220 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-22Z-85 | GJH1211001R8225 | 10 | 0.175 |
| 3 N.O. + 1 N.C. main poles | | | | | |
| 24 | 24 | K6-31Z-01 | GJH1211001R0311 | 10 | 0.175 |
| 42 | 42 | K6-31Z-02 | GJH1211001R0312 | 10 | 0.175 |
| 48 | 48 | K6-31Z-03 | GJH1211001R0313 | 10 | 0.175 |
| 110 ... 127 | 110 ... 127 | K6-31Z-84 | GJH1211001R8314 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-31Z-80 | GJH1211001R8310 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-31Z-85 | GJH1211001R8315 | 10 | 0.175 |
| 4 N.O. main poles | | | | | |
| 24 | 24 | K6-40E-01 | GJH1211001R0401 | 10 | 0.175 |
| 42 | 42 | K6-40E-02 | GJH1211001R0402 | 10 | 0.175 |
| 48 | 48 | K6-40E-03 | GJH1211001R0403 | 10 | 0.175 |
| 110 ... 127 | 110 ... 127 | K6-40E-84 | GJH1211001R8404 | 10 | 0.175 |
| 220 ... 240 | 220 ... 240 | K6-40E-80 | GJH1211001R8400 | 10 | 0.175 |
| 380 ... 415 | 380 ... 415 | K6-40E-85 | GJH1211001R8405 | 10 | 0.175 |

Other types on request.



K6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with screw terminals

DC operated



KC6-22Z

2CDC211016F0011

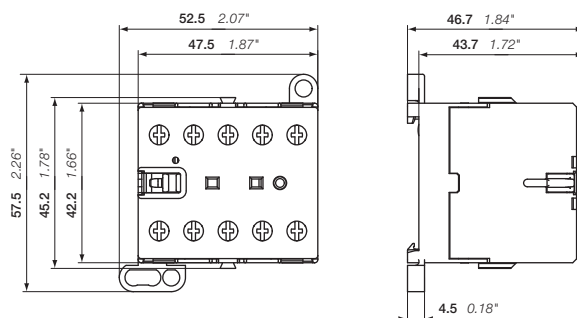
KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for front or side mounting and a wide range of accessories
- suitable for rail or wall mounting

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|------------|-----------------|------------|-------------------------|
| 2 N.O. + 2 N.C. main poles | | | | |
| 12 | KC6-22Z-07 | GJH1213001R0227 | 10 | 0.175 |
| 24 | KC6-22Z-01 | GJH1213001R0221 | 10 | 0.175 |
| 48 | KC6-22Z-16 | GJH1213001R1226 | 10 | 0.175 |
| 60 | KC6-22Z-03 | GJH1213001R0223 | 10 | 0.175 |
| 110 ... 125 | KC6-22Z-04 | GJH1213001R0224 | 10 | 0.175 |
| 220 ... 240 | KC6-22Z-05 | GJH1213001R0225 | 10 | 0.175 |
| 3 N.O. + 1 N.C. main poles | | | | |
| 12 | KC6-31Z-07 | GJH1213001R0317 | 10 | 0.175 |
| 24 | KC6-31Z-01 | GJH1213001R0311 | 10 | 0.175 |
| 48 | KC6-31Z-16 | GJH1213001R1316 | 10 | 0.175 |
| 60 | KC6-31Z-03 | GJH1213001R0313 | 10 | 0.175 |
| 110 ... 125 | KC6-31Z-04 | GJH1213001R0314 | 10 | 0.175 |
| 220 ... 240 | KC6-31Z-05 | GJH1213001R0315 | 10 | 0.175 |
| 4 N.O. main poles | | | | |
| 12 | KC6-40E-07 | GJH1213001R0407 | 10 | 0.175 |
| 24 | KC6-40E-01 | GJH1213001R0401 | 10 | 0.175 |
| 48 | KC6-40E-16 | GJH1213001R1406 | 10 | 0.175 |
| 60 | KC6-40E-03 | GJH1213001R0403 | 10 | 0.175 |
| 110 ... 125 | KC6-40E-04 | GJH1213001R0404 | 10 | 0.175 |
| 220 ... 240 | KC6-40E-05 | GJH1213001R0405 | 10 | 0.175 |

Other types on request



KC6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with screw terminals

DC operated - low consumption



KC6-31Z

2CDC211017F0011

KC6 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to AC-15 4 A / 240 V.

These contactors are designed with 4 poles with various contact combinations:

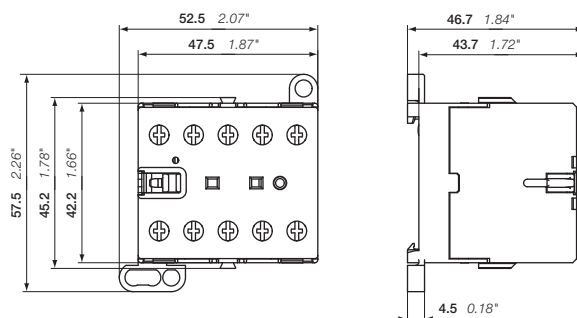
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|----------------|-----------------|------------|-------------------------|
| DC operation 24 V / 1.4 W | | | | |
| 24 | KC6-31Z-1.4-81 | GJH1213001R8311 | 10 | 0.175 |
| 24 | KC6-40E-1.4-81 | GJH1213001R8401 | 10 | 0.175 |
| DC operation 17 ... 32 V / 2.4 W | | | | |
| 17 ... 32 | KC6-31Z-2.4-51 | GJH1213001R5311 | 10 | 0.175 |
| 17 ... 32 | KC6-40E-2.4-51 | GJH1213001R5401 | 10 | 0.175 |

Connection to PLCs with integrated protective circuit

| DC operation 24 V / 1.7 W | | | | |
|---|----------------|-----------------|----|-------|
| 24 | K6S-22Z-1.7-71 | GJH1213001R7221 | 10 | 0.175 |
| 24 | K6S-31Z-1.7-71 | GJH1213001R7311 | 10 | 0.175 |
| 24 | K6S-40E-1.7-71 | GJH1213001R7401 | 10 | 0.175 |
| DC operation 17 ... 32 V / 2.8 W | | | | |
| 17 ... 32 | K6S-22Z-2.8-72 | GJH1213001R7222 | 10 | 0.175 |
| 17 ... 32 | K6S-31Z-2.8-72 | GJH1213001R7312 | 10 | 0.175 |
| 17 ... 32 | K6S-40E-2.8-72 | GJH1213001R7402 | 10 | 0.175 |

Other types on request



KC6

Main dimensions mm, inches

B6, B7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

AC operated



B6-30-10-P

2CDC211003F0100



B7-30-10-P

2CDC211011F0011

B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|-------------------|----------------------|--------------------|--|-------|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | 50 Hz | 60 Hz | | | | | |
| 400 V AC-3 kW | AC-1 A | 480 V hp | | V AC | V AC | | | | | kg |

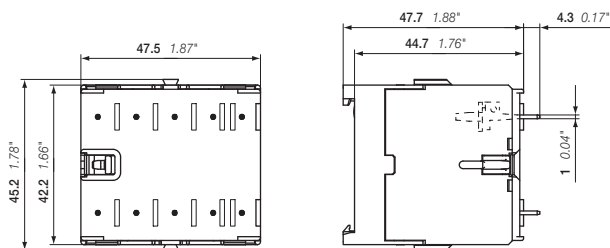
B6 mini contactors

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c 50 Hz | Rated control circuit voltage U _c 60 Hz | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|---------|----------------------|--------------------|--|--|---------------------------|---------------|-----------------|---------|----------------|
| 4 | 12 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | B6-30-10-P-01 | GJL1211009R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-01 | GJL1211009R0011 | 10 | 0.170 |
| | | | | 42 | 42 | 1 0 | B6-30-10-P-02 | GJL1211009R0102 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-02 | GJL1211009R0012 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B6-30-10-P-03 | GJL1211009R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-03 | GJL1211009R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B6-30-10-P-84 | GJL1211009R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-84 | GJL1211009R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B6-30-10-P-80 | GJL1211009R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-80 | GJL1211009R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-P-85 | GJL1211009R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-P-85 | GJL1211009R8015 | 10 | 0.170 |

B7 mini contactors

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c 50 Hz | Rated control circuit voltage U _c 60 Hz | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|---------|----------------------|--------------------|--|--|---------------------------|---------------|-----------------|---------|----------------|
| 5.5 | 12 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | B7-30-10-P-01 | GJL1311009R0101 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-01 | GJL1311009R0011 | 10 | 0.170 |
| | | | | 42 | 42 | 1 0 | B7-30-10-P-02 | GJL1311009R0102 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-02 | GJL1311009R0012 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B7-30-10-P-03 | GJL1311009R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-03 | GJL1311009R0013 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B7-30-10-P-84 | GJL1311009R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-84 | GJL1311009R8014 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B7-30-10-P-80 | GJL1311009R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-80 | GJL1311009R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-P-85 | GJL1311009R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-P-85 | GJL1311009R8015 | 10 | 0.170 |

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

DC operated



BC7-30-10-P

2CDC211030F0011

B6..P and B7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | 3-phase motor rating | General use rating | | | | | | |
| 400 V AC-3 | 3-phase motor rating 480 V | hp | V DC | | | | | kg |
| kW | A | | | | | | | |

BC6 mini contactors with 3 N.O. main poles

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|----------|----------------|-----------------|---------|-------------|
| 4 | 12 | 3 | 300 V / 12 A | 12 | 1 0 | BC6-30-10-P-07 | GJL1213009R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-07 | GJL1213009R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC6-30-10-P-01 | GJL1213009R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-01 | GJL1213009R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC6-30-10-P-16 | GJL1213009R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-16 | GJL1213009R1016 | 10 | 0.170 |
| | | | | 60 | 1 0 | BC6-30-10-P-03 | GJL1213009R0103 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-03 | GJL1213009R0013 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC6-30-10-P-04 | GJL1213009R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-04 | GJL1213009R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC6-30-10-P-05 | GJL1213009R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-05 | GJL1213009R0015 | 10 | 0.170 |

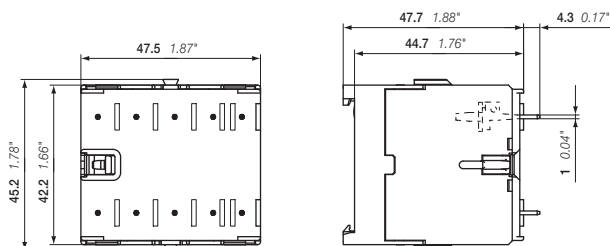
BC7 mini contactors with 3 N.O. main poles

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|----------|----------------|-----------------|---------|-------------|
| 5.5 | 12 | 5 | 600 V / 16 A | 12 | 1 0 | BC7-30-10-P-07 | GJL1313009R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-07 | GJL1313009R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC7-30-10-P-01 | GJL1313009R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-01 | GJL1313009R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC7-30-10-P-16 | GJL1313009R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-16 | GJL1313009R1016 | 10 | 0.170 |
| | | | | 60 | 1 0 | BC7-30-10-P-03 | GJL1313009R0103 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-03 | GJL1313009R0013 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC7-30-10-P-04 | GJL1313009R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-04 | GJL1313009R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC7-30-10-P-05 | GJL1313009R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-05 | GJL1313009R0015 | 10 | 0.170 |

BC6 mini contactors 2 N.O. + 1 N.C. main poles

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|----------|----------------|-----------------|---------|-------------|
| 4 | 12 | 3 | 300 V / 12 A | 24 | 1 0 | BC6-21-10-P-01 | GJL1213109R0101 | 10 | 0.170 |
| | | | | | 1 0 | BC6-21-10-P-16 | GJL1213109R1106 | 10 | 0.170 |
| | | | | 60 | 1 0 | BC6-21-10-P-03 | GJL1213109R0103 | 10 | 0.170 |
| | | | | | 1 0 | BC6-21-10-P-04 | GJL1213109R0104 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC6-21-10-P-05 | GJL1213109R0105 | 10 | 0.170 |

Other types on request



B6, B7

Main dimensions mm, inches

2CDC102024C0201

VB6, VB7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

AC operated



VB7-30-10-P

2CDC1001011012201

VB6..P, VB7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|------------|-------------------------|---------------------------|--|--------------------|---------------------------|------|------------|---------|----------------|
| | Rated operational power | 3-phase current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V AC-3 | AC-1 | 480 V | hp | | | | | | kg |
| kW | A | | | | V AC | V AC | | | |

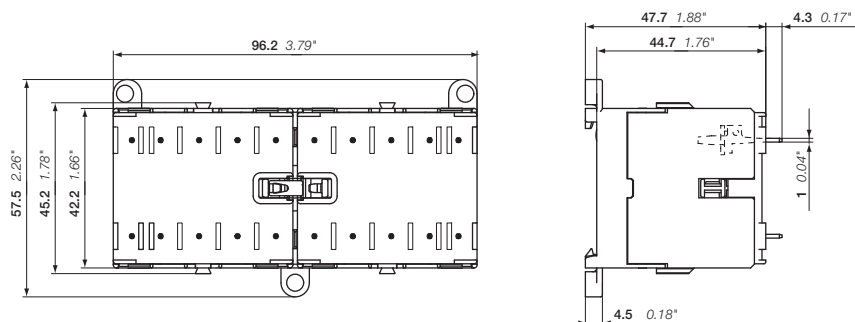
VB6 mini reversing contactors

| Rated power (kW) | Rated current (A) | Rated hp | Rated voltage (V) | Rated current (A) | Rated voltage (V) | Coil type | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|----------|-------------------|-------------------|-------------------|-----------|----------------|-----------------|-------------|-------|
| 4 | 12 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | VB6-30-10-P-01 | GJL1211909R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-01 | GJL1211909R0011 | 5 | 0.345 |
| | | | | 42 | 42 | 1 0 | VB6-30-10-P-02 | GJL1211909R0102 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-02 | GJL1211909R0012 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB6-30-10-P-03 | GJL1211909R0103 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-03 | GJL1211909R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB6-30-10-P-84 | GJL1211909R8104 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-84 | GJL1211909R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB6-30-10-P-80 | GJL1211909R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-80 | GJL1211909R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB6-30-10-P-85 | GJL1211909R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB6-30-01-P-85 | GJL1211909R8015 | 5 | 0.345 |

VB7 mini reversing contactors

| Rated power (kW) | Rated current (A) | Rated hp | Rated voltage (V) | Rated current (A) | Rated voltage (V) | Coil type | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|----------|-------------------|-------------------|-------------------|-----------|----------------|-----------------|-------------|-------|
| 5.5 | 12 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7-30-10-P-01 | GJL1311909R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-01 | GJL1311909R0011 | 5 | 0.345 |
| | | | | 42 | 42 | 1 0 | VB7-30-10-P-02 | GJL1311909R0102 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-02 | GJL1311909R0012 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB7-30-10-P-03 | GJL1311909R0103 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-03 | GJL1311909R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7-30-10-P-84 | GJL1311909R8104 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-84 | GJL1311909R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7-30-10-P-80 | GJL1311909R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-80 | GJL1311909R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7-30-10-P-85 | GJL1311909R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB7-30-01-P-85 | GJL1311909R8015 | 5 | 0.345 |

Other types on request



VB6, VB7

Main dimensions mm, inches

VBC6, VBC7 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

DC operated



VBC7-30-10-P

2CDC21009F0011

VBC6..P, VBC7..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|--------------------|----------------------------------|---------------------------|------|------------|---------|----------------|
| Rated operational power | 3-phase motor rating | General use rating | | | | | | |
| 400 V AC-3 kW | AC-1 A hp | 480 V hp | V DC | | | | | kg |

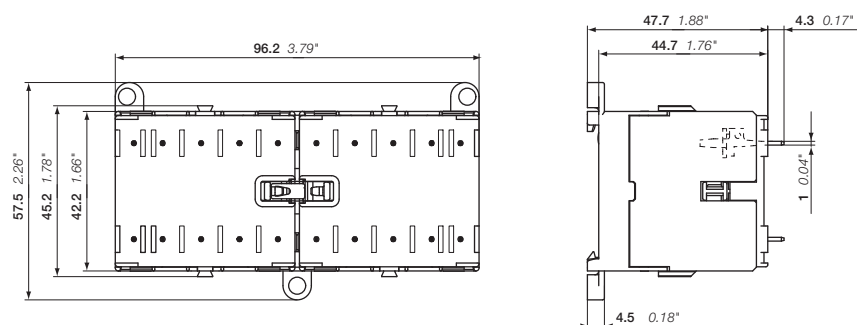
VBC6 mini reversing contactors

| Rated power (kW) | Rated current (A) | Rated hp | Rated voltage (V) | Rated current (A) | Coil voltage (V) | Coil current (A) | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|----------|-------------------|-------------------|------------------|------------------|-----------------|-----------------|-------------|-------|
| 4 | 12 | 3 | 300 V / 12 A | 12 | 1 0 | 0 | VBC6-30-10-P-07 | GJL1213909R0107 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-01-P-07 | GJL1213909R0017 | 5 | 0.345 |
| | | | | 24 | 1 0 | 0 | VBC6-30-10-P-01 | GJL1213909R0101 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-01-P-01 | GJL1213909R0011 | 5 | 0.345 |
| | | | | 48 | 1 0 | 0 | VBC6-30-10-P-06 | GJL1213909R0106 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-06-P-06 | GJL1213909R0016 | 5 | 0.345 |
| | | | | 60 | 1 0 | 0 | VBC6-30-10-P-03 | GJL1213909R0103 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-01-P-03 | GJL1213909R0013 | 5 | 0.345 |
| | | | | 110 ... 125 | 1 0 | 0 | VBC6-30-10-P-04 | GJL1213909R0104 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-01-P-04 | GJL1213909R0014 | 5 | 0.345 |
| | | | | 220 ... 240 | 1 0 | 0 | VBC6-30-10-P-05 | GJL1213909R0105 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC6-30-01-P-05 | GJL1213909R0015 | 5 | 0.345 |

VBC7 mini reversing contactors

| Rated power (kW) | Rated current (A) | Rated hp | Rated voltage (V) | Rated current (A) | Coil voltage (V) | Coil current (A) | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|----------|-------------------|-------------------|------------------|------------------|-----------------|-----------------|-------------|-------|
| 5.5 | 12 | 5 | 600 V / 16 A | 12 | 1 0 | 0 | VBC7-30-10-P-07 | GJL1313909R0107 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-07 | GJL1313909R0017 | 5 | 0.345 |
| | | | | 24 | 1 0 | 0 | VBC7-30-10-P-01 | GJL1313909R0101 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-01 | GJL1313909R0011 | 5 | 0.345 |
| | | | | 48 | 1 0 | 0 | VBC7-30-10-P-16 | GJL1313909R1106 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-16 | GJL1313909R1016 | 5 | 0.345 |
| | | | | 60 | 1 0 | 0 | VBC7-30-10-P-03 | GJL1313909R0103 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-03 | GJL1313909R0013 | 5 | 0.345 |
| | | | | 110 ... 125 | 1 0 | 0 | VBC7-30-10-P-04 | GJL1313909R0104 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-04 | GJL1313909R0014 | 5 | 0.345 |
| | | | | 220 ... 240 | 1 0 | 0 | VBC7-30-10-P-05 | GJL1313909R0105 | 5 | 0.345 |
| | | | | | 0 1 | 1 | VBC7-30-01-P-05 | GJL1313909R0015 | 5 | 0.345 |

Other types on request



VBC6, VBC7

Main dimensions mm, inches

VB6A, VB7A 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

AC operated – with safety blocking function



VB7-30-01-P

2CDC211013F0010

VB6A..P, VB7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | Rated operational power | UL/CSA 3-phase motor rating 480 V | General use rating | Rated control circuit voltage | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---------------------|-------------------------|---|--------------------|-------------------------------|---------------|---------------------------|------|------------|---------|----------------|
| | | | | Uc 50 Hz V AC | 60 Hz V AC | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | | | | | | | | kg |

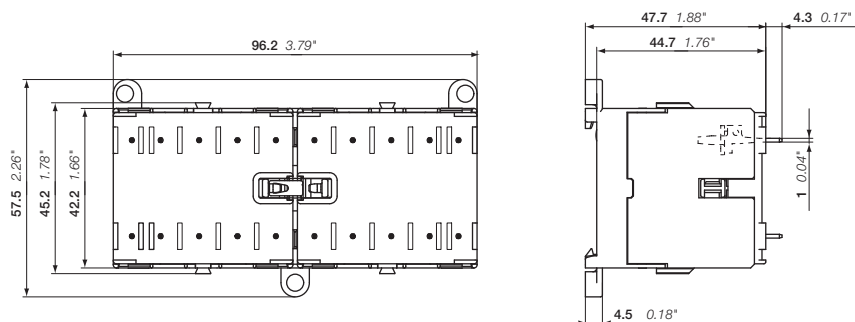
VB6A mini reversing contactors with safety blocking function

| 4 | 12 | 3 | 300 V / 12 A | 24 | 24 | 1 0 0 1 | VB6A-30-10-P-01 VB6A-30-01-P-01 | GJL1211919R0101 GJL1211919R0011 | 5 5 | 0.345 0.345 |
|---|----|---|-----------------|-------------|-------------|------------|------------------------------------|------------------------------------|--------|----------------|
| | | | | 42 | 42 | 1 0 0 1 | VB6A-30-10-P-02 VB6A-30-01-P-02 | GJL1211919R0102 GJL1211919R0012 | 5 5 | 0.345 0.345 |
| | | | | 48 | 48 | 1 0 0 1 | VB6A-30-10-P-03 VB6A-30-01-P-03 | GJL1211919R0103 GJL1211919R0013 | 5 5 | 0.345 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 0 1 | VB6A-30-10-P-84 VB6A-30-01-P-84 | GJL1211919R8104 GJL1211919R8014 | 5 5 | 0.345 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 0 1 | VB6A-30-10-P-80 VB6A-30-01-P-80 | GJL1211919R8100 GJL1211919R8010 | 5 5 | 0.345 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 0 1 | VB6A-30-10-P-85 VB6A-30-01-P-85 | GJL1211919R8105 GJL1211919R8015 | 5 5 | 0.345 0.345 |

VB7A mini reversing contactors with safety blocking function

| 5.5 | 12 | 5 | 600 V / 16 A | 24 | 24 | 1 0 0 1 | VB7A-30-10-P-01 VB7A-30-01-P-01 | GJL1311919R0101 GJL1311919R0011 | 5 5 | 0.345 0.345 |
|-----|----|---|-----------------|-------------|-------------|------------|------------------------------------|------------------------------------|--------|----------------|
| | | | | 42 | 42 | 1 0 0 1 | VB7A-30-10-P-02 VB7A-30-01-P-02 | GJL1311919R0102 GJL1311919R0012 | 5 5 | 0.345 0.345 |
| | | | | 48 | 48 | 1 0 0 1 | VB7A-30-10-P-03 VB7A-30-01-P-03 | GJL1311919R0103 GJL1311919R0013 | 5 5 | 0.345 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 0 1 | VB7A-30-10-P-84 VB7A-30-01-P-84 | GJL1311919R8104 GJL1311919R8014 | 5 5 | 0.345 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 0 1 | VB7A-30-10-P-80 VB7A-30-01-P-80 | GJL1311919R8100 GJL1311919R8010 | 5 5 | 0.345 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 0 1 | VB7A-30-10-P-85 VB7A-30-01-P-85 | GJL1311919R8105 GJL1311919R8015 | 5 5 | 0.345 0.345 |

Other types on request



VB6A, VB7A

Main dimensions mm, inches

2CDC102827C0201

VBC7A 3-pole mini reversing contactors – with soldering pins

4 to 5.5 kW

DC operated – with safety blocking function



VBC7A-30-10-P

2CDC2109F0011

VBC7A..P 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

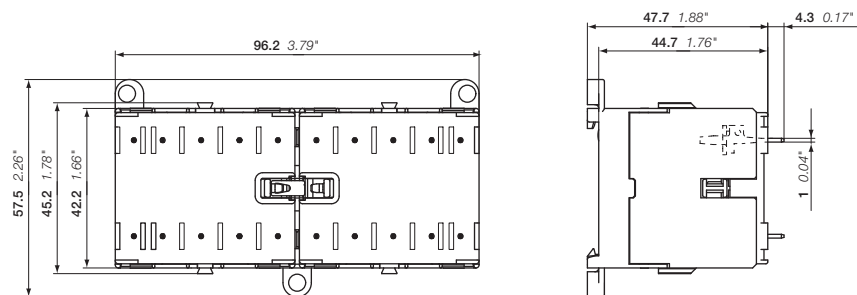
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | 3-phase motor rating | General use rating | | | | | | |
| 400 V AC-3 kW | AC-1 A | 480 V hp | V DC | | | | | kg |

VBC7A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | Rated control circuit voltage (V) | Rated current (A) | Order code | Pkg qty | Weight (1 pce) | | |
|------------------|-------------------|---------------------------|-----------------------------------|-------------------|------------|------------------|-----------------|---|-------|
| 5.5 | 12 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7A-30-10-P-07 | GJL1313919R0107 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-07 | GJL1313919R0017 | 5 | 0.345 |
| | | | | 24 | 1 0 | VBC7A-30-10-P-01 | GJL1313919R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-01 | GJL1313919R0011 | 5 | 0.345 |
| | | | | 48 | 1 0 | VBC7A-30-10-P-16 | GJL1313919R1106 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-16 | GJL1313919R1016 | 5 | 0.345 |
| | | | | 60 | 1 0 | VBC7A-30-10-P-03 | GJL1313919R0103 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-03 | GJL1313919R0013 | 5 | 0.345 |
| | | | | 110 ... 125 | 1 0 | VBC7A-30-10-P-04 | GJL1313919R0104 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-04 | GJL1313919R0014 | 5 | 0.345 |
| | | | | 220 ... 240 | 1 0 | VBC7A-30-10-P-05 | GJL1313919R0105 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-P-05 | GJL1313919R0015 | 5 | 0.345 |

Other types on request



VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with soldering pins

4 to 5.5 kW

DC operated - low consumption



BC7-30-10-P

2CDC211030F0011

BC6..P, BC7..P 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|-------------------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating 480 V | General use rating | | | | | | |
| 400 V | AC-3 | AC-1 | | VDC | | | | | kg |
| kW | A | hp | | | | | | | |

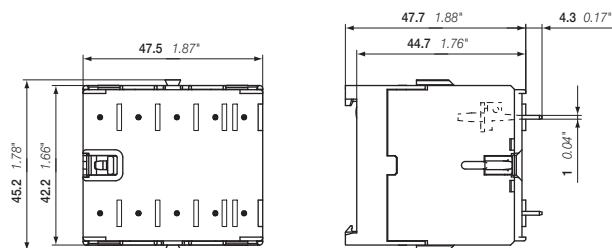
DC operation 24 V / 1.4 W

| Rated power | Rated current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------|---------------|----------------------|--------------------|--|---------------------------|--------------------|-----------------|---------|----------------|
| 4 | 12 | 3 | 300 V / 12 A | 24 | 1 0 | BC6-30-10-P-1.4-81 | GJL1213009R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-1.4-81 | GJL1213009R8011 | 10 | 0.170 |
| 5.5 | 12 | 5 | 600 V / 16 A | 24 | 1 0 | BC7-30-10-P-1.4-81 | GJL1313009R8101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-1.4-81 | GJL1313009R8011 | 10 | 0.170 |

DC operation 17 ... 32 V / 2.4 W, I_{th} < 8 A

| Rated power | Rated current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------|---------------|----------------------|--------------------|--|---------------------------|--------------------|-----------------|---------|----------------|
| 4 | 12 | 3 | 300 V / 12 A | 17 ... 32 | 1 0 | BC6-30-10-P-2.4-51 | GJL1213009R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-P-2.4-51 | GJL1213009R5011 | 10 | 0.170 |
| 5.5 | 12 | 5 | 600 V / 16 A | 17 ... 32 | 1 0 | BC7-30-10-P-2.4-51 | GJL1313009R5101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-P-2.4-51 | GJL1313009R5011 | 10 | 0.170 |

Other types on request



BC6, BC7

Main dimensions mm, inches

K6 4-pole mini contactor relays – with soldering pins

AC operated



K6-22Z-P

2CDC11022F0011

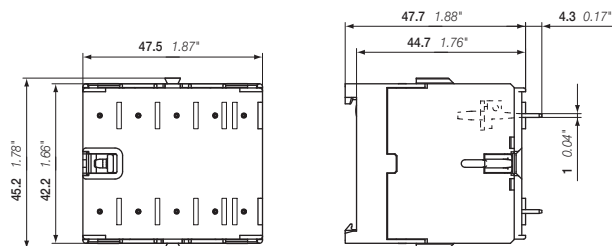
K6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage | | Type | Order code | Pkg qty | Weight (1 pce) |
|-----------------------------------|-------------|-------------|-----------------|---------|----------------|
| Uc | | | | | |
| 50 Hz | 60 Hz | | | | |
| V AC | V AC | | | | kg |
| 2 N.O. + 2 N.C. main poles | | | | | |
| 24 | 24 | K6-22Z-P-01 | GJH1211009R0221 | 10 | 0.170 |
| 42 | 42 | K6-22Z-P-02 | GJH1211009R0222 | 10 | 0.170 |
| 48 | 48 | K6-22Z-P-03 | GJH1211009R0223 | 10 | 0.170 |
| 110 ... 127 | 110 ... 127 | K6-22Z-P-84 | GJH1211009R8224 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-22Z-P-80 | GJH1211009R8220 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-22Z-P-85 | GJH1211009R8225 | 10 | 0.170 |
| 3 N.O. + 1 N.C. main poles | | | | | |
| 24 | 24 | K6-31Z-P-01 | GJH1211009R0311 | 10 | 0.170 |
| 42 | 42 | K6-31Z-P-02 | GJH1211009R0312 | 10 | 0.170 |
| 48 | 48 | K6-31Z-P-03 | GJH1211009R0313 | 10 | 0.170 |
| 110 ... 127 | 110 ... 127 | K6-31Z-P-84 | GJH1211009R8314 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-31Z-P-80 | GJH1211009R8310 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-31Z-P-85 | GJH1211009R8315 | 10 | 0.170 |
| 4 N.O. main poles | | | | | |
| 24 | 24 | K6-40E-P-01 | GJH1211009R0401 | 10 | 0.170 |
| 42 | 42 | K6-40E-P-02 | GJH1211009R0402 | 10 | 0.170 |
| 48 | 48 | K6-40E-P-03 | GJH1211009R0403 | 10 | 0.170 |
| 110 ... 127 | 110 ... 127 | K6-40E-P-84 | GJH1211009R8404 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-40E-P-80 | GJH1211009R8400 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-40E-P-85 | GJH1211009R8405 | 10 | 0.170 |

Other types on request.



K6

Main dimensions mm, inches

04

KC6 4-pole mini contactor relays – with soldering pins

DC operated



2CDC211025F0011

KC6-22Z-P



2CDC211023F0011

KC6-31Z-P

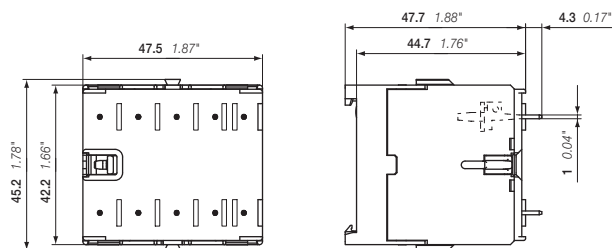
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|--------------|-----------------|------------|-------------------------|
| 2 N.O. + 2 N.C. main poles | | | | |
| 12 | KC6-22Z-P-07 | GJH1213009R0227 | 10 | 0.170 |
| 24 | KC6-22Z-P-01 | GJH1213009R0221 | 10 | 0.170 |
| 48 | KC6-22Z-P-16 | GJH1213009R1226 | 10 | 0.170 |
| 110 ... 125 | KC6-22Z-P-04 | GJH1213009R0224 | 10 | 0.170 |
| 220 ... 240 | KC6-22Z-P-05 | GJH1213009R0225 | 10 | 0.170 |
| 3 N.O. + 1 N.C. main poles | | | | |
| 24 | KC6-31Z-P-01 | GJH1213009R0311 | 10 | 0.170 |
| 48 | KC6-31Z-P-16 | GJH1213009R1316 | 10 | 0.170 |
| 110 ... 125 | KC6-31Z-P-04 | GJH1213009R0314 | 10 | 0.170 |
| 220 ... 240 | KC6-31Z-P-05 | GJH1213009R0315 | 10 | 0.170 |
| 4 N.O. main poles | | | | |
| 12 | KC6-40E-P-07 | GJH1213009R0407 | 10 | 0.170 |
| 24 | KC6-40E-P-01 | GJH1213009R0401 | 10 | 0.170 |
| 48 | KC6-40E-P-16 | GJH1213009R1406 | 10 | 0.170 |
| 110 ... 125 | KC6-40E-P-04 | GJH1213009R0404 | 10 | 0.170 |
| 220 ... 240 | KC6-40E-P-05 | GJH1213009R0405 | 10 | 0.170 |

Other types on request.



KC6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with solderings pins

DC operated - low consumption



KC6-31Z-P-1.4

2CDC11023F0011

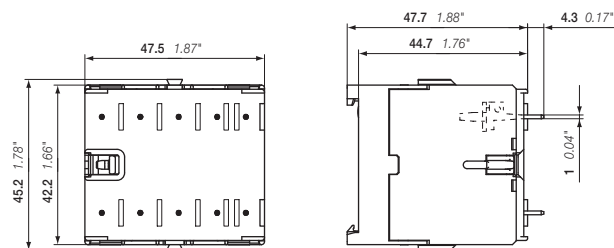
KC6..P 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for soldering on PCB boards

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|------------------|-----------------|------------|-------------------------|
| DC operation 24 V / 1.4 W | | | | |
| 24 | KC6-31Z-P-1.4-81 | GJH1213009R8311 | 10 | 0.170 |
| 24 | KC6-40E-P-1.4-81 | GJH1213009R8401 | 10 | 0.170 |
| DC operation 17 ... 32 V / 2.4 W | | | | |
| 17 ... 32 | KC6-31Z-P-2.4-51 | GJH1213009R5311 | 10 | 0.170 |
| 17 ... 32 | KC6-40E-P-2.4-51 | GJH1213009R5401 | 10 | 0.170 |

Other types on request



KC6

Main dimensions mm, inches

04

B6, B7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

AC operated



B6-30-10-F

2CDC211002F0010



B7-30-10-F

2CDC211031F0011

B6..F, B7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|-------------------------------|--------------------|--|-------|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating 480 V | General use rating | 50 Hz | 60 Hz | | | | | |
| 400 V | AC-1 | | | V AC | V AC | | | | | kg |
| kW | A | hp | | | | | | | | |

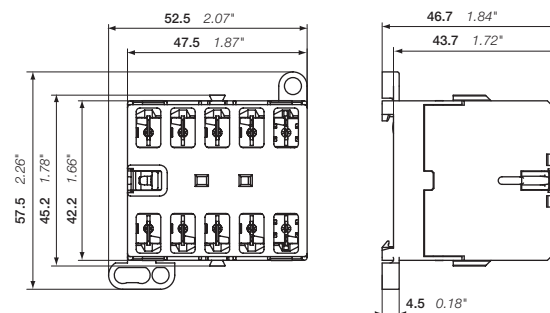
B6 mini contactors

| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | B6-30-10-F-01 | GJL1211003R0101 | 10 | 0.170 |
|---|----|---|--------------|-------------|-------------|-----|---------------|-----------------|----|-------|
| | | | | 42 | 42 | 0 1 | B6-30-01-F-01 | GJL1211003R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B6-30-10-F-02 | GJL1211003R0102 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-02 | GJL1211003R0012 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B6-30-10-F-03 | GJL1211003R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-03 | GJL1211003R0013 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B6-30-10-F-84 | GJL1211003R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-84 | GJL1211003R8014 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-F-80 | GJL1211003R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-80 | GJL1211003R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B6-30-10-F-85 | GJL1211003R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B6-30-01-F-85 | GJL1211003R8015 | 10 | 0.170 |

B7 mini contactors

| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | B7-30-10-F-01 | GJL1311003R0101 | 10 | 0.170 |
|-----|----|---|--------------|-------------|-------------|-----|---------------|-----------------|----|-------|
| | | | | 42 | 42 | 0 1 | B7-30-01-F-01 | GJL1311003R0011 | 10 | 0.170 |
| | | | | 48 | 48 | 1 0 | B7-30-10-F-02 | GJL1311003R0102 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-02 | GJL1311003R0012 | 10 | 0.170 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | B7-30-10-F-03 | GJL1311003R0103 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-03 | GJL1311003R0013 | 10 | 0.170 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | B7-30-10-F-84 | GJL1311003R8104 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-84 | GJL1311003R8014 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-F-80 | GJL1311003R8100 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-80 | GJL1311003R8010 | 10 | 0.170 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | B7-30-10-F-85 | GJL1311003R8105 | 10 | 0.170 |
| | | | | | | 0 1 | B7-30-01-F-85 | GJL1311003R8015 | 10 | 0.170 |

Other types on request



B6, B7

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated



BC6-30-10-F

2CDC21104F0011



BC7-30-10-F

2CDC211024F0011

BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|--|----------------------------|--------------------|----------------------------------|---------------------------|------|------------|---------|----------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating | | | | | | |
| 400 V | AC-3 | | | | | | | | |
| kW | A | hp | | V DC | | | | | kg |

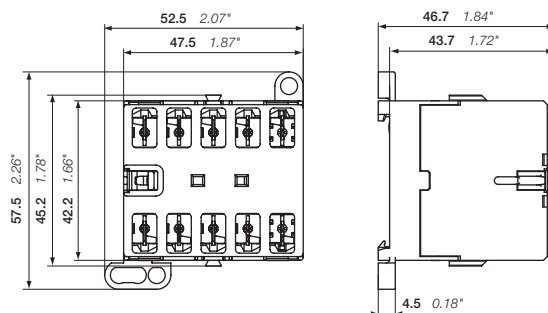
BC6 mini contactors

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating | Rated control circuit voltage (V DC) | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) (kg) |
|------------------------------|-------------|---------------------------|--------------------|--------------------------------------|---------------------------|----------------|-----------------|---------|---------------------|
| 4 | 20 | 3 | 300 V / 12 A | 12 | 1 0 | BC6-30-10-F-07 | GJL1213003R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-07 | GJL1213003R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC6-30-10-F-01 | GJL1213003R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-01 | GJL1213003R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC6-30-10-F-16 | GJL1213003R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-16 | GJL1213003R1016 | 10 | 0.170 |
| | | | | 60 | 1 0 | BC6-30-10-F-03 | GJL1213003R0103 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-03 | GJL1213003R0013 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC6-30-10-F-04 | GJL1213003R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-04 | GJL1213003R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC6-30-10-F-05 | GJL1213003R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC6-30-01-F-05 | GJL1213003R0015 | 10 | 0.170 |

BC7 mini contactors

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating | Rated control circuit voltage (V DC) | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) (kg) |
|------------------------------|-------------|---------------------------|--------------------|--------------------------------------|---------------------------|----------------|-----------------|---------|---------------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | BC7-30-10-F-07 | GJL1313003R0107 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-07 | GJL1313003R0017 | 10 | 0.170 |
| | | | | 24 | 1 0 | BC7-30-10-F-01 | GJL1313003R0101 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-01 | GJL1313003R0011 | 10 | 0.170 |
| | | | | 48 | 1 0 | BC7-30-10-F-16 | GJL1313003R1106 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-16 | GJL1313003R1016 | 10 | 0.170 |
| | | | | 60 | 1 0 | BC7-30-10-F-03 | GJL1313003R0103 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-03 | GJL1313003R0013 | 10 | 0.170 |
| | | | | 110 ... 125 | 1 0 | BC7-30-10-F-04 | GJL1313003R0104 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-04 | GJL1313003R0014 | 10 | 0.170 |
| | | | | 220 ... 240 | 1 0 | BC7-30-10-F-05 | GJL1313003R0105 | 10 | 0.170 |
| | | | | | 0 1 | BC7-30-01-F-05 | GJL1313003R0015 | 10 | 0.170 |

Other types on request



BC6, BC7

Main dimensions mm, inches

VB7 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

AC operated



VB7-30-10-F

2CDC110095F001

VB7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

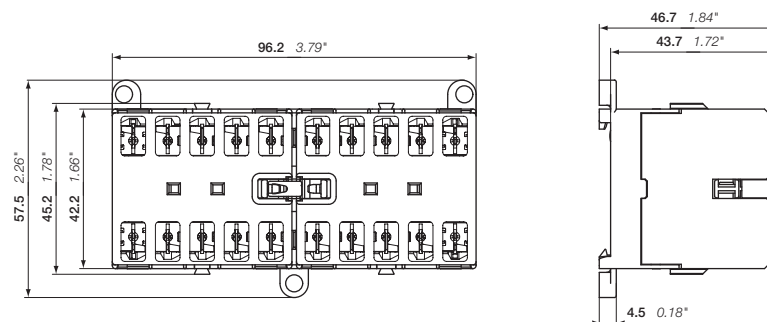
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|-------------------|----------------------|--------------------|--|-------|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | 50 Hz | 60 Hz | | | | | |
| 400 V | | 480 V | | V AC | V AC | | | | | kg |
| AC-3 | AC-1 | | | | | | | | | |
| kW | A | hp | | | | | | | | |

VB7 mini reversing contactors

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Rated current (A) | Coil type | Type | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-----------|----------------|-----------------|---------|-------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7-30-10-F-01 | GJL1311903R0101 | 5 | 0.345 |
| | | | | | 24 | 0 1 | VB7-30-01-F-01 | GJL1311903R0011 | 5 | 0.345 |
| | | | | 42 | 42 | 1 0 | VB7-30-10-F-02 | GJL1311903R0102 | 5 | 0.345 |
| | | | | | 42 | 0 1 | VB7-30-01-F-02 | GJL1311903R0012 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB7-30-10-F-03 | GJL1311903R0103 | 5 | 0.345 |
| | | | | | 48 | 0 1 | VB7-30-01-F-03 | GJL1311903R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7-30-10-F-84 | GJL1311903R8104 | 5 | 0.345 |
| | | | | | 110 ... 127 | 0 1 | VB7-30-01-F-84 | GJL1311903R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7-30-10-F-80 | GJL1311903R8100 | 5 | 0.345 |
| | | | | | 220 ... 240 | 0 1 | VB7-30-01-F-80 | GJL1311903R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7-30-10-F-85 | GJL1311903R8105 | 5 | 0.345 |
| | | | | | 380 ... 415 | 0 1 | VB7-30-01-F-85 | GJL1311903R8015 | 5 | 0.345 |

Other types on request



VB7

Main dimensions mm, inches

VBC7 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

DC operated



VBC7-30-10-F

2CDC211004FP011

VBC7..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

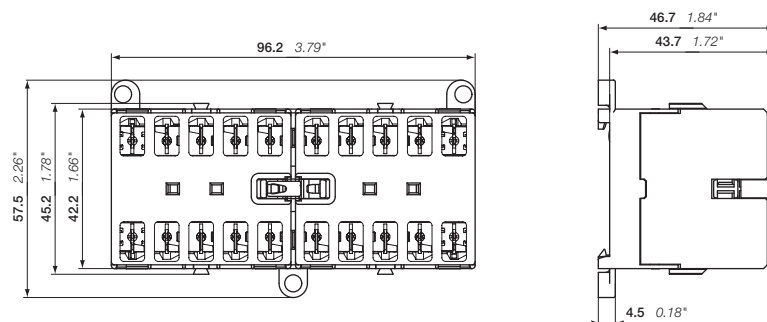
- built-in mechanical interlock. The coils must be mutually interlocked electrically and coils must be de-energised for 50 ms at least to prevent phase to phase short circuit on the arc
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|---|-------------------------------|--------------------|----------------------------------|---------------------------|------|------------|---------|----------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating | | | | | | |
| 400 V | AC-3 | AC-1 | | V DC | | | | | kg |

VBC7 mini reversing contactors

| Rated power (kW) | Rated current (A) | 3-phase motor rating (hp) | UL/CSA rating | Rated control voltage (V) | Coil type | Type | Order code | Pkg qty | Weight (kg) | |
|------------------|-------------------|---------------------------|---------------|---------------------------|-------------|-----------------|-----------------|-----------------|-------------|-------|
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7-30-10-F-07 | GJL1313903R0107 | 5 | 0.345 | |
| | | | | | 0 1 | VBC7-30-01-F-07 | GJL1313903R0017 | 5 | 0.345 | |
| | | | | | 24 | 1 0 | VBC7-30-10-F-01 | GJL1313903R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VBC7-30-01-F-01 | GJL1313903R0011 | 5 | 0.345 |
| | | | | | 48 | 1 0 | VBC7-30-10-F-16 | GJL1313903R1106 | 5 | 0.345 |
| | | | | | | 0 1 | VBC7-30-01-F-16 | GJL1313903R1016 | 5 | 0.345 |
| | | | | | 60 | 1 0 | VBC7-30-10-F-03 | GJL1313903R0103 | 5 | 0.345 |
| | | | | | | 0 1 | VBC7-30-01-F-03 | GJL1313903R0013 | 5 | 0.345 |
| | | | | | 110 ... 125 | 1 0 | VBC7-30-10-F-04 | GJL1313903R0104 | 5 | 0.345 |
| | | | | | | 0 1 | VBC7-30-01-F-04 | GJL1313903R0014 | 5 | 0.345 |
| | | | | | 220 ... 240 | 1 0 | VBC7-30-10-F-05 | GJL1313903R0105 | 5 | 0.345 |
| | | | | | | 0 1 | VBC7-30-01-F-05 | GJL1313903R0015 | 5 | 0.345 |

Other types on request



VBC7

Main dimensions mm, inches

VB7A 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

AC operated – with safety blocking function



VB7A-30-10-F

2CDC21003F0011

VB7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

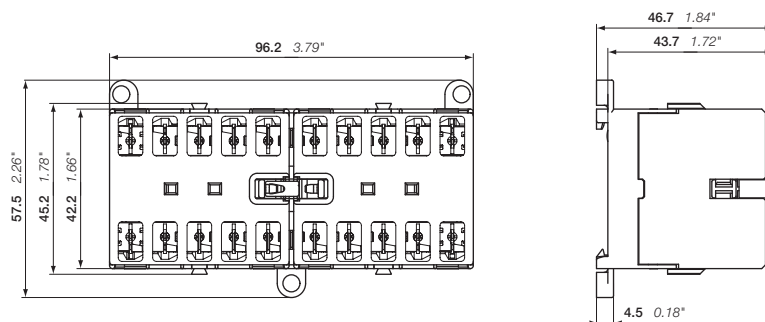
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | UL/CSA | | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|---------------|-------------------------|---|----------------------------------|-------|---------------------------|------|------------|---------|----------------|
| | Rated operational power | 3-phase motor current rating $\theta \leq 40^\circ\text{C}$ | General use rating | 50 Hz | | | | | |
| 400 V AC-3 kW | AC-1 A | 480 V hp | V AC | V AC | | | | pce | kg |

VB7A mini reversing contactors with safety blocking function

| Rated operational power | 3-phase motor current rating $\theta \leq 40^\circ\text{C}$ | General use rating | Rated control circuit voltage Uc | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) | |
|-------------------------|---|--------------------|----------------------------------|----------------------------------|---------------------------|------|-----------------|-----------------|----------------|-------|
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | VB7A-30-10-F-01 | GJL1311913R0101 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-01 | GJL1311913R0011 | 5 | 0.345 |
| | | | | 42 | 42 | 1 0 | VB7A-30-10-F-02 | GJL1311913R0102 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-02 | GJL1311913R0012 | 5 | 0.345 |
| | | | | 48 | 48 | 1 0 | VB7A-30-10-F-03 | GJL1311913R0103 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-03 | GJL1311913R0013 | 5 | 0.345 |
| | | | | 110 ... 127 | 110 ... 127 | 1 0 | VB7A-30-10-F-84 | GJL1311913R8104 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-84 | GJL1311913R8014 | 5 | 0.345 |
| | | | | 220 ... 240 | 220 ... 240 | 1 0 | VB7A-30-10-F-80 | GJL1311913R8100 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-80 | GJL1311913R8010 | 5 | 0.345 |
| | | | | 380 ... 415 | 380 ... 415 | 1 0 | VB7A-30-10-F-85 | GJL1311913R8105 | 5 | 0.345 |
| | | | | | | 0 1 | VB7A-30-01-F-85 | GJL1311913R8015 | 5 | 0.345 |

Other types on request



VB7A

Main dimensions mm, inches

VBC7A 3-pole mini reversing contactors – with flat pin connection

4 to 5.5 kW

DC operated – with safety blocking function



VBC7A-30-10-F

2CDC211002P0011

VBC7A..F 3-pole compact design reversing contactors are space optimized control products mainly used for switching resistive or motor loads up to 690 V AC.

These reversing contactors are designed with:

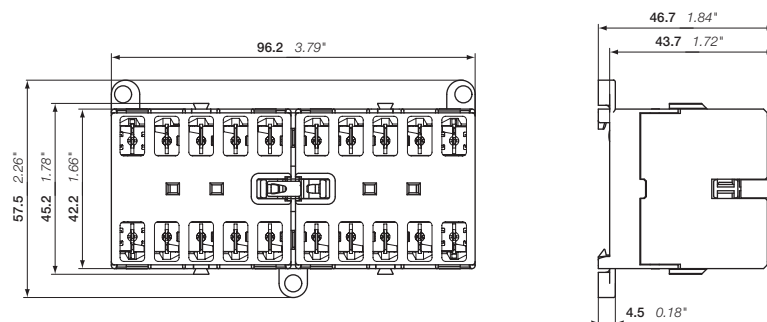
- built-in mechanical interlock and safety blocking function. The safety blocking function is triggered if the voltage is applied to the coil of the contactor to be switched on before the contactor to be switched off has dropped out. The contactor coils are designed for continuous operation when the contactor is de-energised i.e. the coil is not damaged if the mechanical interlock prevents switch-on of the contactor with the coil voltage applied
- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|----------------------|-------------------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating 480 V | General use rating | | | | | | |
| 400 V | | | | V DC | | | | | kg |
| AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | | | | | | | |

VBC7A mini reversing contactors with safety blocking function

| Rated power (kW) | Rated current (A) | Motor rating (hp) | Rated voltage (V) | Rated current (A) | Coil voltage (V) | Coil power (W) | Order code | Pkg qty | Weight (kg) |
|------------------|-------------------|-------------------|-------------------|-------------------|------------------|------------------|-----------------|---------|-------------|
| 5.5 | 20 | 5 | 600 V / 16 A | 12 | 1 0 | VBC7A-30-10-F-07 | GJL1313913R0107 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-07 | GJL1313913R0017 | 5 | 0.345 |
| | | | | 24 | 1 0 | VBC7A-30-10-F-01 | GJL1313913R0101 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-01 | GJL1313913R0011 | 5 | 0.345 |
| | | | | 48 | 1 0 | VBC7A-30-10-F-16 | GJL1313913R1106 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-16 | GJL1313913R1016 | 5 | 0.345 |
| | | | | 60 | 1 0 | VBC7A-30-10-F-03 | GJL1313913R0103 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-03 | GJL1313913R0013 | 5 | 0.345 |
| | | | | 110 ... 125 | 1 0 | VBC7A-30-10-F-04 | GJL1313913R0104 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-04 | GJL1313913R0014 | 5 | 0.345 |
| | | | | 220 ... 240 | 1 0 | VBC7A-30-10-F-05 | GJL1313913R0105 | 5 | 0.345 |
| | | | | | 0 1 | VBC7A-30-01-F-05 | GJL1313913R0015 | 5 | 0.345 |

Other types on request



VBC7A

Main dimensions mm, inches

BC6, BC7 3-pole mini contactors – with flat pin connection

4 to 5.5 kW

DC operated - low consumption



BC6-30-10-F

2CDC21104F0011



BC7-30-10-F

2CDC21102F0011

BC6..F, BC7..F 3-pole mini contactors are compact control products mainly used for switching resistive or motor loads up to 690 V AC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 30-01 fulfills the requirements for Mirror contacts acc. to annex F of IEC/EN 60947-4-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------|-------------------|----------------------|--------------------|--|---------------------------|------|------------|---------|----------------|
| Rated operational power | current θ ≤ 40 °C | 3-phase motor rating | General use rating | | | | | | |
| 400 V | AC-3 | AC-1 | 480 V | V DC | | | | | kg |

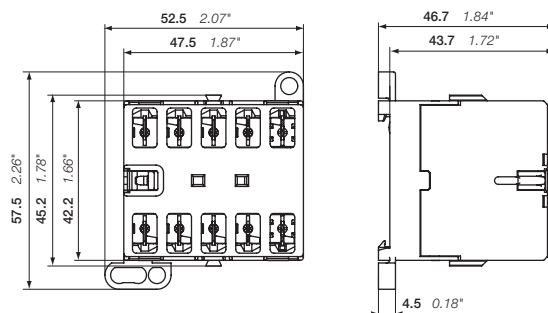
DC operation 24 V / 1.4 W

| Power (kW) | Current (A) | Motor Rating (hp) | Rated Voltage (V) | Rated Voltage (V) | U _c | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------|-------------|-------------------|-------------------|-------------------|----------------|----------|--------------------|-----------------|---------|-------------|
| 4 | 20 | 3 | 300 V / 12 A | 24 | 24 | 1 0 | BC6-30-10-F-1.4-81 | GJL1213003R8101 | 10 | 0.170 |
| | | | | | | 0 1 | BC6-30-01-F-1.4-81 | GJL1213003R8011 | 10 | 0.170 |
| 5.5 | 20 | 5 | 600 V / 16 A | 24 | 24 | 1 0 | BC7-30-10-F-1.4-81 | GJL1313003R8101 | 10 | 0.170 |
| | | | | | | 0 1 | BC7-30-01-F-1.4-81 | GJL1313003R8011 | 10 | 0.170 |

DC operation 17 ... 32 V / 2.4 W

| Power (kW) | Current (A) | Motor Rating (hp) | Rated Voltage (V) | Rated Voltage (V) | U _c | Contacts | Type | Order code | Pkg qty | Weight (kg) |
|------------|-------------|-------------------|-------------------|-------------------|----------------|----------|--------------------|-----------------|---------|-------------|
| 4 | 20 | 3 | 300 V / 12 A | 17 ... 32 | 17 ... 32 | 1 0 | BC6-30-10-F-2.4-51 | GJL1213003R5101 | 10 | 0.170 |
| | | | | | | 0 1 | BC6-30-01-F-2.4-51 | GJL1213003R5011 | 10 | 0.170 |
| 5.5 | 20 | 5 | 600 V / 16 A | 17 ... 32 | 17 ... 32 | 1 0 | BC7-30-10-F-2.4-51 | GJL1313003R5101 | 10 | 0.170 |
| | | | | | | 0 1 | BC7-30-01-F-2.4-51 | GJL1313003R5011 | 10 | 0.170 |

Other types on request



BC6, BC7

Main dimensions mm, inches

K6 4-pole mini contactor relays – with flat pin connection

AC operated



K6-22Z-F

K6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: AC operated, low consumption coil (3.5 VA at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| Rated control circuit voltage | | Type | Order code | Pkg qty | Weight (1 pce) |
|-------------------------------|-------|------|------------|---------|----------------|
| Uc | | | | | |
| 50 Hz | 60 Hz | | | | |
| V AC | V AC | | | | kg |

2 N.O. + 2 N.C. main poles

| | | | | | |
|-------------|-------------|-------------|-----------------|----|-------|
| 24 | 24 | K6-22Z-F-01 | GJH1211003R0221 | 10 | 0.170 |
| 42 | 42 | K6-22Z-F-02 | GJH1211003R0222 | 10 | 0.170 |
| 48 | 48 | K6-22Z-F-03 | GJH1211003R0223 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-22Z-F-84 | GJH1211003R8224 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-22Z-F-80 | GJH1211003R8220 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-22Z-F-85 | GJH1211003R8225 | 10 | 0.170 |

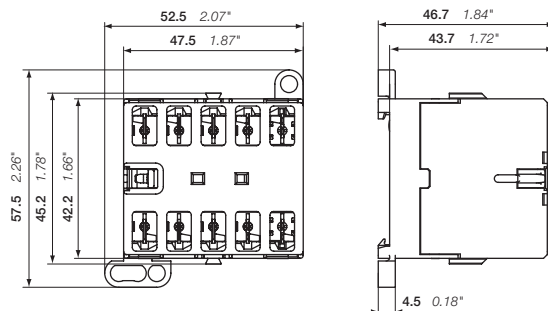
3 N.O. + 1 N.C. main poles

| | | | | | |
|-------------|-------------|-------------|-----------------|----|-------|
| 24 | 24 | K6-31Z-F-01 | GJH1211003R0311 | 10 | 0.170 |
| 42 | 42 | K6-31Z-F-02 | GJH1211003R0312 | 10 | 0.170 |
| 48 | 48 | K6-31Z-F-03 | GJH1211003R0313 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-31Z-F-84 | GJH1211003R8314 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-31Z-F-80 | GJH1211003R8310 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-31Z-F-85 | GJH1211003R8315 | 10 | 0.170 |

4 N.O. main poles

| | | | | | |
|-------------|-------------|-------------|-----------------|----|-------|
| 24 | 24 | K6-40E-F-01 | GJH1211003R0401 | 10 | 0.170 |
| 42 | 42 | K6-40E-F-02 | GJH1211003R0402 | 10 | 0.170 |
| 48 | 48 | K6-40E-F-03 | GJH1211003R0403 | 10 | 0.170 |
| 110 ...127 | 110 ...127 | K6-40E-F-84 | GJH1211003R8404 | 10 | 0.170 |
| 220 ... 240 | 220 ... 240 | K6-40E-F-80 | GJH1211003R8400 | 10 | 0.170 |
| 380 ... 415 | 380 ... 415 | K6-40E-F-85 | GJH1211003R8405 | 10 | 0.170 |

Other types on request.



K6

Main dimensions mm, inches

KC6 4-pole mini contactor relays – with flat pin connection

DC operated



KC6-22Z-F-01

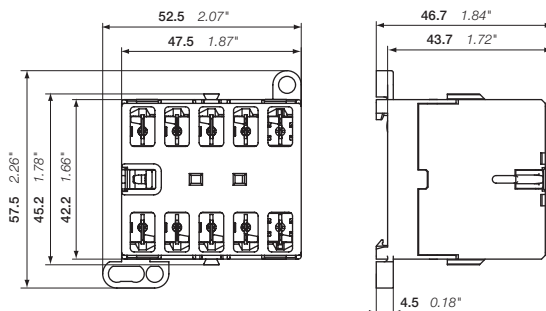
K6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated, low consumption coil (3.5 W at pull-in and at holding)
- hum-free coil
- contacts configurations 22 and 31 fulfill the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- add-on auxiliary contact blocks for side mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|--------------|-----------------|------------|-------------------------|
| 2 N.O. + 2 N.C. main poles | | | | |
| 12 | KC6-22Z-F-07 | GJH1213003R0227 | 10 | 0.170 |
| 24 | KC6-22Z-F-01 | GJH1213003R0221 | 10 | 0.170 |
| 48 | KC6-22Z-F-16 | GJH1213003R1226 | 10 | 0.170 |
| 110 ... 125 | KC6-22Z-F-04 | GJH1213003R0224 | 10 | 0.170 |
| 220 ... 240 | KC6-22Z-F-05 | GJH1213003R0225 | 10 | 0.170 |
| 3 N.O. + 1 N.C. main poles | | | | |
| 12 | KC6-31Z-F-07 | GJH1213003R0317 | 10 | 0.170 |
| 24 | KC6-31Z-F-01 | GJH1213003R0311 | 10 | 0.170 |
| 48 | KC6-31Z-F-16 | GJH1213003R1316 | 10 | 0.170 |
| 110 ... 125 | KC6-31Z-F-04 | GJH1213003R0314 | 10 | 0.170 |
| 220 ... 240 | KC6-31Z-F-05 | GJH1213003R0315 | 10 | 0.170 |
| 4 N.O. main poles | | | | |
| 24 | KC6-40E-F-01 | GJH1213003R0401 | 10 | 0.170 |
| 48 | KC6-40E-F-16 | GJH1213003R1406 | 10 | 0.170 |
| 110 ... 125 | KC6-40E-F-04 | GJH1213003R0404 | 10 | 0.170 |
| 220 ... 240 | KC6-40E-F-05 | GJH1213003R0405 | 10 | 0.170 |

Other types on request.



KC6
Main dimensions mm, inches

KC6 4-pole mini contactor relays – with flat pin connection

DC operated - low consumption



KC6-31Z-F-05

2CDC211033F0011

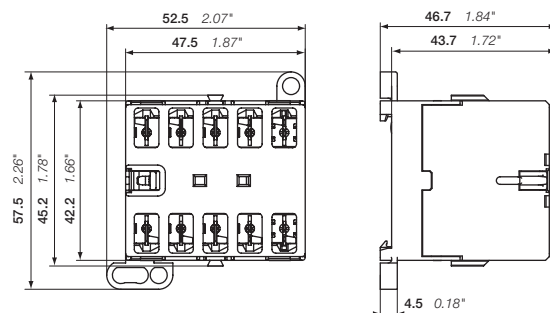
KC6..F 4-pole mini-contactor relays are space optimized control products mainly used for control functions or for small loads up to 4 A.

These contactors are designed with 4 poles with various contact combinations:

- flat pin connection for plug-in wiring and shake proven connection
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- hum-free coil
- contacts configuration 31 fulfills the requirements for Mechanically linked contacts acc. to annex L of IEC/EN 60947-5-1
- no auxiliary contact block permitted for mounting
- suitable for rail or wall mounting

| Rated control circuit voltage Uc VDC | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|------------------|-----------------|------------|-------------------------|
| DC operation 24 V / 1.4 W | | | | |
| 24 | KC6-31Z-F-1.4-81 | GJH1213003R8311 | 10 | 0.170 |
| 24 | KC6-40E-F-1.4-81 | GJH1213003R8401 | 10 | 0.170 |
| DC operation 17 ... 32 V / 2.4 W | | | | |
| 17 ... 32 | KC6-31Z-F-51 | GJH1213003R5311 | 10 | 0.170 |
| 17 ... 32 | KC6-40E-F-51 | GJH1213003R5401 | 10 | 0.170 |

Other types on request



KC6

Main dimensions mm, inches

B6, B7, BC6, BC7 3- and 4-pole mini contactors

VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors

Technical data

Main pole – Utilization characteristics according to IEC

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|---|---|-----------------------------|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1 | | |
| Rated operational voltage U _e max | 690 V AC | | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | | |
| Conventional free-air thermal current I _{th} acc. to IEC/EN 60947-4-1, open contactors, $\theta \leq 40$ °C, with conductor cross-sectional area | Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A | | |
| AC-1 Utilization category for air temperature close to contactor $\theta \leq 40$ °C | | | |
| I _e / Rated operational current AC-1 | 220-230-240 V | Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A | |
| U _e max \leq 690 V, 50/60 Hz | 380-400 V | Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A | |
| | 440 V | Screw terminal types: 20 A Flat pin types: 20 A Soldering pin types: 12 A | |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-1 Utilization category for air temperature close to contactor $\theta \leq 55$ °C | | | |
| I _e / Rated operational current AC-1 | 220-230-240 V | Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A | |
| U _e max \leq 690 V, 50/60 Hz | 380-400 V | Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A | |
| | 440 V | Screw terminal types: 16 A Flat pin types: 16 A Soldering pin types: 12 A | |
| | 500 V | 12 A | |
| | 690 V | 6 A | |
| AC-3 / AC-3e Utilization category for air temperature close to contactor $\theta \leq 55$ °C | | | |
| I _e / Rated operational current AC-3 / AC-3e | 220 / 230 / 240 V | 8.9 / 8.5 / 8.1 A | 11.8 / 11.3 / 10.8 A |
| 3-phase motors | 380 / 400 V | 8.9 / 8.5 A | 12.1 / 11.5 A |
| | 440 V | 7.4 A | 10.1 A |
| | 500 V | 6.8 A | 9.2 A |
| | 690 V | 3.8 A | 3.8 A |
| Rated operational power AC-3 / AC-3e | 220-230-240 V | 2.2 kW | 3 kW |
| | 380-400 V | 4 kW | 5.5 kW |
| | 440 V | 4 kW | 5.5 kW |
| | 500 V | 4 kW | 5.5 kW |
| | 690 V | 3 kW | 3 kW |
| DC-1 Utilization category for air temperature close to contactor $\theta \leq 55$ °C | | | |
| I _e / Rated operational current DC-1 | 110 V | - | 4 A |
| | 220 V | - | 0.6 A |
| DC-3 Utilization category for air temperature close to contactor $\theta \leq 55$ °C | | | |
| I _e / Rated operational current DC-3 | 110 V | - | 1.5 A |
| | 220 V | - | 0.25 A |
| DC-5 Utilization category for air temperature close to contactor $\theta \leq 55$ °C | | | |
| I _e / Rated operational current DC-5 | 110 V | - | 0.4 A |
| | 220 V | - | 0.2 A |
| Rated making capacity | 10 x I _e AC-3 acc. to IEC/EN 60947-4-1; 13 x I _e AC-3e acc. to IEC/EN 60947-4-1 | | |
| Rated breaking capacity | 8 x I _e AC-3 acc. to IEC/EN 60947-4-1; 8.5 x I _e AC-3e acc. to IEC/EN 60947-4-1 | | |
| Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG | Type 1: 25 A / Type 2: 20 A | | Type 1: 25 A / Type 2: 25 A |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | 10 s | 64 A | 96 A |
| Maximum breaking capacity cos $\phi = 0.45$ | at 400 V | 64 A | 96 A |
| Maximum electrical switching frequency | AC-1 | 300 cycles/h | |
| | AC-3 | 600 cycles/h | |
| | DC-1, DC-3, DC-5 | 600 cycles/h | |

B6, B7, BC6, BC7 3- and 4-pole mini contactors

VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors

Technical data

Main pole – Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|----------------------------------|-------------------------|-------------------------|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Standards | UL/CSA 60947-1, UL/CSA 60947-4-1 | | |
| Maximum operational voltage | 600 V | | |
| UL/CSA general use rating | 12 A / 300 V | | 16 A / 600 V |
| UL/CSA maximum 1-phase motor rating | | | |
| Full load current | 120 V AC | 5.8 A | 13.8 A |
| | 240 V AC | 4.9 A | 10.0 A |
| Horse power rating | 120 V AC | 0.25 hp | 0.75 hp |
| | 240 V AC | 0.5 hp | 1.5 hp |
| UL/CSA maximum 3-phase motor rating | | | |
| Full load current (1) | 200 / 208 V AC | 4.8 / 4.6 A | 7.8 / 10.6 A |
| | 220-240 V AC | 6.8 A | 9.6 A |
| | 440-480 V AC | 4.8 A | 7.6 A |
| | 550-600 V AC | 1.7 A | 6.1 A |
| Horse power rating (1) | 200 / 208 V AC | 1 hp | 2 / 3 hp |
| | 220-240 V AC | 2 hp | 3 hp |
| | 440-480 V AC | 3 hp | 5 hp |
| | 550-600 V AC | 1 hp | 5 hp |
| Resistive Heating | 300 V per pole | 8 A | 8 A |
| Incandescent Lamps | 300 V per pole | 6 A | 6 A |
| Fluorescent Lamps | 300 V per pole | 8.4 A | 8.4 A |
| Short-circuit protection device for contactors without thermal overload relay - motor protection excluded | | | |
| Fuse rating | 600 V | 40 A | |
| Fuse type | 600 V | Class J | |
| Maximum electrical switching frequency | | | |
| For resistive loads AC-1 | 300 cycles/h | | |
| For motor loads AC-3 | 600 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|---|------------------------------------|-------------------------|-------------------------|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Rated insulation voltage Ui | | | |
| acc. to IEC/EN 60947-4-1 | 690 V | | |
| acc. to UL/CSA 60947-4-1 | 600 V | | |
| Rated impulse withstand voltage Uimp | 6 kV | | |
| Ambient air temperature, close to contactor | | | |
| Operation | Fitted with thermal overload relay | -25 ... +50 °C | |
| | Without thermal overload relay | -25 ... +55 °C | |
| Storage | -40 ... +80 °C | | |
| Climatic withstand | Acc. to IEC 60947-1 Annex Q | | |
| Maximum operating altitude (without derating) | 2000 m | | |
| Mechanical durability | 10 ⁷ operating cycles | | |
| Resistance to shock | Half-sine | | |
| acc. to IEC/EN 60068-2-27 | 15 g / 11 ms | | |
| acc. to IEC/EN 60947-1 Annex. Q | Category E | | |
| Resistance to vibrations | Sinusoidal | | |
| acc. to IEC/EN 60068-2-6 | 5 g / 3 ... 150 Hz | | |
| acc. to IEC/EN 60947-1 Annex. Q | Category E | | |

B6, B7, BC6, BC7 3- and 4-pole mini contactors

VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors

Technical data

Magnet system characteristics for B6, B7 contactors

| | | | |
|--|-----------------------|-------------------------------|----------------|
| Contactor types | AC operated | B6, VB6 | B7, VB7 |
| Coil operating limits acc. to IEC/EN 60947-4-1 | AC supply | 0.85 ... 1.1 x U _c | |
| AC control voltage | | See ordering tables | |
| Rated control circuit voltage U _c | | See ordering tables | |
| Coil consumption | Average pull-in value | 3.5 VA / 3.5 W | |
| | Average holding value | 3.5 VA / 3.5 W | |
| Drop-out voltage in % of U _c min | | 20 ... 75 % | |

Magnet system characteristics for BC6, BC7 contactors

| | | | |
|--|-----------------------|-------------------------------|------------------|
| Contactor types | DC operated | BC6, VBC6 | BC7, VBC7 |
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x U _c | |
| AC control voltage | | See ordering tables | |
| Rated control circuit voltage U _c | | See ordering tables | |
| Coil consumption (1) | Average pull-in value | 3.5 VA / 3.5 W | |
| | Average holding value | 3.5 VA / 3.5 W | |
| Drop-out voltage in % of U _c min | | 10 ... 75 % | |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

Mounting characteristics and conditions for use

| | | | |
|--------------------|--|-------------------------|-------------------------|
| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Mounting positions | | | |
| Mounting distances | The contactors can be assembled side by side | | |
| Fixing | On rail acc. to IEC/EN 60715 | | |
| | By screws (not supplied) | | |
| | 35 x 7.5 mm or 35 x 15 mm | | |
| | 2 x M4 screws placed diagonally | | |

B6, B7, BC6, BC7 3- and 4-pole mini contactors

VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors

Technical data






Built-in auxiliary contact according to IEC

| Types | Built-in auxiliary contacts | |
|--|----------------------------------|--------------|
| Standards | IEC/EN 60947-1, IEC/EN 60947-5-1 | |
| Rated operational voltage U _e max | 690 V | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | 6 A | |
| I _e / Rated operational current AC-15 | 24 V | 4 A |
| | 110-120 V | 4 A |
| | 220-230-240 V | 4 A |
| | 380-400 V | 3 A |
| | 440 V | 3 A |
| I _e / Rated operational current DC-13 | 24 V | 2.5 A |
| | 110 V | 0.7 A |
| | 220 - 240 V | 0.4 A |
| Short-circuit protection device - fuse type gG | 6 A | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

Built-in auxiliary contact according to UL/CSA

| Types | Built-in auxiliary contacts | |
|--------------------------|----------------------------------|--|
| Standard | UL/CSA 60947-1, UL/CSA 60947-5-1 | |
| Max. operational voltage | 600 V AC | |
| Pilot duty | A600 | |

Connection characteristics

| Contactor types | AC operated | B6, VB6, VB6A | B7, VB7, VB7A |
|--|---|---------------------------|------------------|
| | DC operated | BC6, VBC6, VBC6A | BC7, VBC7, VBC7A |
| Terminals (1) |  <p>Screw terminals with cable clamp</p> | | |
| Connection capacity | | | |
| Main conductors (poles) | | | |
|  Rigid: solid | 1 or 2 x | 1 ... 4 mm ² | |
|  Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm ² | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 | |
| Stripping length | 9 mm | | |
| Tightening torques | 0.8 ... 1.1 Nm / 7 lb.in | | |
| Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | |
|  Rigid: solid | 1 or 2 x | 1 ... 4 mm ² | |
|  Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm ² | |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 22 ... 10 | |
| Stripping length | 9 mm | | |
| Tightening torques | | | |
| Coil terminals | 0.8 ... 1.1 Nm / 7 lb.in | | |
| Built-in auxiliary terminals | 0.8 ... 1.1 Nm / 7 lb.in | | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| Main terminals | IP20 | | |
| Coil terminals | IP20 | | |
| Built-in auxiliary terminals | IP20 | | |
| Screw terminals | (Delivered in open position, screws of unused terminals must be tightened) | | |
| All terminals | M3 | | |
| Screwdriver type | Flat Ø 5.5 mm / Pozidriv 1 | | |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

K6, KC6 4-pole mini contactor relays

Technical data

Main pole – Utilization characteristics according to IEC

| | | |
|--|----------------------------------|--------------|
| Contactor types | AC operated | K6 |
| | DC operated | KC6 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-5-1 | |
| Rated operational voltage U _{emax} | 690 V | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | 6 A | |
| I _e / Rated operational current AC-15 | 24 V | 4 A |
| | 110-120 V | 4 A |
| | 220-230-240 V | 4 A |
| | 380-400 V | 3 A |
| | 440 V | 3 A |
| | 480-500 V | 2 A |
| I _e / Rated operational current DC-13 | 24 V | 2.5 A |
| | 110 V | 0.7 A |
| | 220-240 V | 0.4 A |
| Short-circuit protection device for contactors - fuse type gG | 6 A | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

Main pole – Utilization characteristics according to UL/NEMA/CSA

| | | |
|-----------------------------|----------------------------------|------------|
| Contactor types | AC operated | K6 |
| | DC operated | KC6 |
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 | |
| Maximum operational voltage | 600 V AC | |
| Pilot duty | A600 | |

K6, KC6 4-pole mini contactor relays

Technical data

General technical data

| | | |
|--|---------------------------------|----------------------------------|
| Contactor types | AC operated | K6 |
| | DC operated | KC6 |
| Rated insulation voltage U_i | | 690 V |
| acc. to IEC/EN 60947-5-1 | | 600 V |
| acc. to UL/CSA 60947-5-1 | | 600 V |
| Rated impulse withstand voltage U_{imp} | | 6 kV |
| Electromagnetic compatibility | | |
| Ambient air temperature close to contactor relay | Operation in free air | -25 ... +55 °C |
| | Storage | -40 ... +80 °C |
| Climatic withstand | | Acc. to IEC/EN 60068-2-30 |
| Maximum operating altitude (without derating) | | 2000 m |
| Mechanical durability | | 10 ⁷ operating cycles |
| Resistance to shock | | Half-sine |
| | acc. to IEC/EN 60068-2-27 | 15 g / 11ms |
| | acc. to IEC/EN 60947-1 Annex. Q | Category E |
| Resistance to vibrations | | Sinusoidal |
| | acc. to IEC/EN 60068-2-6 | 5 g / 3 ... 150 Hz |
| | acc. to IEC/EN 60947-1 Annex. Q | Category E |

Magnet system characteristics for K6 contactor relays

| | | |
|-------------------------------------|-----------------------|----------------------|
| Contactor types | AC operated | K6 |
| Coil operating limits | AC supply | 0.85 ... 1.1 x U_c |
| acc. to IEC/EN 60947-5-1 | | |
| AC control voltage | | |
| Rated control circuit voltage U_c | | See ordering tables |
| Coil consumption | Average pull-in value | 3.5 VA / 3.5 W |
| | Average holding value | 3.5 VA / 3.5 W |
| Drop-out voltage in % of U_c min. | | 20 ... 75 % |

Magnet system characteristics for KC6 contactor relays

| | | |
|-------------------------------------|-----------------------|----------------------|
| Contactor types | DC operated | KC6 |
| Coil operating limits | DC supply | 0.85 ... 1.1 x U_c |
| acc. to IEC/EN 60947-5-1 | | |
| DC control voltage | | |
| Rated control circuit voltage U_c | | See ordering tables |
| Coil consumption (1) | Average pull-in value | 3.5 VA / 3.5 W |
| | Average holding value | 3.5 VA / 3.5 W |
| Drop-out voltage in % of U_c min. | | 10 ... 75 % |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

K6, KC6 4-pole mini contactor relays

Technical data

Mounting characteristics and conditions for use

| | | |
|--------------------|---|------------|
| Contactor types | AC operated | K6 |
| | DC operated | KC6 |
| Mounting positions | | |
| Mounting distances | The contactors can be assembled side by side. | |
| Fixing | <p>On rail acc. to IEC/EN 60715</p> <p>By screws (not supplied)</p> | |
| | <p>35 x 7.5 mm or 35 x 15 mm</p> <p>2 x M4 screws placed diagonally</p> | |

Connecting characteristics

| | | |
|---|---|------------|
| Contactor types | AC operated | K6 |
| | DC operated | KC6 |
| Terminals (1) | <p>Screw terminals with cable clamp</p> | |
| Connection capacity | <p>Main conductors (poles)</p> <p> Rigid: solid 1 or 2 x 1 ... 4 mm² </p> <p> Flexible without ferrule 1 or 2 x 1 ... 2.5 mm² </p> <p>Connection capacity acc. to UL/CSA 1 or 2 x AWG 22 ... 10</p> <p>Stripping length 9 mm</p> <p>Tightening torques 0.8 ... 1.1 Nm / 7 lb.in</p> | |
| Degree of protection acc. to IEC/EN60947-1 and IEC/EN 60529 | <p>All IP20</p> | |
| Screw terminals | (Delivered in open position, screws of unused terminals must be tightened) | |
| All terminals | M3 | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 1 | |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
 Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

Accessories for B mini contactors



CAF6-11N

2CDC2101250010



CA6-11E

2CDC2100850010



CA6-11E-P

2CDC2101850011



CA6-11E-F

2CDC2102050011



RV-BC6/250

2CDC2100750010



BSM6-30

S5T2792R



LT6-B

2CDC2301250011

| Suitable for | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front mounted instantaneous auxiliary contact blocks (not allowed for mounting on B6S, B7S, interface contactors) (1) (2)

| | | | | | |
|--|-----|----------|-----------------|----|-------|
| B6-, B7-40-00, BC6-, BC7-40-00 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A | 1 1 | CAF6-11E | GJL1201330R0002 | 10 | 0.020 |
| | 2 0 | CAF6-20E | GJL1201330R0006 | 10 | 0.020 |
| | 0 2 | CAF6-02E | GJL1201330R0010 | 10 | 0.020 |
| B6-, B7-30-10, BC6-, BC7-30-10 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A | 1 1 | CAF6-11M | GJL1201330R0003 | 10 | 0.020 |
| | 2 0 | CAF6-20M | GJL1201330R0007 | 10 | 0.020 |
| | 0 2 | CAF6-02M | GJL1201330R0011 | 10 | 0.020 |
| B6-, B7-30-01, BC6-, BC7-30-01 VB6, VB7, VBC6, VBC7, VB6A, VB7A VBC6A, VBC7A | 1 1 | CAF6-11N | GJL1201330R0004 | 10 | 0.020 |
| | 2 0 | CAF6-20N | GJL1201330R0008 | 10 | 0.020 |
| | 0 2 | CAF6-02N | GJL1201330R0012 | 10 | 0.020 |

Side mounted instantaneous auxiliary contact block (1) (2)

| | | | | | |
|--------------------------------|-----|---------|-----------------|----|-------|
| B6-, B7-40-00, BC6-, BC7-40-00 | 1 1 | CA6-11E | GJL1201317R0002 | 10 | 0.030 |
| B6-, B7-30-10, BC6-, BC7-30-10 | 1 1 | CA6-11M | GJL1201317R0003 | 10 | 0.030 |
| B6-, B7-30-01, BC6-, BC7-30-01 | 1 1 | CA6-11N | GJL1201317R0004 | 10 | 0.030 |

Side mounted instantaneous auxiliary contact block with soldering pins (1) (2)

| | | | | | |
|------------------------------------|-----|-----------|-----------------|----|-------|
| B6-, B7-40-00-P, BC6-, BC7-40-00-P | 1 1 | CA6-11E-P | GJL1201319R0002 | 10 | 0.025 |
| B6-, B7-30-10-P, BC6-, BC7-30-10-P | 1 1 | CA6-11M-P | GJL1201319R0003 | 10 | 0.025 |
| B6-, B7-30-01-P, BC6-, BC7-30-01-P | 1 1 | CA6-11N-P | GJL1201319R0004 | 10 | 0.025 |

Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2)

| | | | | | |
|------------------------------------|-----|-----------|-----------------|----|-------|
| B6-, B7-40-00-F, BC6-, BC7-40-00-F | 1 1 | CA6-11E-F | GJL1201318R0002 | 10 | 0.025 |
| B6-, B7-30-10-F, BC6-, BC7-30-10-F | 1 1 | CA6-11M-F | GJL1201318R0003 | 10 | 0.025 |
| B6-, B7-30-01-F, BC6-, BC7-30-01-F | 1 1 | CA6-11N-F | GJL1201318R0004 | 10 | 0.025 |

Soldering socket (Ith = 10 A, AC-3: 500 V / 8 A, 690 V / 3.5 A, UL: 300 V / 8 A)

| | | | | |
|------------------------------|--------|-----------------|----|-------|
| B6, B7, BC6, BC7 | LB6 | GJL1201902R0001 | 10 | 0.020 |
| 2-pole aux.contact blocks CA | LB6-CA | GJL1201903R0001 | 10 | 0.010 |

- (1) CA6 and CAF6 must not be fitted simultaneously.
- (2) The auxiliary contacts in the front or side blocks are not Mirror contacts

| Suitable for | Rated control circuit voltage UC V DC | Connection type | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------|---------------------------------------|-----------------|------|------------|---------|-------------------|
|--------------|---------------------------------------|-----------------|------|------------|---------|-------------------|

Surge suppressors for contactor coils

| | | | | | | |
|----------|------------|-----------|------------|-----------------|----|-------|
| BC6, BC7 | 24 ... 60 | Cable lug | RV-BC6/60 | GHV2501902R0002 | 10 | 0.005 |
| | 50 ... 250 | Cable lug | RV-BC6/250 | GHV2501903R0002 | 10 | 0.005 |

Note: Mini contactors for AC operation have an integrated protective circuit

Connecting links with manual motor starters

| | | | | |
|---|----------|-----------------|----|-------|
| To connect B..VB.. mini contactor to MS116, MS132 | BEA7/132 | 1SBN080906R1002 | 10 | 0.013 |
| To connect B..VB.. mini contactors to MS325 | BEA7/325 | 1SBN080906R1001 | 10 | 0.021 |

Connection sets for reversing contactors

| | | | | |
|---|---------|-----------------|----|-------|
| VB6, VB7, VBC6, VBC7, VB6A, VB7A, VBC6A, VBC7A, cross-section 1.8 mm ² | BSM6-30 | GJL1201908R0001 | 10 | 0.010 |
|---|---------|-----------------|----|-------|

Parallel connecting link

| | | | | |
|------------------|-----|-----------------|-----|-------|
| B6, B7, BC6, BC7 | LP6 | GJL1201907R0001 | 100 | 0.009 |
|------------------|-----|-----------------|-----|-------|

Cover cap, transparent fitting to DIN rail design, sealable

| | | | | |
|------------------|-------|-----------------|----|-------|
| B6, B7, BC6, BC7 | LT6-B | GJL1201906R0001 | 10 | 0.015 |
|------------------|-------|-----------------|----|-------|

Plastic label for markings

| | | | | |
|------------------|--------|-----------------|----|-------|
| B6, B7, BC6, BC7 | BA5-50 | 1SBN110000R1000 | 50 | 0.020 |
|------------------|--------|-----------------|----|-------|

Accessories for K mini contactor relays



CAF6-11K

2CDC21101950011



CA6-11K

2CDC21100950010



CA6-11K-P

2CDC21101150010



CA6-11K-F

2CDC21101050010



LT6-B

2CDC21100650010



RV-BC6/250

2CDC21100750010

| Suitable for | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|--------------------|------|------------|---------|----------------|
| | | | | | kg |

Front mounted instantaneous auxiliary contact blocks (1) (2)

| | | | | | |
|---------|-----|----------|-----------------|----|-------|
| K6, KC6 | 1 1 | CAF6-11K | GJL1201330R0001 | 10 | 0.020 |
| | 2 0 | CAF6-20K | GJL1201330R0005 | 10 | 0.020 |
| | 0 2 | CAF6-02K | GJL1201330R0009 | 10 | 0.020 |

Side mounted instantaneous auxiliary contact block (1) (2)

| | | | | | |
|---------|-----|---------|-----------------|----|-------|
| K6, KC6 | 1 1 | CA6-11K | GJL1201317R0001 | 10 | 0.030 |
|---------|-----|---------|-----------------|----|-------|

Side mounted instantaneous auxiliary contact block with soldering pins (1) (2)

| | | | | | |
|---------------|-----|-----------|-----------------|----|-------|
| K6..P, KC6..P | 1 1 | CA6-11K-P | GJL1201319R0001 | 10 | 0.025 |
|---------------|-----|-----------|-----------------|----|-------|

Side mounted instantaneous auxiliary contact block with flat pin connection (1) (2)

| | | | | | |
|---------------|-----|-----------|-----------------|----|-------|
| K6..F, KC6..F | 1 1 | CA6-11K-F | GJL1201318R0001 | 10 | 0.025 |
|---------------|-----|-----------|-----------------|----|-------|

Soldering socket (Ie < 8 A)

| | | | | | |
|------------------------------------|--|--------|-----------------|----|-------|
| K6, KC6 | | LB6 | GJL1201902R0001 | 10 | 0.020 |
| 2-pole auxiliary contact blocks CA | | LB6-CA | GJL1201903R0001 | 10 | 0.010 |

- (1) CA6 and CAF6 must not be fitted simultaneously.
- (2) The auxiliary contacts in the front or side blocks are not Mechanically linked contacts

| Suitable for | Rated control circuit voltage UC V DC | Connection type | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|---|-----------------|------|------------|---------|----------------|
| | | | | | | kg |

Surge suppressors for contactor coils

| | | | | | | |
|-----|------------|-----------|------------|-----------------|----|-------|
| KC6 | 24 ... 60 | Cable lug | RV-BC6/60 | GHV2501902R0002 | 10 | 0.005 |
| | 50 ... 250 | Cable lug | RV-BC6/250 | GHV2501903R0002 | 10 | 0.005 |

Note: Mini contactors for AC operation have an integrated protective circuit

Cover cap, transparent fitting to DIN rail design, sealable

| | | | | | |
|---------|--|-------|-----------------|----|-------|
| K6, KC6 | | LT6-B | GJL1201906R0001 | 10 | 0.015 |
|---------|--|-------|-----------------|----|-------|

B6, B7, BC6, BC7 3- and 4-pole mini contactors

VB6, VB7, VBC6, VBC7 3- and 4-pole mini reversing contactors

Technical data




Auxiliary contacts for front mounting and side mounting according to IEC

| Types | | CA6, CAF6 |
|---|---------------------------|----------------------------------|
| Standards | | IEC/EN 60947-1, IEC/EN 60947-5-1 |
| Rated operational voltage U _e max | | 690 V |
| Rated frequency (without derating) | | DC or 50 / 60 Hz |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | | 6 A |
| I _e / Rated operational current AC-15 | 24 V 50/60 Hz | 4 A |
| | 110-120 V 50/60 Hz | 4 A |
| | 220-230-240 V 50/60 Hz | 4 A |
| | 380-400 V 50/60 Hz | 3 A |
| | 440 V 50/60 Hz | 3 A |
| I _e / Rated operational current DC-13 | 24 V DC | 2.5 A |
| | 110 V DC | 0.7 A |
| | 220 - 240 V DC | 0.4 A |
| Short-circuit protection device - fuse type gG | | 6 A |
| Minimum switching capacity with failure rate acc. to IEC/EN 60947-5-4 | | 17 V / 5 mA |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

Auxiliary contacts for front mounting and side mounting according to UL/CSA

| Types | | CA6, CAF6 |
|--------------------------|--|----------------------------------|
| Standards | | UL/CSA 60947-1, UL/CSA 60947-5-1 |
| Max. operational voltage | | 600 V AC |
| Pilot duty | | A600 |
| AC thermal rated current | | 5 A |

Connection characteristics

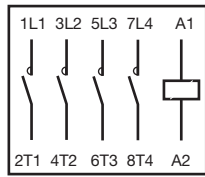
| Types | | CA6, CAF6 |
|--|----------|---|
| Terminals (1) | |  Screw terminals with cable clamp |
| Connection capacity – auxiliary conductors (built-in auxiliary terminals + coil terminals) | | |
|  Rigid: solid | 1 or 2 x | 1 ... 4 mm ² |
|  Flexible without ferrule | 1 or 2 x | 1 ... 2.5 mm ² |
| Connection capacity acc. to UL/CSA | | 1 or 2 x AWG 22 ... 10 |
| Stripping length | | 9 mm |
| Tightening torques | | 0.8 ... 1.1 Nm / 7 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | |
| Auxiliary terminals | | IP20 |
| Screw terminals | | (Delivered in open position, screws of unused terminals must be tightened) |
| All terminals | | M3 |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 1 |

(1) Soldering pin connection acc. to DIN 40801: 0.8 x 1 mm / 0.8 x 2.54 mm
Flat pin connection acc. to DIN 46248: 1 x 6.3 mm / 1 x 2.8 mm

B mini contactors and K mini contactor relays

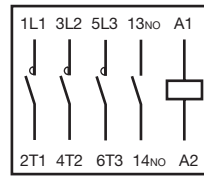
Terminal marking and positioning

Mini contactors



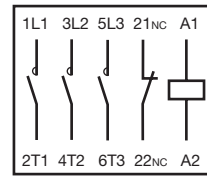
B6(7)-40-00 ...
BC6(7)-40-00 ...

2CDC12001F0012



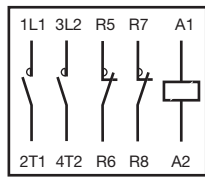
B6(7)-30-10 ...
BC6(7)-30-10 ...

2CDC12009F0012



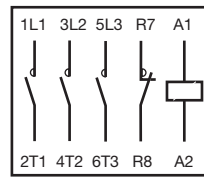
B6(7)-30-01 ...
BC6(7)-30-01 ...

2CDC12003F0012



B6(7)-22-00 ...
BC6(7)-22-00 ...

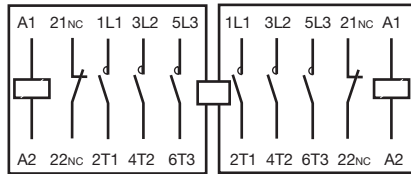
2CDC12004F0012



B6(7)-31-00 ...
BC6(7)-31-00 ...

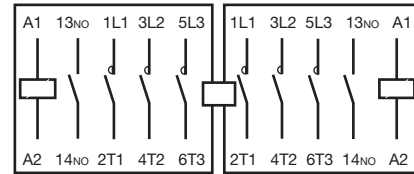
2CDC12005F0012

Compact reversing contactors



VB6(7)-30-01 ...
VBC6(7)-30-01 ...

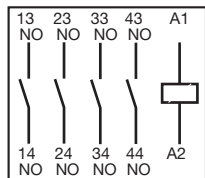
2CDC12006F0012



VB6(7)-30-10 ...
VBC6(7)-30-10 ...

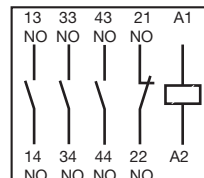
2CDC12007F0012

Mini contactor relays



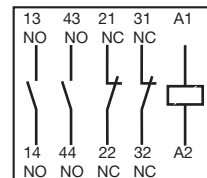
K6-40E ...
KC6-40E ...

2CDC12008F0012



K6-31Z ...
KC6-31Z ...

2CDC12009F0012

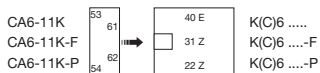
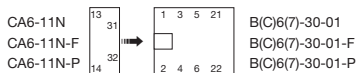
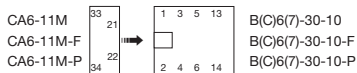
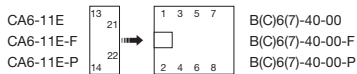


K6-22Z ...
KC6-22Z ...

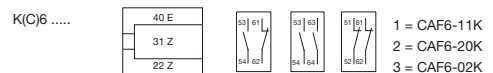
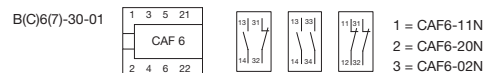
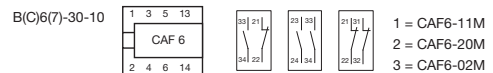
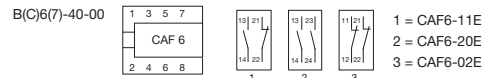
2CDC12010F0012

Auxiliary switches

CA6...



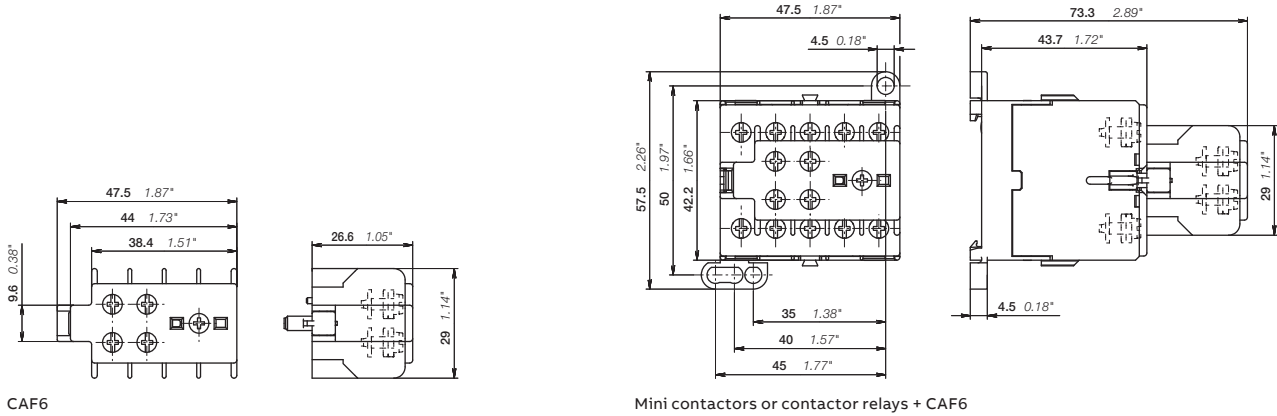
CAF...



B mini contactors and K mini contactor relays

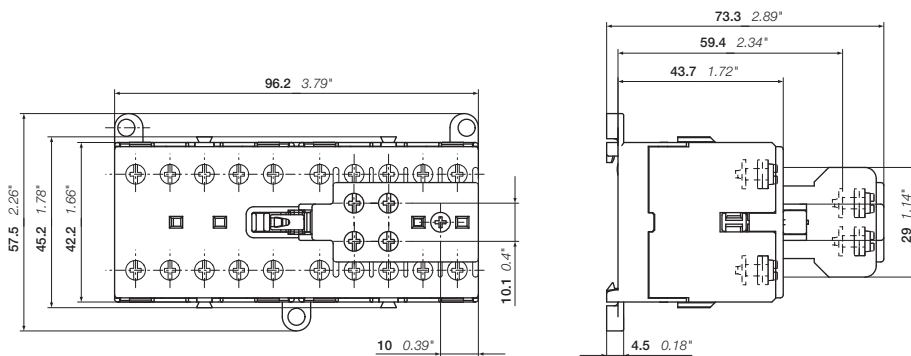
Dimension drawings with accessories

Front mounted auxiliary contact blocks, with screw terminals



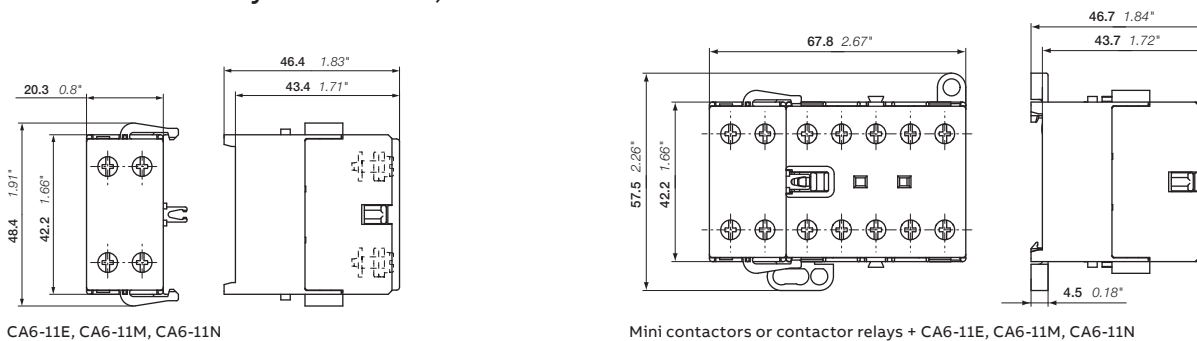
CAF6

Mini contactors or contactor relays + CAF6



Mini reversing contactors + CAF6 (max. 2 contact blocks)

Side mounted auxiliary contact blocks, with screw terminals



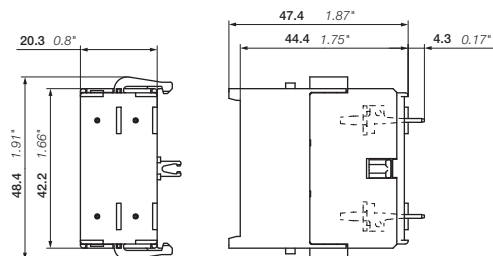
CA6-11E, CA6-11M, CA6-11N

Mini contactors or contactor relays + CA6-11E, CA6-11M, CA6-11N

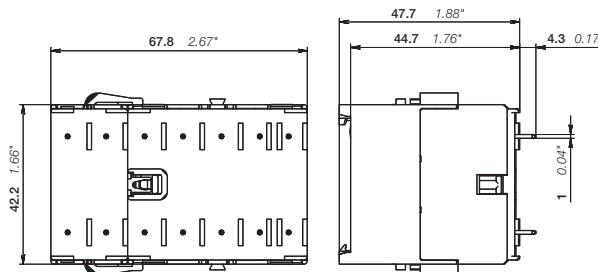
B mini contactors and K mini contactor relays

Dimension drawings with accessories

Side mounted auxiliary contact blocks, with soldering pins

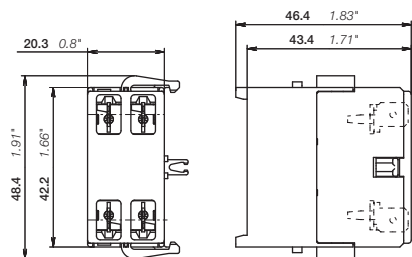


CA6-11E-P, CA6-11M-P, CA6-11N-P

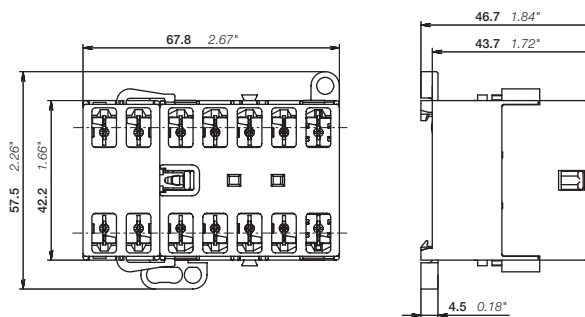


Mini contactors or contactor relays + CA6-11E-P, CA6-11M-P, CA6-11N-P

Side mounted auxiliary contact blocks, with flat pin connection

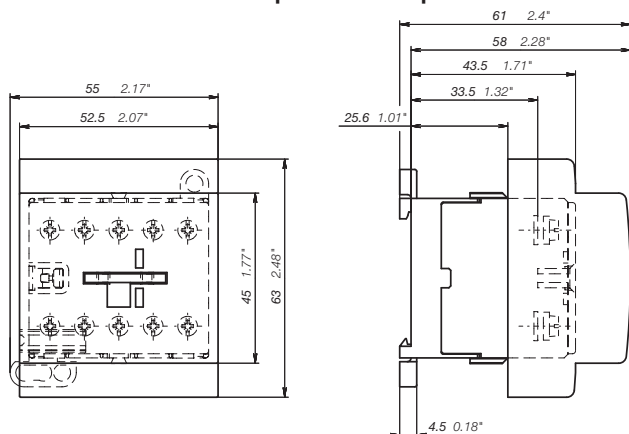


CA6-11E-F, CA6-11M-F, CA6-11N-F



Mini contactors or contactor relays + CA6-11E-F, CA6-11M-F, CA6-11N-F

Front mounted cover cap for DIN rail panel installation

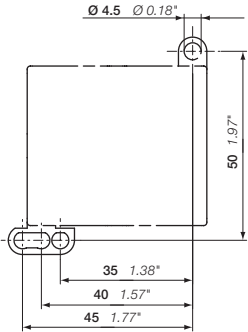


Mini contactors or contactor relays + LT6-B cover cap

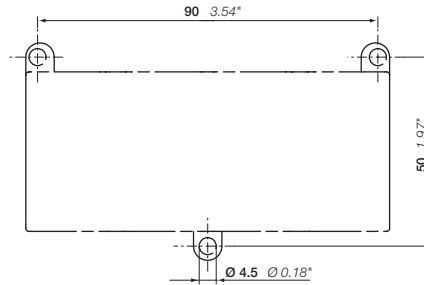
B mini contactors and K mini contactor relays

Dimension drawings with accessories

Drilling plans for wall mounting

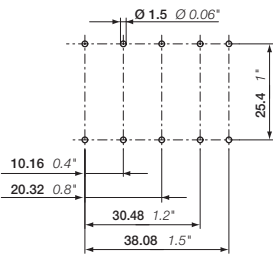


Mini contactors or contactor relays with screw terminals and flat pin connection

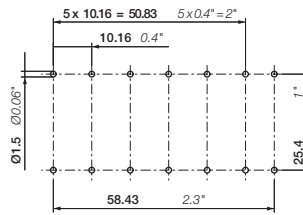


Mini reversing contactors with screw terminals and flat pin connection

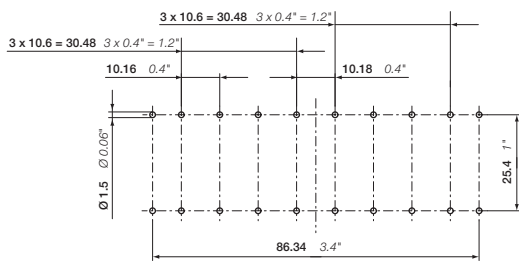
Drilling plans for PCBA



Mini contactors or contactor relays with soldering pins



Mini contactors or contactor relays with soldering pins + CA6-11E-P, CA6-11M-P, CA6-11N-P



Mini reversing contactors with soldering pins



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For more information please find our electronic data sheets online, for example:

or www.abb.com/productdetails/MC1A310AT1
www.abb.com/productdetails/1SAL102617R9901

M mini contactors and contactor relays

4/59 Presentation

4/61 Overview

3-pole mini contactors - 4 to 5.5 kW

With screw terminals

| | | |
|-------------|------------------------|-------------------------------|
| 4/62 | MC1A | AC operated |
| 4/63 | MC2A | AC operated |
| 4/64 | MC1C | DC operated |
| 4/65 | MC2C | DC operated |
| 4/66 | MC1I, MC1K, MC2I, MC2K | DC operated - low consumption |

For ring tongue ferrules

| | | |
|-------------|------------------|-------------------------------|
| 4/67 | MC1A..R, MC2A..R | AC operated |
| 4/68 | MC1C..R | DC operated |
| 4/69 | MC1K..R | DC operated - low consumption |

4-pole mini contactors - 4 to 5.5 kW

With screw terminals

| | | |
|-------------|------------|-------------------------------|
| 4/70 | MC1A | AC operated |
| 4/71 | MC2A | AC operated |
| 4/72 | MC1C, MC2C | DC operated |
| 4/73 | MC1I, MC1K | DC operated - low consumption |

For ring tongue ferrules

| | | |
|-------------|---------|-------------------------------|
| 4/74 | MC1A..R | AC operated |
| 4/75 | MC1C..R | DC operated |
| 4/76 | MC1K..R | DC operated - low consumption |

4-pole mini contactor relays

With screw terminals

| | | |
|-------------|------------|-------------------------------|
| 4/77 | MCRA | AC operated |
| 4/78 | MCRC | DC operated |
| 4/79 | MCRI, MCRK | DC operated - low consumption |

For ring tongue ferrules

| | | |
|-------------|---------|-------------------------------|
| 4/80 | MCRA..R | AC operated |
| 4/81 | MCRC..R | DC operated |
| 4/82 | MCRK..R | DC operated - low consumption |

4/85 Accessories

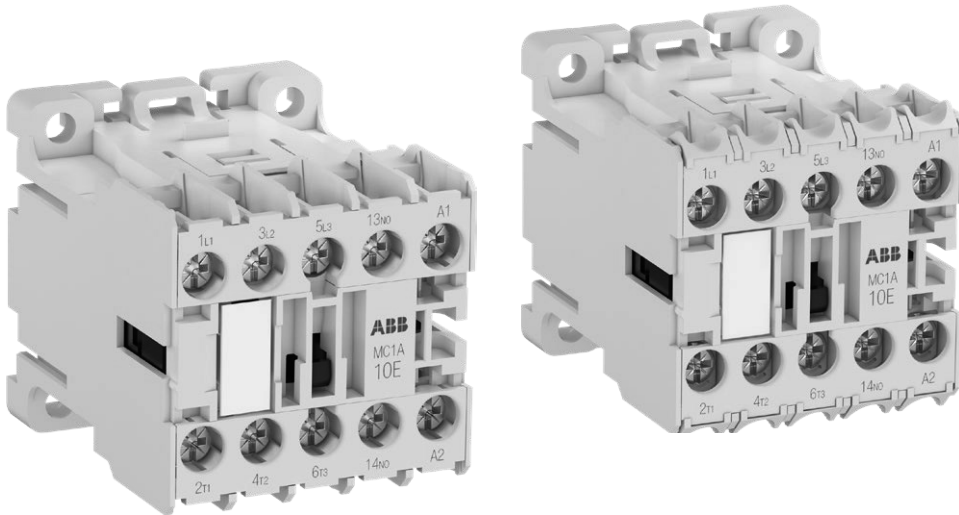
4/87 Technical data

4/96 Terminal marking and positioning

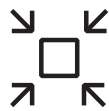
4/98 Dimensions

M mini contactors and contactor relays

Reliability, always



The M contactors range is a performance-dimension optimized solution for all the purposes. Its high reliability, even in extreme conditions, combined to the small sizes and the safe connections lead to easy design and compact panels.



Space-saving

Small dimensions for big projects

The M range devices are a great solution when high performances are needed but the space is limited. The small dimensions of the products and the possibility to mount them side by side will maximize the cost efficiency of the cabinets without making compromises.



Reliability in extreme conditions

Made for all the applications

The technology used in the design of the contactors and the wide set of variants available guarantee reliability of operation with heavy working conditions as well. Instability of the network, high altitude and extreme temperatures will not be a limit anymore.



Optimum interface

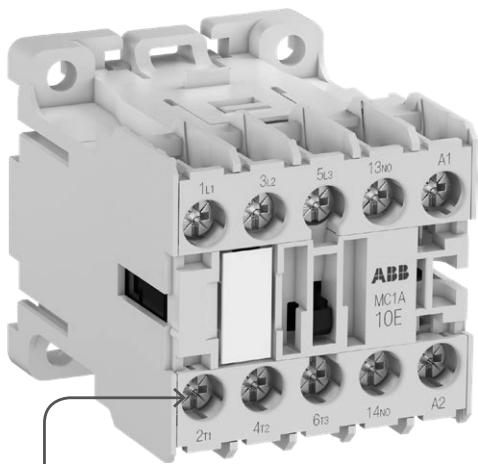
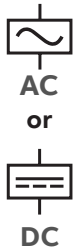
Never without a solution

A wide set of coils is provided for matching all the requirements: pure AC or DC for very fast switching, with low energy consumption for direct control by PLC and with extended operating limits to face voltage fluctuations. A complete offer for realizing your projects.

M mini contactors and contactor relays

Efficient - High performances in small dimensions

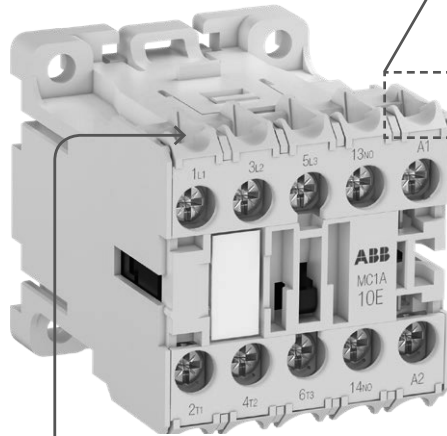
04



Screw

Screw terminals

The same screw is used for all the terminals and circuits of the device for an efficient and fast screwing. The connection is always stable, the range of usable wire dimensions wide and the maintenance easy.

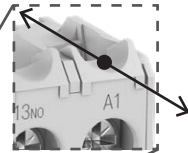


Ring tongue ferrules

With specific screw terminal

A large set of contactors and contactor relays is equipped with specific screw terminals; these allow quick and simple installations using ring tongue ferrules. A must for applications with shocks and vibrations and when the solidity of the connection is a crucial factor.

Lugs easy connection



Wide range of accessories

Up to 6 auxiliary contacts can be mounted on the devices, on the side or the front and with both the connection types. Electronic timers, surge suppressors and parallel connection links are also available in the assortment.



Assemble your reversing starter

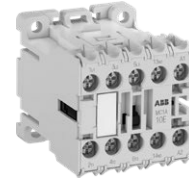
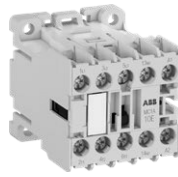
Thanks to the mechanical interlock and the connection sets a compact reversing starter can be easily assembled for motor controlling in both directions. Auxiliary contact blocks can be installed on the front or on both sides of the reversing contactor.





Compact protection

The M mini contactors are fully compatible with the T16 thermal overload relays for creating a very compact but still effective solution to defend your loads against current overloads and phase failures.

M mini contactors



| | | | | Screw terminals | | Screw terminals for ring tongue ferrules | |
|--|---------------------------------|------|------------|-------------------|-------------------|--|---------|
| AC Control supply  | | | | | | | |
| 3-pole contactors | Coil consumption (50 Hz) 5.3 VA | Type | | MC1A..T | MC2A..T | MC1A..R | MC2A..R |
| 4-pole contactors | Coil consumption (50 Hz) 5.3 VA | Type | | MC1A..T | MC2A..T | MC1A..R | - |
| DC Control supply  | | | | | | | |
| 3-pole contactors | Coil consumption 3 W | Type | | MC1C..T | MC2C..T | MC1C..R | - |
| 3-pole low consumption contactors | Coil consumption 1.2 / 2 W | Type | | MC1I..T / MC1K..T | MC2I..T / MC2K..T | MC1K..R | - |
| 3-pole extended limits coil contactors | Coil consumption 4 W | Type | | MC1C..TW | MC2C..TW | - | - |
| 4-pole contactors | Coil consumption 3 W | Type | | MC1C..T | - | MC1C..R | - |
| 4-pole low consumption contactors | Coil consumption 1.2 / 2 W | Type | | MC1I..T / MC1K..T | - | MC1K..R | - |
| 4-pole extended limits coil contactors | Coil consumption 4 W | Type | | MC1C..TW | MC2C..TW | - | - |
| IEC Rated operational power AC-3 | 230 V | kW | 2.2 | 3 | 2.2 | 3 | |
| | 400 V | kW | 4 | 5.5 | 4 | 5.5 | |
| | 500 V | kW | 4 | 5.5 | 4 | 5.5 | |
| | 690 V | kW | 4 (1) | 4 (1) | 4 (1) | 4 (1) | |
| UL/CSA 3-phase motor rating | Rated operational current AC-1 | A | 20 | 20 | 20 | 20 | |
| | 200 V AC | hp | 3 | 3 | 3 | 3 | |
| | 240 V AC | hp | 3 | 3 | 3 | 3 | |
| | 380-425 V AC | hp | 3 | 5 | 3 | 5 | |
| | 440-480 V AC | hp | 5 | 7.5 | 5 | 7.5 | |
| General use rating | 500-600 V AC | hp | 5 | 10 | 5 | 10 | |
| | | A | 20 (600 V) | 20 (600 V) | 20 (600 V) | 20 (600 V) | |

Main accessories

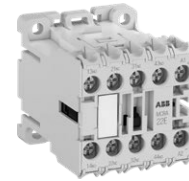
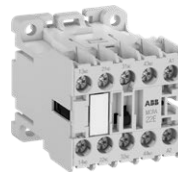
| | | |
|--------------------------|--------------------------|-------------|
| Auxiliary contact blocks | Front mounting | MACN / MARN |
| | Side mounting | MACL / MARL |
| Electronic timers | | MREBC |
| Connection sets | For reversing contactors | WKMIU |
| Surge suppressors | | MP0 |



Overload relays

| | | |
|--|----------|-----|
| Thermal overload relays | Class 10 | T16 |
| Thermal and phase failure protection, with single setup possible | | |

(1) Valid for N.O. contacts only.

M mini contactor relays



| | | | | Screw terminals | | Screw terminals for ring tongue ferrules | |
|--|---------------------------------|------|---|-------------------|--|--|--|
| AC Control supply  | | | | | | | |
| 4-pole contactor relays | Coil consumption (50 Hz) 5.3 VA | Type | | MCRA..T | | MCRA..R | |
| DC Control supply  | | | | | | | |
| 4-pole contactor relays | Coil consumption 3 W | Type | | MCRC..T | | MCRC..R | |
| 4-pole low consumption contactor relays | Coil consumption 1.2 / 2 W | Type | | MCRI..T / MCRK..T | | MCRK..R | |
| 4-pole extended limits coil contactor relays | Coil consumption 4 W | Type | | MCRC..TW | | - | |
| IEC Rated operational current AC-15 | 240 V | A | 6 | 6 | | 6 | |
| | 400 V | A | 4 | 4 | | 4 | |
| | Rated operational current DC-13 | 24 V | A | 5 | | 5 | |
| UL/CSA Pilot duty | | | | A600, Q600 | | | |
| Main accessories | | | | | | | |
| Auxiliary contact blocks | Front mounting | | | MARN | | | |
| | Side mounting | | | MARL | | | |
| Electronic timers | | | | MREBC | | | |
| Surge suppressor | | | | MP0 | | | |

04

MC1A 3-pole mini contactors with screw terminals

4 kW

AC operated



2CDC110030001

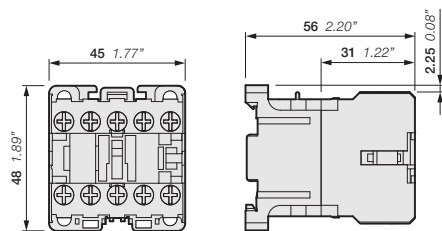
MC1A310AT

MC1A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC Rated operational power | UL/CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|---|--------------------------------------|--|-----------|---------------------------------|------------|------------|--|-------|
| | | | V 50 Hz | V 60 Hz | | | | | |
| 400 V AC-3 kW | AC-1 A | 5 hp | 20 A | 24 | 24 | 1 0 0 1 | MC1A310AT1 | 1SAL102617R9901 | 0.170 |
| | | | | 48 | 48 | | MC1A301AT1 | 1SAL102638R9901 | 0.170 |
| | | | | 110...115 | 110...120 | 1 0 0 1 | MC1A310AT9 | 1SAL100298R9901 | 0.170 |
| | | | | 120 | 120 | | MC1A301AT9 | 1SAL100320R9901 | 0.170 |
| | | | | - | 208...220 | 1 0 0 1 | MC1A310ATJ | 1SAL100213R9901 | 0.170 |
| | | | | | | | MC1A301ATJ | 1SAL100223R9901 | 0.170 |
| | | | | 220...230 | 220...230 | 1 0 0 1 | MC1A310AT4 | 1SAL102620R9901 | 0.170 |
| | | | | | | | MC1A301AT4 | 1SAL102641R9901 | 0.170 |
| | | | | 220...230 | 220...230 | 1 0 0 1 | MC1A310ATM | 1SAL102611R9901 | 0.170 |
| | | | | | | | MC1A301ATM | 1SAL220348R9901 | 0.170 |
| | | | | 220...240 | 220...230 | 1 0 0 1 | MC1A310AT6 | 1SAL102622R9901 | 0.170 |
| | | | | | | | MC1A301AT6 | 1SAL102643R9901 | 0.170 |
| | | | | 220...240 | 240...277 | 1 0 0 1 | MC1A310ATN | 1SAL100214R9901 | 0.170 |
| | | | | | | | MC1A301ATN | 1SAL100224R9901 | 0.170 |
| | | | | 240 | 240 | 1 0 0 1 | MC1A310AT7 | 1SAL102623R9901 | 0.170 |
| | | | | | | | MC1A301AT7 | 1SAL102995R9901 | 0.170 |
| | | | | 380...400 | 440 | 1 0 0 1 | MC1A310ATU | 1SAL100215R9901 | 0.170 |
| | | | | | | | MC1A301ATU | 1SAL100225R9901 | 0.170 |
| | | | | 415...440 | 480 | 1 0 0 1 | MC1A310ATW | 1SAL102615R9901 | 0.170 |
| | | | | | | | MC1A301ATW | 1SAL102636R9901 | 0.170 |
| | | | | 500 | 600 | 1 0 0 1 | MC1A310ATY | 1SAL102616R9901 | 0.170 |
| | | | | | | | MC1A301ATY | 1SAL102637R9901 | 0.170 |



MC1A

Main dimensions mm, inches

MC2A 3-pole mini contactors with screw terminals

5.5 kW

AC operated



2CDC211004V0019

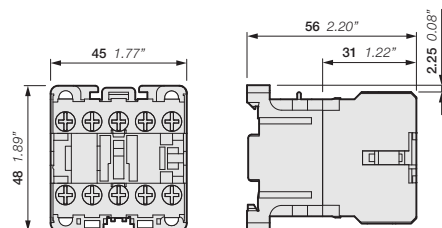
MC2A310AT

MC2A 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC Rated operational power | UL/CSA 3-phase motor rating 480 V | General use rating 600 V AC | Rated control circuit voltage Uc | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-----------------------------------|---|--------------------------------------|--|-----------------|---------------------------------|------|------------|--|-------|
| | | | V 50 Hz | V 60 Hz | | | | | |
| 400 V AC-3 kW | AC-1 A | 7.5 | 20 | 24 | 24 | 1 0 | MC2A310AT1 | 1SAL103577R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT1 | 1SAL103569R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310AT9 | 1SAL103268R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT9 | 1SAL103269R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310ATJ | 1SAL103573R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATJ | 1SAL103565R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310AT4 | 1SAL101644R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT4 | 1SAL101641R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310ATM | 1SAL103835R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATM | 1SAL100046R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310AT6 | 1SAL103579R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT6 | 1SAL103571R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310ATN | 1SAL103574R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATN | 1SAL103566R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310AT7 | 1SAL101875R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301AT7 | 1SAL101877R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310ATU | 1SAL103575R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATU | 1SAL103567R9902 | 0.170 |
| | | | | | | 1 0 | MC2A310ATW | 1SAL135704R9902 | 0.170 |
| | | | | | | 0 1 | MC2A301ATW | 1SAL135705R9902 | 0.170 |
| | | 1 0 | MC2A310ATY | 1SAL101876R9902 | 0.170 | | | | |
| | | 0 1 | MC2A301ATY | 1SAL101907R9902 | 0.170 | | | | |



MC2A

Main dimensions mm, inches

MC1C 3-pole mini contactors with screw terminals

4 kW

DC operated



MC1C310AT

MC1C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|----------------------|----------------------|--------------------|--|---------------------------|------|------------|--------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-1 | 480 V | 600 V AC | V DC | | | | kg |
| AC-3 | A | hp | A | | | | | |

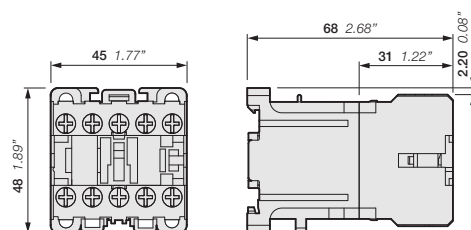
MC1C mini contactors

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|---------|----------------------|--------------------|--|---------------------------|-------------|-----------------|-----------------|
| 4 | 20 | 5 | 20 | 12 | 1 0 | MC1C310ATB | 1SAL100210R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATB | 1SAL100220R9901 | 0.250 |
| | | | | 24 | 1 0 | MC1C310ATD | 1SAL100216R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATD | 1SAL100226R9901 | 0.250 |
| | | | | 24 | 1 0 | MC1C310ATDD | 1SAL113312R9901 | 0.250 |
| | | | | | with Diode | 0 1 | MC1C301ATDD | 1SAL113328R9901 |

MC1C mini contactors with extended operating limits coil

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|---------|----------------------|--------------------|--|---------------------------|-------------|-----------------|--------|
| 4 | 20 | 5 | 20 | 24* | 1 0 | MC1C310ATWD | 1SAL220373R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWD | 1SAL220372R9901 | 0.250 |
| | | | | 48* | 1 0 | MC1C310ATWG | 1SAL100380R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWG | 1SAL200795R9901 | 0.250 |
| | | | | 110* | 1 0 | MC1C310ATWJ | 1SAL220371R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWJ | 1SAL220370R9901 | 0.250 |
| | | | | 125* | 1 0 | MC1C310ATWL | 1SAL220460R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWL | 1SAL220459R9901 | 0.250 |
| | | | | 220* | 1 0 | MC1C310ATWN | 1SAL220369R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ATWN | 1SAL220368R9901 | 0.250 |

* With the extended operating limits coils:
 - at nominal voltage, U_c, a higher number of additional auxiliary contacts can be attached to the device
 - a wider range of voltages, -30% ≤ U_c ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC1C

Main dimensions mm, inches

MC2C 3-pole mini contactors with screw terminals

5.5 kW

DC operated



MC2C310AT

2CDC1100600019

MC2C 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|----------------------|----------------------|--------------------|--|---------------------------|------|------------|--------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | | 480 V | 600 V AC | V DC | | | | kg |
| AC-3 | AC-1 | | A | | | | | |
| kW | A | hp | A | | | | | |

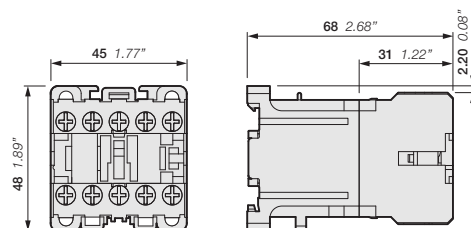
MC2C mini contactors

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight | |
|-------------------------|---------|----------------------|--------------------|--|---------------------------|------------|-----------------|-----------------|-------|
| 5.5 | 20 | 7.5 | 20 | 12 | 1 0 | MC2C310ATB | 1SAL103588R9902 | 0.250 | |
| | | | | | 0 1 | MC2C301ATB | 1SAL103589R9902 | 0.250 | |
| | | | | | 24 | 1 0 | MC2C310ATD | 1SAL103584R9902 | 0.250 |
| | | | | | | 0 1 | MC2C301ATD | 1SAL103580R9902 | 0.250 |
| | | | | | 24 | 1 0 | MC2C310ATDD | 1SAL101926R9902 | 0.250 |
| | | | | | | 0 1 | MC2C301ATDD | 1SAL101955R9902 | 0.250 |

MC2C mini contactors with extended operating limits coil

| Rated operational power | current | 3-phase motor rating | General use rating | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|---------|----------------------|--------------------|--|---------------------------|-------------|-----------------|--------|
| 5.5 | 20 | 7.5 | 20 | 24* | 1 0 | MC2C310ATWD | 1SAL102378R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWD | 1SAL102379R9902 | 0.250 |
| | | | | 48* | 1 0 | MC2C310ATWG | 1SAL101951R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWG | 1SAL101958R9902 | 0.250 |
| | | | | 110* | 1 0 | MC2C310ATWJ | 1SAL102381R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWJ | 1SAL102382R9902 | 0.250 |
| | | | | 125* | 1 0 | MC2C310ATWL | 1SAL204887R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWL | 1SAL204886R9902 | 0.250 |
| | | | | 220* | 1 0 | MC2C310ATWN | 1SAL100442R9902 | 0.250 |
| | | | | | 0 1 | MC2C301ATWN | 1SAL100435R9902 | 0.250 |

* With the extended operating limits coils:
 - at nominal voltage, U_c, a higher number of additional auxiliary contacts can be attached to the device
 - a wider range of voltages, -30% ≤ U_c ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC2C

Main dimensions mm, inches

MC1I, MC1K, MC2I, MC2K 3- pole mini contactors with screw terminals

4 to 5.5 kW

DC operated - low consumption



MC1I310AT



MC2I310AT



MC1K310AT



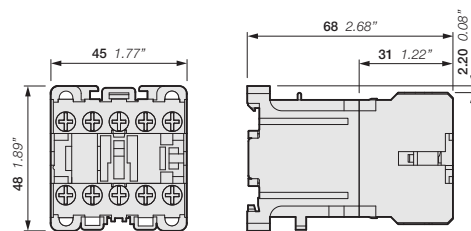
MC2K310AT

MC..I and MC..K 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|----------------------------------|----------------------|----------------------|--------------------|--|---------------------------|------------|-----------------|-----------------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V DC | | | | |
| kW | A | hp | A | | | | | |
| DC operation 24 V / 1.2 W | | | | | | | | |
| 4 | 20 | 7.5 | 20 | 24 | 1 0 | MC1I310ATD | 1SAL100572R9901 | 0.250 |
| | | | | | 0 1 | MC1I301ATD | 1SAL100573R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24 | 1 0 | MC2I310ATD | 1SAL100559R9902 | 0.250 |
| | | | | | 0 1 | MC2I301ATD | 1SAL100538R9902 | 0.250 |
| DC operation 24 V / 2 W | | | | | | | | |
| 4 | 20 | 7.5 | 20 | 24 | 1 0 | MC1K310ATD | 1SAL100576R9901 | 0.250 |
| | | | | | 0 1 | MC1K301ATD | 1SAL100577R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24 | 1 0 | MC2K310ATD | 1SAL103590R9902 | 0.250 |
| | | | | | 0 1 | MC2K301ATD | 1SAL103591R9902 | 0.250 |



MC1I, MC1K, MC2I, MC2K

Main dimensions mm, inches

MC1A..R, MC2A..R 3-pole mini contactors for ring tongue ferrules

4 to 5.5 kW

AC operated



MC1A310AR

2CDC211009V0019



MC2A310AR

2CDC211010V0019

MC1A..R and MC2A..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

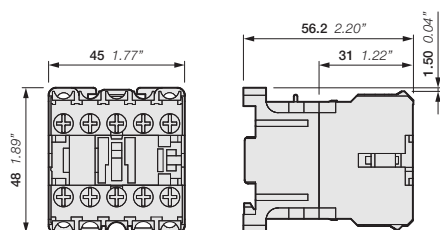
| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|-------------------------|----------------------|----------------------|--------------------|--|---------|---------------------------|------|------------|--------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | V 50 Hz | V 60 Hz | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | | | | | | kg |
| kW | A | hp | A | | | | | | |

MC1A mini contactors

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating (A) | V 50 Hz | V 60 Hz | 1 0 | 0 1 | Order code | Weight (kg) | |
|------------------------------|-------------|---------------------------|------------------------|-------------|-------------|-----|-----|------------|-----------------|-------|
| 4 | 20 | 5 | 20 | 24 | 24 | 1 0 | 0 1 | MC1A310AR1 | 1SAL103386R9901 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC1A301AR1 | 1SAL103399R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 1 0 | 0 1 | MC1A310ARJ | 1SAL100182R9901 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC1A301ARJ | 1SAL100175R9901 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC1A310AR6 | 1SAL102157R9901 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC1A301AR6 | 1SAL102158R9901 | 0.170 |

MC2A mini contactors

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating (A) | V 50 Hz | V 60 Hz | 1 0 | 0 1 | Order code | Weight (kg) | |
|------------------------------|-------------|---------------------------|------------------------|-------------|-------------|-----|-----|------------|-----------------|-------|
| 5.5 | 20 | 7.5 | 20 | 24 | 24 | 1 0 | 0 1 | MC2A310AR1 | 1SAL103412R9902 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC2A301AR1 | 1SAL103425R9902 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 1 0 | 0 1 | MC2A310ARJ | 1SAL103414R9902 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC2A301ARJ | 1SAL103427R9902 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC2A310AR6 | 1SAL102175R9902 | 0.170 |
| | | | | | | 1 0 | 0 1 | MC2A301AR6 | 1SAL102176R9902 | 0.170 |



MC1A..R, MC2A..R

Main dimensions mm, inches

MC1C..R 3-pole mini contactors for ring tongue ferrules

4 kW

DC operated



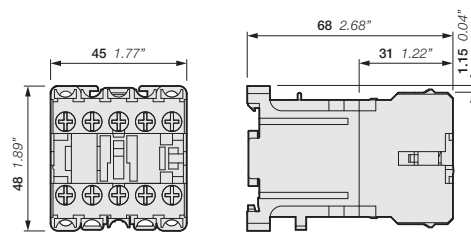
MC1C310AR

MC1C..R 3-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|----------------------|----------------------|--------------------|--|---------------------------|------------|-----------------|-----------------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V DC | | | | |
| kW | A | hp | A | | | | | |
| 4 | 20 | 5 | 20 | 12 | 1 0 | MC1C310ARB | 1SAL101847R9901 | 0.250 |
| | | | | | 0 1 | MC1C301ARB | 1SAL101848R9901 | 0.250 |



MC1C..R

Main dimensions mm, inches

MC1K..R 3-pole mini contactors for ring tongue ferrules

4 kW

DC operated - low consumption



MC1K310AR

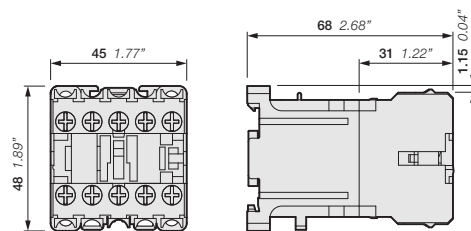
2CDC110120V0019

MC1K..R 3-pole interface mini contactors are high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 3 main poles and one built-in auxiliary contact:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------------------|----------------------|----------------------|--------------------|-------------------------------------|---------------------------|------------|-----------------|-----------------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V DC | | | | |
| kW | A | hp | A | | | | | |
| DC operation 24 V / 2 W | | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | 1 0 | MC1K310ARD | 1SAL103446R9901 | 0.250 |
| | | | | | 0 1 | MC1K301ARD | 1SAL101858R9901 | 0.250 |



MC1K..R

Main dimensions mm, inches

MC1A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated



MC1A400AT

MC1A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|----------------------|-------------------------------|--------------------------------|--|---------|---------------------------|------|------------|--------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | |
| 400 V | AC-1 | hp | A | | | | | | kg |
| kW | A | hp | A | | | | | | |

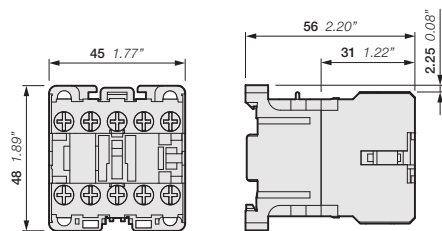
4 N.O. main poles

| 4 | 20 | 5 | 20 | 24 | 24 | 0 0 | MC1A400AT1 | 1SAL102986R9901 | 0.170 |
|---|----|---|----|-------------|-------------|-----|------------|-----------------|-------|
| | | | | 48 | 48 | 0 0 | MC1A400AT9 | 1SAL100296R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1A400ATJ | 1SAL100363R9901 | 0.170 |
| | | | | 120 | 120 | 0 0 | MC1A400AT4 | 1SAL102989R9901 | 0.170 |
| | | | | - | 208 ... 220 | 0 0 | MC1A400ATM | 1SAL102980R9901 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1A400AT6 | 1SAL102991R9901 | 0.170 |
| | | | | 220 ... 240 | 240 ... 277 | 0 0 | MC1A400ATN | 1SAL100364R9901 | 0.170 |
| | | | | 240 | 240 | 0 0 | MC1A400AT7 | 1SAL103101R9901 | 0.170 |
| | | | | 380 ... 400 | 440 | 0 0 | MC1A400ATU | 1SAL100365R9901 | 0.170 |
| | | | | 415 ... 440 | 480 | 0 0 | MC1A400ATW | 1SAL102984R9901 | 0.170 |
| | | | | 500 | 600 | 0 0 | MC1A400ATY | 1SAL102985R9901 | 0.170 |

2 N.O. + 2 N.C. main poles

| 4 | 20 | 5 | 20 | 24 | 24 | 0 0 | MC1AB00AT1 | 1SAL103007R9901 | 0.170 |
|---|----|---|----|-------------|-------------|-----|------------|-----------------|-------|
| | | | | 48 | 48 | 0 0 | MC1AB00AT9 | 1SAL100400R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1AB00ATJ | 1SAL100373R9901 | 0.170 |
| | | | | 120 | 120 | 0 0 | MC1AB00AT4 | 1SAL103010R9901 | 0.170 |
| | | | | - | 208 ... 220 | 0 0 | MC1AB00ATM | 1SAL103001R9901 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1AB00AT6 | 1SAL103012R9901 | 0.170 |
| | | | | 240 | 240 | 0 0 | MC1AB00AT7 | 1SAL103099R9901 | 0.170 |
| | | | | 220 ... 240 | 240 ... 277 | 0 0 | MC1AB00ATN | 1SAL100374R9901 | 0.170 |
| | | | | 380 ... 400 | 440 | 0 0 | MC1AB00ATU | 1SAL100375R9901 | 0.170 |
| | | | | 415 ... 440 | 480 | 0 0 | MC1AB00ATW | 1SAL101834R9901 | 0.170 |
| | | | | 500 | 600 | 0 0 | MC1AB00ATY | 1SAL103006R9901 | 0.170 |

Note: Other contact configuration available. Please consult your ABB local sales organization.



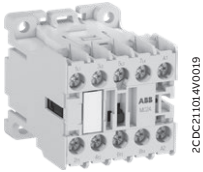
MC1A

Main dimensions mm, inches

MC2A 4-pole mini contactors with screw terminals

4 to 5.5 kW

AC operated



MC2A400AT

2CDC211014V0019

MC2A 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|----------------------|----------------------|--------------------|--|---------|---------------------------|------|------------|--------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | V 50 Hz | V 60 Hz | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | | | | | | |
| kW | A | hp | A | | | | kg | | |

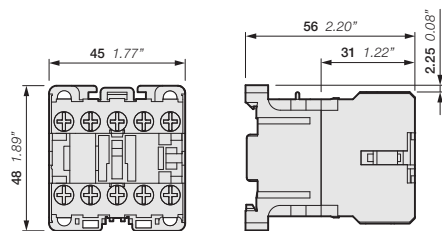
4 N.O. main poles

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating (A) | V 50 Hz | V 60 Hz | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------------------|-------------|---------------------------|------------------------|-------------|-------------|--------------------|------------|-----------------|-------------|
| 5.5 | 20 | 7.5 | 20 | 24 | 24 | 0 0 | MC2A400AT1 | 1SAL101645R9902 | 0.170 |
| | | | | 48 | 48 | 0 0 | MC2A400AT9 | 1SAL116195R9902 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC2A400ATJ | 1SAL116184R9902 | 0.170 |
| | | | | 120 | 120 | 0 0 | MC2A400AT4 | 1SAL101647R9902 | 0.170 |
| | | | | - | 208 ... 220 | 0 0 | MC2A400ATM | 1SAL101912R9902 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC2A400AT6 | 1SAL103595R9902 | 0.170 |
| | | | | 220 ... 240 | 240 ... 277 | 0 0 | MC2A400ATN | 1SAL116177R9902 | 0.170 |
| | | | | 240 | 240 | 0 0 | MC2A400AT7 | 1SAL101910R9902 | 0.170 |
| | | | | 380 ... 400 | 440 | 0 0 | MC2A400ATU | 1SAL103292R9902 | 0.170 |
| | | | | 415 ... 440 | 480 | 0 0 | MC2A400ATW | 1SAL116193R9902 | 0.170 |
| | | | | 500 | 600 | 0 0 | MC2A400ATY | 1SAL101915R9902 | 0.170 |

2 N.O. + 2 N.C. main poles

| Rated operational power (kW) | Current (A) | 3-phase motor rating (hp) | General use rating (A) | V 50 Hz | V 60 Hz | Auxiliary contacts | Type | Order code | Weight (kg) |
|------------------------------|-------------|---------------------------|------------------------|-------------|-------------|--------------------|------------|-----------------|-------------|
| 5.5 | 20 | 7.5 | 20 | 24 | 24 | 0 0 | MC2AB00AT1 | 1SAL101648R9902 | 0.170 |
| | | | | 48 | 48 | 0 0 | MC2AB00AT9 | 1SAL248068R9902 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC2AB00ATJ | 1SAL110548R9902 | 0.170 |
| | | | | 120 | 120 | 0 0 | MC2AB00AT4 | 1SAL101650R9902 | 0.170 |
| | | | | - | 208 ... 220 | 0 0 | MC2AB00ATM | 1SAL101918R9902 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC2AB00AT6 | 1SAL103027R9902 | 0.170 |
| | | | | 220 ... 240 | 240 ... 277 | 0 0 | MC2AB00ATN | 1SAL135699R9902 | 0.170 |
| | | | | 240 | 240 | 0 0 | MC2AB00AT7 | 1SAL101917R9902 | 0.170 |
| | | | | 380 ... 400 | 440 | 0 0 | MC2AB00ATU | 1SAL101919R9902 | 0.170 |
| | | | | 415 ... 440 | 480 | 0 0 | MC2AB00ATW | 1SAL247441R9902 | 0.170 |
| | | | | 500 | 600 | 0 0 | MC2AB00ATY | 1SAL101923R9902 | 0.170 |

Note: Other contact configuration available. Please consult your ABB local sales organization.



MC2A

Main dimensions mm, inches

MC1C, MC2C 4-pole mini contactors with screw terminals

4 to 5.5 kW

DC operated



MC1C400AT



MC2C400AT

MC1C, MC2C 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

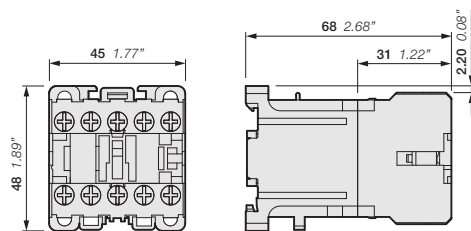
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Auxiliary contacts fitted | Type | Order code | Weight |
|---|----------------------|----------------------|--------------------|--|---------------------------|-------------|-----------------|--------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | | |
| 400 V | | 480 V | 600 V AC | V DC | | | | kg |
| AC-3 | AC-1 | | A | | | | | |
| kW | A | hp | A | | | | | |
| 4 N.O. main poles | | | | | | | | |
| 4 | 20 | 5 | 20 | 12 | 0 0 | MC1C400ATB | 1SAL100360R9901 | 0.250 |
| | | | | 24 | 0 0 | MC1C400ATD | 1SAL100366R9901 | 0.250 |
| | | | | 24 | 0 0 | MC1C400ATDD | 1SAL101841R9901 | 0.250 |
| | | | | with Diode | | | | |
| 4 N.O. main poles mini contactors with extended operating limits coil | | | | | | | | |
| 4 | 20 | 5 | 20 | 24* | 0 0 | MC1C400ATWD | 1SAL220344R9901 | 0.250 |
| | | | | 48* | 0 0 | MC1C400ATWG | 1SAL220364R9901 | 0.250 |
| | | | | 110* | 0 0 | MC1C400ATWJ | 1SAL220342R9901 | 0.250 |
| | | | | 125* | 0 0 | MC1C400ATWL | 1SAL220462R9901 | 0.250 |
| | | | | 220* | 0 0 | MC1C400ATWN | 1SAL220340R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24* | 0 0 | MC2C400ATWD | 1SAL101961R9902 | 0.250 |
| | | | | 48* | 0 0 | MC2C400ATWG | 1SAL101962R9902 | 0.250 |
| | | | | 110* | 0 0 | MC2C400ATWJ | 1SAL101963R9902 | 0.250 |
| | | | | 125* | 0 0 | MC2C400ATWL | 1SAL101964R9902 | 0.250 |
| | | | | 220* | 0 0 | MC2C400ATWN | 1SAL100445R9902 | 0.250 |
| 2 N.O. + 2 N.C. main poles mini contactors with extended operating limits coil | | | | | | | | |
| 4 | 20 | 5 | 20 | 24* | 0 0 | MC1CB00ATWD | 1SAL220345R9901 | 0.250 |
| | | | | 48* | 0 0 | MC1CB00ATWG | 1SAL220366R9901 | 0.250 |
| | | | | 110* | 0 0 | MC1CB00ATWJ | 1SAL220343R9901 | 0.250 |
| | | | | 125* | 0 0 | MC1CB00ATWL | 1SAL220461R9901 | 0.250 |
| | | | | 220* | 0 0 | MC1CB00ATWN | 1SAL220341R9901 | 0.250 |
| 5.5 | 20 | 7.5 | 20 | 24* | 0 0 | MC2CB00ATWD | 1SAL101965R9902 | 0.250 |
| | | | | 48* | 0 0 | MC2CB00ATWG | 1SAL101966R9902 | 0.250 |
| | | | | 110* | 0 0 | MC2CB00ATWJ | 1SAL101967R9902 | 0.250 |
| | | | | 125* | 0 0 | MC2CB00ATWL | 1SAL204888R9902 | 0.250 |
| | | | | 220* | 0 0 | MC2CB00ATWN | 1SAL101968R9902 | 0.250 |

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:

- at nominal voltage, U_c, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, -30% ≤ U_c ≤ +30%, can be used for the operation with a limitation of the number of auxiliary contacts.



MC1C, MC2C

Main dimensions mm, inches

MC1I, MC1K 4-pole mini contactors with screw terminals

4 kW

DC operated - low consumption



MC1I400AT

2CDC211017V0019



MC1K400AT

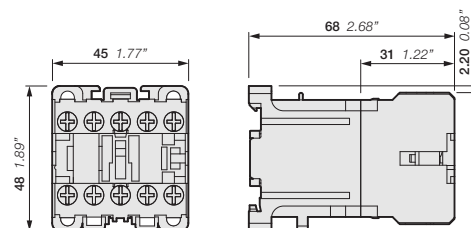
2CDC211018V0019

MC1I, MC1K 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive loads up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Type | Order code | Weight Pkg (1 pce) kg |
|----------------------------------|----------------------|----------------------|--------------------|--|------------|-----------------|--------------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V DC | | | |
| kW | A | hp | A | | | | |
| DC operation 24 V / 1.2 W | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | MC1I400ATD | 1SAL101840R9901 | 0.250 |
| DC operation 24 V / 2 W | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | MC1K400ATD | 1SAL100569R9901 | 0.250 |



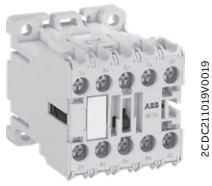
MC1I, MC1K

Main dimensions mm, inches

MC1A..R 4-pole mini contactors for ring tongue ferrules

4 kW

AC operated



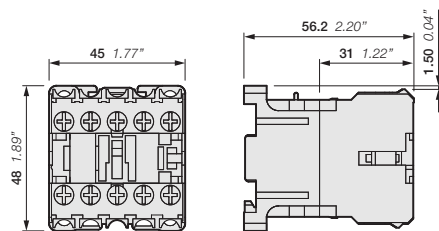
MC1A400AR

MC1A..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-----------------------------------|----------------------|----------------------|--------------------|--|-------------|---------------------------|------------|-----------------|--------------------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | V 50 Hz | V 60 Hz | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | | | | | | |
| kW | A | hp | A | | | | | | |
| | | | | | | | | | |
| 4 N.O. main poles | | | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | 24 | 0 0 | MC1A400AR1 | 1SAL102160R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1A400ARJ | 1SAL102166R9901 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1A400AR6 | 1SAL102164R9901 | 0.170 |
| 2 N.O. + 2 N.C. main poles | | | | | | | | | |
| 4 | 20 | 5 | 20 | 24 | 24 | 0 0 | MC1AB00AR1 | 1SAL102172R9901 | 0.170 |
| | | | | 110 ... 115 | 110 ... 120 | 0 0 | MC1AB00ARJ | 1SAL102174R9901 | 0.170 |
| | | | | 220 ... 230 | 220 ... 230 | 0 0 | MC1AB00AR6 | 1SAL102173R9901 | 0.170 |



MC1A..R

Main dimensions mm, inches

MC1C..R 4-pole mini contactors for ring tongue ferrules

4 kW

DC operated



MC1C400AR

MC1C..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

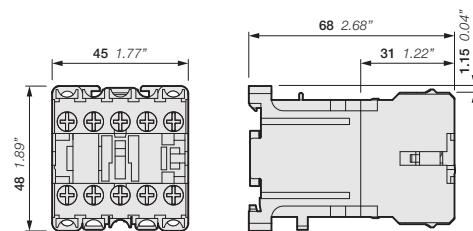
These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|---|----------------------|--------------------|-------------------------------------|---------------------------|------|------------|-----------------------------|
| Rated operational power | current $\theta \leq 55^\circ\text{C}$ | 3-phase motor rating | General use rating | | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | V DC | | | | |
| kW | A | hp | A | | | | | |

4 N.O. main poles

| | | | | | | | | |
|---|----|---|----|----|-----|------------|-----------------|-------|
| 4 | 20 | 5 | 20 | 12 | 0 0 | MC1C400ARB | 1SAL101859R9901 | 0.250 |
|---|----|---|----|----|-----|------------|-----------------|-------|



MC1C..R

Main dimensions mm, inches

04

MC1K..R 4-pole mini contactors for ring tongue ferrules

4 kW

DC operated - low consumption



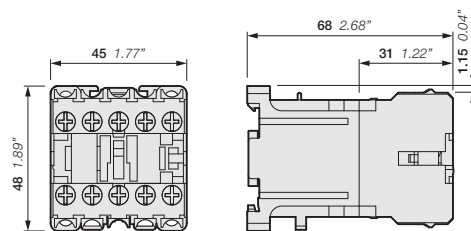
MC1K400AR

MC1K..R 4-pole mini contactors are a high performance but space saving solution for the control of small motors and resistive circuits up to 690 V AC and 220 V DC.

These contactors are designed with 4 main poles:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| IEC | | UL/CSA | | Rated control circuit voltage U _c | Type | Order code | Weight |
|-------------------------|----------------------|----------------------|--------------------|--|------------|-----------------|-------------|
| Rated operational power | current θ ≤ 55 °C | 3-phase motor rating | General use rating | | | | |
| 400 V | AC-3 | 480 V | 600 V AC | | | | Pkg (1 pce) |
| kW | A | hp | A | V DC | | | kg |
| 4 | 20 | 5 | 20 | 24 | MC1K400ARD | 1SAL101860R9901 | 0.250 |



MC1K..R

Main dimensions mm, inches

MCRA 4-pole mini contactor relays with screw terminals

AC operated



MCRA040AT

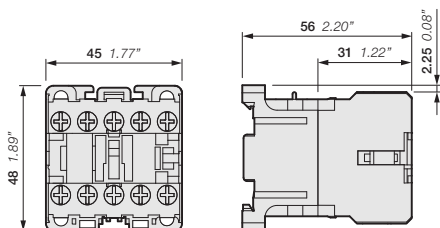
MCRA 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage U _c | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|--|-------------|---------------------------|------------|-----------------|--------------------|
| V 50 Hz | V 60 Hz | | | | kg |
| 4 N.O. poles | | | | | |
| 24 | 24 | 4 0 | MCRA040AT1 | 1SAH102013R9900 | 0.170 |
| 48 | 48 | 4 0 | MCRA040AT9 | 1SAH108237R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 4 0 | MCRA040ATJ | 1SAH100003R9900 | 0.170 |
| 120 | 120 | 4 0 | MCRA040AT4 | 1SAH102016R9900 | 0.170 |
| - | 208 ... 220 | 4 0 | MCRA040ATM | 1SAH102007R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 4 0 | MCRA040AT6 | 1SAH102018R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 4 0 | MCRA040ATN | 1SAH100004R9900 | 0.170 |
| 240 | 240 | 4 0 | MCRA040AT7 | 1SAH103106R9900 | 0.170 |
| 380 ... 400 | 440 | 4 0 | MCRA040ATU | 1SAH100005R9900 | 0.170 |
| 415 ... 440 | 480 | 4 0 | MCRA040ATW | 1SAH102011R9900 | 0.170 |
| 500 | 600 | 4 0 | MCRA040ATY | 1SAH102012R9900 | 0.170 |
| 3 N.O. + 1 N.C. poles | | | | | |
| 24 | 24 | 3 1 | MCRA031AT1 | 1SAH102034R9900 | 0.170 |
| 48 | 48 | 3 1 | MCRA031AT9 | 1SAH108238R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 3 1 | MCRA031ATJ | 1SAH100013R9900 | 0.170 |
| 120 | 120 | 3 1 | MCRA031AT4 | 1SAH102037R9900 | 0.170 |
| - | 208 ... 220 | 3 1 | MCRA031ATM | 1SAH102028R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 3 1 | MCRA031AT6 | 1SAH102039R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 3 1 | MCRA031ATN | 1SAH100014R9900 | 0.170 |
| 240 | 240 | 3 1 | MCRA031AT7 | 1SAH103105R9900 | 0.170 |
| 380 ... 400 | 440 | 3 1 | MCRA031ATU | 1SAH100015R9900 | 0.170 |
| 415 ... 440 | 480 | 3 1 | MCRA031ATW | 1SAH102032R9900 | 0.170 |
| 500 | 600 | 3 1 | MCRA031ATY | 1SAH102033R9900 | 0.170 |
| 2 N.O. + 2 N.C. poles | | | | | |
| 24 | 24 | 2 2 | MCRA022AT1 | 1SAH220438R9900 | 0.170 |
| 48 | 48 | 2 2 | MCRA022AT9 | 1SAH108236R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 2 2 | MCRA022ATJ | 1SAH100023R9900 | 0.170 |
| 120 | 120 | 2 2 | MCRA022AT4 | 1SAH102058R9900 | 0.170 |
| - | 208 ... 220 | 2 2 | MCRA022ATM | 1SAH102049R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 2 2 | MCRA022AT6 | 1SAH102060R9900 | 0.170 |
| 220 ... 240 | 240 ... 277 | 2 2 | MCRA022ATN | 1SAH100024R9900 | 0.170 |
| 240 | 240 | 2 2 | MCRA022AT7 | 1SAH102061R9900 | 0.170 |
| 380 ... 400 | 440 | 2 2 | MCRA022ATU | 1SAH100025R9900 | 0.170 |
| 415 ... 440 | 480 | 2 2 | MCRA022ATW | 1SAH102053R9900 | 0.170 |
| 500 | 600 | 2 2 | MCRA022ATY | 1SAH102054R9900 | 0.170 |

Note : Other contact configuration available. Please consult your ABB local sales organization.



MCRA

Main dimensions mm, inches

MCRC 4-pole mini contactor relays with screw terminals

DC operated



MCRC040AT

MCRC 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------------------|---------------------------|------|------------|-----------------------------|
| VDC | | | | |

4 N.O. poles

| | | | | |
|---------------|-----|-------------|----------------|-------|
| 12 | 4 0 | MCRC040ATB | 1SAH10000R9900 | 0.235 |
| 24 | 4 0 | MCRC040ATD | 1SAH10000R9900 | 0.235 |
| 24 with Diode | 4 0 | MCRC040ATDD | 1SAH11331R9900 | 0.235 |

3 N.O. + 1 N.C. poles

| | | | | |
|---------------|-----|-------------|----------------|-------|
| 12 | 3 1 | MCRC031ATB | 1SAH10001R9900 | 0.235 |
| 24 | 3 1 | MCRC031ATD | 1SAH10001R9900 | 0.235 |
| 24 with Diode | 3 1 | MCRC031ATDD | 1SAH11332R9900 | 0.235 |

2 N.O. + 2 N.C. poles

| | | | | |
|---------------|-----|-------------|----------------|-------|
| 12 | 2 2 | MCRC022ATB | 1SAH10002R9900 | 0.235 |
| 24 | 2 2 | MCRC022ATD | 1SAH10002R9900 | 0.235 |
| 24 with Diode | 2 2 | MCRC022ATDD | 1SAH11332R9900 | 0.235 |

4 N.O. poles MCRC mini contactors relays with extended operating limits coil

| | | | | |
|------|-----|-------------|----------------|-------|
| 24* | 4 0 | MCRC040ATWD | 1SAH22041R9900 | 0.235 |
| 48* | 4 0 | MCRC040ATWG | 1SAH22046R9900 | 0.235 |
| 110* | 4 0 | MCRC040ATWJ | 1SAH22047R9900 | 0.235 |
| 125* | 4 0 | MCRC040ATWL | 1SAH22045R9900 | 0.235 |
| 220* | 4 0 | MCRC040ATWN | 1SAH22044R9900 | 0.235 |

3 N.O. + 1 N.C. poles mini contactors relays with extended operating limits coil

| | | | | |
|------|-----|-------------|----------------|-------|
| 24* | 3 1 | MCRC031ATWD | 1SAH22049R9900 | 0.235 |
| 48* | 3 1 | MCRC031ATWG | 1SAH10007R9900 | 0.235 |
| 110* | 3 1 | MCRC031ATWJ | 1SAH22046R9900 | 0.235 |
| 125* | 3 1 | MCRC031ATWL | 1SAH22045R9900 | 0.235 |
| 220* | 3 1 | MCRC031ATWN | 1SAH22043R9900 | 0.235 |

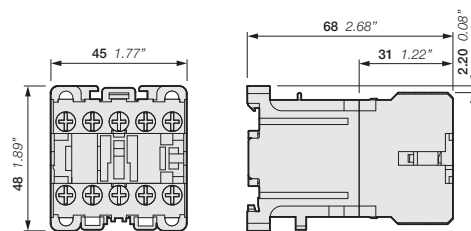
2 N.O. + 2 N.C. poles mini contactors relays with extended operating limits coil

| | | | | |
|-------------|-----|-------------|----------------|-------|
| 17 ... 32 | 2 2 | MCRC022ATWD | 1SAH22040R9900 | 0.235 |
| 34 ... 62 | 2 2 | MCRC022ATWG | 1SAH10008R9900 | 0.235 |
| 77 ... 143 | 2 2 | MCRC022ATWJ | 1SAH10717R9900 | 0.235 |
| 87 ... 162 | 2 2 | MCRC022ATWL | 1SAH22045R9900 | 0.235 |
| 154 ... 286 | 2 2 | MCRC022ATWN | 1SAH22042R9900 | 0.235 |

Note : Other contact configuration available. Please consult your ABB local sales organization.

* With the extended operating limits coils:

- at nominal voltage, Uc, a higher number of additional auxiliary contacts can be attached to the device
- a wider range of voltages, $-30\% \leq Uc \leq +30\%$, can be used for the operation with a limitation of the number of auxiliary contacts.



MCRC

Main dimensions mm, inches

MCRI, MCRK 4-pole mini contactor relays with screw terminals

DC operated - low consumption



MCRI040AT

2CDC211025V0019



MCRK040AT

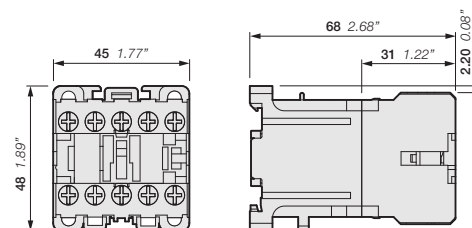
2CDC211026V0019

MCRI, MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- only for K variants: add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts)
- wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------------------|---------------------------|------------|-----------------|-----------------------------|
| VDC | | | | |
| DC operation 24 V / 1.2 W | | | | |
| 24 | 4 0 | MCRI040ATD | 1SAH100530R9900 | 0.235 |
| | 3 1 | MCRK031ATD | 1SAH100531R9900 | 0.235 |
| | 2 2 | MCRK022ATD | 1SAH100532R9900 | 0.235 |
| DC operation 24 V / 2 W | | | | |
| 24 | 4 0 | MCRK040ATD | 1SAH100533R9900 | 0.235 |
| | 3 1 | MCRK031ATD | 1SAH100534R9900 | 0.235 |
| | 2 2 | MCRK022ATD | 1SAH100535R9900 | 0.235 |



MCRI, MCRK

Main dimensions mm, inches

MCRA..R 4-pole mini contactor relays for ring tongue ferrules

AC operated



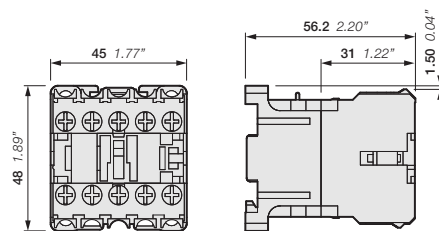
MCRA040AR

MCRA..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: AC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg | |
|-------------------------------------|---------------------------|------|------------|-----------------------------|-------|
| V 50 Hz | V 60 Hz | | | | |
| 4 N.O. poles | | | | | |
| 24 | 24 | 4 0 | MCRA040AR1 | 1SAH102177R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 4 0 | MCRA040ARJ | 1SAH102179R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 4 0 | MCRA040AR6 | 1SAH102178R9900 | 0.170 |
| 3 N.O. + 1 N.C. poles | | | | | |
| 24 | 24 | 3 1 | MCRA031AR1 | 1SAH102180R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 3 1 | MCRA031ARJ | 1SAH102182R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 3 1 | MCRA031AR6 | 1SAH102181R9900 | 0.170 |
| 2 N.O. + 2 N.C. poles | | | | | |
| 24 | 24 | 2 2 | MCRA022AR1 | 1SAH102183R9900 | 0.170 |
| 110 ... 115 | 110 ... 120 | 2 2 | MCRA022ARJ | 1SAH100485R9900 | 0.170 |
| 220 ... 230 | 220 ... 230 | 2 2 | MCRA022AR6 | 1SAH102184R9900 | 0.170 |



MCRA..R

Main dimensions mm, inches

MCRC..R 4-pole mini contactor relays for ring tongue ferrules

DC operated



MCRC040AR

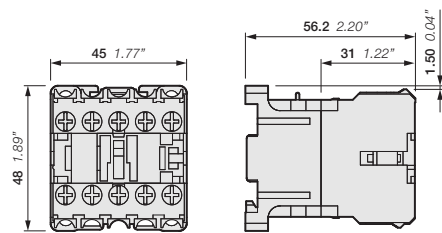
2CDC211028V019

MCRC..R 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- add-on auxiliary contact blocks for front or side mounting (up to 6 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------------------|---------------------------|------------|-----------------|-----------------------------|
| VDC | | | | |
| 12 | 4 0 | MCRC040ARB | 1SAH101994R9900 | 0.245 |
| | 3 1 | MCRC031ARB | 1SAH101996R9900 | 0.245 |
| | 2 2 | MCRC022ARB | 1SAH101998R9900 | 0.245 |



MCRC..R

Main dimensions mm, inches

04

MCRK..R 4-pole mini contactor relays for ring tongue ferrules

DC operated - low consumption



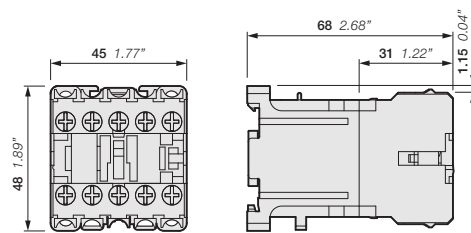
MCRK040AR

MCRK 4-pole mini contactor relays are a high performance but space saving solution used for control functions or for switching small loads up to 6 A.

These contactors are designed with 4 main poles with various contact combinations:

- specific screw terminals for an easy connection with ring tongue ferrules
- control circuit: DC operated
- coil with very low energy consumption; suitable for direct control by PLC outputs
- add-on auxiliary contact blocks for front or side mounting (up to 2 additional contacts) and a wide range of accessories
- suitable for rail or wall mounting.

| Rated control circuit voltage Uc | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------------------|---------------------------|------------|-----------------|-----------------------------|
| VDC | | | | |
| DC operation 24 V / 2 W | | | | |
| 24 | 4 0 | MCRK040ARD | 1SAH101995R9900 | 0.245 |
| | 3 1 | MCRK031ARD | 1SAH101997R9900 | 0.245 |
| | 2 2 | MCRK022ARD | 1SAH100540R9900 | 0.245 |

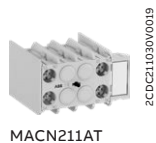


MCRK..R

Main dimensions mm, inches

Auxiliary contact blocks for MC1 and MC2 mini contactors

With screw terminals and specific screw terminals for ring tongue ferrules



MACN211AT



MACN422AT



MACL110AT

Screw terminals

| Suitable for | Auxiliary contacts | Type | Order code | Weight |
|--------------|--------------------|------|------------|-------------------|
| | | | | Pkg (1 pce) kg |

Front mounted instantaneous auxiliary contact blocks

| | | | | |
|--|-----|-----------|-----------------|-------|
| All MC1 and MC2 variants Contacts in accordance with EN 50012 | 1 1 | MACN211AT | 1SAL100999R9906 | 0.030 |
| | 0 2 | MACN202AT | 1SAL100998R9906 | 0.030 |
| | 3 1 | MACN431AT | 1SAL100995R9906 | 0.040 |
| | 2 2 | MACN422AT | 1SAL100996R9906 | 0.040 |
| | 1 3 | MACN413AT | 1SAL100997R9906 | 0.040 |
| All MC1 and MC2 variants Contacts in accordance with EN 50005 | 2 0 | MARN220AT | 1SAL100994R9906 | 0.030 |
| | 1 1 | MARN211AT | 1SAL100993R9906 | 0.030 |
| | 0 2 | MARN202AT | 1SAL100992R9906 | 0.030 |
| | 4 0 | MARN440AT | 1SAL100991R9906 | 0.040 |
| | 3 1 | MARN431AT | 1SAL100990R9906 | 0.040 |
| | 2 2 | MARN422AT | 1SAL100989R9906 | 0.040 |
| | 1 3 | MARN413AT | 1SAL100988R9906 | 0.040 |
| | 0 4 | MARN404AT | 1SAL100987R9906 | 0.040 |

Side mounted instantaneous auxiliary contact block

| | | | | |
|--|-----|------------|-----------------|-------|
| All MC1 and MC2 variants Contacts in accordance with EN 50012 | 1 0 | MACL110AT | 1SAL100560R9906 | 0.017 |
| | 0 1 | MACL101AT | 1SAL100561R9906 | 0.017 |
| All MC1 and MC2 variants Contacts in accordance with EN 50005 | 1 0 | MARL110ATS | 1SAL100519R9906 | 0.017 |
| | 0 1 | MARL101ATS | 1SAL100520R9906 | 0.017 |



MARN211AR



MARN422AR



MACL110AR

Specific screw terminals for ring tongue ferrules

| Suitable for | Auxiliary contacts | Type | Order code | Weight |
|--------------|--------------------|------|------------|-------------------|
| | | | | Pkg (1 pce) kg |

Front mounted instantaneous auxiliary contact blocks

| | | | | |
|--|-----|-----------|-----------------|-------|
| All MC1 and MC2 variants Contacts in accordance with EN 50012 | 1 1 | MACN211AR | 1SAL103557R9906 | 0.030 |
| | 0 2 | MACN202AR | 1SAL103558R9906 | 0.030 |
| | 3 1 | MACN431AR | 1SAL103559R9906 | 0.040 |
| | 2 2 | MACN422AR | 1SAL103560R9906 | 0.040 |
| | 1 3 | MACN413AR | 1SAL103561R9906 | 0.040 |
| All MC1 and MC2 variants Contacts in accordance with EN 50005 | 2 0 | MARN220AR | 1SAL103349R9906 | 0.030 |
| | 1 1 | MARN211AR | 1SAL103350R9906 | 0.030 |
| | 0 2 | MARN202AR | 1SAL103351R9906 | 0.030 |
| | 4 0 | MARN440AR | 1SAL103352R9906 | 0.040 |
| | 3 1 | MARN431AR | 1SAL103353R9906 | 0.040 |
| | 2 2 | MARN422AR | 1SAL103354R9906 | 0.040 |
| | 1 3 | MARN413AR | 1SAL103355R9906 | 0.040 |
| | 0 4 | MARN404AR | 1SAL103300R9906 | 0.040 |

Side mounted instantaneous auxiliary contact block

| | | | | |
|--|-----|------------|-----------------|-------|
| All MC1 and MC2 variants Contacts in accordance with EN 50012 | 1 0 | MACL110AR | 1SAL103555R9906 | 0.017 |
| | 0 1 | MACL101AR | 1SAL103556R9906 | 0.017 |
| All MC1 and MC2 variants Contacts in accordance with EN 50005 | 1 0 | MARL110ARS | 1SAL103299R9906 | 0.017 |
| | 0 1 | MARL101ARS | 1SAL103298R9906 | 0.017 |

Other accessories for MC1 and MC2 mini contactors



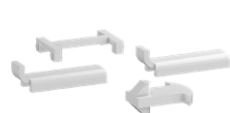
MPOAAE1

2CDC211036V0019



MREBC10AC2

2CDC211037V0019



MMH0

2CDC211038V0019



MVBOR

2CDC211039V0019



MVBOR

2CDC211040V0019



MVP0C

2CDC211041V0019



MVB0L

2CDC211042V0019

| Suitable for | Rated control circuit voltage | | | Protection type | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|-------------------------------|---------|---------|-----------------|------|------------|---------|----------------|
| | V DC | V 50 Hz | V 60 Hz | | | | | |

Surge suppressors for contactor coils

| | | | | | | | | |
|--------------------------------------|-------------|-------------|-------------|----------|---------|-----------------|---|-------|
| All MC1 and MC2 DC operated variants | 6 ... 250 | - | - | Diode | MPOCAE3 | 1SAL100546R9906 | 1 | 0.006 |
| All MC1 and MC2 AC operated variants | - | 12 ... 60 | 12 ... 60 | R/C | MPOAAE1 | 1SAL100544R9906 | 1 | 0.006 |
| All MC1 and MC2 variants | 24 ... 48 | 24 ... 48 | 24 ... 48 | Varistor | MPOAAE2 | 1SAL100545R9906 | 1 | 0.006 |
| | 50 ... 127 | 50 ... 127 | 50 ... 127 | Varistor | MPODAE4 | 1SAL100536R9906 | 1 | 0.006 |
| | 130 ... 250 | 130 ... 250 | 130 ... 250 | Varistor | MPODAE5 | 1SAL204848R9906 | 1 | 0.006 |
| | | | | Varistor | MPODAE6 | 1SAL204849R9906 | 1 | 0.006 |

Electronic timers

| | | | | | | | | |
|--------------------------|------------|------------|------------|-----------------|------------|-----------------|---|-------|
| All MC1 and MC2 variants | 24 ... 250 | 24 ... 250 | 24 ... 250 | 0.5 ... 60 sec. | MREBC10AC2 | 1SAL100541R9906 | 1 | 0.040 |
| | | | | 0.2 ... 24 sec | MREBC20AC2 | 1SAL100542R9906 | 1 | 0.040 |

DIN rail adapter for electronic timers

| | | | | |
|--------------------|-------|-----------------|---|-------|
| All MREBC variants | MVBOR | 1SAL100543R9906 | 1 | 0.003 |
|--------------------|-------|-----------------|---|-------|

Mechanical interlock

| | | | | |
|--------------------------|------|-----------------|---|-------|
| All MC1 and MC2 variants | MMH0 | 1SAL100547R9906 | 1 | 0.003 |
|--------------------------|------|-----------------|---|-------|

Parallel connecting link

| | | | | |
|--------------------------|-------|-----------------|---|-------|
| All MC1 and MC2 variants | MVPOC | 1SAL100600R9906 | 1 | 0.010 |
|--------------------------|-------|-----------------|---|-------|

Connection sets for reversing contactors

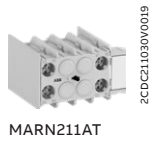
| | | | | |
|--------------------------|-------|-----------------|---|-------|
| All MC1 and MC2 variants | WKMIU | 1SAL101421R9906 | 1 | 0.030 |
|--------------------------|-------|-----------------|---|-------|

Lütze® rail adapter for contactors and contactor relays

| | | | | |
|--------------------------|-------|-----------------|----|-------|
| All MC1 and MC2 variants | MVB0L | 1SAL101830R9906 | 30 | 0.002 |
|--------------------------|-------|-----------------|----|-------|

Auxiliary contact blocks for MCR mini contactor relays

With screw terminals and specific screw terminals for ring tongue ferrules



MARN211AT



MARN422AT



MARL110AT

Screw terminals

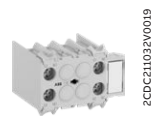
| Suitable for | Auxiliary contacts | Type | Order code | Weight |
|--------------|--------------------|------|------------|-------------------|
| | | | | Pkg (1 pce) kg |

Front mounted instantaneous auxiliary contact blocks

| All MCR variants | Contacts in accordance with EN 50005 | Auxiliary contacts | Type | Order code | Weight |
|------------------|--------------------------------------|--------------------|-----------|-----------------|--------|
| | | 2 0 | MARN220AT | 1SAL100994R9906 | 0.030 |
| | | 1 1 | MARN211AT | 1SAL100993R9906 | 0.030 |
| | | 0 2 | MARN202AT | 1SAL100992R9906 | 0.030 |
| | | 4 0 | MARN440AT | 1SAL100991R9906 | 0.040 |
| | | 3 1 | MARN431AT | 1SAL100990R9906 | 0.040 |
| | | 2 2 | MARN422AT | 1SAL100989R9906 | 0.040 |
| | | 1 3 | MARN413AT | 1SAL100988R9906 | 0.040 |
| | | 0 4 | MARN404AT | 1SAL100987R9906 | 0.040 |

Side mounted instantaneous auxiliary contact block

| All MCR variants | Auxiliary contacts | Type | Order code | Weight |
|------------------|--------------------|------------|-----------------|--------|
| | 1 0 | MARL110AT | 1SAL100513R9906 | 0.017 |
| | 0 1 | MARL101AT | 1SAL100514R9906 | 0.017 |
| | 1 0 | MARL110ATS | 1SAL100519R9906 | 0.017 |
| | 0 1 | MARL101ATS | 1SAL100520R9906 | 0.017 |



MARN211AR



MARN422AR



MARL110AR

Specific screw terminals for ring tongue ferrules

| Suitable for | Auxiliary contacts | Type | Order code | Weight |
|--------------|--------------------|------|------------|-------------------|
| | | | | Pkg (1 pce) kg |

Front mounted instantaneous auxiliary contact blocks

| All MCR variants | Contacts in accordance with EN 50005 | Auxiliary contacts | Type | Order code | Weight |
|------------------|--------------------------------------|--------------------|-----------|-----------------|--------|
| | | 2 0 | MARN220AR | 1SAL103349R9906 | 0.030 |
| | | 1 1 | MARN211AR | 1SAL103350R9906 | 0.030 |
| | | 0 2 | MARN202AR | 1SAL103351R9906 | 0.030 |
| | | 4 0 | MARN440AR | 1SAL103352R9906 | 0.040 |
| | | 3 1 | MARN431AR | 1SAL103353R9906 | 0.040 |
| | | 2 2 | MARN422AR | 1SAL103354R9906 | 0.040 |
| | | 1 3 | MARN413AR | 1SAL103355R9906 | 0.040 |
| | | 0 4 | MARN404AR | 1SAL103300R9906 | 0.040 |

Side mounted instantaneous auxiliary contact block

| All MCR variants | Auxiliary contacts | Type | Order code | Weight |
|------------------|--------------------|------------|-----------------|--------|
| | 1 0 | MARL110AR | 1SAL103356R9906 | 0.017 |
| | 0 1 | MARL101AR | 1SAL103357R9906 | 0.017 |
| | 1 0 | MARL110ARS | 1SAL103299R9906 | 0.017 |
| | 0 1 | MARL101ARS | 1SAL103298R9906 | 0.017 |

Other accessories for MCR mini contactor relays



2CDC211036V0019

MPOAAE1



2CDC211037V0019

MREBC10AC2



2CDC211040V0019

MVBOR



2CDC211038V0019

MMHO



2CDC211042V0019

MVB0L

| Suitable for | Rated control circuit voltage | | | Protection type | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------|-------------------------------|---------|---------|-----------------|------|------------|---------|----------------|
| | Uc | V 50 Hz | V 60 Hz | | | | | |
| | V DC | | | | | | | kg |

Surge suppressors for contactor coils

| | | | | | | | | |
|----------------------|-------------|-------------|-------------|----------|---------|-----------------|---|-------|
| All MCR | 6 ... 250 | – | – | Diode | MPOCAE3 | 1SAL100546R9906 | 1 | 0.006 |
| DC operated variants | | | | | | | | |
| All MC1 and MC2 | – | 12 ... 60 | 12 ... 60 | R/C | MPOAAE1 | 1SAL100544R9906 | 1 | 0.006 |
| AC operated variants | – | 72 ... 250 | 72 ... 250 | R/C | MPOAAE2 | 1SAL100545R9906 | 1 | 0.006 |
| All MCR variants | 24 ... 48 | 24 ... 48 | 24 ... 48 | Varistor | MP0DAE4 | 1SAL100536R9906 | 1 | 0.006 |
| | 50 ... 127 | 50 ... 127 | 50 ... 127 | Varistor | MP0DAE5 | 1SAL204848R9906 | 1 | 0.006 |
| | 130 ... 250 | 130 ... 250 | 130 ... 250 | Varistor | MP0DAE6 | 1SAL204849R9906 | 1 | 0.006 |

Electronic timers

| | | | | | | | | |
|------------------|------------|------------|------------|-----------------|------------|-----------------|---|-------|
| All MCR variants | 24 ... 250 | 24 ... 250 | 24 ... 250 | 0.5 ... 60 sec. | MREBC10AC2 | 1SAL100541R9906 | 1 | 0.040 |
| | | | | 0.2 ... 24 sec | MREBC20AC2 | 1SAL100542R9906 | 1 | 0.040 |

DIN rail adapter for electronic timers

| | | | | |
|--------------------|-------|-----------------|---|-------|
| All MREBC variants | MVBOR | 1SAL100543R9906 | 1 | 0.003 |
|--------------------|-------|-----------------|---|-------|

Mechanical interlock

| | | | | |
|------------------|------|-----------------|---|-------|
| All MCR variants | MMHO | 1SAL100547R9906 | 1 | 0.003 |
|------------------|------|-----------------|---|-------|



Lütze® rail adapter for contactors and contactor relays

| | | | | |
|------------------|-------|-----------------|----|-------|
| All MCR variants | MVB0L | 1SAL101830R9906 | 30 | 0.002 |
|------------------|-------|-----------------|----|-------|

MC1, MC2 3-pole and 4-pole mini contactors

Technical data

Main pole – Utilization characteristics according to IEC

| Contactor types | AC operated | MC1A | MC2A |
|--|-------------|--|----------|
| | DC operated | MC1C | MC2C |
| Standards | | IEC/EN 60947-1, IEC/EN 60947-4-1 | |
| Rated operational voltage U_e max | | 690 V AC, 440 V DC | |
| Rated frequency (without derating) | | DC or 50 / 60 Hz | |
| Conventional free-air thermal current I_{th} acc. to IEC/EN 60947-4-1, open contactors, $\theta \leq 55^\circ\text{C}$, with conductor cross-sectional area | | 20 A | |
| AC-1 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current AC-1 | 230 V | 20 A | |
| U_e max ≤ 690 V, 50/60 Hz | 400 V | 20 A | |
| | 500 V | 20 A | |
| | 690 V | 20 A | |
| AC-1 Utilization category for air temperature close to contactor $55 < \theta \leq 70^\circ\text{C}$ | | | |
| I_e / Rated operational current AC-1 | 230 V | 16 A | |
| U_e max ≤ 690 V, 50/60 Hz | 400 V | 16 A | |
| | 500 V | 16 A | |
| | 690 V | 16 A | |
| AC-3 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current AC-3 | 230 V | 9 A | 12 A |
| | 400 V | 9 A | 12 A |
| | 500 V | 8 A | 10 A |
| | 690 V | 5 A (1) | 5 A (1) |
|  3-phase motors | | | |
| Rated operational power AC-3 | 230 V | 2.2 kW | 3 kW |
| 1500 r.p.m. 50 Hz | 400 V | 4 kW | 5.5 kW |
| 1800 r.p.m. 60 Hz | 500 V | 4 kW | 5.5 kW |
| 3-phase motors | 690 V | 4 kW (1) | 4 kW (1) |
| AC-4 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current AC-4 | 230 V | 9 A | |
| | 400 V | 9 A (1) | |
| | 500 V | 8 A | |
| | 690 V | 5 A (1) | |
|  3-phase motors | | | |
| Rated operational power AC-4 | 230 V | 2.2 kW | |
| 1500 r.p.m. 50 Hz | 400 V | 4 kW (1) | |
| 1800 r.p.m. 60 Hz | 500 V | 4 kW | |
| 3-phase motors | 690 V | 4 kW (1) | |
| DC-1 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current DC-1 with 3 poles in series | 24 V | 20 A | |
| | 48 V | 20 A | |
| | 60 V | 20 A | |
| | 125 V | 10 A | |
| | 220 V | 8 A | |
| DC-3 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current DC-3 with 3 poles in series | 24 V | 12 A | |
| | 48 V | 9 A | |
| | 60 V | 9 A | |
| | 125 V | 6 A | |
| | 220 V | 2.5 A | |
| DC-5 Utilization category for air temperature close to contactor $\theta \leq 55^\circ\text{C}$ | | | |
| I_e / Rated operational current DC-5 with 3 poles in series | 24 V | 9 A | |
| | 48 V | 8 A | |
| | 60 V | 7 A | |
| | 125 V | 2 A | |
| | 220 V | 0.8 A | |
| Rated making capacity | | 10 x I_e AC-3 acc. to IEC/EN 60947-4-1, 12 x I_e AC-4 acc. to IEC/EN 60947-4-1 | |
| Rated breaking capacity | | 8 x I_e AC-3 acc. to IEC/EN 60947-4-1, 10 x I_e AC-4 acc. to IEC/EN 60947-4-1 | |
| Short-circuit protection device for contactors without thermal O/L relay - motor protection excluded fuse type gG | | Type 1: 32 A / Type 2: 20 A | |
| Rated short-time withstand current I_{cw} at 40 °C ambient temperature, in free air from a cold state | 10 s | 72 A | 96 A |
| Maximum breaking capacity $\cos \phi = 0.45$ | at 400 V | 90 A | 120 A |
| Maximum electrical switching frequency | | AC 300 cycles/h (AC-1), 1200 cycles/h (AC-3), 150 cycles/h (AC-4) | |
| | | DC 600 cycles/h | |

(1) Valid for N.O. contacts only. Other ratings on request.

MC1, MC2 3-pole and 4-pole mini contactors

Technical data

Main pole – Utilization characteristics according to UL/NEMA/CSA

| Contactor types | AC operated | MC1A | MC2A |
|--|----------------------------------|---------|--------|
| | DC operated | MC1C | MC2C |
| Standards | UL/CSA 60947-1, UL/CSA 60947-4-1 | | |
| Maximum operational voltage | 600 V AC | | |
| UL/CSA general use rating | 20 A / 600 V | | |
| UL/CSA maximum 1-phase motor rating for air temperature close to contactor $\theta \leq 40^\circ\text{C}$ | | | |
| Full load current | 115 V AC | 9.8 A | 9.8 A |
| | 230 V AC | 10 A | 12 A |
| Horse power rating | 115 V AC | 0.5 hp | 0.5 hp |
| | 230 V AC | 1.5 hp | 2 hp |
| UL/CSA maximum 3-phase motor rating for air temperature close to contactor $\theta \leq 40^\circ\text{C}$ | | | |
| Full load current (1) | 200 V AC | 11 A | 11 A |
| | 240 V AC | 9.6 A | 9.6 A |
| | 380-415 V AC | 6.1 A | 9.7 A |
| | 440-480 V AC | 7.6 A | 11 A |
| | 550-600 V AC | 6.1 A | 11 A |
| Horse power rating (1) | 200 V AC | 3 hp | 3 hp |
| | 240 V AC | 3 hp | 3 hp |
| | 380-415 V AC | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7.5 hp |
| | 550-600 V AC | 5 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - motor protection excluded | | | |
| Fuse rating | 600 V | 50 A | |
| Fuse type | 600 V | Class J | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

| Contactor types | AC operated | MC1A | MC2A |
|---|------------------------------------|------------------------------------|-------------------------------------|
| | DC operated | MC1C | MC2C |
| Rated insulation voltage U_i | | | |
| acc. to IEC/EN 60947-4-1 | 750 V | | |
| acc. to UL/CSA 60947-4-1 | 600 V | | |
| Rated impulse withstand voltage U_{imp} | 6 kV (1) | | |
| Ambient air temperature, close to contactor | | | |
| Operation | Fitted with thermal overload relay | -25 ... +55 °C | |
| | Without thermal overload relay | -40 ... +55 °C | |
| Storage | -55 ... +80 °C | | |
| Climatic withstand | Acc. to IEC 60947-1 Annex Q | | |
| Maximum operating altitude (without derating) | 3000 m | | |
| Mechanical durability | 10 ⁷ operating cycles | | |
| Electrical durability | | | |
| | AC-1 20 A | 210 000 operating cycles | 260 000 operating cycles |
| | AC-3 400 V | 900 000 operating cycles (9 A) (2) | 800 000 operating cycles (12 A) (2) |
| | AC-4 400 V | 30 000 operating cycles (9 A) (2) | 35 000 operating cycles (9 A) (2) |
| Resistance to shock | Half-sine | | |
| acc. to IEC/EN 60068-2-27 | 25 g / 11 ms | | |
| acc. to IEC/EN 60947-1 Annex. Q | Category E | | |
| Resistance to vibrations | Sinusoidal | | |
| acc. to IEC/EN 60068-2-6 | 5 g / 3 ... 150 Hz | | |
| acc. to IEC/EN 60947-1 Annex. Q | Category E | | |

(1) 2 mm clearance distance between contactor side wall and grounded metal parts of cabinet required

(2) Valid for 3-pole mini contactors only. Other ratings on request.

MC1, MC2 3-pole and 4-pole mini contactors

Technical data

Magnet system characteristics for MC1A, MC2A contactors

| Contactor types | AC operated | MC1A | MC2A |
|--|-------------------------------|---------------------|------|
| Coil operating limits acc. to IEC/EN 60947-4-1 | AC supply | 0.85 ... 1.1 x Uc | |
| AC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption | Average pull-in value (50 Hz) | 26 VA | |
| | Average pull-in value (60 Hz) | 32 VA | |
| | Average holding value (50 Hz) | 5.3 VA | |
| | Average holding value (60 Hz) | 4.5 VA | |
| Drop-out voltage in % of Uc min | | 20 ... 75% | |

Magnet system characteristics for MC1C, MC2C contactors

| Contactor types | DC operated | MC1C | MC2C |
|--|-----------------------|---------------------|------|
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x Uc | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption (1) | Average pull-in value | 3 W | |
| | Average holding value | 3 W | |
| Drop-out voltage in % of Uc min | | 10 ... 75% | |

(1) Low consumption mini contactors: see coil consumption on ordering details pages.

Magnet system characteristics for MC1C, MC2C contactors with extended operating limits coils

| Contactor types | DC operated | MC1C | MC2C |
|--|-----------------------|---------------------|------|
| Coil operating limits acc. to IEC/EN 60715 | DC supply | 0.85 ... 1.1 x Uc | |
| DC control voltage | | | |
| Rated control circuit voltage Uc | | See ordering tables | |
| Coil consumption | Average pull-in value | 4 W | |
| | Average holding value | 4 W | |
| Drop-out voltage in % of Uc min | | 10 ... 65% | |

Mounting characteristics and conditions for use

| Contactor types | AC operated | MC1A | MC2A |
|------------------------------|-------------|--|------|
| | DC operated | MC1C | MC2C |
| Mounting positions | | | |
| | | | |
| Mounting distances | | The contactors can be assembled side by side | |
| Fixing | | | |
| On rail acc. to IEC/EN 60715 | | 35 x 7.5 mm or 35 x 15 mm | |
| By screws (not supplied) | | 4 screws at the 4 angles - M4 | |

MC1, MC2 3-pole and 4-pole mini contactors

Technical data













Built-in auxiliary contact according to IEC

| Types | Built-in auxiliary contacts | |
|---|----------------------------------|--------------|
| Standards | IEC/EN 60947-1, IEC/EN 60947-5-1 | |
| Rated operational voltage U_e max | 690 V AC, 440 V DC | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | |
| Conventional free-air thermal current $I_{th} \theta \leq 55^\circ\text{C}$ | 10 A | |
| I_e / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| I_e / Rated operational current DC-13 | 24 V | 5 A |
| | 48 V | 2.5 A |
| | 125 V | 0.7 A |
| | 250 V | 0.3 A |
| | 440 V | 0.15 A |
| Short-circuit protection device - fuse type gG | 10 A | |
| Minimum switching capacity with failure rate acc. to IEC/EN 60947-5-4 | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 360 cycles/h |
| | DC-13 | 360 cycles/h |

Built-in auxiliary contact according to UL/CSA

| Types | Built-in auxiliary contacts | |
|-----------------------------|----------------------------------|--|
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 | |
| Maximum operational voltage | 600 V AC | |
| Pilot duty | A600, Q600 | |

Connection

| Contactor types | AC operated | MC1A, MC2A | MC1A..R, MC2A..R |
|--|---|------------------------------|--|
| | DC operated | MC1C, MC2C | MC1C..R, MC2C..R |
| Terminals |  Screw terminals with cable clamp | |  Conductors with insulated ring tongue ferrule |
| Connection capacity | | | |
| Main conductors (poles + built-in auxiliary terminals) | | | |
|  Rigid: solid | 1 x | 0.75 ... 4 mm ² | - |
|  Flexible without ferrule | 2 x | 0.75 ... 2.5 mm ² | - |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
|  Flexible with ferrule (insulated or not) | 1 x | 0.75 ... 2.5 mm ² | - |
|  Lugs | 2 x | 0.75 ... 1.5 mm ² | - |
| | \varnothing mm > | - | 3.6 mm |
| | L mm < | - | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | - |
| Stripping length | | 9 mm | - |
| Tightening torques | | 0.8 ... 1.0 Nm / 7 lb.in | 0.8 Nm / 7 lb.in |
| Coil terminals | | | |
|  Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
|  Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
|  Flexible with ferrule | 1 x | 0.75 ... 2.5 mm ² | - |
|  Flexible with ferrule (insulated or not) | 2 x | 0.75 ... 1.5 mm ² | - |
|  Lugs | \varnothing mm > | - | 3.6 mm |
| | L mm < | - | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | - |
| Stripping length | | 9 mm | - |
| Tightening torques | | 0.8 Nm / 7 lb.in | |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | IP20 | | |
| All terminals | IP20 | | |
| Screw terminals | (screws of unused terminals must be tightened) | | |
| All terminals | | M3 | M3.5 |
| Screwdriver type | Flat \varnothing 5.5 mm / Pozidriv 2 | | |

MCR 4-pole mini contactor relays

Technical data

Main pole – Utilization characteristics according to IEC

| | | |
|--|------------------------------|--------------|
| Contactor types | AC operated | MCRA |
| | DC operated | MCRC |
| Standards | IEC/EN 60947-1, EN 60947-5-1 | |
| Rated operational voltage U _e max | 690 V AC, 440 V DC | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} θ ≤ 55 °C | 10 A | |
| I _e / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| I _e / Rated operational current DC-13 | 24 V | 5 A |
| | 48 V | 2.5 A |
| | 125 V | 0.7 A |
| | 250 V | 0.3 A |
| | 440 V | 0.15 A |
| Short-circuit protection device for contactors - fuse type gG | 10 A | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 600 cycles/h |
| | DC-13 | 600 cycles/h |

Main pole – Utilization characteristics according to UL/NEMA/CSA

| | | |
|-----------------------------|----------------------------------|-------------|
| Contactor types | AC operated | MCRA |
| | DC operated | MCRC |
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 | |
| Maximum operational voltage | 600 V AC | |
| Pilot duty | A600, Q600 | |

MCR 4-pole mini contactor relays

Technical data

General technical data

| | | |
|--|---------------------------------|-----------------------------------|
| Contactor relay types | AC operated | MCRA |
| | DC operated | MCRC |
| Rated insulation voltage U_i | | 750 V |
| acc. to IEC/EN 60947-5-1 | | 600 V |
| acc. to UL/CSA 60947-5-1 | | 6 kV |
| Rated impulse withstand voltage U_{imp} | | 6 kV |
| Electromagnetic compatibility | | |
| Ambient air temperature close to contactor relay | Operation in free air | -40 ... +55 °C |
| | Storage | -55 ... +80 °C |
| Climatic withstand | | Acc. to IEC / EN 60947-1 Annex. Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | 10 ⁷ operating cycles |
| Resistance to shock | | Half-sine |
| | acc. to IEC/EN 60068-2-27 | 25 g / 11ms |
| | acc. to IEC/EN 60947-1 Annex. Q | Category E |
| Resistance to vibrations | | Sinusoidal |
| | acc. to IEC/EN 60068-2-6 | 5 g / 3 ... 150 Hz |
| | acc. to IEC/EN 60947-1 Annex. Q | Category E |

Magnet system characteristics for MCRA contactor relays

| | | |
|--|-------------------------------|----------------------|
| Contactor relay types | AC operated | MCRA |
| Coil operating limits acc. to IEC/EN 60947-5-1 | AC supply | 0.85 ... 1.1 x U_c |
| AC control voltage | | |
| Rated control circuit voltage U_c | | See ordering tables |
| Coil consumption | Average pull-in value (50 Hz) | 26 VA |
| | Average pull-in value (60 Hz) | 32 VA |
| | Average holding value (50 Hz) | 5.3 VA |
| | Average holding value (60 Hz) | 4.5 VA |
| Drop-out voltage in % of U_c min | | 20 ... 75 % |

Magnet system characteristics for MCRC contactor relays

| | | |
|--|-----------------------|----------------------|
| Contactor relay types | DC operated | MCRC |
| Coil operating limits acc. to IEC/EN 60947-5-1 | DC supply | 0.85 ... 1.1 x U_c |
| DC control voltage | | |
| Rated control circuit voltage U_c | | See ordering tables |
| Coil consumption (1) | Average pull-in value | 3 W |
| | Average holding value | 3 W |
| Drop-out voltage in % of U_c min | | 10 ... 75 % |

(1) Low consumption mini contactor relays: see coil consumption on ordering details pages.

Magnet system characteristics for MCRC contactor relays with extended operating limits coils

| | | |
|--|-----------------------|----------------------|
| Contactor types | DC operated | MCRC |
| Coil operating limits acc. to IEC/EN 60947-4-1 | DC supply | 0.85 ... 1.1 x U_c |
| DC control voltage | | |
| Rated control circuit voltage U_c | | See ordering tables |
| Coil consumption | Average pull-in value | 4 W |
| | Average holding value | 4 W |
| Drop-out voltage in % of U_c min | | 10 ... 65 % |

MCR 4-pole mini contactor relays

Technical data

Mounting characteristics and conditions for use

| | | |
|--------------------|--|-------------|
| Contactor types | AC operated | MCRA |
| | DC operated | MCRC |
| Mounting positions | | |
| Mounting distances | The contactors can be assembled side by side. | |
| Fixing | On rail acc. to IEC/EN 60715 35 x 7.5 mm or 35 x 15 mm By screws (not supplied) 4 screws at the 4 angles - M4 | |

Connection characteristics

| | | | |
|--|----------------------------------|------------------------------|--|
| Contactor types | AC operated | MCRA | MCRA..R |
| | DC operated | MCRC | MCRC..R |
| Terminals | Screw terminals with cable clamp | | Conductors with insulated ring tongue ferrule |
| Connection capacity | | | |
| Auxiliary terminals | | | |
| Rigid: solid | 1 x | 0.75 ... 4 mm ² | - |
| | 2 x | 0.75 ... 2.5 mm ² | - |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
| Flexible with ferrule (insulated or not) | 1 x | 0.75 ... 2.5 mm ² | - |
| | 2 x | 0.75 ... 1.5 mm ² | - |
| Lugs | ∅ mm > | - | 3.6 mm |
| | L mm < | - | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | - |
| Stripping length | | | 9 mm |
| Tightening torques | | | 0.8 Nm / 7 lb.in |
| Coil terminals | | | |
| Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
| Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | - |
| Flexible with ferrule (insulated or not) | 1 x | 0.75 ... 2.5 mm ² | - |
| | 2 x | 0.75 ... 1.5 mm ² | - |
| Lugs | ∅ mm > | - | 3.6 mm |
| | L mm < | - | 6.6 mm |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 | - |
| Stripping length | | | 9 mm |
| Tightening torques | | | 0.8 Nm / 7 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | | |
| All terminals | | | IP20 |
| Screw terminals | | | (screws of unused terminals must be tightened) |
| All terminals | | | M3 |
| Screwdriver type | | | M3.5 |
| | | | Flat ∅ 5.5 mm / Pozidriv 2 |

Accessories

Technical data








Auxiliary contacts for front mounting and side mounting according to IEC

| | | |
|---|----------------------------------|--------------|
| Types | MACN, MARN, MACL, MARL | |
| Standards | IEC/EN 60947-1, IEC/EN 60947-5-1 | |
| Rated operational voltage U _e max | 690 V AC | |
| Rated frequency (without derating) | DC or 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} θ ≤ 55 °C | 10 A | |
| I _e / Rated operational current AC-15 | 240 V | 6 A |
| | 400 V | 4 A |
| | 500 V | 2.5 A |
| | 690 V | 1.5 A |
| I _e / Rated operational current DC-13 | 24 V | 4 A |
| | 48 V | 2 A |
| | 125 V | 0.55 A |
| | 250 V | 0.27 A |
| | 440 V | 0.15 A |
| Short-circuit protection device - fuse type gG | 10 A | |
| Minimum switching capacity with failure rate acc. to IEC/EN 60947-5-4 | 17 V / 5 mA | |
| Maximum electrical switching frequency | AC-15 | 360 cycles/h |
| | DC-13 | 360 cycles/h |

Auxiliary contacts for front mounting and side mounting according to UL/CSA

| | | |
|--------------------------|----------------------------------|--|
| Types | MACN, MARN, MACL, MARL | |
| Standards | UL/CSA 60947-1, UL/CSA 60947-5-1 | |
| Max. operational voltage | 600 V AC | |
| Pilot duty | A600, Q600 | |

Connection characteristics

| | | |
|--|---|--|
| Terminals |   | |
| | Screw terminals with cable clamp | Conductors with insulated ring tongue ferrule |
| Connection capacity | | |
| Auxiliary terminals | | |
|  Rigid: solid | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible without ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with ferrule | 1 x | 0.75 ... 2.5 mm ² |
|  (insulated or not) | 2 x | 0.75 ... 1.5 mm ² |
|  Lugs | Ø mm > | - |
| | L mm < | - |
| Connection capacity acc. to UL/CSA | 1 or 2 x | AWG 12 ... 18 |
| Stripping length | | 9 mm |
| Tightening torques | | 0.8 Nm / 7 lb.in |
| Degree of protection acc. to IEC/EN 60947-1 and IEC/EN 60529 | | |
| Auxiliary terminals | | IP20 |
| Screw terminals | | (screws of unused terminals must be tightened) |
| All terminals | | M3.5 |
| Screwdriver type | | Flat Ø 5.5 mm / Pozidriv 2 |

Accessories

Technical data

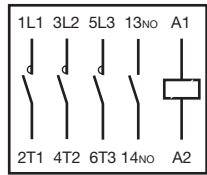
Electronic timers

| | | |
|--|-----------------------|------------------------|
| Insulation Voltage | | 750 V |
| Impulse withstand voltage Uimp | | 4 kV |
| Control voltage, Uc | 50 Hz, 60 Hz, DC | 24-250 V |
| Tolerance of control voltage | | 85% - 110% |
| Timing range | | 0.5 s - 60 s (+/- 6 s) |
| Ambient air temperature close to the timer | Operation in free air | -25 °C ... +55 °C |
| | Storage | -55 °C ... +80 °C |
| Recovery time | | 100 ms |
| Repeatability | | +/-1 % |
| Temperature variation of delay | % / °C | 0.05 |
| Degree of protection | | IP20 |
| Mounting position | | Any |

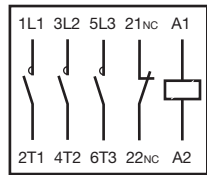
MC.. 3-pole and 4-pole mini contactors, MCR.. 4-pole mini contactor relays

Terminal marking and positioning

MC.. 3-pole mini contactors

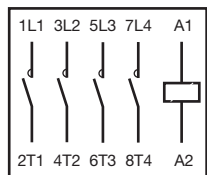


MC..310A

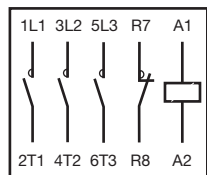


MC..301A

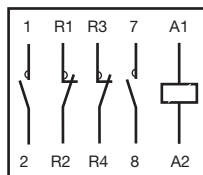
MC.. 4-pole mini contactors



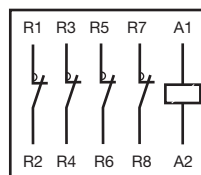
MC..400A



MC..C00A

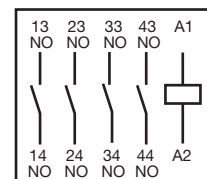


MC..B00A

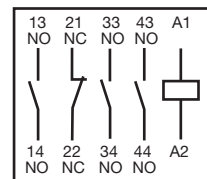


MC..A00A

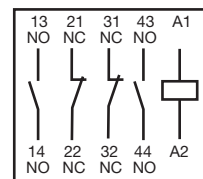
MC.. 4-pole mini contactor relays



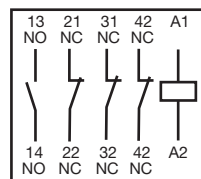
MCR..040A



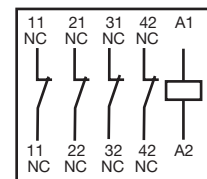
MCR..031A



MCR..022A



MCR..013A

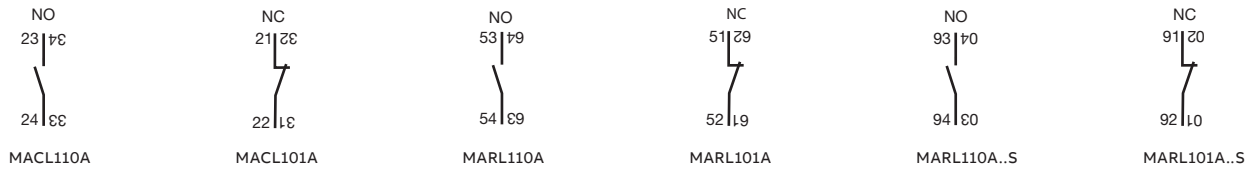


MCR..004A

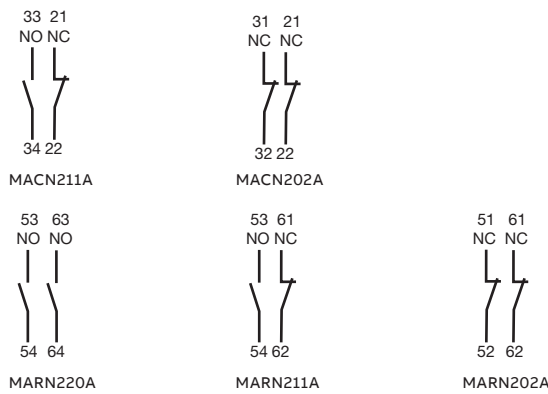
Auxiliary contact blocks for MC1 and MC2 mini contactors

Terminal marking and positioning

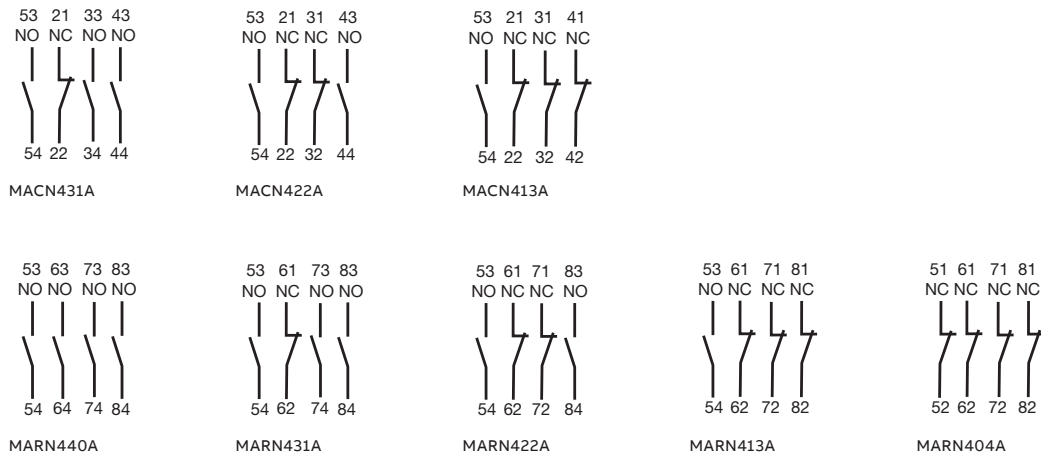
MACL..., MARL... side mounted (left or right) 1-pole auxiliary contact block



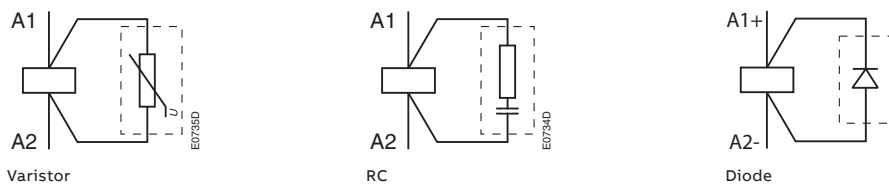
MACN..., MARN... front mounted 2-pole auxiliary contact block



MACN..., MARN... front mounted 4-pole auxiliary contact block



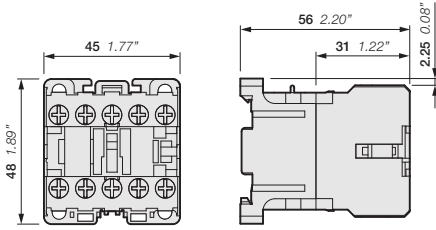
Surge suppressors



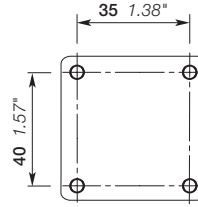
MC.. mini contactors and MCR.. mini contactor relays - AC operated with screw terminals and specific screw terminals for ring tongue ferrules

Dimensions

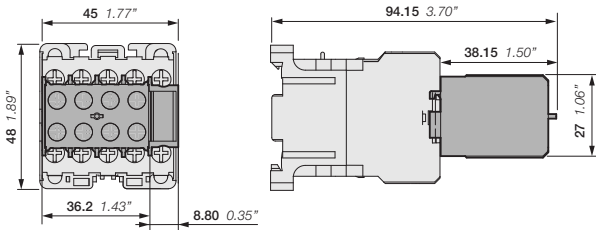
04



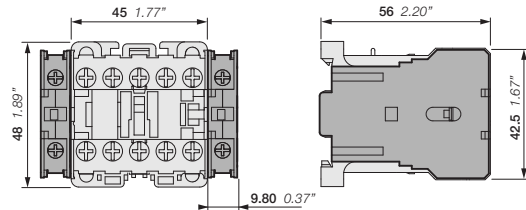
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R



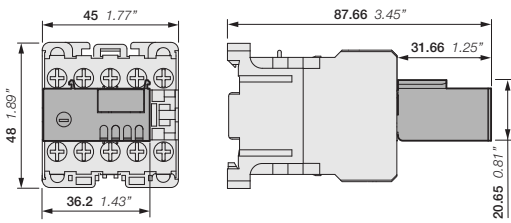
Drilling plan



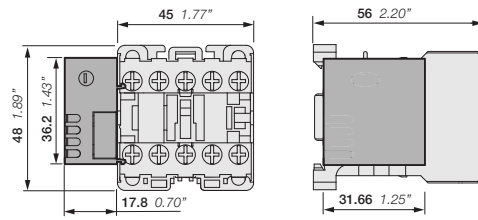
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACN2..., MARN2.. 2-pole auxiliary contact block
MACN4..., MARN4.. 4-pole auxiliary contact block



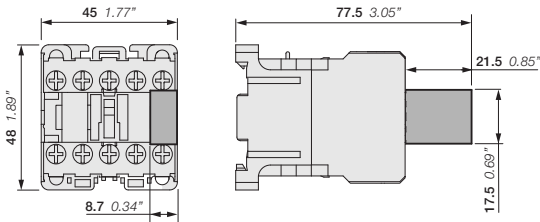
MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+ MACL..., MARL.. 1-pole auxiliary contact block



MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC front mounted electronic timer



MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MREBC side mounted electronic timer

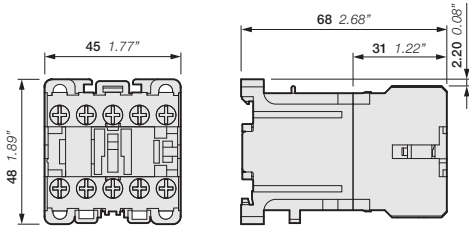


MC1A, MC2A, MCRA, MC1A..R, MC2A..R, MCRA..R
+MP0A surge suppressor

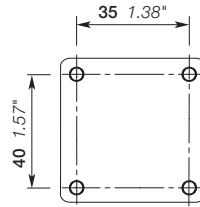
MC.. mini contactors and MCR.. mini contactor relays - DC operated

with screw terminals and specific screw terminals for ring tongue ferrules

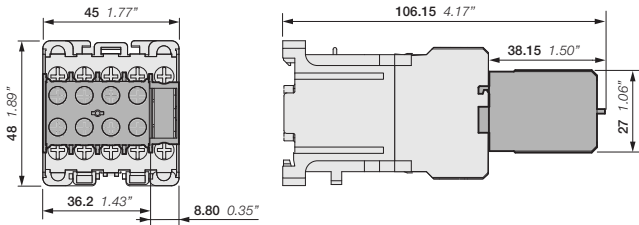
Dimensions



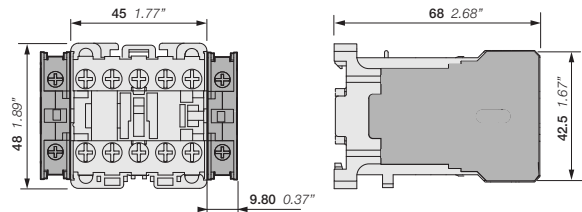
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R



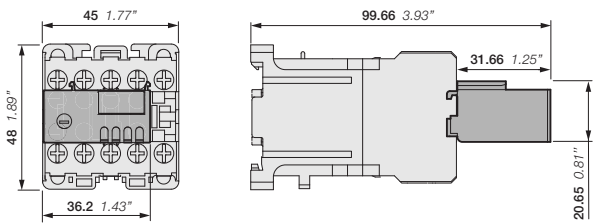
Drilling plan



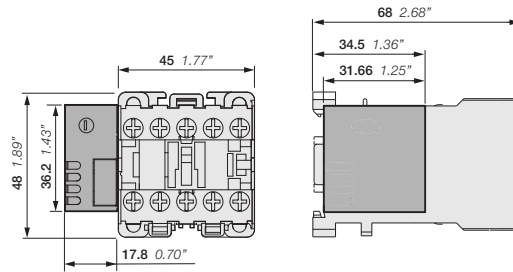
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACN2.., MARN2.. 2-pole auxiliary contact block
MACN4.., MARN4.. 4-pole auxiliary contact block



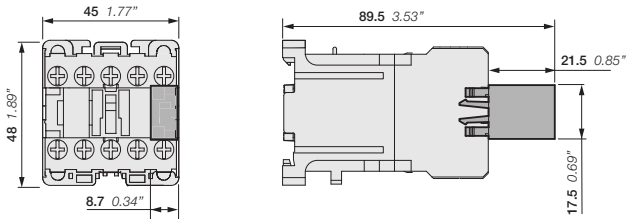
MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+ MACL.., MARL.. 1-pole auxiliary contact block



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC front mounted electronic timer



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MREBC side mounted electronic timer



MC1C, MC2C, MCRC, MC1C..R, MC2C..R, MCRC..R
+MPOA surge suppressor



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/AS09-30-10-20
www.abb.com/productdetails/1SBL101001R2010

AS 3-pole contactors and NS 3-pole contactor relays with screw terminals

3-pole contactors

- 5/3** Overview
- 5/8** AS09 ... AS16 AC operated
- 5/9** ASL09 ... ASL16 DC operated
- 5/10** AS09 ... AS16 AC operated - 2-stack
- 5/11** ASL09 ... ASL16 DC operated - 2-stack
- 5/12** Main accessories
- 5/14** Technical data
- 5/20** Electrical durability
- 5/22** Terminal marking and positioning
- 5/24** Dimensions

Contactor relays

- 5/28** Overview
- 5/30** NS AC operated
- 5/31** NSL DC operated
- 5/32** Main accessories
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Accessories

- 5/42** Auxiliary contact blocks
- 5/45** Electronic timers
- 5/48** Surge suppressors
- 5/50** Mechanical interlock unit and other accessories
- 5/51** Connection accessories for starting solutions

5/52 Voltage code table

AS contactors

Efficient and space saving



The compact AS contactor range allows you to optimize equipment design and is a reliable, time and cost saving solution.



Speed up your projects

Simpler by design

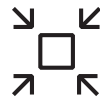
AS contactors come in one single size and are designed to make life easy for engineering, handling and wiring purposes. These products follow a simple marking pattern, which enables a quick identification of their individual features.



Easy to install

Easy to use

Make engineering a simple process with AS contactors. Every product is delivered with opened terminals, located directly on the front for easy access. Every terminal is screwdriver guided. Spring terminal versions are also available for a time-saving and reliable connection alternative.



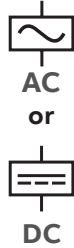
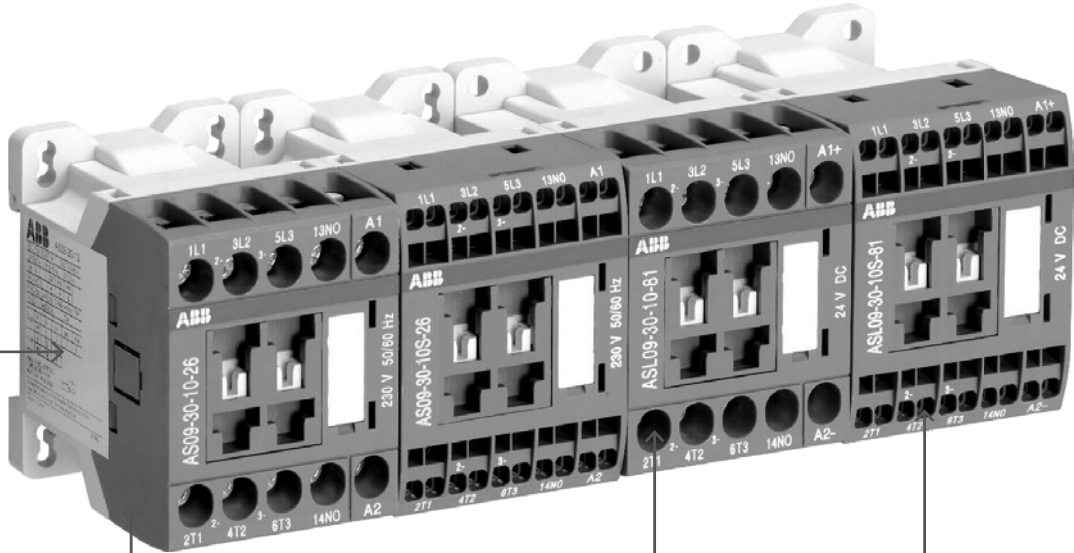
Space saving

Space optimization

The addition of accessories keeps the panel smart and compact, while providing additional features. Interlocking kits and surge suppression are clipped into the housing without adding width to the small frame of the contactor.

Compact and efficient

Optimize your equipment dimensions!



W 45 x H 68 x D 72.5 mm

Easy to engineer with just one size

For motor starting solutions up to 7.5 kW at 400 V and 3 hp at 440 V, contactors are in one frame size for both AC and DC coils.



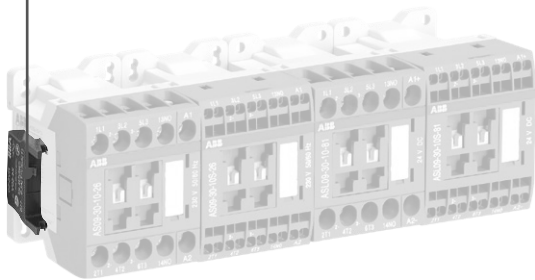
Screw

Screw terminal
On top of that, they are available with screw or spring terminals.



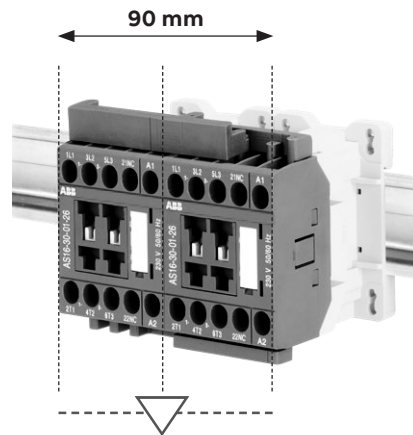
Spring

Spring terminal



Side clip-on surge suppressors

This add-on snaps and connects to the side of the housing and does not add width to the frame. The coil terminals remain accessible this way.



Compact reversing contactors

With their low consumption coil of only 3 W, AS contactors can be controlled directly by most PLC's. For 24 V control circuits, this is only 125 mA.

Easy to use

Space-saving and intuitive

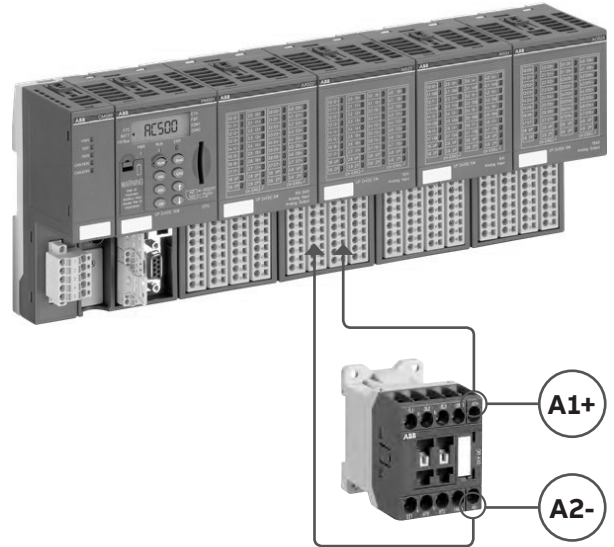


Make your control circuits reliable

Built-in and add-on auxiliary contacts offer high reliability for low signals and meet the requirements for mechanically linked and mirror contacts according to IEC standards.

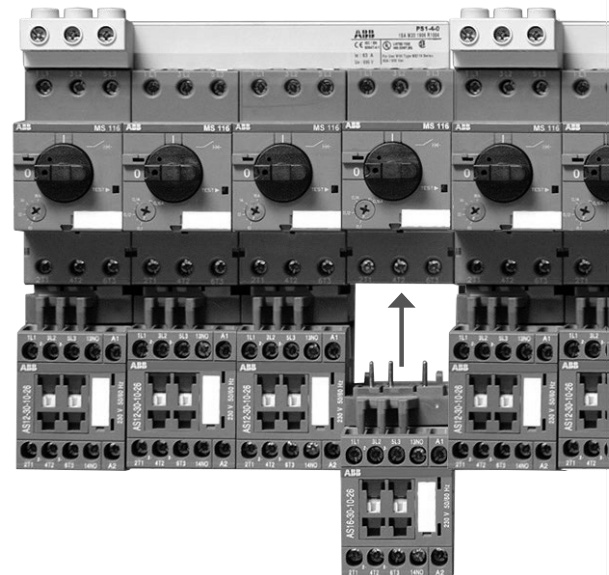
Two types of terminals, for even more choices

As an alternative to the conventional screw terminals, spring terminals are often used in applications with vibrations. Both types are able to accommodate two cables. This way, AS offers the right type of terminal depending on the installation.



Direct control by PLC

With their low consumption coil of only 3 W, AS contactors can be controlled directly by most PLC's. For 24 V control circuits, this is only 125 mA.



Choose reliable and time-saving solutions

AS contactors can easily be connected to manual motor starters or overload relays. The connecting accessories prevent mistakes and save time when assembling starter combinations.

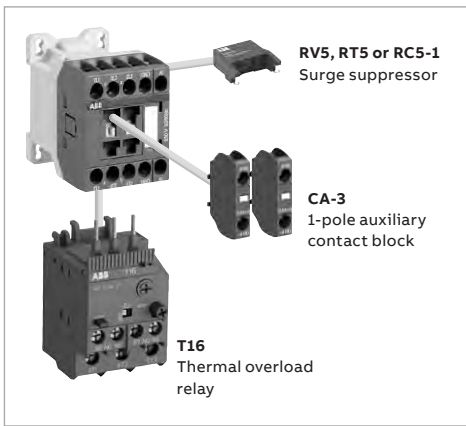
3-pole contactors

Main accessories



AS09 ... AS16
3-pole contactors

Main accessories for contactors

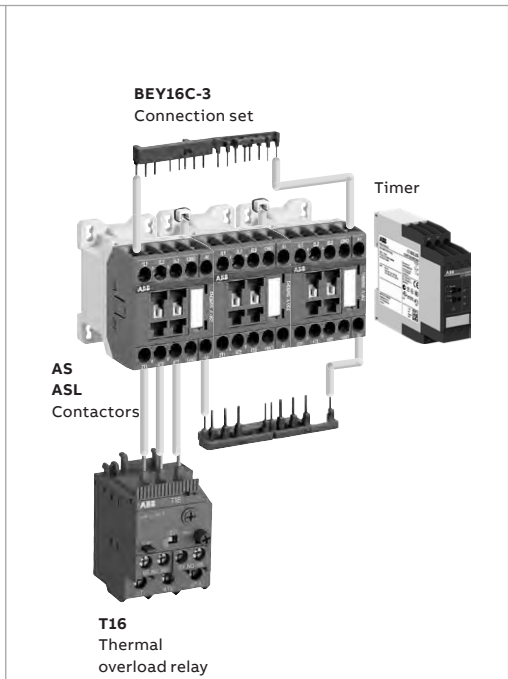
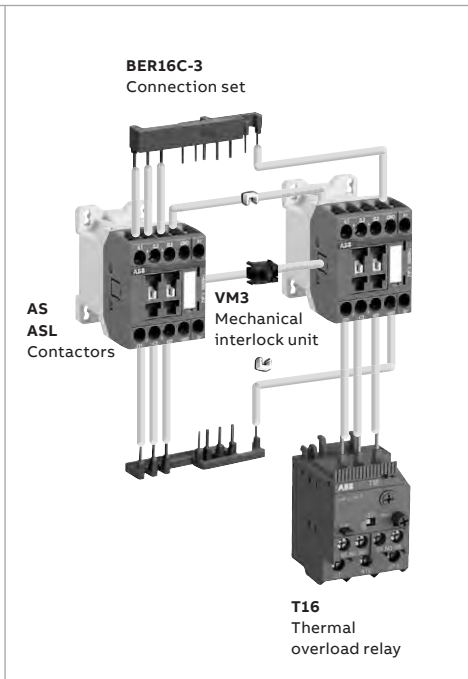
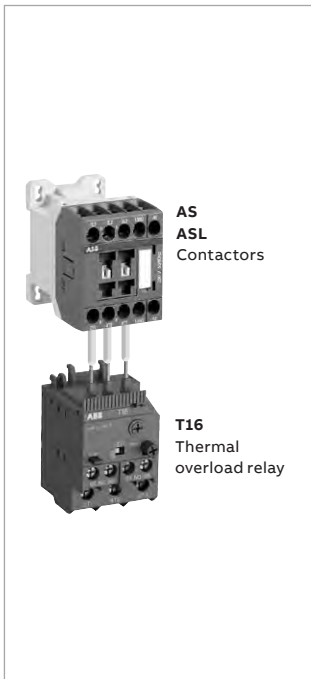


Main accessories for starting solutions

Direct-on-line starter

Reversing starter

Star-delta starter



3-pole contactors



Screw terminals



| | | | | |
|--|--------------------|--------------|--------------|--------------|
| | AC control voltage | AS09 | AS12 | AS16 |
| | DC control voltage | ASL09 | ASL12 | ASL16 |

Switching of 3-phase cage motors

| | | | | | | | | |
|--|-----------|--------------------------------|---------------------------|--------------------------------|-------|--------|--------|--------|
| | IEC | AC-3 | Rated operational power | 400 V | 4 kW | 5.5 kW | 7.5 kW | |
| | | | Rated operational current | $\theta \leq 60^\circ\text{C}$ | 400 V | 9 A | 12 A | 15.5 A |
| | | | | $\theta \leq 60^\circ\text{C}$ | 415 V | 9 A | 12 A | 15.5 A |
| | | $\theta \leq 60^\circ\text{C}$ | 690 V | 5 A | 7 A | 9 A | | |
| | UL / CSA | 3-phase motor rating | | 440-480 V | 5 hp | 7.5 hp | 10 hp | |
| | NEMA size | | | 00 | 00 | 0 | | |

Protection of 3-phase motors

| | | | | | | | |
|-------------------------|--|---------------|-------------|-------------|-------------|-------------|-------------|
| Thermal overload relays | | T16... | | | | | |
| | | 0.10...0.13 | 0.23...0.31 | 0.55...0.74 | 1.30...1.70 | 3.10...4.20 | 7.60...10.0 |
| | | 0.13...0.17 | 0.31...0.41 | 0.74...1.00 | 1.70...2.30 | 4.20...5.70 | 10.0...13.0 |
| | | 0.17...0.23 | 0.41...0.55 | 1.00...1.30 | 2.30...3.10 | 5.70...7.60 | 13.0...16.0 |

Switching of resistive circuits

| | | | | | | | | |
|----------|-------------------------------------|-------------|---------------------------|--------------------------------|-------|---------------------|---------------------|---------------------|
| | IEC | AC-1 | Rated operational current | $\theta \leq 40^\circ\text{C}$ | 690 V | 22 A | 24 A | 24 A |
| | | | | $\theta \leq 60^\circ\text{C}$ | 690 V | 18 A | 20 A | 20 A |
| | | | | $\theta \leq 70^\circ\text{C}$ | 690 V | 15 A | 16 A | 16 A |
| | With conductor cross-sectional area | | | | | 2.5 mm ² | 2.5 mm ² | 2.5 mm ² |
| UL / CSA | General use rating | | 600 V AC | | | 20 A | 20 A | 20 A |
| | With conductor cross-sectional area | | | | | AWG 12 | AWG 12 | AWG 12 |

Main accessories

| | | | |
|--------------------------|---|--|---|
| Auxiliary contact blocks | Front mounting | | 1-pole CA3-10 or CA3-01 |
| Interlocks | Mechanical | | VM3 |
| Surge suppressors | Side-mounted (without additional width) | | RV5 (Varistor) AC / DC RC5-1 (Capacitor) AC RT5 (Transil diode) DC |
| Connection sets | Reversing starters Star-delta starters | | BER16C-3 BEY16C-3 |
| Connecting link | With manual motor starter | | BEA16-3 |

AS09 ... AS16 3-pole contactors

4 to 7.5 kW

AC operated



AS09-30-10

AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

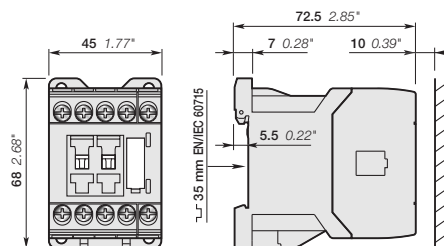
These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight | | | | | | | | |
|-------------------------|---|-------------------------------|--------------------------------|--------------------------------------|---------|---------------------------|---------------|-----------------|---------------|-----------------|---------------|-----------------|-------|--|---------------|-----------------|---------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | | Pkg (1 pce) | | | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | 24 | 24 | | AS09-30-10-20 | 1SBL101001R2010 | 0.220 | | | | | | | | |
| | | | | | | | | 0 1 | AS09-30-01-20 | 1SBL101001R2001 | 0.220 | | | | | | |
| | | | | | | | | 230 | 230 | 1 0 | AS09-30-10-26 | 1SBL101001R2610 | 0.220 | | | | |
| | | | | | | | | | | 0 1 | AS09-30-01-26 | 1SBL101001R2601 | 0.220 | | | | |
| | | | | | | | | 5.5 | 24 | 7.5 | 20 | 24 | 24 | | AS12-30-10-20 | 1SBL111001R2010 | 0.220 |
| | | | | | | | | | | | | | | | | 0 1 | AS12-30-01-20 |
| 230 | 230 | 1 0 | AS12-30-10-26 | 1SBL111001R2610 | 0.220 | | | | | | | | | | | | |
| | | 0 1 | AS12-30-01-26 | 1SBL111001R2601 | 0.220 | | | | | | | | | | | | |
| 7.5 | 24 | 10 | 20 | 24 | 24 | | AS16-30-10-20 | 1SBL121001R2010 | 0.220 | | | | | | | | |
| | | | | | | | | 0 1 | AS16-30-01-20 | 1SBL121001R2001 | 0.220 | | | | | | |
| | | | | | | | | 230 | 230 | 1 0 | AS16-30-10-26 | 1SBL121001R2610 | 0.220 | | | | |
| | | | | | | | | | | 0 1 | AS16-30-01-26 | 1SBL121001R2601 | 0.220 | | | | |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



AS09, AS12, AS16

Main dimensions mm, inches

ASL09 ... ASL16 3-pole contactors

4 to 7.5 kW

DC operated



ASL09-30-10

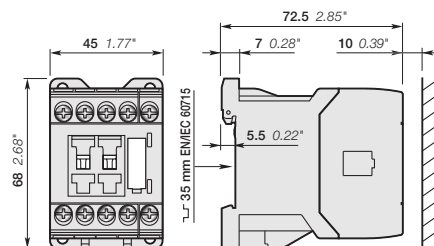
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 3 main poles and 1 built-in auxiliary contact
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------------------------|----------------|-----------------|--------------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V AC-3 kW | AC-1 A | hp | A | V DC | | | | kg |
| 4 | 22 | 5 | 20 | 24 | 1 0 | ASL09-30-10-81 | 1SBL103001R8110 | 0.280 |
| | | | | | 0 1 | ASL09-30-01-81 | 1SBL103001R8101 | 0.280 |
| 5.5 | 24 | 7.5 | 20 | 24 | 1 0 | ASL12-30-10-81 | 1SBL113001R8110 | 0.280 |
| | | | | | 0 1 | ASL12-30-01-81 | 1SBL113001R8101 | 0.280 |
| 7.5 | 24 | 10 | 20 | 24 | 1 0 | ASL16-30-10-81 | 1SBL123001R8110 | 0.280 |
| | | | | | 0 1 | ASL16-30-01-81 | 1SBL123001R8101 | 0.280 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



ASL09, ASL12, ASL16

Main dimensions mm, inches

AS09 ... AS16 2-stack 3-pole contactors

4 to 7.5 kW

AC operated



AS09-30-32

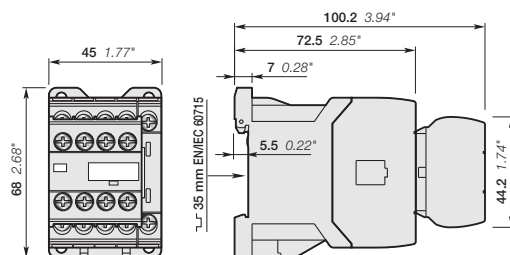
AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC operated
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------|---------------------------|---------------|-----------------|-----------------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | |
| 400 V AC-3 | AC-1 | | | | | | | | |
| kW | A | hp | A | | | | | | |
| 4 | 22 | 5 | 20 | 24 | 24 | 3 2 | AS09-30-32-20 | 1SBL101001R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS09-30-32-26 | 1SBL101001R2632 | 0.260 |
| 5.5 | 24 | 7.5 | 20 | 24 | 24 | 3 2 | AS12-30-32-20 | 1SBL111001R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS12-30-32-26 | 1SBL111001R2632 | 0.260 |
| 7.5 | 24 | 10 | 20 | 24 | 24 | 3 2 | AS16-30-32-20 | 1SBL121001R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS16-30-32-26 | 1SBL121001R2632 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



AS09, AS12, AS16

Main dimensions mm, inches

ASL09 ... ASL16 2-stack 3-pole contactors

4 to 7.5 kW

DC operated



ASL09-30-32

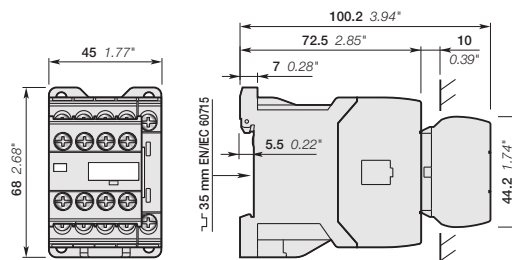
ASL09 ... ASL16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block. The auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|---|-------------------------------|--------------------------------|--|---------------------------|----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V AC-3 | AC-1 | | | | | | | kg |
| kW | A | hp | A | V DC | | | | |
| 4 | 22 | 5 | 20 | 24 | 3 2 | ASL09-30-32-81 | 1SBL103001R8132 | 0.320 |
| 5.5 | 24 | 7.5 | 20 | 24 | 3 2 | ASL12-30-32-81 | 1SBL113001R8132 | 0.320 |
| 7.5 | 24 | 10 | 20 | 24 | 3 2 | ASL16-30-32-81 | 1SBL123001R8132 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



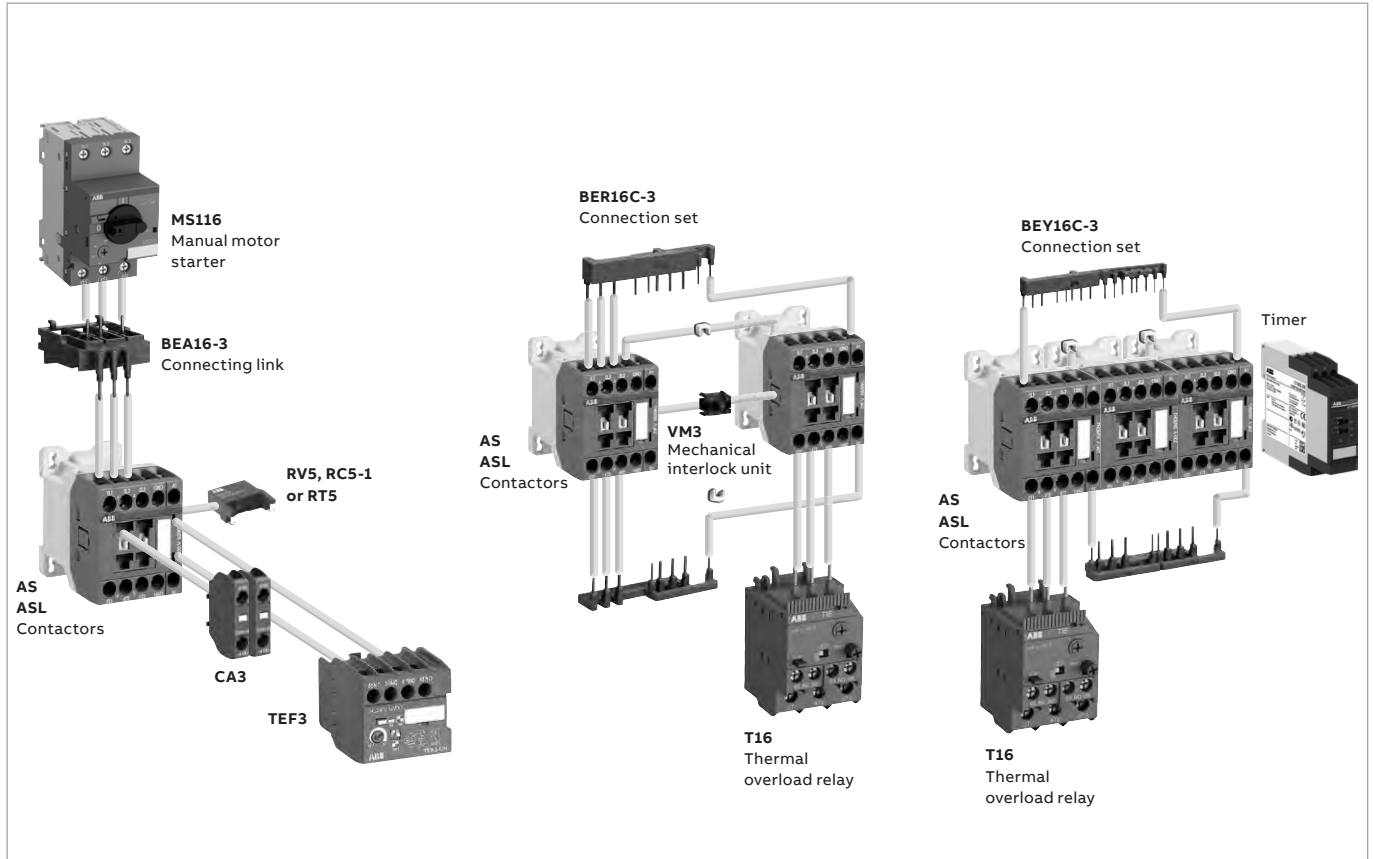
ASL09, ASL12, ASL16

Main dimensions mm, inches

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

Many configurations of accessories are possible depending on whether these are front-mounted or side-mounted.

| Contactor types | Main poles | Built-in auxiliary contacts | Front-mounted accessories | | | Side-mounted accessories | |
|-----------------|------------|-----------------------------|---------------------------|------------------|--|--------------------------|----------|
| | | | Auxiliary contact blocks | Electronic timer | Mechanical interlock unit (between 2 contactors) | Surge suppressors | |
| | | | 1-pole CA3 | TEF3 | VM3 | RV5 | or RC5-1 |
| AS09 ... AS16 | 3 0 | 1 0 | 2 max. | or 1 | + 1 | | |
| | 3 0 | 0 1 | | | | RV5 | or RC5-1 |
| AS09 ... AS16 | 3 0 | 3 2 | - | - | 1 | | |
| ASL09 ... ASL16 | 3 0 | 1 0 | 2 max. | or 1 | + 1 | RV5 | or RT5 |
| | 3 0 | 0 1 | | | | | |
| ASL09 ... ASL16 | 3 0 | 3 2 | - | - | 1 | RV5 | or RT5 |

Overload relays fitting details (1)

| Contactor types | Thermal overload relays |
|-----------------|-------------------------|
| AS09 ... AS16 | T16 (0.10...16 A) |
| ASL09 ... ASL16 | |

The addition of an overload relay on the contactor does not prevent fitting of many other accessories as shown above.

(1) Direct mounting - No kit required.

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Main accessories



CA3-10



TEF3-ON



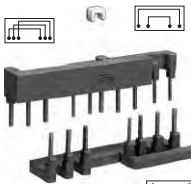
VM3



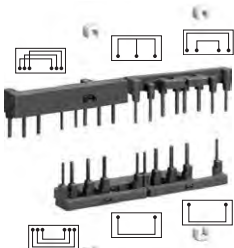
RV5



BEA16-3



BER16C-3



BEY16C-3

Front-mounted instantaneous auxiliary contact blocks

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|-----------------|--------------------|--------|-----------------|---------|----------------|
| | | | | | kg |
| AS09 ... AS16 | 1 0 | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| ASL09 ... ASL16 | 0 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |

Front-mounted electronic timer

| For contactors | Rated control circuit voltage - U _c | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|--|------|------------|---------|----------------|
| | V | | | | kg |

ON-delay

| | | | | | |
|--------------------------------|------------------|---------|-----------------|---|-------|
| AS09 ... AS16, ASL09 ... ASL16 | 24...240 V AC/DC | TEF3-ON | 1SBN021012R1000 | 1 | 0.065 |
|--------------------------------|------------------|---------|-----------------|---|-------|

OFF-delay

| | | | | | |
|--------------------------------|------------------|----------|-----------------|---|-------|
| AS09 ... AS16, ASL09 ... ASL16 | 24...240 V AC/DC | TEF3-OFF | 1SBN021014R1000 | 1 | 0.065 |
|--------------------------------|------------------|----------|-----------------|---|-------|

Mechanical interlock unit

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------------------------|------|-----------------|---------|----------------|
| AS09 ... AS16, ASL09 ... ASL16 | VM3 | 1SBN031005T1000 | 10 | 0.002 |

Surge suppressors

| For contactors | Rated control circuit voltage - U _c | | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------------------------|--|----|------|------------|---------|----------------|
| | V | AC | | | | |
| AS09 ... AS16, ASL09 ... ASL16 | 24...50 | ● | ● | RV5/50 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 2 | 0.015 |
| AS09 ... AS16 | 24...50 | ● | - | RC5-1/50 | 2 | 0.012 |
| | 50...133 | ● | - | RC5-1/133 | 2 | 0.012 |
| | 110...250 | ● | - | RC5-1/250 | 2 | 0.012 |
| ASL09 ... ASL16 | 250...440 | ● | - | RC5-1/440 | 2 | 0.012 |
| | 12...32 | - | ● | RT5/32 | 2 | 0.015 |
| | 25...65 | - | ● | RT5/65 | 2 | 0.015 |
| | 50...90 | - | ● | RT5/90 | 2 | 0.015 |
| | 77...150 | - | ● | RT5/150 | 2 | 0.015 |
| | 150...264 | - | ● | RT5/264 | 2 | 0.015 |

Connecting links with manual motor starters

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) |
|-----------------|-------------------------|---------|-----------------|---------|----------------|
| AS09 ... AS16 | MS116-0.16 ... MS116-16 | BEA16-3 | 1SBN081006T1000 | 10 | 0.019 |
| ASL09 ... ASL16 | MS132-0.16 ... MS132-16 | | | | |

Connection sets for reversing contactors

| For contactors | Mechanical interlock unit | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------------------------|---------------------------|----------|-----------------|---------|----------------|
| AS09 ... AS16, ASL09 ... ASL16 | with or without VM3 | BER16C-3 | 1SBN081012R1000 | 1 | 0.035 |

Note: BER16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on contactors with built-in N.C. auxiliary contacts. BER16C-3 can be used with or without VM3 mechanical interlock unit.

Connection sets for star-delta starting

| For contactors | Mech. interlock unit between Star & Delta contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|--------------------------------|--|----------|-----------------|---------|----------------|
| AS09 ... AS12, ASL09 ... ASL12 | with or without VM3 | BEY16C-3 | 1SBN081018R2000 | 1 | 0.041 |

Note: BEY16C-3 connection set includes two BB3 fixing clips, and an electrical interlocking when fitted on Star and Delta contactors with built-in N.C. auxiliary contacts. BEY16C-3 can be used with or without VM3 mechanical interlock unit.

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|--|--|---------------------|-------------------|-------------------|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | |
| Rated operational voltage U_e max. | 690 V | | | |
| Rated frequency (without derating) | 50 / 60 Hz | | | |
| Conventional free-air thermal current I_{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 22 A | 25 A | 25 A |
| With conductor cross-sectional area | | 2.5 mm ² | 4 mm ² | 4 mm ² |
| AC-1 Utilization category | | | | |
| For air temperature close to contactor | | | | |
| I_e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 22 A | 24 A | 24 A |
| U_e max. $\leq 690\text{ V}$, 50/60 Hz | $\theta \leq 60^\circ\text{C}$ | 18 A | 20 A | 20 A |
| | $\theta \leq 70^\circ\text{C}$ | 15 A | 16 A | 16 A |
| With conductor cross-sectional area | | 2.5 mm ² | | |
| AC-3 Utilization category | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | |
| I_e / Max. rated operational current AC-3 (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
| | 400 V | 9 A | 12 A | 15.5 A |
| | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| Rated operational power AC-3 (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
| | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| Rated making capacity AC-3 | 10 x I_e AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | 8 x I_e AC-3 acc. to IEC 60947-4-1 | | | |
| AC-8a Utilization category | | | | |
| (without thermal overload relay - U_e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$) | | | | |
| I_e / Rated operational current AC-8a | | 12 A | 16 A | 22 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) | | | | |
| $U_e \leq 500\text{ V AC}$ - gG type fuse | | 25 A | | |
| Rated short-time withstand current I_{cw} at 40°C ambient temperature, in free air from a cold state | 1 s | 230 A | 250 A | 250 A |
| | 10 s | 100 A | 124 A | 124 A |
| | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 22 A | 24 A | 24 A |
| Maximum breaking capacity $\cos \phi = 0.45$ | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| Power dissipation per pole | I_e / AC-1 | 1 W | 1.2 W | 1.2 W |
| | I_e / AC-3 | 0.16 W | 0.3 W | 0.5 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

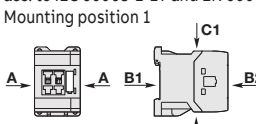
Technical data

Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|------------------------|---------------|--------------|--------------|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Standards | UL 508, CSA C22.2 N°14 | | | |
| Max. operational voltage | 690 V | | | |
| NEMA size | 00 | | | |
| NEMA continuous amp rating | Thermal current | 9 A | 9 A | 18 A |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1/3 hp | 1 hp |
| | 230 V AC | 1 hp | 1 hp | 2 hp |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1 1/2 hp | 1 1/2 hp | 3 hp |
| | 230 V AC | 1 1/2 hp | 1 1/2 hp | 3 hp |
| | 460 V AC | 2 hp | 2 hp | 5 hp |
| | 575 V AC | 2 hp | 2 hp | 5 hp |
| UL / CSA general use rating 600 V AC With conductor cross-sectional area | | 20 A | 20 A | 20 A |
| | | AWG 12 | AWG 12 | AWG 12 |
| UL / CSA maximum 1-phase motor rating Full load current | 120 V AC | 7.2 A | 9.8 A | 13.8 A |
| | 240 V AC | 8 A | 10 A | 12 A |
| Horse power rating | 120 V AC | 1/3 hp | 1/2 hp | 3/4 hp |
| | 240 V AC | 1 hp | 1-1/2 hp | 2 hp |
| UL / CSA maximum 3-phase motor rating Full load current (1) | 200-208 V AC | 7.8 A | 7.8 A | 11 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A |
| | 550-600 V AC | 9 A | 11 A | 11 A |
| | Horse power rating (1) | 200-208 V AC | 2 hp | 2 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded Fuse rating | | 40 A | 50 A | 60 A |
| | Fuse type, 600 V | J | | |
| Max. electrical switching frequency | For general use | 600 cycles/h | | |
| | For motor use | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|--|--|--|--------------|---|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Rated insulation voltage Ui acc. to IEC 60947-4-1 acc. to UL / CSA | 690 V 600 V | | | |
| Rated impulse withstand voltage Uimp. | 6 kV | | | |
| Ambient air temperature close to contactor | Operation | Fitted with thermal overload relay | -25...+60 °C | |
| | | Without thermal overload relay | -40...+70 °C | |
| | Storage | -60...+80 °C | | |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | 3000 m | | | |
| Mechanical durability | Number of operating cycles | | | |
| | 10 millions operating cycles | | | |
| Max. switching frequency | | 3600 cycles/h | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | | | |
| | Shock direction | AS contactors - AC operated | | ASL contactors - DC operated |
| Mounting position 1  | A | 20 g | | 20 g closed position / 10 g open position |
| | B1 | 10 g closed position / 5 g open position | | 15 g closed position / 5 g open position |
| | B2 | 15 g | | 10 g |
| | C1 | 20 g closed position / 9 g open position | | 15 g closed position / 8 g open position |
| | C2 | 20 g closed position / 14 g open position | | 14 g closed position / 8 g open position |
| | Vibration withstand acc. to IEC 60068-2-6 | 5...300 Hz / 3 g closed position / 2 g open position | | |

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Technical data

Magnet system characteristics for AS09 ... AS16 contactors

| Contactor types | | AC operated | AS09 | AS12 | AS16 | |
|---|--|-----------------------|--|----------------|------|--|
| Coil operating limits acc. to IEC 60947-4-1 | | AC supply | 0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C) | | | |
| AC control voltage | Rated control circuit voltage U _c | at 50 Hz | 24...415 V | | | |
| | | at 60 Hz | 24...415 V | | | |
| Coil consumption | Average pull-in value | 50 Hz | 33 VA | | | |
| | | 60 Hz | 33 VA | | | |
| | | 50/60 Hz | 33 VA | | | |
| | | Average holding value | 50 Hz | 6.5 VA / 1.5 W | | |
| | | | 60 Hz | 5 VA / 1.2 W | | |
| | | | 50/60 Hz | 6.5 VA / 1.5 W | | |
| Drop-out voltage | | | Approx. 30...50 % of U _c | | | |
| Operating time | | | | | | |
| Between coil energization and: | N.O. contact closing | | 9...24 ms | | | |
| | N.C. contact opening | | 6...18 ms | | | |
| Between coil de-energization and: | N.O. contact opening (1) | | 5...19 ms | | | |
| | N.C. contact closing (1) | | 7...22 ms | | | |
| | | | (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3 | | | |

Magnet system characteristics for ASL09 ... ASL16 contactors

| Contactor types | | DC operated | ASL09 | ASL12 | ASL16 |
|---|--|-----------------------|--|-------|-------|
| Coil operating limits acc. to IEC 60947-4-1 | | DC supply | 0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C) | | |
| DC control voltage | Rated control circuit voltage U _c | | 12...240 V DC | | |
| | Coil consumption | Average pull-in value | 3 W | | |
| | | Average holding value | 3 W | | |
| Drop-out voltage | | | Approx. 10...40 % of U _c | | |
| Coil time constant | Open | L/R | 12 ms | | |
| | Closed | L/R | 40 ms | | |
| Operating time | | | | | |
| Between coil energization and: | N.O. contact closing | | 36...59 ms | | |
| | N.C. contact opening | | 31...53 ms | | |
| Between coil de-energization and: | N.O. contact opening (1) | | 13...17 ms | | |
| | N.C. contact closing (1) | | 15...20 ms | | |
| | | | (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | |
















Mounting characteristics and conditions for use

| Contactor types | | AC operated | AS09 | AS12 | AS16 |
|--------------------|--|---|-------|-------|-------|
| | | DC operated | ASL09 | ASL12 | ASL16 |
| Mounting positions | | | | | |
| Mounting distances | | The contactors can be assembled side by side. | | | |
| Fixing | On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | |
| | By screws (not supplied) | 2 x M4 screws placed diagonally | | | |

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Technical data

Connecting characteristics

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|---|----------------------------|--------------|--------------|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Main terminals |  Screw terminals with cable clamp | | | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
|  Rigid solid | 1 x | 0.75...4 mm ² | | |
|  Flexible with non insulated ferrule | 2 x | 0.75...4 mm ² | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² | | |
|  Bars or lugs | L ≤ | 7.7 mm | | |
| | l > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...12 | | |
| Stripping length | 9 mm | | | |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in | | |
| | Max. | 1.20 Nm | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | |
|  Rigid solid | 1 x | 0.75...2.5 mm ² | | |
|  Flexible with non insulated ferrule | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² | | |
|  Lugs | L ≤ | 7.7 mm | | |
| | l > | 3.2 mm | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | |
| Stripping length | | | | |
| Tightening torque | | | | |
| Coil terminals | Recommended | 1.00 Nm / 9 lb.in | | |
| | Max. | 1.20 Nm | | |
| Built-in auxiliary terminals | Recommended | 1.00 Nm / 9 lb.in | | |
| | Max. | 1.20 Nm | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | | | |
| All terminals | IP20 | | | |
| Screw terminals | Delivered in open position, screws of unused terminals must be tightened | | | |
| All terminals | M3 | | | |
| Screwdriver type | Flat Ø 5.5 / Pozidriv 2 | | | |

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|---|--------------------|---|--------------|--------------|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Rated operational voltage U_e max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free-air thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 10 A | | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 400-440 V 50/60 Hz | 3 A | | |
| | 500 V 50/60 Hz | 2 A | | |
| | 690 V 50/60 Hz | 2 A | | |
| Making capacity AC-15 | | 10 x I_e AC-15 acc. to IEC 60947-5-1 | | |
| Breaking capacity AC-15 | | 10 x I_e AC-15 acc. to IEC 60947-5-1 | | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.27 A / 60 W | | |
| | 250 V DC | 0.27 A / 68 W | | |
| Short-circuit protection device gG type fuse | | 10 A | | |
| Rated short-time withstand current I_{cw} | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity | | 12 V / 3 mA | | |
| with failure rate acc. to IEC 60947-5-4 | | 10^{-7} | | |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms | | |
| Power dissipation per pole at 6 A | | 0.1 W | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | |
| | DC-13 | 900 cycles/h | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | AS09 | AS12 | AS16 |
|--|-------------|--------------------|--------------|--------------|
| | DC operated | ASL09 | ASL12 | ASL16 |
| Max. operational voltage | | 600 V AC, 250 V DC | | |
| Pilot duty | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

Notes

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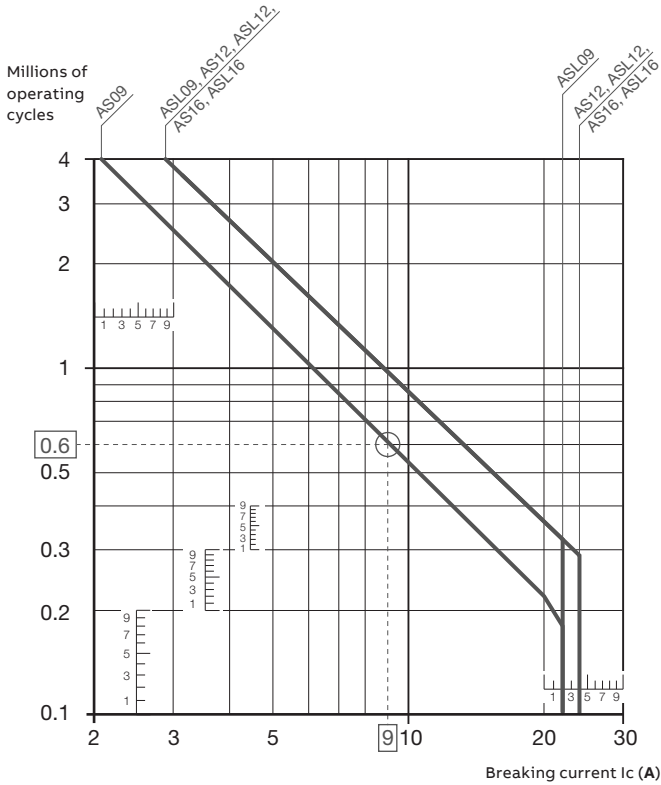
AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



Example:

Breaking current = 9 A.

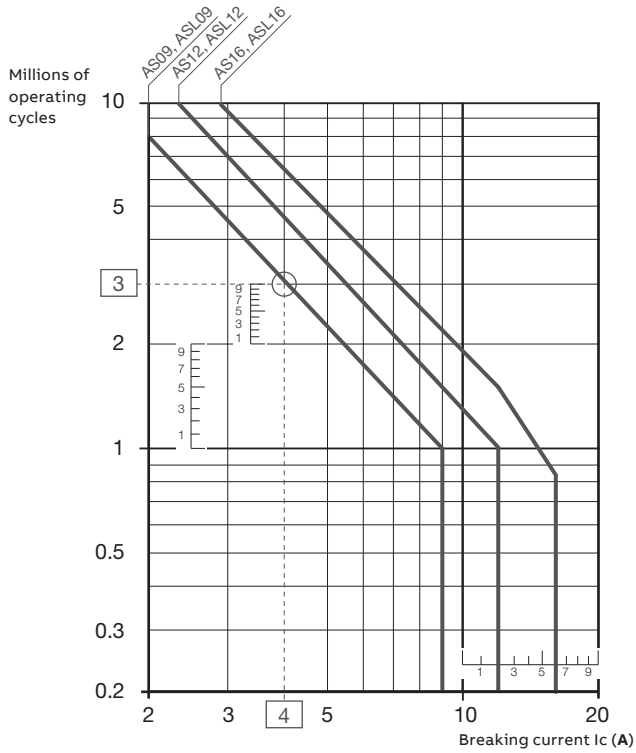
On the opposite curve at intersection "O" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

AS09 ... AS16 and ASL09 ... ASL16 3-pole contactors

Electrical durability

Electrical durability for AC-3 utilization category - $U_e \leq 440 \text{ V}$ - Ambient temperature $\leq 60 \text{ }^\circ\text{C}$

Switching cage motors: starting and switching off running motors. The breaking current I_c for AC-3 is equal to the rated operational current I_e (I_e = motor full load current). Maximum electrical switching frequency: 1200 cycles / hour.



Example:

Breaking current = 4 A.

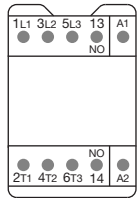
On the opposite curve at intersection "O" 4 A the corresponding value for the electrical durability is approximately 3 millions operating cycles.

AS09 ... AS16 3-pole contactors

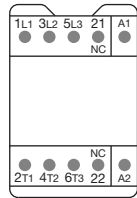
Terminal marking and positioning

AS contactors - AC operated

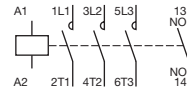
Standard devices without addition of auxiliary contacts



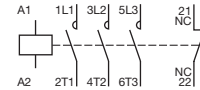
AS09 ... AS16-30-10



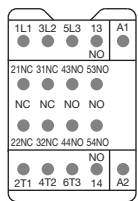
AS09 ... AS16-30-01



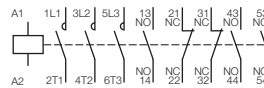
AS09 ... AS16-30-10



AS09 ... AS16-30-01

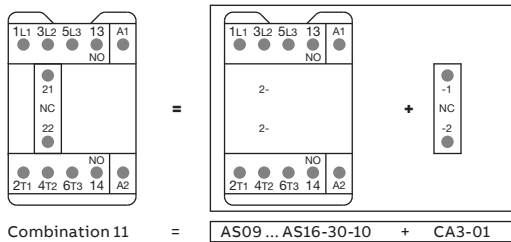


AS09 ... AS16-30-32

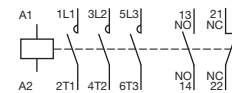


AS09 ... AS16-30-32

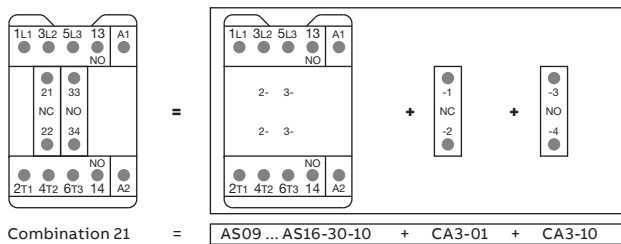
Other possible contact combinations with auxiliary contact blocks added by the user



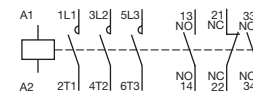
Combination 11



Combination 11

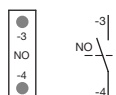


Combination 21

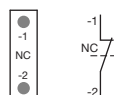


Combination 21

CA3 1-pole auxiliary contact blocks

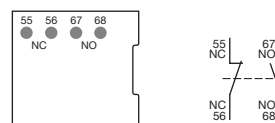


CA3-10



CA3-01

TEF3 front-mounted electronic timer



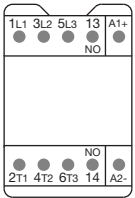
TEF3

ASL09 ... ASL16 3-pole contactors

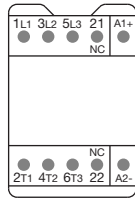
Terminal marking and positioning

ASL contactors - DC operated (the polarity A1+, A2- must be respected)

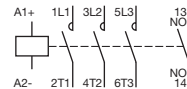
Standard devices without addition of auxiliary contacts



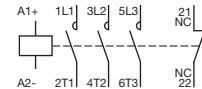
ASL09 ... ASL16-30-10



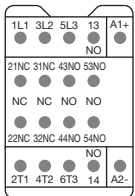
ASL09 ... ASL16-30-01



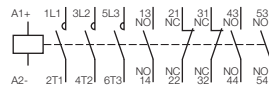
ASL09 ... ASL16-30-10



ASL09 ... ASL16-30-01

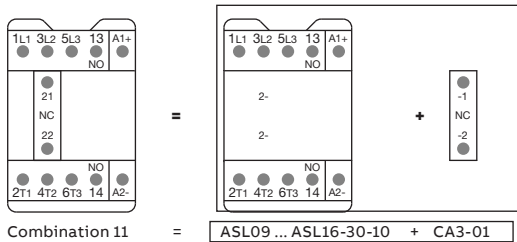


ASL09 ... ASL16-30-32

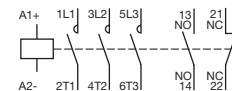


ASL09 ... ASL16-30-32

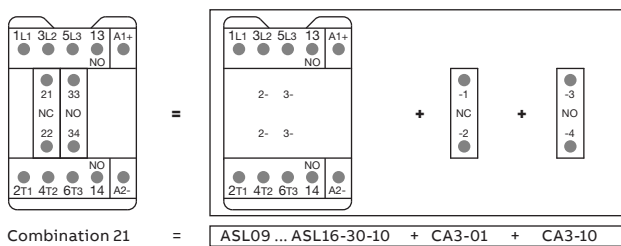
Other possible contact combinations with auxiliary contact blocks added by the user



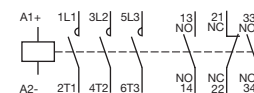
Combination 11



Combination 11

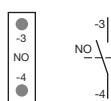


Combination 21

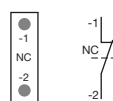


Combination 21

CA3 1-pole auxiliary contact blocks

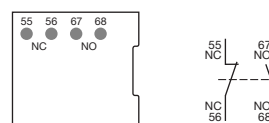


CA3-10



CA3-01

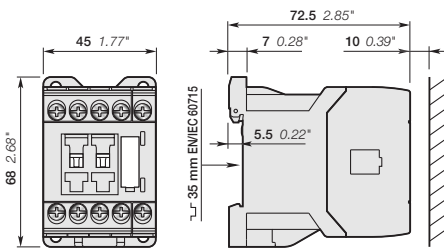
TEF3 front-mounted electronic timer



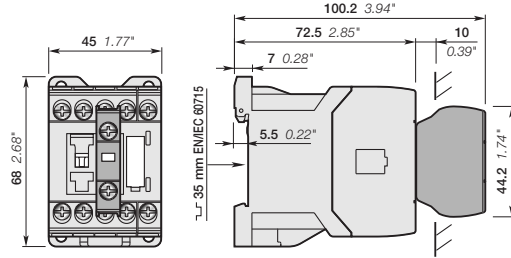
TEF3

AS09 ... AS16 3-pole contactors

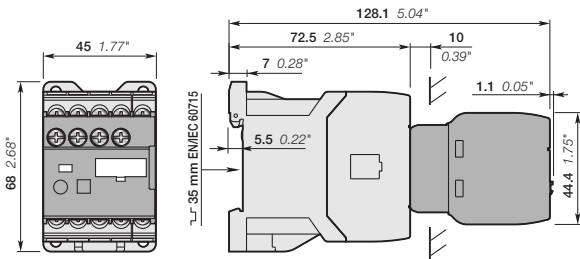
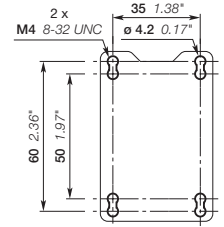
Dimensions



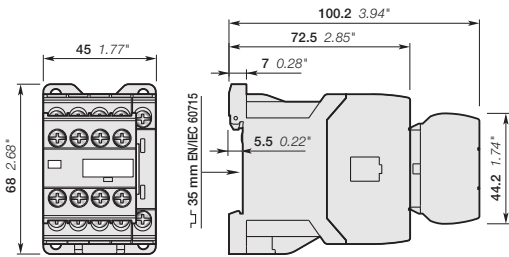
AS09, AS12, AS16



AS09, AS12, AS16
+ CA3 front-mounted 1-pole auxiliary contact block



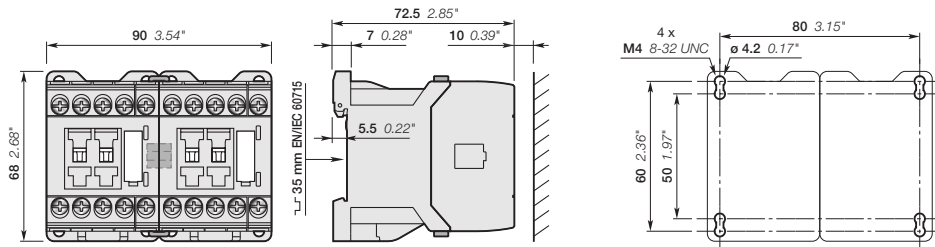
AS09, AS12, AS16
+ TEF3 electronic timer



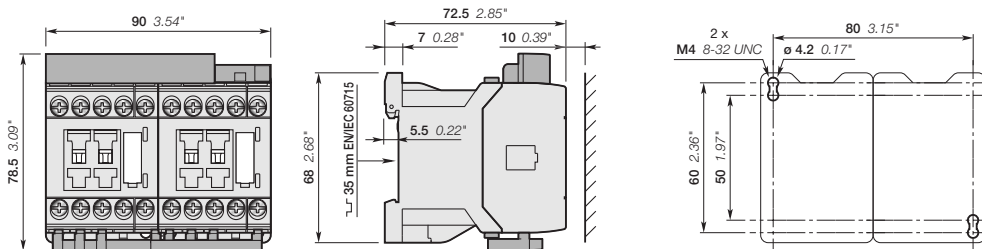
AS09 ... 16-30-32

AS09 ... AS16 3-pole contactors

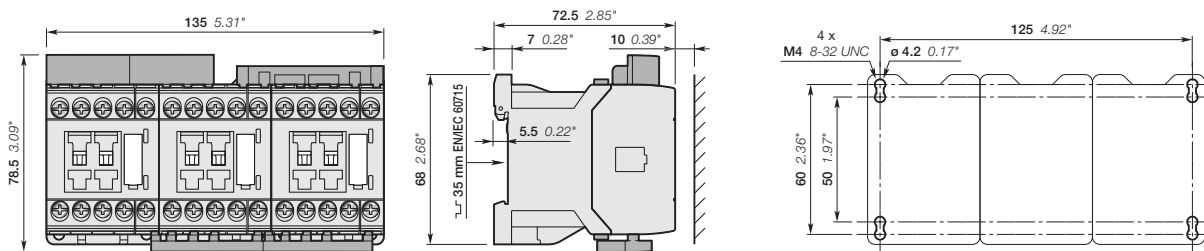
Dimensions



AS09, AS12, AS16
+ VM3 mechanical interlock unit including two BB3 fixing clips



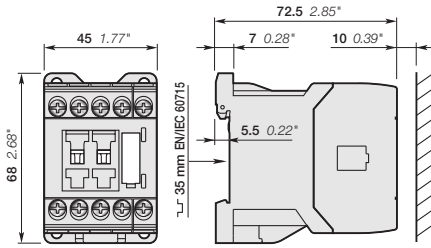
AS09, AS12, AS16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



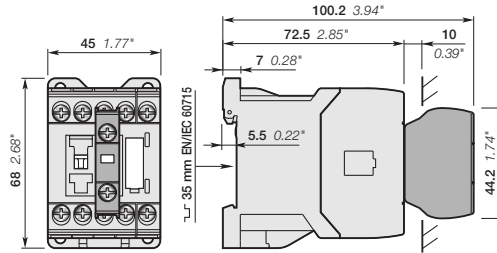
AS09, AS12, AS16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

ASL09 ... ASL16 3-pole contactors

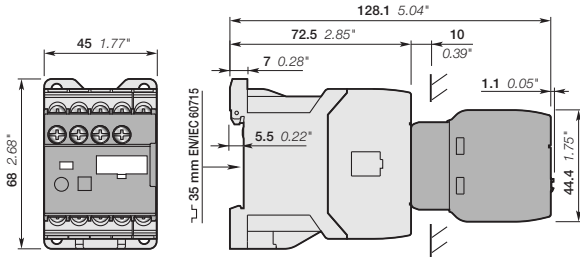
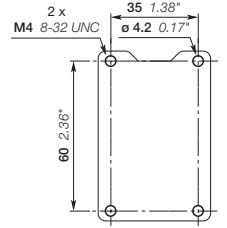
Dimensions



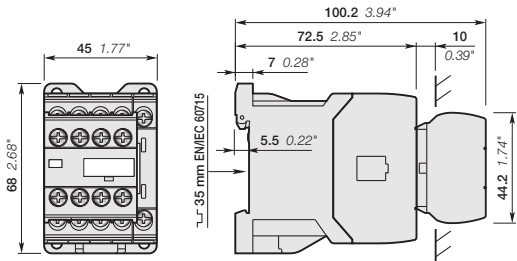
ASL09, ASL12, ASL16



ASL09, ASL12, ASL16
+ CA3 front-mounted 1-pole auxiliary contact block



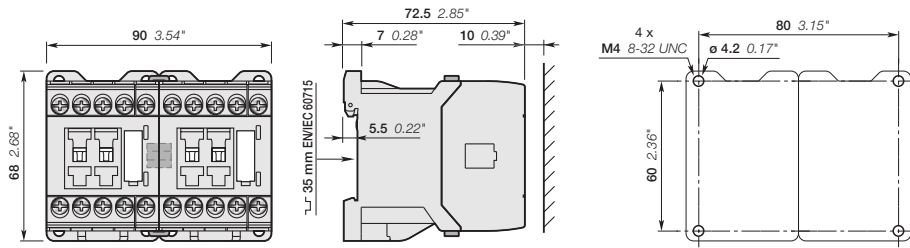
ASL09, ASL12, ASL16
+ TEF3 electronic timer



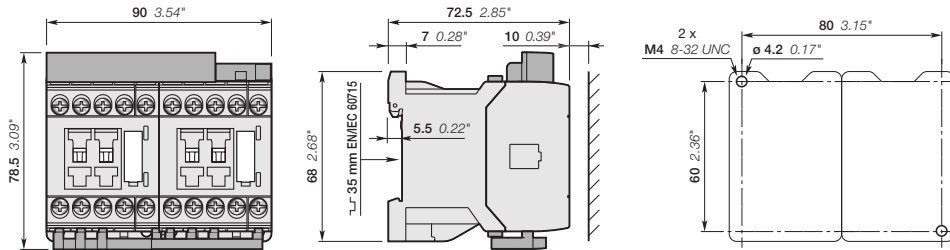
ASL09 ... 16-30-32

ASL09 ... ASL16 3-pole contactors

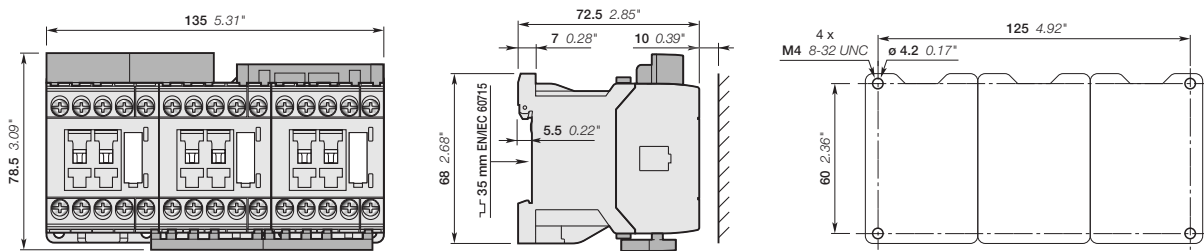
Dimensions



ASL09, ASL12, ASL16
+ VM3 mechanical interlock unit including two BB3 fixing clips



ASL09, ASL12, ASL16
+ BER16C-3 connection set for reversing starter including two BB3 fixing clips



ASL09, ASL12, ASL16
+ BEY16C-3 connection set for star-delta starter including four BB3 fixing clips

—

Contactor relays

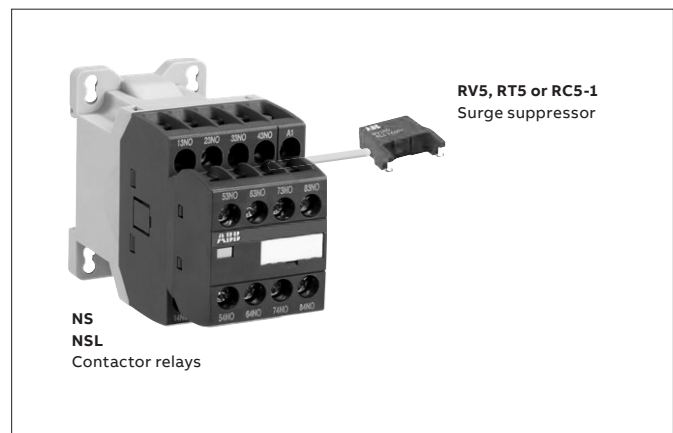
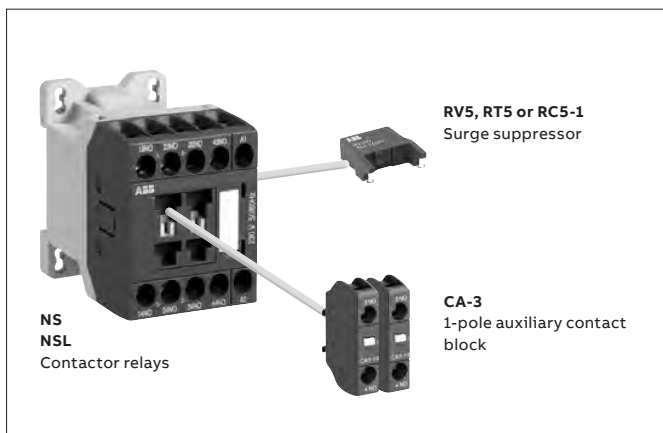
Main accessories

05



4-pole contactor relays

8-pole contactor relays



Contactor relays



Screw terminals



NS



NSL

| | | | | |
|--|--------------------|-----------------|-----------------|---------------|
| | AC control voltage | NS22E | NS31E | NS40E |
| | DC control voltage | NSL22E | NSL31E | NSL40E |
| | | 2 N.O. + 2 N.C. | 3 N.O. + 1 N.C. | 4 N.O. |



NS



NSL

| | | | | | | |
|--|--------------------|-----------------|-----------------|-----------------|-----------------|---------------|
| | AC control voltage | NS44E | NS53E | NS62E | NS71E | NS80E |
| | DC control voltage | NSL44E | NSL53E | NSL62E | NSL71E | NSL80E |
| | | 4 N.O. + 4 N.C. | 5 N.O. + 3 N.C. | 6 N.O. + 2 N.C. | 7 N.O. + 1 N.C. | 8 N.O. |

Control circuit switching

| | | | |
|----------|------------------------------------|---------------|-------------|
| IEC | Rated operational current AC-15 | 240 V | 4 A |
| | | 400 V | 3 A |
| | | 690 V | 2 A |
| | DC-13 | 24 V | 6 A / 144 W |
| 250 V | | 0.27 A / 68 W | |
| UL / CSA | Pilot Duty | A600, Q300 | |

Main accessories

| | | | |
|--------------------------|---|-------------------------|--|
| Auxiliary contact blocks | Front mounting | 1-pole CA3-10 or CA3-01 | |
| Surge suppressors | Side-mounted (without additional width) | RV5 RC5-1 RT5 | (Varistor) AC / DC (Capacitor) AC (Transil diode) DC |

NS contactor relays

AC operated



NS22E

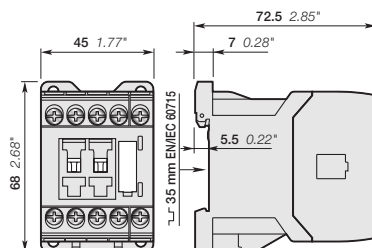
NS contactor relays are used for switching auxiliary and control circuits.

These contactor relays are designed with:

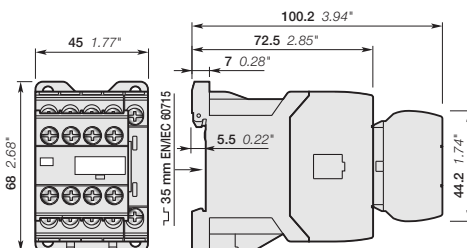
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts | Rated control circuit voltage U _c (1) | Type | Order code | Weight Pkg (1 pce) |
|--------------------|--|----------|-----------------|--------------------|
| | | | | |
| | 24 | NS22E-20 | 1SBH101001R2022 | 0.220 |
| | 230 | NS22E-26 | 1SBH101001R2622 | 0.220 |
| | 24 | NS31E-20 | 1SBH101001R2031 | 0.220 |
| | 230 | NS31E-26 | 1SBH101001R2631 | 0.220 |
| | 24 | NS40E-20 | 1SBH101001R2040 | 0.220 |
| | 230 | NS40E-26 | 1SBH101001R2640 | 0.220 |
| | 24 | NS44E-20 | 1SBH101001R2044 | 0.260 |
| | 230 | NS44E-26 | 1SBH101001R2644 | 0.260 |
| | 24 | NS53E-20 | 1SBH101001R2053 | 0.260 |
| | 230 | NS53E-26 | 1SBH101001R2653 | 0.260 |
| | 24 | NS62E-20 | 1SBH101001R2062 | 0.260 |
| | 230 | NS62E-26 | 1SBH101001R2662 | 0.260 |
| | 24 | NS71E-20 | 1SBH101001R2071 | 0.260 |
| | 230 | NS71E-26 | 1SBH101001R2671 | 0.260 |
| | 24 | NS80E-20 | 1SBH101001R2080 | 0.260 |
| | 230 | NS80E-26 | 1SBH101001R2680 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



NS22E, NS31E, NS40E



NS44E, NS53E, NS62E, NS71E, NS80E

Main dimensions mm, inches

NSL contactor relays

DC operated



NSL22E

NSL contactor relays are used for switching auxiliary and control circuits.

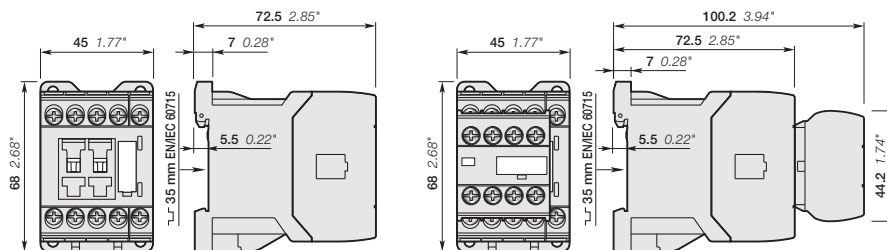
These contactor relays are designed with:

- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| Number of contacts | | Rated control circuit voltage Uc (1) V DC | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|-----------|--|-----------|-----------------|--------------------------------|
| 1st stack | 2nd stack | | | | |
| | | 24 | NSL22E-81 | 1SBH103001R8122 | 0.280 |
| | | 24 | NSL31E-81 | 1SBH103001R8131 | 0.280 |
| | | 24 | NSL40E-81 | 1SBH103001R8140 | 0.280 |
| | | 24 | NSL44E-81 | 1SBH103001R8144 | 0.320 |
| | | 24 | NSL53E-81 | 1SBH103001R8153 | 0.320 |
| | | 24 | NSL62E-81 | 1SBH103001R8162 | 0.320 |
| | | 24 | NSL71E-81 | 1SBH103001R8171 | 0.320 |
| | | 24 | NSL80E-81 | 1SBH103001R8180 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



NSL22E, NSL31E, NSL40E

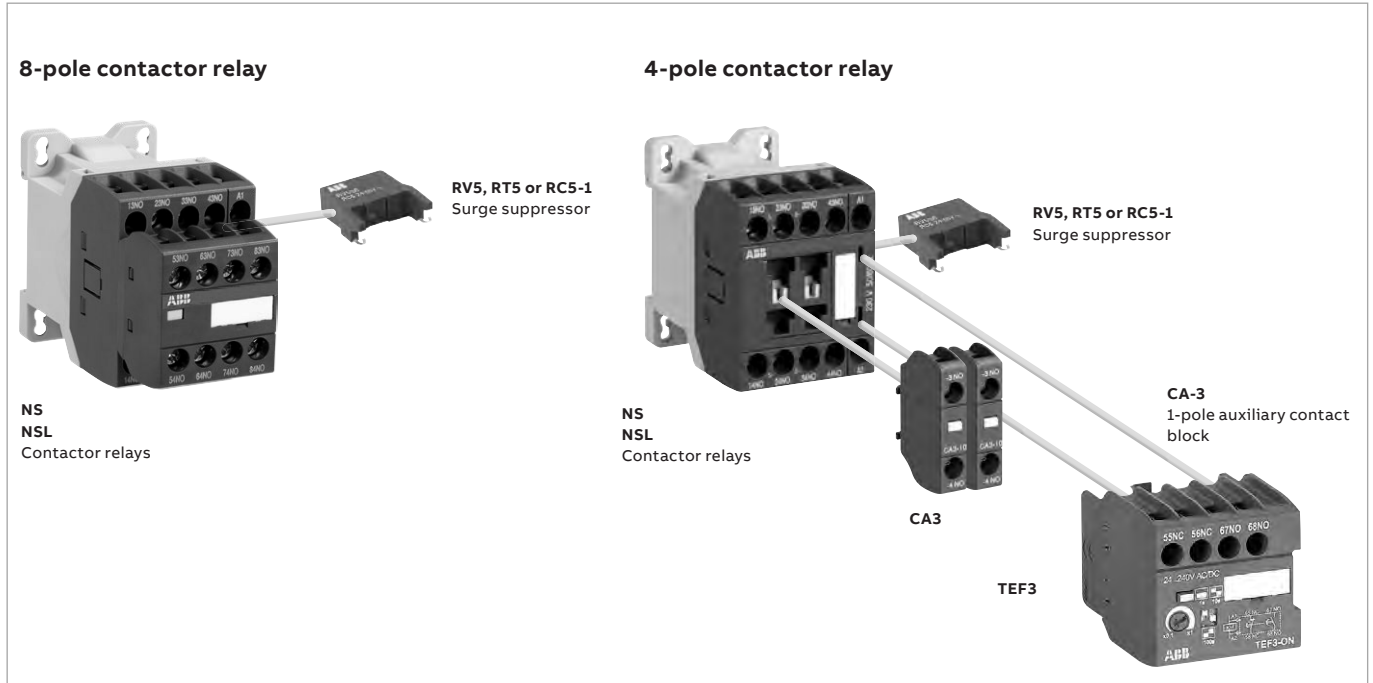
NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Main dimensions mm, inches

NS and NSL contactor relays

Main accessories

Contactor relays and main accessories (other accessories available)



Main accessory fitting details

| Contactor types | Main poles | Front-mounted accessories | | Side-mounted accessories | |
|-----------------|----------------|---------------------------|------------------|--------------------------|----------|
| | | Auxiliary contact blocks | Electronic timer | Surge suppressors | |
| NS.. | 2 2 E | 2 max. | TEF3 | + RV5 | or RC5-1 |
| NS.. | 3 1 E | | | | |
| NS.. | 4 0 E | | | | |
| NS.. | 4 4 E | | | | |
| NS.. | 5 3 E | | | | |
| NS.. | 6 2 E | | | | |
| NS.. | 7 1 E | | | | |
| NS.. | 8 0 E | 2 max. | or 1 | + RV5 | or RT5 |
| NSL.. | 2 2 E | | | | |
| NSL.. | 3 1 E | | | | |
| NSL.. | 4 0 E | | | | |
| NSL.. | 4 4 E | | | | |
| NSL.. | 5 3 E | | | | |
| NSL.. | 6 2 E | | | | |
| NSL.. | 7 1 E | | | | |
| NSL.. | 8 0 E | | | | |

NS and NSL contactor relays

Main accessories



CA3-10

1SBFC101036F0014

Front-mounted instantaneous auxiliary contact blocks

| For contactor relays | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------------|--------------------|--------|-----------------|---------|----------------|
| | | | | | kg |
| NS, NSL | 1 0 | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| | 0 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |



TEF3-ON

1SPC101337F0014

Front-mounted electronic timer

| For contactors | Rated control circuit voltage - Uc | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|------------------------------------|------|------------|---------|----------------|
| | V | | | | kg |

ON-delay

| | | | | | |
|---------|------------------|---------|-----------------|---|-------|
| NS, NSL | 24...240 V AC/DC | TEF3-ON | 1SBN021012R1000 | 1 | 0.065 |
|---------|------------------|---------|-----------------|---|-------|

OFF-delay

| | | | | | |
|---------|------------------|----------|-----------------|---|-------|
| NS, NSL | 24...240 V AC/DC | TEF3-OFF | 1SBN021014R1000 | 1 | 0.065 |
|---------|------------------|----------|-----------------|---|-------|



RV5

1SBCE574001F0301

Surge suppressors

| For contactor relays | Rated control circuit voltage - Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------------|------------------------------------|----|----|-----------|-----------------|---------|----------------|
| | V | AC | DC | | | | |
| NS, NSL | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| NS | 24...50 | ● | - | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | - | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | - | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | - | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| NSL | 12...32 | - | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | - | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | - | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | - | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | - | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

NS and NSL contactor relays

Technical data

Contact utilization characteristics according to IEC

| Contactor relay types | AC operated | NS |
|--|---|---------------|
| | DC operated | NSL |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated operational voltage U _e max. | 690 V | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} - θ ≤ 40 °C | 10 A | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | 10 x I _e AC-15 acc. to IEC 60947-5-1 | |
| Breaking capacity AC-15 | 10 x I _e AC-15 acc. to IEC 60947-5-1 | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device for contactors U _e ≤ 500 V AC - gG type fuse | 10 A | |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 12 V / 3 mA | |
| | 10 ⁻⁷ | |
| Non-overlapping time between N.O. and N.C. contacts | 1.5 ms | |
| Power dissipation per pole at 6 A | 0.1 W | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | DC-13 | 900 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | |

Contact utilization characteristics according to UL / CSA

| Contactor relay types | AC operated | NS |
|--|------------------------|------------|
| | DC operated | NSL |
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 600 V AC, 250 V DC | |
| Pilot duty | A600, Q300 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 VA | |
| AC maximum volt-ampere breaking | 720 VA | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 VA | |

NS and NSL contactor relays

Technical data

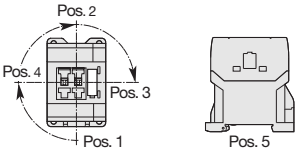
Magnet system characteristics for NS contactor relays

| | | | |
|---|--|-------------------------------------|---|
| Contactor relay types | | AC operated | NS |
| Coil operating limits acc. to IEC 60947-5-1 | | AC supply | 0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C) |
| AC control voltage | Rated control circuit voltage U _c | at 50 Hz | 24...415 V |
| | | at 60 Hz | 24...415 V |
| Coil consumption | Average pull-in value | 50 Hz | 33 VA |
| | | 60 Hz | 33 VA |
| | | 50/60 Hz | 33 VA |
| Average holding value | | 50 Hz | 6.5 VA / 1.5 W |
| | | 60 Hz | 5 VA / 1.2 W |
| | | 50/60 Hz | 6.5 VA / 1.5 W |
| Drop-out voltage | | Approx. 30...50 % of U _c | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | | 9...24 ms |
| | N.C. contact opening | | 6...18 ms |
| Between coil de-energization and: | N.O. contact opening (1) | | 5...19 ms |
| | N.C. contact closing (1) | | 7...22 ms |
| (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | | |

Magnet system characteristics for NSL contactor relays

| | | | |
|---|--|-------------------------------------|---|
| Contactor relay types | | DC operated | NSL |
| Coil operating limits acc. to IEC 60947-5-1 | | DC supply | 0.85...1.1 x U _c (at θ ≤ 60 °C); U _c (at θ ≤ 70 °C) |
| DC control voltage | Rated control circuit voltage U _c | | 12...240 V DC |
| | Coil consumption | Average pull-in value | 3 W |
| Average holding value | | 3 W | |
| Drop-out voltage | | Approx. 10...40 % of U _c | |
| Coil time constant | Open | L/R | 12 ms |
| | Closed | L/R | 40 ms |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | | 36...59 ms |
| | N.C. contact opening | | 31...53 ms |
| Between coil de-energization and: | N.O. contact opening (1) | | 13...17 ms |
| | N.C. contact closing (1) | | 15...20 ms |
| (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2. | | | |

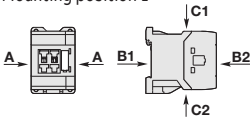
Mounting characteristics and conditions for use

| | | | |
|-----------------------|--|---|------------|
| Contactor relay types | | AC operated | NS |
| | | DC operated | NSL |
| Mounting positions | |  | |
| Mounting distances | | The contactor relays can be assembled side by side. | |
| Fixing | On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | |
| | By screws (not supplied) | 2 x M4 screws placed diagonally | |






NS and NSL contactor relays

Technical data

General technical data

| | | |
|---|-----------------|--|
| Contactor relay types | AC operated | NS |
| | DC operated | NSL |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 690 V |
| acc. to UL / CSA | | 600 V |
| Rated impulse withstand voltage U_{imp} . | | 6 kV |
| Ambient air temperature close to contactor relay | | |
| Operation in free air | | -40...+70 °C |
| Storage | | -60...+80 °C |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q |
| Maximum operating altitude (without derating) | | 3000 m |
| Mechanical durability | | |
| Number of operating cycles | | 20 millions operating cycles |
| Max. switching frequency | | 3600 cycles/h |
| Shock withstand | | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position |
| acc. to IEC 60068-2-27 and EN 60068-2-27 | Shock direction | NS contactor relays - AC operated |
| Mounting position 1 | | NSL contactor relays - DC operated |
|  | A | 20 g |
| | B1 | 5 g |
| | B2 | 15 g |
| | C1 | 19 g closed position / 8 g open position |
| | C2 | 16 g closed position / 13 g open position |
| | | 10 g |
| | | 19 g closed position / 8 g open position |
| | | 14 g closed position / 8 g open position |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz / 3 g closed position / 2 g open position |

Connecting characteristics

| | | |
|---|-------------|---|
| Contactor relay types | AC operated | NS |
| | DC operated | NSL |
| Main terminals | |  Screw terminals with cable clamp |
| Connection capacity (min. ... max.) | | |
| Pole and coil terminals | | |
|  Rigid solid | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...1.5 mm ² |
|  Lugs | L ≤ | 7.7 mm |
| | L > | 3.2 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 9 mm |
| Tightening torque | Recommended | 1.00 Nm / 9 lb.in |
| | Max. | 1.20 Nm |
| Degree of protection | | |
| acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | |
| All terminals | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened |
| All terminals | | M3 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |

Notes

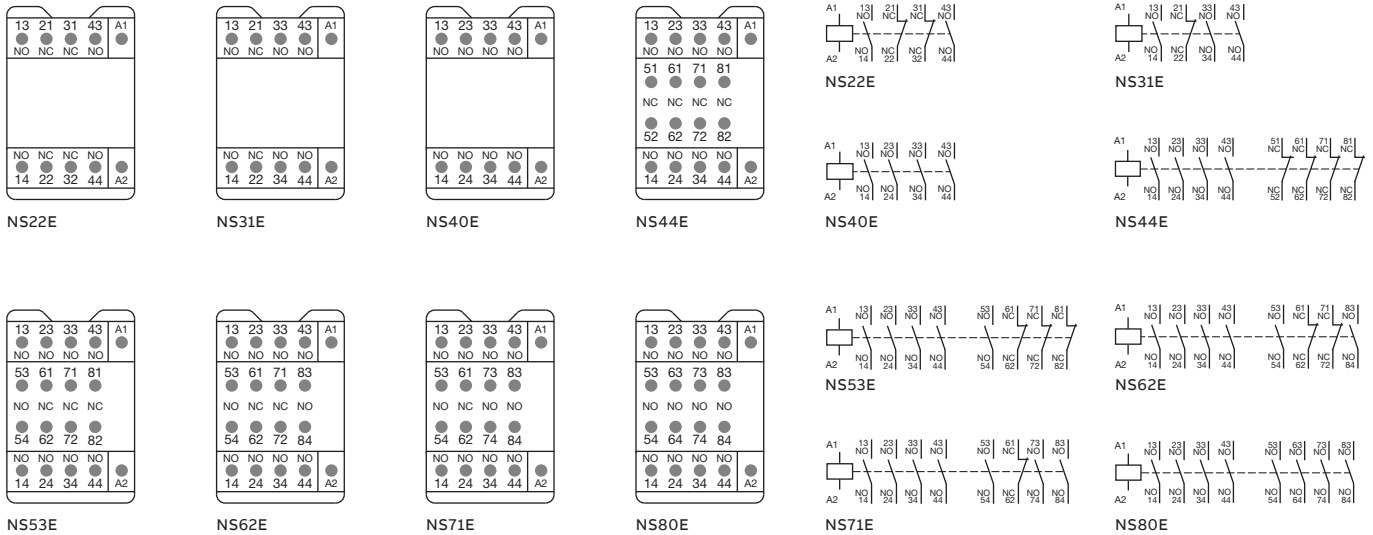
A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.

NS contactor relays

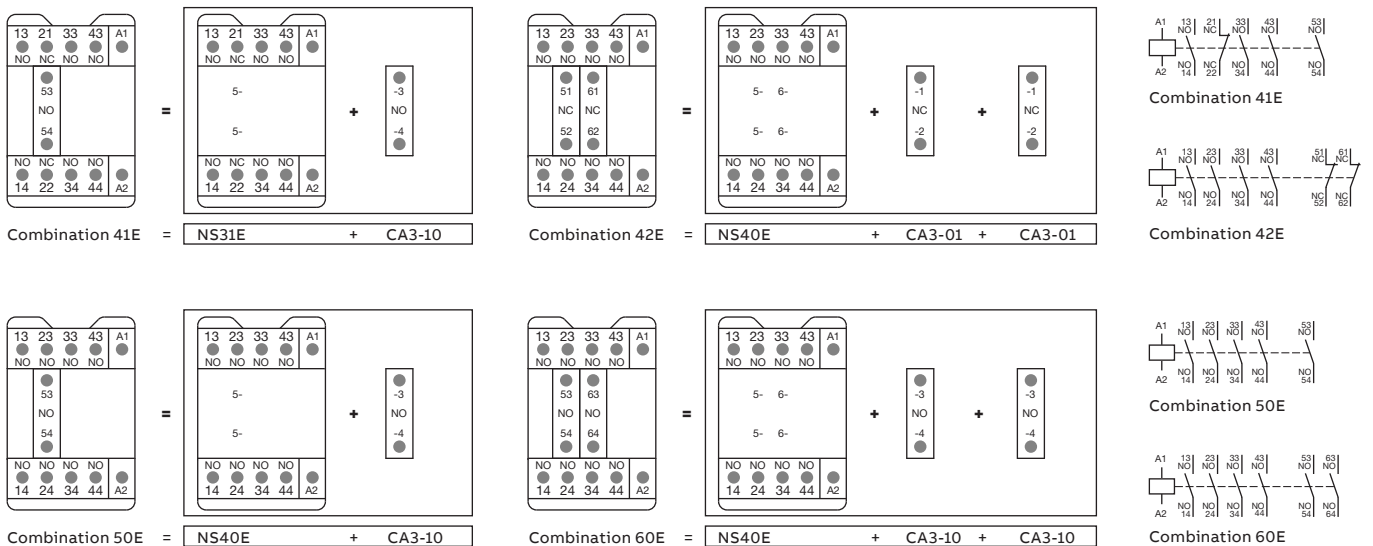
Terminal marking and positioning

NS contactor relays - AC operated

Standard devices without addition of auxiliary contact blocks



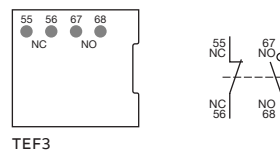
Other possible contact combinations with auxiliary contact blocks added by the user



CA3 1-pole auxiliary contact blocks



TEF3 front-mounted electronic timer

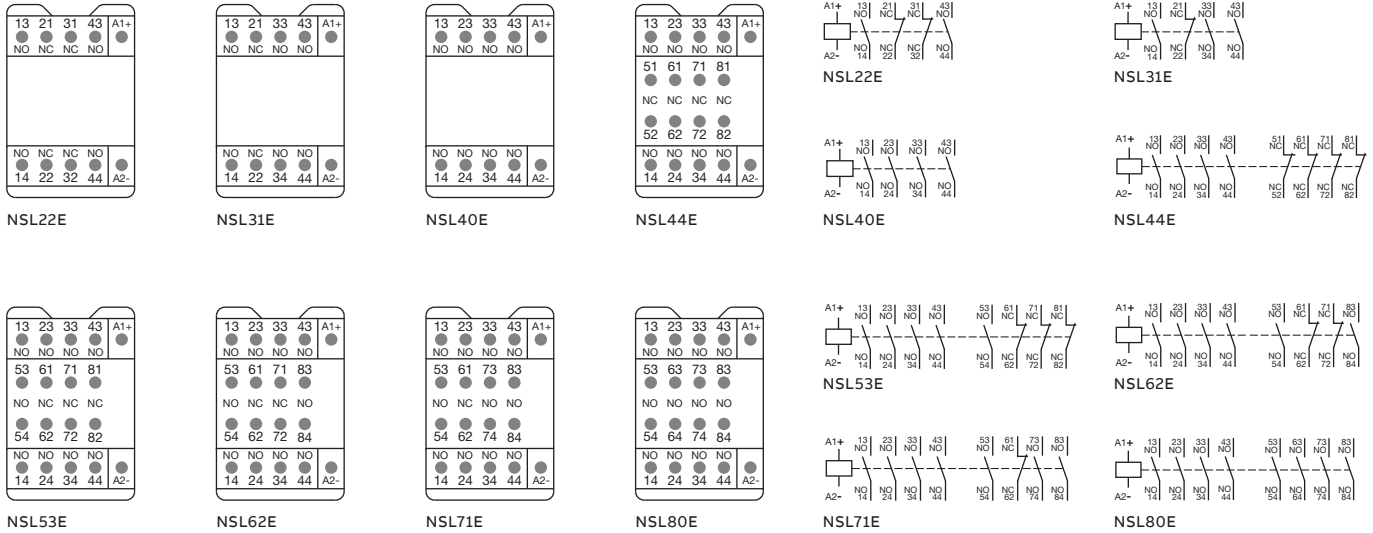


NSL contactor relays

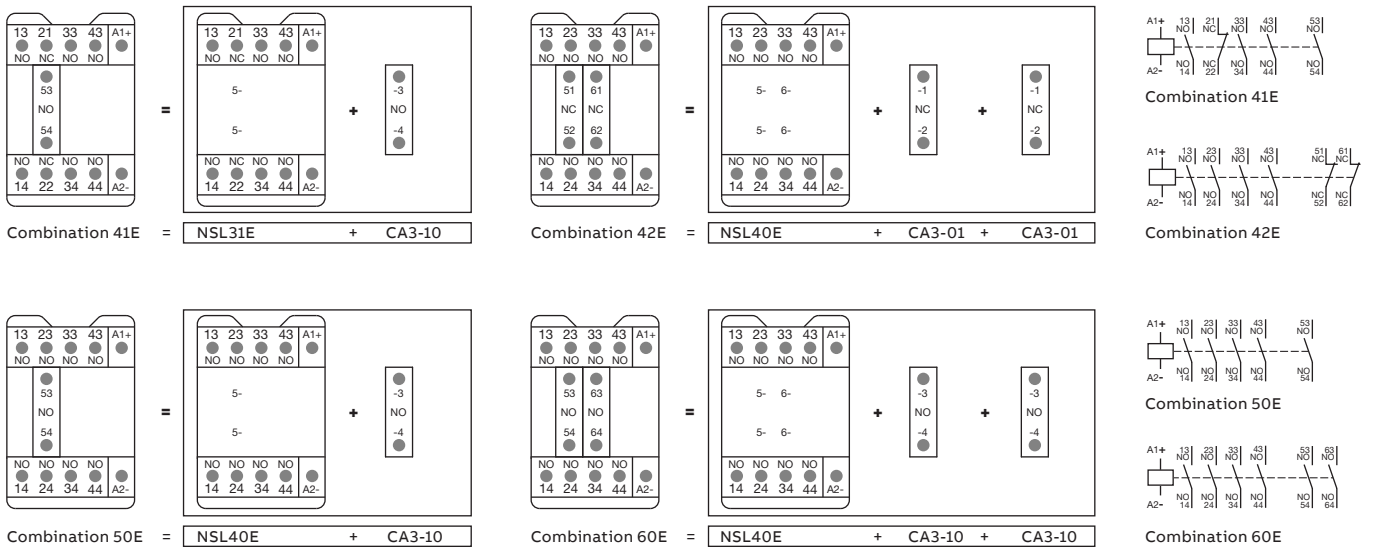
Terminal marking and positioning

NSL contactor relays - DC operated (the polarity A1+, A2- must be respected)

Standard devices without addition of auxiliary contact blocks



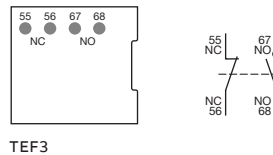
Other possible contact combinations with auxiliary contact blocks added by the user



CA3 1-pole auxiliary contact blocks



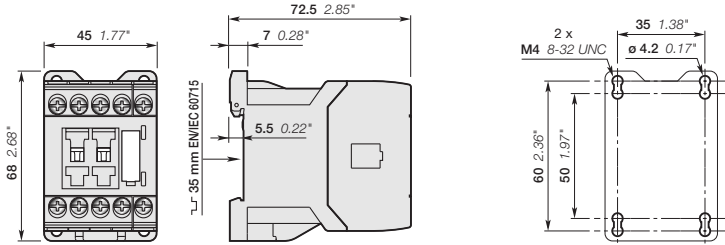
TEF3 front-mounted electronic timer



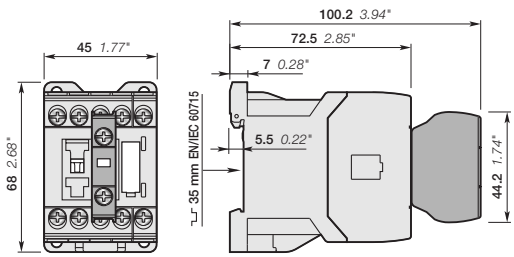
NS contactor relays

Dimensions

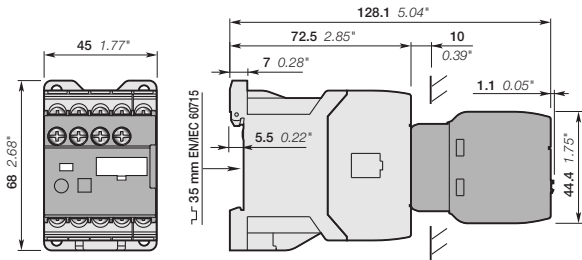
4-pole contactor relays



NS22E, NS31E, NS40E

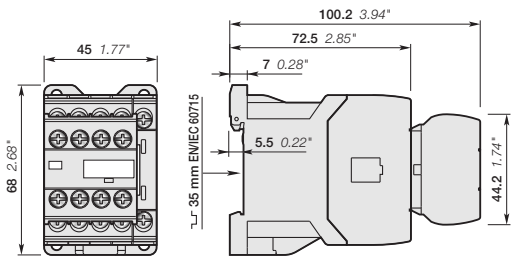


NS22E, NS31E, NS40E
+ CA3 front-mounted 1-pole auxiliary contact block



NS22E, NS31E, NS40E
+ TEF3 electronic timer

8-pole contactor relays

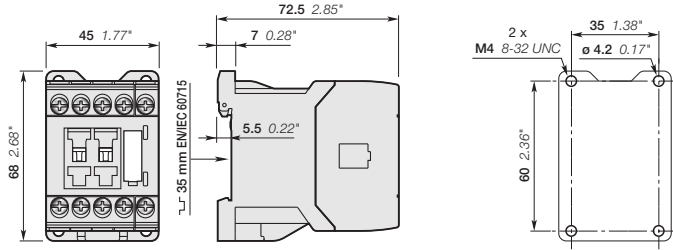


NS44E, NS53E, NS62E, NS71E, NS80E

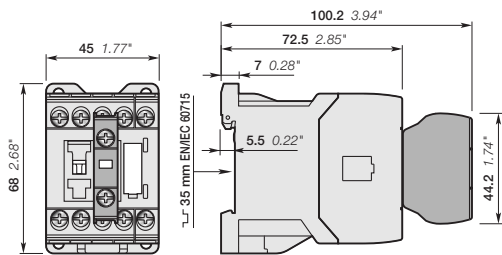
NSL contactor relays

Dimensions

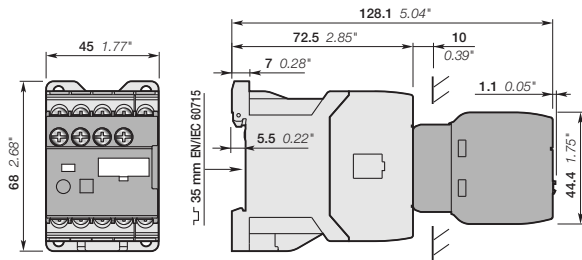
4-pole contactor relays



NSL22E, NSL31E, NSL40E

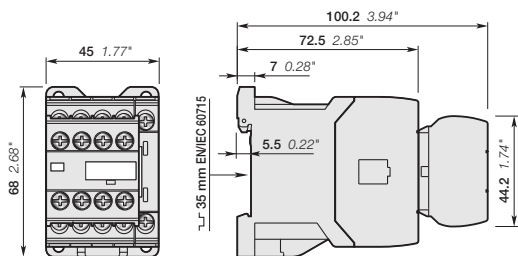


NSL22E, NSL31E, NSL40E
+ CA3 front-mounted 1-pole auxiliary contact block



NSL22E, NSL31E, NSL40E
+ TEF3 electronic timer

8-pole contactor relays



NSL44E, NSL53E, NSL62E, NSL71E, NSL80E

Auxiliary contact blocks

Accessories



CA3-10

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits. CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- Screw-type connecting terminals with cage clamp delivered open.

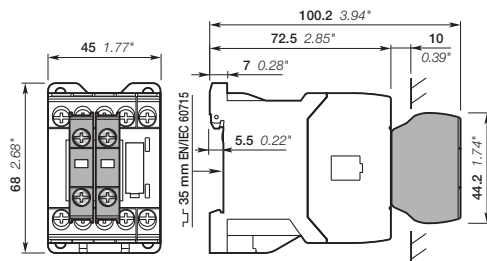
All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

| For contactors | For contactor relays | Contact blocks | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|----------------------|----------------|------|------------|---------|----------------|
| | | | | | | kg |

1-pole auxiliary contact blocks with screw terminals

| | | | | | | |
|-----------------|---------|-----|--------|-----------------|----|-------|
| AS09 ... AS16 | NS, NSL | 1 - | CA3-10 | 1SBN011010T1010 | 10 | 0.011 |
| ASL09 ... ASL16 | | - 1 | CA3-01 | 1SBN011010T1001 | 10 | 0.011 |



Main dimensions mm, inches

Auxiliary contact blocks

Technical data








Contact utilization characteristics according to IEC

| Types | | 1-pole CA3 | | | | | | | | | | | | | | |
|---|---------------|---|-------------------|---------------|--------------------|---------------|--------------------|------------|----------------|---------------|----------------|---------------|----------|---------------|----------|---------------|
| Standards | | IEC 60947-5-1 and EN 60947-5-1 | | | | | | | | | | | | | | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 690 V | | | | | | | | | | | | | | |
| Rated impulse withstand voltage U_{imp} | | 6 kV | | | | | | | | | | | | | | |
| Rated operational voltage U_e max. | | 690 V | | | | | | | | | | | | | | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 10 A | | | | | | | | | | | | | | |
| le / Rated operational current AC-15 acc. to IEC 60947-5-1 | | <table border="1"> <tr> <td>24-127 V 50/60 Hz</td> <td>6 A</td> </tr> <tr> <td>220-240 V 50/60 Hz</td> <td>4 A</td> </tr> <tr> <td>400-440 V 50/60 Hz</td> <td>3 A</td> </tr> <tr> <td>500 V 50/60 Hz</td> <td>2 A</td> </tr> <tr> <td>690 V 50/60 Hz</td> <td>2 A</td> </tr> </table> | 24-127 V 50/60 Hz | 6 A | 220-240 V 50/60 Hz | 4 A | 400-440 V 50/60 Hz | 3 A | 500 V 50/60 Hz | 2 A | 690 V 50/60 Hz | 2 A | | | | |
| 24-127 V 50/60 Hz | 6 A | | | | | | | | | | | | | | | |
| 220-240 V 50/60 Hz | 4 A | | | | | | | | | | | | | | | |
| 400-440 V 50/60 Hz | 3 A | | | | | | | | | | | | | | | |
| 500 V 50/60 Hz | 2 A | | | | | | | | | | | | | | | |
| 690 V 50/60 Hz | 2 A | | | | | | | | | | | | | | | |
| Making capacity | | 10 x le AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | | | | | |
| Breaking capacity | | 10 x le AC-15 acc. to IEC 60947-5-1 | | | | | | | | | | | | | | |
| le / Rated operational current DC-13 acc. to IEC 60947-5-1 | | <table border="1"> <tr> <td>24 V DC</td> <td>6 A / 144 W</td> </tr> <tr> <td>48 V DC</td> <td>2.8 A / 134 W</td> </tr> <tr> <td>72 V DC</td> <td>1 A / 72 W</td> </tr> <tr> <td>110 V DC</td> <td>0.55 A / 60 W</td> </tr> <tr> <td>125 V DC</td> <td>0.55 A / 69 W</td> </tr> <tr> <td>220 V DC</td> <td>0.27 A / 60 W</td> </tr> <tr> <td>250 V DC</td> <td>0.27 A / 68 W</td> </tr> </table> | 24 V DC | 6 A / 144 W | 48 V DC | 2.8 A / 134 W | 72 V DC | 1 A / 72 W | 110 V DC | 0.55 A / 60 W | 125 V DC | 0.55 A / 69 W | 220 V DC | 0.27 A / 60 W | 250 V DC | 0.27 A / 68 W |
| 24 V DC | 6 A / 144 W | | | | | | | | | | | | | | | |
| 48 V DC | 2.8 A / 134 W | | | | | | | | | | | | | | | |
| 72 V DC | 1 A / 72 W | | | | | | | | | | | | | | | |
| 110 V DC | 0.55 A / 60 W | | | | | | | | | | | | | | | |
| 125 V DC | 0.55 A / 69 W | | | | | | | | | | | | | | | |
| 220 V DC | 0.27 A / 60 W | | | | | | | | | | | | | | | |
| 250 V DC | 0.27 A / 68 W | | | | | | | | | | | | | | | |
| Short-circuit protection device gG type fuse | | 10 A | | | | | | | | | | | | | | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | | <table border="1"> <tr> <td>for 1.0 s</td> <td>100 A</td> </tr> <tr> <td>for 0.1 s</td> <td>140 A</td> </tr> </table> | for 1.0 s | 100 A | for 0.1 s | 140 A | | | | | | | | | | |
| for 1.0 s | 100 A | | | | | | | | | | | | | | | |
| for 0.1 s | 140 A | | | | | | | | | | | | | | | |
| Minimum switching capacity | | 12 V / 3 mA | | | | | | | | | | | | | | |
| with failure rate acc. to IEC 60947-5-4 | | 10 ⁻⁷ | | | | | | | | | | | | | | |
| Power dissipation per pole at 6 A | | 0.1 W | | | | | | | | | | | | | | |
| Mechanical durability | | | | | | | | | | | | | | | | |
| Number of operating cycles | | 10 millions operating cycles | | | | | | | | | | | | | | |
| Max. switching frequency | | 3600 cycles/h | | | | | | | | | | | | | | |
| Max. electrical switching frequency | | <table border="1"> <tr> <td>AC-15</td> <td>1200 cycles/h</td> </tr> <tr> <td>DC-13</td> <td>900 cycles/h</td> </tr> </table> | AC-15 | 1200 cycles/h | DC-13 | 900 cycles/h | | | | | | | | | | |
| AC-15 | 1200 cycles/h | | | | | | | | | | | | | | | |
| DC-13 | 900 cycles/h | | | | | | | | | | | | | | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Additional N.O. or N.C. auxiliary contacts (CA3) are mechanically linked contacts | | | | | | | | | | | | | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Additional N.C. auxiliary contacts (CA3) are mirror contacts | | | | | | | | | | | | | | |

Contact utilization characteristics according to UL / CSA

| | | |
|--|--|------------------------|
| Standards | | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | | 690 V AC, 250 V DC |
| Pilot duty | | A600, Q300 |
| AC thermal rated current | | 10 A |
| AC maximum volt-ampere making | | 7200 VA |
| AC maximum volt-ampere breaking | | 720 VA |
| DC thermal rated current | | 2.5 A |
| DC maximum volt-ampere making-breaking | | 69 VA |

Connecting characteristics

| | | | | | | |
|---|-------------------------------------|---|-------------|----------------|------|---------|
| Connection capacity (min. ... max.) | | | | | | |
|  | Rigid solid | 1 x 0.75...2.5 mm ² | | | | |
|  | | 2 x 0.75...2.5 mm ² | | | | |
|  | Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² | | | | |
|  | | 2 x 0.75...2.5 mm ² | | | | |
|  | Flexible with insulated ferrule | 1 x 0.75...2.5 mm ² | | | | |
|  | | 2 x 0.75...1.5 mm ² | | | | |
|  | Lugs | L ≤ 7.7 mm | | | | |
| | | l > 3.2 mm | | | | |
| Connection capacity acc. to UL / CSA | | 1 or 2 x AWG 18...14 | | | | |
| Stripping length | | 9 mm | | | | |
| Tightening torque | | <table border="1"> <tr> <td>Recommended</td> <td>1 Nm / 9 lb.in</td> </tr> <tr> <td>Max.</td> <td>1.20 Nm</td> </tr> </table> | Recommended | 1 Nm / 9 lb.in | Max. | 1.20 Nm |
| Recommended | 1 Nm / 9 lb.in | | | | | |
| Max. | 1.20 Nm | | | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 | | | | |
| Screw terminals | | Delivered in open position, screws of unused terminals must be tightened | | | | |
| All terminals | | M3 | | | | |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 | | | | |

Auxiliary contact blocks for AS09 ... AS16, ASL09 ... ASL16 contactors and NS, NSL contactor relays

Electrical durability

Electrical durability for AC-15 utilization category - $U_e \leq 400\text{ V}$

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

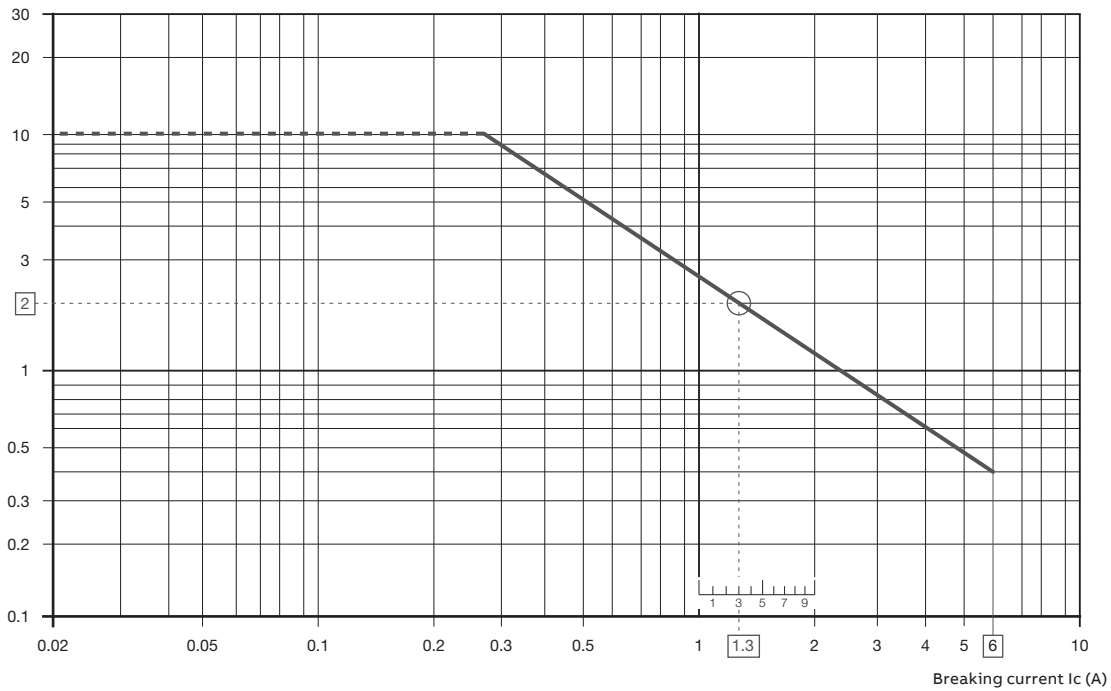
This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curve has been drawn for resistive and inductive loads up to 400 V:

- AS09 ... AS16 and ASL09 ... ASL16 contactor built-in auxiliary contacts
- 1-pole CA3
- NS and NSL contactor relays.

50

Millions of operating cycles



Example:

Breaking current = 1.3 A

On the opposite curve at intersection "O" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Electronic timers



TEF3-ON

1SB C101337F0010



TEF3-OFF

1SB C101336F0010

TEF3 frontal electronic timers are used for realizing timing function and are available in ON-delay and OFF-delay versions.

Compact solution in cabinet compared to separate timers

TEF3 electronic timers are front-mounted and locked on AS/ASL contactors or NS/NSL contactor relays. A mechanical indicator allows to show the state of the contactor.

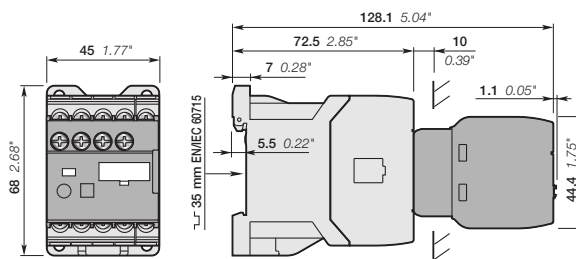
Safe and cost-reduced wiring

TEF3 electronic timers are supplied by a direct plug-in parallel connection to the coil terminals A1 - A2 of the contactor or contactor relay. A varistor is integrated on the timer to offer a built-in protection against surges in the contactor coil.

Available for a wide control voltage range 24...240 V AC/DC

TEF3-ON or TEF3-OFF allow time-delayed functions up to 100 s in 3 distinct time ranges, independently of the control system. The time delay ranges are selected by a switch and the time delay can be adjusted by means of a rotary switch. The timing function is activated by closing or opening the device on which the timer is mounted. The OFF-delay version operates without additional control supply.

| For contactors, contactor relays | Time delay range selected by switch | Delay type | Rated control circuit voltage Uc V 50/60 Hz or DC | Auxiliary contacts | Type | Order code | Weight Pkg (1 pce) kg |
|----------------------------------|-------------------------------------|------------|--|------------------------|----------|-----------------|-----------------------------|
| AS09 ... AS16 | 0.1...1 s | ON-delay | 24...240 | 1 1 | TEF3-ON | 1SBN021012R1000 | 0.065 |
| ASL09 ... ASL16 NS, NSL | 1...10 s 10...100 s | OFF-delay | 24...240 | 1 1 | TEF3-OFF | 1SBN021014R1000 | 0.065 |



Main dimensions mm, inches

Electronic timers

Technical data

Contact utilization characteristics according to IEC

| Types | | TEF3-ON | TEF3-OFF |
|--|-------------------------------------|--|--------------------------------|
| Standards | | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | | 400 V | |
| Rated impulse withstand voltage U_{imp} | | 4 kV | |
| Rated operational voltage U_e max. | | 240 V | |
| Rated frequency (without derating) | | 50 / 60 Hz | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | | 5 A | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | | 24-127 V 50/60 Hz 3 A | 220-240 V 50/60 Hz 1.5 A |
| Making capacity acc. to IEC 60947-5-1 | | 10 x I _e AC-15 | |
| Breaking capacity acc. to IEC 60947-5-1 | | 10 x I _e AC-15 | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | | 24 V DC 1 A / 24 W | |
| Short-circuit protection device gG type fuse | | 6 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | | for 1.0 s 8 A | for 0.1 s 8 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 24 V DC 12 V / 3 mA 10-7 | |
| Power dissipation per pole at 3 A | | 0.1 W | |
| Function diagram | | ON-delay | OFF-delay |
| | | | |
| | | Bistable relay inside. Before use, once apply U_c then switch it off in order to initialize position of the contacts. | |
| Control circuit voltage | | | |
| AC control voltage | Rated control circuit voltage U_c | 24...240 V AC | |
| 50/60 Hz | Average consumption | 1.5 mA RMS | 1 mA RMS |
| DC control voltage | Rated control circuit voltage U_c | 24...240 V DC | |
| | Average consumption | 1.5 mA | 1 mA |
| Rated frequency limits | | 50 / 60 Hz | |
| Supply voltage range | | 0.85...1.1 x U_c (at $\theta \leq 70^\circ\text{C}$) | |
| Overvoltage protection | | Varistor included | |
| Time delay range (t) selected by switch | | 0.1...1 s <input type="checkbox"/> | |
| | | 1...10 s <input type="checkbox"/> | |
| | | 10...100 s <input type="checkbox"/> | |
| On-load reiteration accuracy under constant conditions | | $\leq 1\%$ | |
| Minimum ON period | | 0.1 s | 1 s |
| Recovery time | | 0.15 s | 0.1 s |
| Ambient air temperature | Operation | -25 °C ... +70 °C | |
| | Storage | -40 °C ... +80 °C | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude | | 2000 m | |
| Mounting positions | | Mounting positions 1, 1 +/- 30°, 2, 3, 4, 5 | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 (Mounting position 1) | | 1/2 sinusoidal shock for 11 ms: no change in contact position Same as contactor or contactor relay | |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 3 g closed position / 2 g open position | |
| Mechanical durability | | | |
| | Number of operating cycles | 5 millions operating cycles | |
| | Max. switching frequency | 3600 cycles/h | 1800 cycles/h |
| Max. electrical switching frequency | | | |
| | AC-15 | 1200 cycles/h | |
| | DC-13 | 900 cycles/h | |








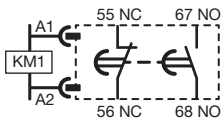
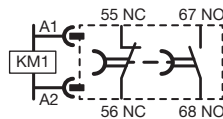
Electronic timers

Technical data

Contact utilization characteristics according to UL / CSA

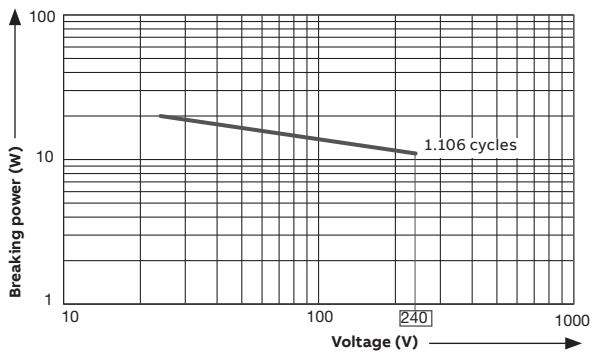
| Types | TEF3-ON | TEF3-OFF |
|---|------------------------|----------|
| Standards | UL 508, CSA C22.2 N°14 | |
| Rated insulation voltage U_i acc. to UL / CSA | 300 V | |
| Max. operational voltage | 240 V | |
| Pilot duty | B300, R300 | |
| AC thermal rated current | 5 A | |
| AC maximum volt-ampere making | 3600 VA | |
| AC maximum volt-ampere breaking | 360 VA | |
| DC thermal rated current | 1 A | |
| DC maximum volt-ampere making-breaking | 28 VA | |

Connecting characteristics

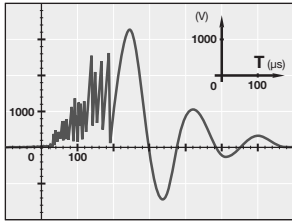
| | | |
|---|-------------|--|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 0.75...2.5 mm ² |
|  Rigid solid | 2 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 2 x | 0.75...1.5 mm ² |
|  Lugs | L ≤ | 7.7 mm |
| | l > | 3.2 mm |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 9 mm |
| Tightening torque | Recommended | 1 N.m / 9 lb.in |
| | Max. | 1.20 N.m |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 |
| Screw terminals | | Delivered in open position, screws of unused terminals should be tightened |
| All terminals | | M3 |
| Screwdriver type | | Flat Ø 5.5 / Pozidriv 2 |
| Terminal Marking | |   |

Electrical durability for DC-13 utilization category

DC-13 utilization category according to IEC 60947-5-1 / EN 60947-5-1 : making and breaking current I_e and U_e .



Surge suppressors for contactor coils



The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil. The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{in AC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5

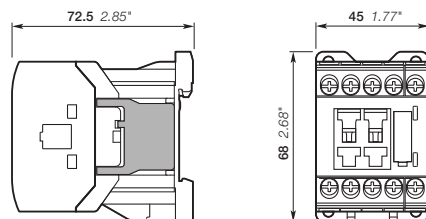


RC5-1



RT5

| For contactors | For contactor relays | Rated control circuit voltage - U_c | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|----------------------|---------------------------------------|-------|-----------|-----------------|---------|----------------------|
| | | V | AC DC | | | | |
| AS, ASL | NS, NSL | 24...50 | ● ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | | 50...133 | ● ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | | 110...250 | ● ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | | 250...440 | ● ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS | NS | 24...50 | ● - | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | | 50...133 | ● - | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | | 110...250 | ● - | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | | 250...440 | ● - | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL | NSL | 12...32 | - ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | | 25...65 | - ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | | 50...90 | - ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | | 77...150 | - ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | | 150...264 | - ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |



Main dimensions mm, inches

Easy connection to the coil terminals
(parallel mounting)
Clip-on for both fixing and connection.

No additional space
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

Surge suppressors for contactor coils

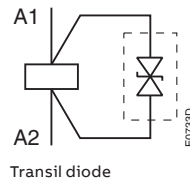
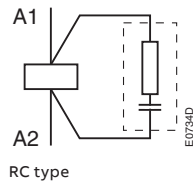
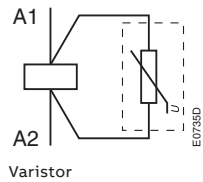
Technical data

| Varistor | RV5/50 | RV5/133 | RV5/250 | RV5/440 |
|---|---|--------------------------------|----------------------------------|----------------------------------|
| Rated control circuit voltage U_c | 24...50 V AC 24...50 V DC | 50...133 V AC 50...133 V DC | 110...250 V AC 110...250 V DC | 250...440 V AC 250...440 V DC |
| Residual overvoltage (clipping voltage) | 132 V AC 132 V DC | 270 V AC 270 V DC | 480 V AC 480 V DC | 825 V AC 825 V DC |
| Opening time growth factor | none | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from U_{vdr}^* , thus voltage front up to this point. | | | |
| | * U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$. | | | |

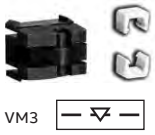
| RC type | RC5-1/50 | RC5-1/133 | RC5-1/250 | RC5-1/440 |
|---|--|---------------|----------------|----------------|
| Rated control circuit voltage U_c | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x U_c max. | | | |
| Opening time growth factor | 2...3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

| Transil diode | RT5/32 | RT5/65 | RT5/90 | RT5/150 | RT5/264 |
|---|--|--------------|--------------|---------------|----------------|
| Rated control circuit voltage U_c | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| Residual overvoltage (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| Opening time growth factor | 1.1...1.2 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Advantages | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| Drawback | Delay on drop out which does not however reduce contactor breaking capacity. | | | | |

Wiring diagrams



Mechanical interlock unit and other accessories



VM3



Mechanical interlock unit

When mounted between two contactors without additional width, the VM3 mechanical interlock unit prevents one of the contactors from closing as long as the other contactor is closed.

The mechanical interlock unit includes 2 fixing clips.

| For contactors | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|-------|------|-----------------|---------|-------------------|
| Left | Right | VM3 | 1SBN031005T1000 | 10 | 0.002 |
| AS | AS | | | | |
| ASL | ASL | | | | |

Note : VM3 mechanical durability, 5 millions of operating cycles on both reversing contactors.

Fixing clips

BB3 is a set of 50 fixing clips.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|------|-----------------|---------|-------------------|
| AS, ASL | BB3 | 1SBN111020R1000 | 1 | 0.009 |

Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|------------------|------|-----------------|---------|-------------------|
| AS, ASL, NS, NSL | BDT4 | 1SBN110122T1000 | 10 | 0.007 |

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787").

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---------------------------------|------------|-----------------|---------|-------------------|
| AS, ASL, NS, NSL | BA4 | 1SNA235156R2700 | 16 | 0.011 |
| AMS 500 support plate for 8 BA4 | SPRC 1 | 1SNA360010R1500 | 1 | 0.220 |
| HTP500 support plate | HTP500-BA4 | 1SNA235712R2400 | 1 | 0.290 |



BDT4



BA4

Connection accessories for starting solutions



BEA16-3

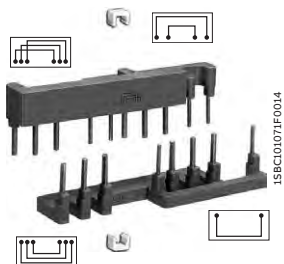
1SBCT0034F0014

Connecting links

The BEA16-3 insulated 3-pole connecting links are used to connect an AC or DC operated contactors with manual motor starters.

The connecting links ensure the electrical and mechanical connection between the contactor and the manual motor starter.

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------------------------|--|---------|-----------------|---------|-------------------|
| AS09 ... AS16 ASL09 ... ASL16 | MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16 | BEA16-3 | 1SBN081006T1000 | 10 | 0.019 |



BER16C-3

1SBCT0071F0014

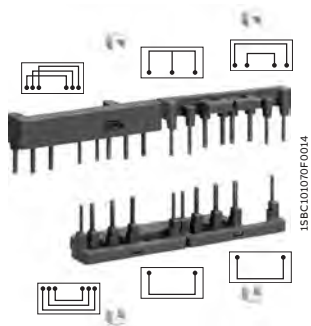
Connection sets for reversing contactors

The BER16C-3 connection sets are used for the connections between the main poles of two 3-pole contactors mounted side by side as reversing contactors, including electrical interlocking between built-in N.C. auxiliary contact and coil terminals.

The connection sets are made up of:

- 1 upstream and 1 downstream connections: insulated, solid copper bars,
- 2 connections to realize electrical interlocking between contactors equipped with built-in N.C. auxiliary contacts,
- 2 fixing clips.

| For contactors | Mechanical interlock unit | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|---------------------------|----------|-----------------|---------|-------------------|
| 2 x AS09 ... AS16 2 x ASL09 ... ASL16 | with or without VM3 | BER16C-3 | 1SBN081012R1000 | 1 | 0.035 |



BEY16C-3

1SBCT0070F0014

Connection sets for star-delta starting

BEY16C-3 connection sets are designed for star-delta starters whose contactors are assembled according to line delta star mounting.

The connection sets are made up of:

- Line contactor / delta contactor: upstream phase-to-phase connection,
- Delta contactor / star contactor: downstream connection in parallel,
- Star contactor: star point upstream,
- An electrical interlocking between delta and star contactors equipped with built-in N.C. auxiliary contacts,
- 4 fixing clips.

| For contactors | | | Mech. interlock unit between star & delta contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|----------------|-------|------|--|----------|-----------------|---------|-------------------|
| Line | Delta | Star | with or without VM3 | BEY16C-3 | 1SBN081018R2000 | 1 | 0.041 |
| AS09 | AS09 | AS09 | | | | | |
| AS12 | AS12 | AS09 | | | | | |

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. For detail code information, please contact your ABB local sales organization.

3-pole contactors

Type

AS16 - 30 - 10 - 26

Contactor type

AS AC operated
ASL DC operated

Order code

1SBL121001R 26 10

AC coil code

| | 50 Hz | 60 Hz |
|----|-----------|-------|
| 20 | 24 V 24 V | |
| 22 | 48 V 48 V | |
| 23 | 110 V | 110 V |
| 16 | - 120 V | |
| 25 | 220 V | 220 V |
| 26 | 230 V | 230 V |
| 13 | 380 V | - |
| 28 | 400 V | 400 V |

DC coil code

| | |
|----|-------|
| 81 | 24 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |

Contactor relays

Type

NS 40 E - 26

Contactor type

NS AC operated
NSL DC operated

Order code

1SBH101001R 26 40

AC coil code

| | 50 Hz | 60 Hz |
|----|-----------|-------|
| 20 | 24 V 24 V | |
| 23 | 110 V | 110 V |
| 16 | - 120 V | |
| 25 | 220 V | 220 V |
| 26 | 230 V | 230 V |
| 28 | 400 V | 400 V |

DC coil code

| | |
|----|-------|
| 81 | 24 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.



AS..S 3-pole contactors and NS..S contactor relays with spring terminals

AS..S 3-pole contactors - with spring terminals

| | | |
|------|----------------------------------|-----------------------|
| 5/56 | AS09..S ... AS16..S | AC operated |
| 5/57 | ASL09..S ... ASL16..S | DC operated |
| 5/58 | AS09..S ... AS16..S | AC operated - 2-stack |
| 5/59 | ASL09..S ... ASL16..S | DC operated - 2-stack |
| 5/60 | Main accessories | |
| 5/62 | Technical data | |
| 5/68 | Electrical durability | |
| 5/69 | Terminal marking and positioning | |
| 5/71 | Dimensions | |

NS..S contactors relays - with spring terminals

| | | |
|------|----------------------------------|-------------|
| 5/73 | NS..S | AC operated |
| 5/74 | NSL..S | DC operated |
| 5/75 | Main accessories | |
| 5/77 | Technical data | |
| 5/80 | Terminal marking and positioning | |
| 5/82 | Dimensions | |

Accessories

| | | |
|------|--|--|
| 5/84 | Auxiliary contact blocks - with spring terminals | |
| 5/88 | Surge suppressors for contactor coils | |
| 5/90 | Connecting links for starting solution and other accessories | |

| | | |
|------|---------------------------|--|
| 5/91 | Voltage code table | |
|------|---------------------------|--|



For direct product details information, use product type or order code, ex:

- www.abb.com/productdetails/AF09-30-10-13
- or www.abb.com/productdetails/1SBL137001R1310

AS09..S ... AS16..S 3-pole contactors

4 to 7.5 kW

AC operated - with spring terminals



AS09-30-10S

AS09 ... AS16 contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

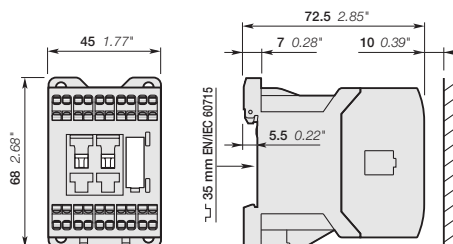
These contactors are of the block type design with:

- spring terminals
- 3 main poles and 1 built-in auxiliary contact
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------|---------------------------|----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | |
| 400 V AC-3 | AC-1 | hp | A | | | | | | |
| kW | A | hp | A | | | | | kg | |
| 4 | 20 | 5 | 12 | 24 | 24 | 1 0 | AS09-30-10S-20 | 1SBL101004R2010 | 0.220 |
| | | | | | 24 | 0 1 | AS09-30-01S-20 | 1SBL101004R2001 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS09-30-10S-26 | 1SBL101004R2610 | 0.220 |
| | | | | | 230 | 0 1 | AS09-30-01S-26 | 1SBL101004R2601 | 0.220 |
| 5.5 | 22 | 7.5 | 12 | 24 | 24 | 1 0 | AS12-30-10S-20 | 1SBL111004R2010 | 0.220 |
| | | | | | 24 | 0 1 | AS12-30-01S-20 | 1SBL111004R2001 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS12-30-10S-26 | 1SBL111004R2610 | 0.220 |
| | | | | | 230 | 0 1 | AS12-30-01S-26 | 1SBL111004R2601 | 0.220 |
| 7.5 | 22 | 10 | 15.2 | 24 | 24 | 1 0 | AS16-30-10S-20 | 1SBL121004R2010 | 0.220 |
| | | | | | 24 | 0 1 | AS16-30-01S-20 | 1SBL121004R2001 | 0.220 |
| | | | | 230 | 230 | 1 0 | AS16-30-10S-26 | 1SBL121004R2610 | 0.220 |
| | | | | | 230 | 0 1 | AS16-30-01S-26 | 1SBL121004R2601 | 0.220 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



AS09..S, AS12..S, AS16..S

Main dimensions mm, inches

ASL09..S ... ASL16..S 3-pole contactors

4 to 7.5 kW

DC operated - with spring terminals



ASL09-30-10S

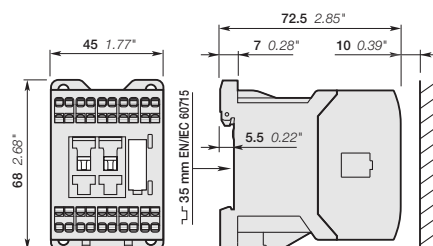
ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 3 main poles and 1 built-in auxiliary contact
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------------------------|-----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V | | | | V DC | | | | kg |
| AC-3 | AC-1 | | | | | | | |
| kW | A | hp | A | | | | | |
| 4 | 20 | 5 | 12 | 24 | 1 0 | ASL09-30-10S-81 | 1SBL103004R8110 | 0.280 |
| | | | | | 0 1 | ASL09-30-01S-81 | 1SBL103004R8101 | 0.280 |
| 5.5 | 22 | 7.5 | 12 | 24 | 1 0 | ASL12-30-10S-81 | 1SBL113004R8110 | 0.280 |
| | | | | | 0 1 | ASL12-30-01S-81 | 1SBL113004R8101 | 0.280 |
| 7.5 | 22 | 10 | 15.2 | 24 | 1 0 | ASL16-30-10S-81 | 1SBL123004R8110 | 0.280 |
| | | | | | 0 1 | ASL16-30-01S-81 | 1SBL123004R8101 | 0.280 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



ASL09..S, ASL12..S, ASL16..S

Main dimensions mm, inches

AS09..S ... AS16..S 2-stack 3-pole contactors

4 to 7.5 kW

AC operated - with spring terminals



AS09-30-32S

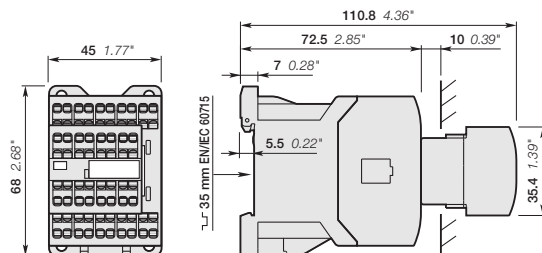
AS09..S ... AS16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

These contactors are of the block type design with:

- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: AC operated
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------|---------------------------|----------------|-----------------|-------------------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | V 50 Hz | V 60 Hz | | | | |
| 400 V | | | | | | | | | Pkg (1 pce) kg |
| AC-3 kW | AC-1 A | hp | A | | | | | | |
| 4 | 20 | 5 | 12 | 24 | 24 | 3 2 | AS09-30-32S-20 | 1SBL101004R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS09-30-32S-26 | 1SBL101004R2632 | 0.260 |
| 5.5 | 22 | 7.5 | 12 | 24 | 24 | 3 2 | AS12-30-32S-20 | 1SBL111004R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS12-30-32S-26 | 1SBL111004R2632 | 0.260 |
| 7.5 | 22 | 10 | 15.2 | 24 | 24 | 3 2 | AS16-30-32S-20 | 1SBL121004R2032 | 0.260 |
| | | | | 230 | 230 | 3 2 | AS16-30-32S-26 | 1SBL121004R2632 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.



AS09..S, AS12..S, AS16..S

Main dimensions mm, inches

ASL09..S ... ASL16..S 2-stack 3-pole contactors

4 to 7.5 kW

DC operated - with spring terminals



ASL09-30-32S

ASL09..S ... ASL16..S contactors are mainly used for controlling 3-phase motors and power circuits up to 690 V AC and 220 V DC.

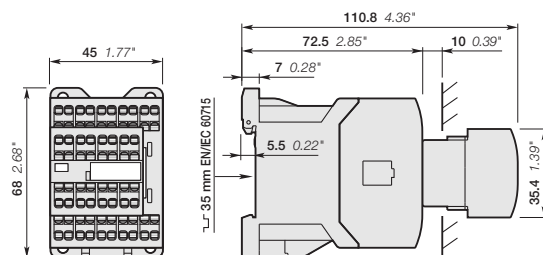
These contactors are of the block type design with:

- spring terminals
- 1st stack with 3 main poles and 1 N.O. built-in auxiliary contact
- 2nd stack with permanently fixed 2 N.O. + 2 N.C. auxiliary contact block
- the auxiliary contact elements are mechanically linked (side-marked symbol) and the N.C. auxiliary contacts are mirror contacts
- control circuit: low consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- a comprehensive range of accessories.

| IEC | | UL/CSA | | Rated control circuit voltage Uc (1) | Auxiliary contacts fitted | Type | Order code | Weight |
|-------------------------|--|----------------------------|-----------------------------|--------------------------------------|---------------------------|-----------------|-----------------|--------|
| Rated operational power | current $\theta \leq 40^\circ\text{C}$ | 3-phase motor rating 480 V | General use rating 600 V AC | | | | | |
| 400 V | | | | | | | | |
| AC-3 | AC-1 | | | V DC | | kg | | |
| kW | A | hp | A | | | | | |
| 4 | 20 | 5 | 12 | 24 | 3 2 | ASL09-30-32S-81 | 1SBL103004R8132 | 0.320 |
| 5.5 | 22 | 7.5 | 12 | 24 | 3 2 | ASL12-30-32S-81 | 1SBL113004R8132 | 0.320 |
| 7.5 | 22 | 10 | 15.2 | 24 | 3 2 | ASL16-30-32S-81 | 1SBL123004R8132 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



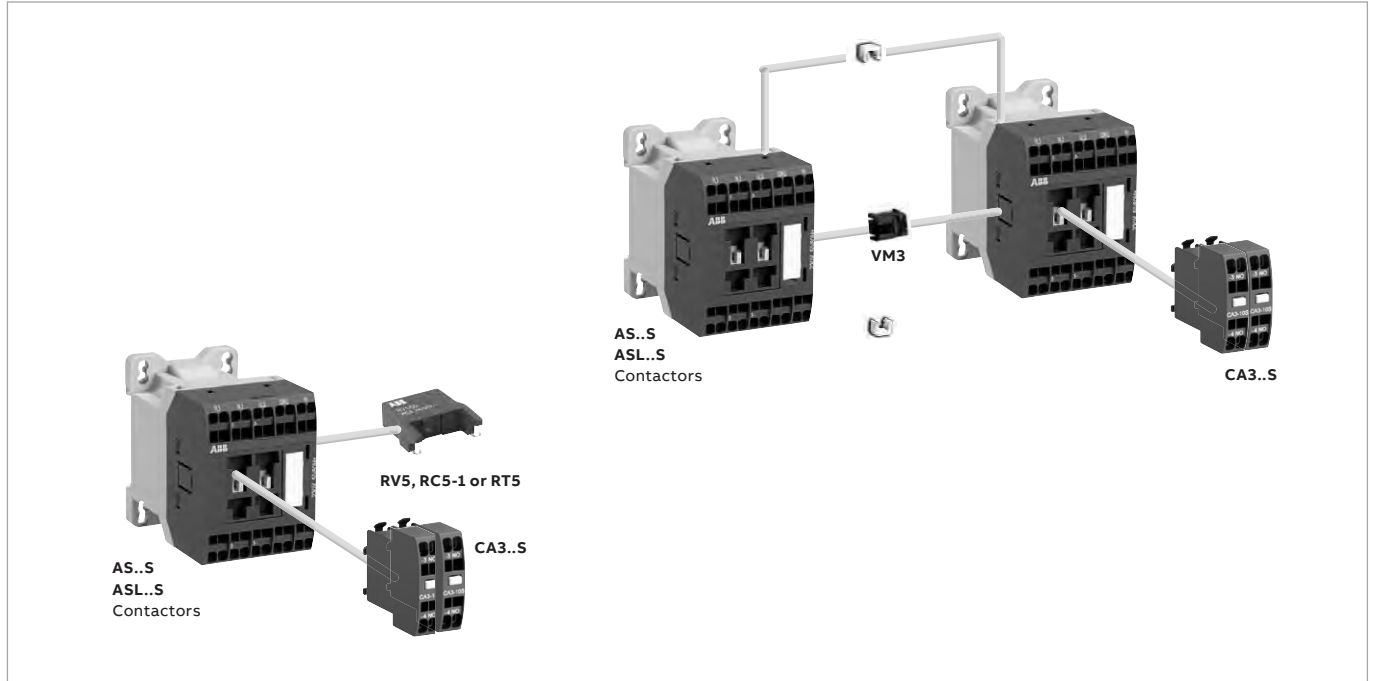
ASL09..S, ASL12..S, ASL16..S

Main dimensions mm, inches



AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories

Contactor and main accessories (other accessories available)



Main accessory fitting details

| Contactor types | Main poles  | Built-in auxiliary contacts  | Front-mounted accessories | | Side-mounted accessories | |
|-----------------------|---|--|---|---|--------------------------|----------|
| | | | Auxiliary contact blocks 1-pole CA3..S | Mechanical interlock unit (between 2 contactors) VM3 | Surge suppressors | |
| AS09..S ... AS16..S | 3 0 | 1 0 | 2 max. | + 1 | + RV5 | or RC5-1 |
| AS09..S ... AS16..S | 3 0 | 0 1 | - | 1 | + RV5 | or RC5-1 |
| ASL09..S ... ASL16..S | 3 0 | 1 0 | 2 max. | + 1 | + RV5 | or RT5 |
| ASL09..S ... ASL16..S | 3 0 | 0 1 | - | 1 | + RV5 | or RT5 |
| ASL09..S ... ASL16..S | 3 0 | 3 2 | - | 1 | + RV5 | or RT5 |

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Main accessories



CA3-10S

1SBC10037F0014

Front-mounted instantaneous auxiliary contact blocks

| For contactors | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|-----------------------|--------------------|---------|-----------------|---------|----------------|
| | | | | | kg |
| AS09..S ... AS16..S | 1 0 | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| ASL09..S ... ASL16..S | 0 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |



VM3

1SBC101069F0014

Mechanical interlock unit

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) |
|--|------|-----------------|---------|----------------|
| AS09..S ... AS16..S, ASL09..S ... ASL16..S | VM3 | 1SBN031005T1000 | 10 | 0.002 |



RV5

1SBC57401F0301

Surge suppressors

| For contactors | Rated control circuit voltage - Uc | | Type | Order code | Pkg qty | Weight (1 pce) | |
|---|------------------------------------|----|------|------------|-----------------|----------------|-------|
| | V | AC | | | | | DC |
| AS09..S ... AS16..S, ASL09..S ... ASL16..S | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS09..S ... AS16..S | 24...50 | ● | - | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | - | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | - | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | - | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL09..S ... ASL16..S | 12...32 | - | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | - | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | - | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | - | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | - | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |



BEA16-3U

1SBC101384F0010

Connecting links with manual motor starters

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) |
|--|--|----------|-----------------|---------|----------------|
| AS09..S ... AS16..S ASL09..S ... ASL16..S | MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16 | BEA16-3U | 1SBN081020R1000 | 1 | 0.045 |

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data

Main pole - Utilization characteristics according to IEC

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|--|---------------------|---------------------|---------------------|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Standards | IEC 60947-1 / 60947-4-1 and EN 60947-1 / 60947-4-1 | | | |
| Rated operational voltage U _e max. | 690 V | | | |
| Rated frequency (without derating) | 50 / 60 Hz | | | |
| Conventional free-air thermal current I _{th} acc. to IEC 60947-4-1, open contactors, $\theta \leq 40^\circ\text{C}$ | | 20 A | 22 A | 22 A |
| With conductor cross-sectional area | | 2.5 mm ² | 2.5 mm ² | 2.5 mm ² |
| AC-1 Utilization category | | | | |
| For air temperature close to contactor | | | | |
| I _e / Rated operational current AC-1 | $\theta \leq 40^\circ\text{C}$ | 20 A | 22 A | 22 A |
| U _e max. $\leq 690\text{ V}, 50/60\text{ Hz}$ | $\theta \leq 60^\circ\text{C}$ | 15 A | 17 A | 17 A |
| | $\theta \leq 70^\circ\text{C}$ | 12 A | 14 A | 14 A |
| With conductor cross-sectional area | | 2.5 mm ² | | |
| AC-3 Utilization category | | | | |
| For air temperature close to contactor $\theta \leq 60^\circ\text{C}$ | | | | |
| I _e / Max. rated operational current AC-3 (1) | | | | |
| | 220-230-240 V | 9 A | 12 A | 15.7 A |
| | 400 V | 9 A | 12 A | 15.5 A |
| | 415 V | 9 A | 12 A | 15.5 A |
| | 440 V | 8 A | 11 A | 13.6 A |
| | 500 V | 8 A | 11 A | 12.5 A |
| | 690 V | 5 A | 7 A | 9 A |
| Rated operational power AC-3 (1) | | | | |
| | 220-230-240 V | 2.2 kW | 3 kW | 4 kW |
| | 400 V | 4 kW | 5.5 kW | 7.5 kW |
| | 415 V | 4 kW | 5.5 kW | 7.5 kW |
| | 440 V | 4 kW | 5.5 kW | 7.5 kW |
| | 500 V | 4 kW | 5.5 kW | 7.5 kW |
| | 690 V | 4 kW | 5.5 kW | 7.5 kW |
| Rated making capacity AC-3 | 10 x I _e AC-3 acc. to IEC 60947-4-1 | | | |
| Rated breaking capacity AC-3 | 8 x I _e AC-3 acc. to IEC 60947-4-1 | | | |
| AC-8a Utilization category | | | | |
| (without thermal overload relay - U _e 400 V 50/60 Hz - $\theta \leq 40^\circ\text{C}$) | | | | |
| I _e / Rated operational current AC-8a | | 12 A | 16 A | 22 A |
| Rated operational power AC-8a | | 5.5 kW | 7.5 kW | 11 kW |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded (2) | | | | |
| U _e $\leq 500\text{ V AC}$ - gG type fuse | | 25 A | | |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | 1 s | 230 A | 250 A | 250 A |
| | 10 s | 100 A | 124 A | 124 A |
| | 30 s | 65 A | 75 A | 75 A |
| | 1 min | 50 A | 55 A | 55 A |
| | 15 min | 20 A | 22 A | 22 A |
| Maximum breaking capacity cos $\phi = 0.45$ | at 440 V | 155 A | | |
| | at 690 V | 90 A | | |
| Power dissipation per pole | I _e / AC-1 | 0.9 W | 1.1 W | 1.1 W |
| | I _e / AC-3 | 0.18 W | 0.33 W | 0.55 W |
| Max. electrical switching frequency | AC-1 | 600 cycles/h | | |
| | AC-3 | 1200 cycles/h | | |
| | AC-4 | 300 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m. 50 Hz or 1800 r.p.m. 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

(2) For the protection of motor starters against short circuits, see "Coordination with short-circuit protection devices".

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data

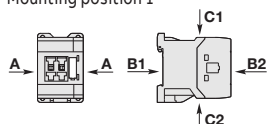
Main pole - Utilization characteristics according to UL / NEMA / CSA

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|--|-------------------------------------|---------------|----------|----------|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Standards | UL 508, CSA C22.2 N°14 | | | |
| Max. operational voltage | 690 V | | | |
| NEMA size | 00 | | 00 | 00 |
| NEMA continuous amp rating | Thermal current | 9 A | | |
| NEMA maximum horse power ratings 1-phase, 60 Hz | 115 V AC | 1/3 hp | 1/3 hp | 1/3 hp |
| | 230 V AC | 1 hp | 1 hp | 1 hp |
| NEMA maximum horse power ratings 3-phase, 60 Hz | 200 V AC | 1-1/2 hp | 1-1/2 hp | 1-1/2 hp |
| | 230 V AC | 1-1/2 hp | 1-1/2 hp | 1-1/2 hp |
| | 460 V AC | 2 hp | 2 hp | 2 hp |
| | 575 V AC | 2 hp | 2 hp | 2 hp |
| UL / CSA General use rating 600 V AC | | 12 A | 12 A | 15.2 A |
| | With conductor cross-sectional area | AWG 14 | AWG 14 | AWG 12 |
| UL / CSA maximum 1-phase motor rating Full load current | 120 V AC | 7.2 A | 9.8 A | 13.8 A |
| | 240 V AC | 8 A | 10 A | 12 A |
| Horse power rating | 120 V AC | 1/3 hp | 1/2 hp | 3/4 hp |
| | 240 V AC | 1 hp | 1-1/2 hp | 2 hp |
| UL / CSA maximum 3-phase motor rating Full load current (1) | 200-208 V AC | 7.8 A | 7.8 A | 11 A |
| | 220-240 V AC | 6.8 A | 9.6 A | 15.2 A |
| | 440-480 V AC | 7.6 A | 11 A | 14 A |
| | 550-600 V AC | 9 A | 11 A | 11 A |
| Horse power rating (1) | 200-208 V AC | 2 hp | 2 hp | 3 hp |
| | 220-240 V AC | 2 hp | 3 hp | 5 hp |
| | 440-480 V AC | 5 hp | 7-1/2 hp | 10 hp |
| | 550-600 V AC | 7-1/2 hp | 10 hp | 10 hp |
| Short-circuit protection device for contactors without thermal overload relay - Motor protection excluded | Fuse rating | 40 A | 50 A | 60 A |
| | Fuse type, 600 V | J | | |
| Max. electrical switching frequency | For general use | 600 cycles/h | | |
| | For motor use | 1200 cycles/h | | |

(1) For the corresponding kW/A or hp/A values of 1500 r.p.m, 50 Hz or 1800 r.p.m, 60 Hz, 3-phase motors, see "Motor rated operational powers and currents".

General technical data

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|--|---|---|--|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Rated insulation voltage Ui | acc. to IEC 60947-4-1 | 690 V | | |
| | acc. to UL / CSA | 600 V | | |
| Rated impulse withstand voltage Uimp. | 6 kV | | | |
| Ambient air temperature close to contactor | Operation | -40...+70 °C | | |
| | Storage | -60...+80 °C | | |
| Climatic withstand | Category B according to IEC 60947-1 Annex Q | | | |
| Maximum operating altitude (without derating) | 3000 m | | | |
| Mechanical durability | Number of operating cycles | 10 millions operating cycles | | |
| | Max. switching frequency | 3600 cycles/h | | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | Shock direction | AS contactors - AC operated | | ASL contactors - DC operated |
| | Mounting position 1 | A | 20 g closed position / 10 g open position | |
| | B1 | 10 g closed position / 5 g open position | | 15 g closed position / 5 g open position |
| | B2 | 15 g | | 10 g |
| | C1 | 20 g closed position / 9 g open position | | 15 g closed position / 8 g open position |
| | C2 | 20 g closed position / 14 g open position | | 14 g closed position / 8 g open position |
| Vibration withstand acc. to IEC 60068-2-6 | 5...300 Hz / 3 g closed position / 2 g open position | | | |



AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data

Magnet system characteristics for AS09..S ... AS16..S contactors

| Contactor types | | AC operated | AS09..S | AS12..S | AS16..S |
|---|-------------------------------------|--------------------------|---|---------|---------|
| Coil operating limits acc. to IEC 60947-4-1 | | AC supply | 0.85...1.1 x U_c (at $\theta \leq 60^\circ\text{C}$); U_c (at $\theta \leq 70^\circ\text{C}$) | | |
| AC control voltage | Rated control circuit voltage U_c | at 50 Hz | 24...415 V | | |
| | | at 60 Hz | 24...415 V | | |
| Coil consumption | Average pull-in value | 50 Hz | 33 VA | | |
| | | 60 Hz | 33 VA | | |
| | | 50/60 Hz | 33 VA | | |
| Average holding value | | 50 Hz | 6.5 VA / 1.5 W | | |
| | | 60 Hz | 5 VA / 1.2 W | | |
| | | 50/60 Hz | 6.5 VA / 1.5 W | | |
| Drop-out voltage | | | Approx. 30...50 % of U_c | | |
| Operating time | | | | | |
| Between coil energization and: | | N.O. contact closing | 9...24 ms | | |
| | | N.C. contact opening | 6...18 ms | | |
| Between coil de-energization and: | | N.O. contact opening (1) | 5...19 ms | | |
| | | N.C. contact closing (1) | 7...22 ms | | |
| (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | | | | |

Magnet system characteristics for ASL09..S ... ASL16..S contactors

| Contactor types | | DC operated | ASL09..S | ASL12..S | ASL16..S |
|--|-------------------------------------|--------------------------|---|----------|----------|
| Coil operating limits acc. to IEC 60947-4-1 | | DC supply | 0.85...1.1 x U_c (at $\theta \leq 60^\circ\text{C}$); U_c (at $\theta \leq 70^\circ\text{C}$) | | |
| DC control voltage | Rated control circuit voltage U_c | | 12...240 V DC | | |
| | | Coil consumption | | | |
| | Average pull-in value | | 3 W | | |
| | Average holding value | | 3 W | | |
| Drop-out voltage | | | Approx. 10...40 % of U_c | | |
| Coil time constant | Open | L/R | 12 ms | | |
| | | Closed | 40 ms | | |
| Operating time | | | | | |
| Between coil energization and: | | N.O. contact closing | 36...59 ms | | |
| | | N.C. contact opening | 31...53 ms | | |
| Between coil de-energization and: | | N.O. contact opening (1) | 13...17 ms | | |
| | | N.C. contact closing (1) | 15...20 ms | | |
| (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2 | | | | | |








Mounting characteristics and conditions for use

| Contactor types | | AC operated | AS09..S | AS12..S | AS16..S |
|--------------------|--|---|----------|----------|----------|
| | | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Mounting positions | | | | | |
| Mounting distances | | The contactors can be assembled side by side. | | | |
| Fixing | On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm | | | |
| | By screws (not supplied) | 2 x M4 screws placed diagonally | | | |

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data

Connecting characteristics

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|---|----------------------------|----------|----------|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Main terminals |  Spring terminals | | | |
| Connection capacity (min. ... max.) | | | | |
| Main conductors (poles) | | | | |
|  Rigid | 1 x | 0.75...2.5 mm ² | | |
| | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
| | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 1 x | 0.75...1.5 mm ² | | |
| | 2 x | 0.75...1.5 mm ² | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...12 | | |
| Stripping length | 10 mm | | | |
| Auxiliary conductors (built-in auxiliary terminals + coil terminals) | | | | |
|  Rigid solid | 1 x | 0.75...2.5 mm ² | | |
| | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² | | |
| | 2 x | 0.75...2.5 mm ² | | |
|  Flexible with insulated ferrule | 1 x | 0.75...1.5 mm ² | | |
| | 2 x | 0.75...1.5 mm ² | | |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 | | |
| Stripping length | 10 mm | | | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | | | |
| All terminals | Flat Ø 3.5 | | | |
| Screwdriver type | Flat Ø 3.5 | | | |

AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Technical data

Built-in auxiliary contacts according to IEC

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|---|--------------------|---|----------|----------|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Rated operational voltage U _e max. | | 690 V | | |
| Rated frequency (without derating) | | 50 / 60 Hz | | |
| Conventional free air thermal current I _{th} - θ ≤ 40 °C | | 10 A | | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A | | |
| | 220-240 V 50/60 Hz | 4 A | | |
| | 400-440 V 50/60 Hz | 3 A | | |
| | 500 V 50/60 Hz | 2 A | | |
| | 690 V 50/60 Hz | 2 A | | |
| Making capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | |
| Breaking capacity AC-15 | | 10 x I _e AC-15 acc. to IEC 60947-5-1 | | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W | | |
| | 48 V DC | 2.8 A / 134 W | | |
| | 72 V DC | 1 A / 72 W | | |
| | 110 V DC | 0.55 A / 60 W | | |
| | 125 V DC | 0.55 A / 69 W | | |
| | 220 V DC | 0.27 A / 60 W | | |
| | 250 V DC | 0.27 A / 68 W | | |
| Short-circuit protection device gG type fuse | | 10 A | | |
| Rated short-time withstand current I _{cw} | for 1.0 s | 100 A | | |
| | for 0.1 s | 140 A | | |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | | 12 V / 3 m | | |
| | | 10-7 | | |
| Non-overlapping time between N.O. and N.C. contacts | | 1.5 ms | | |
| Power dissipation per pole at 6 A | | 0.1 W | | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h | | |
| | DC-13 | 900 cycles/h | | |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3 aux. contact blocks) are mechanically linked contacts. | | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | | Built-in N.C. auxiliary contacts or additional N.C. auxiliary contacts (CA3 aux. contact blocks) are mirror contacts. | | |

Built-in auxiliary contacts according to UL / CSA

| Contactor types | AC operated | AS09..S | AS12..S | AS16..S |
|--|-------------|--------------------|----------|----------|
| | DC operated | ASL09..S | ASL12..S | ASL16..S |
| Max. operational voltage | | 600 V AC, 250 V DC | | |
| Pilot duty | | A600, Q300 | | |
| AC thermal rated current | | 10 A | | |
| AC maximum volt-ampere making | | 7200 VA | | |
| AC maximum volt-ampere breaking | | 720 VA | | |
| DC thermal rated current | | 2.5 A | | |
| DC maximum volt-ampere making-breaking | | 69 VA | | |

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.

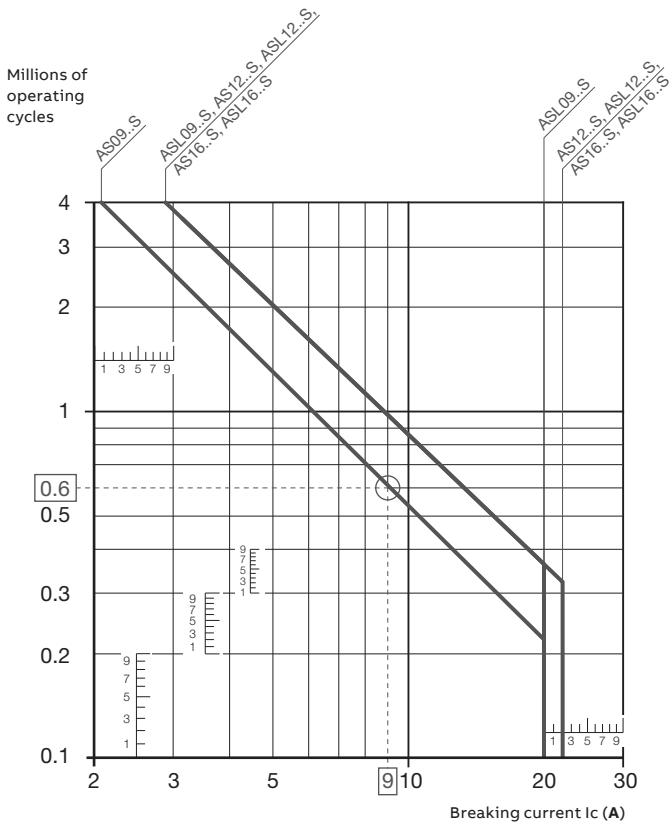
AS09..S ... AS16..S and ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

Electrical durability

Electrical durability for AC-1 utilization category - $U_e \leq 690\text{ V}$

Note: AC-1 maximum current is selected according to ambient temperature. Please see technical data.

Switching non-inductive or slightly inductive loads. The breaking current I_c for AC-1 is equal to the rated operational current of the load. Maximum electrical switching frequency: 600 cycles / hour.



Example:

Breaking current = 9 A.

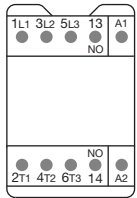
On the opposite curve at intersection "O" 9 A the corresponding value for the electrical durability is approximately 0.6 millions operating cycles.

AS09..S ... AS16..S 3-pole contactors - with spring terminals

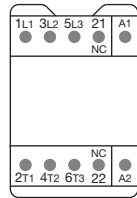
Terminal marking and positioning

AS..S contactors - AC operated

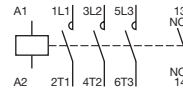
Standard devices without addition of auxiliary contacts



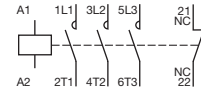
AS09 ... AS16-30-10S



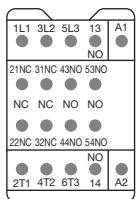
AS09 ... AS16-30-01S



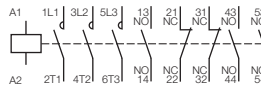
AS09 ... AS16-30-10S



AS09 ... AS16-30-01S

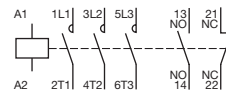
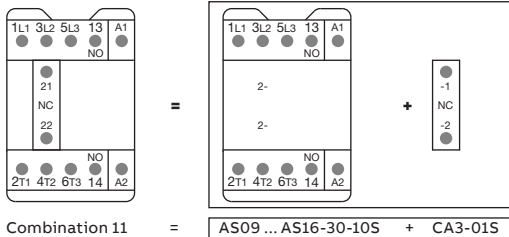


AS09 ... AS16-30-32S

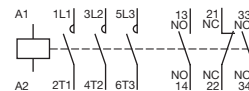
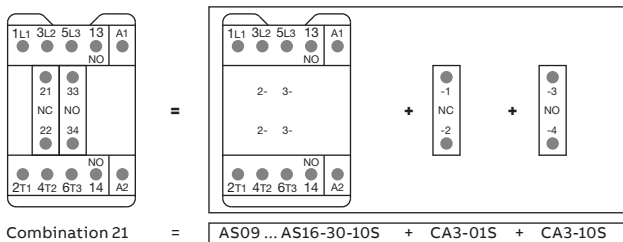


AS09 ... AS16-30-32S

Other possible contact combinations with auxiliary contact blocks added by the user

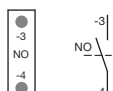


Combination 11

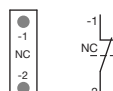


Combination 21

CA3..S 1-pole auxiliary contact blocks



CA3-10S



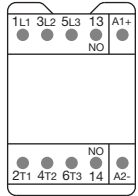
CA3-01S

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

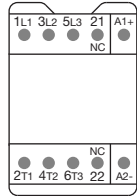
Terminal marking and positioning

ASL..S contactors - DC operated (the polarity A1+, A2- must be respected)

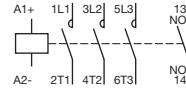
Standard devices without addition of auxiliary contacts



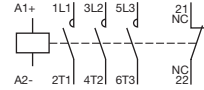
ASL09 ... ASL16-30-10S



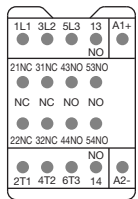
ASL09 ... ASL16-30-01S



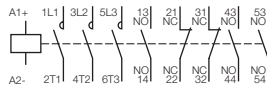
ASL09 ... ASL16-30-10S



ASL09 ... ASL16-30-01S

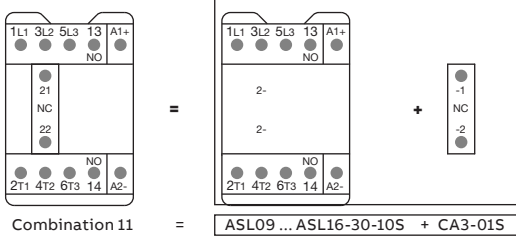


ASL09 ... ASL16-30-32S



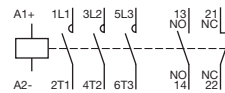
ASL09 ... ASL16-30-32S

Other possible contact combinations with auxiliary contact blocks added by the user

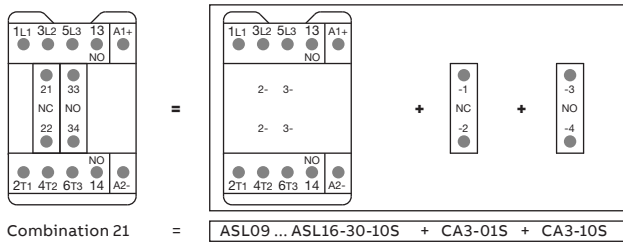


Combination 11

ASL09 ... ASL16-30-10S + CA3-01S

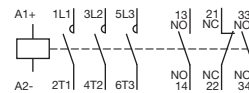


Combination 11



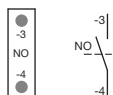
Combination 21

ASL09 ... ASL16-30-10S + CA3-01S + CA3-10S

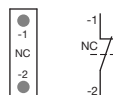


Combination 21

CA3..S 1-pole auxiliary contact blocks



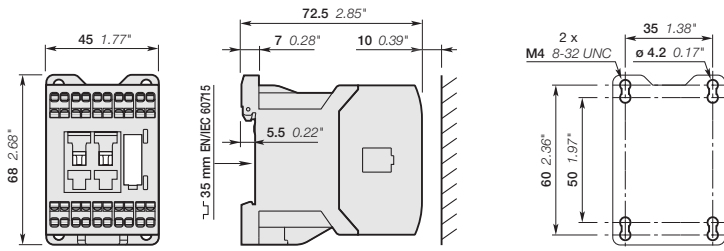
CA3-10S



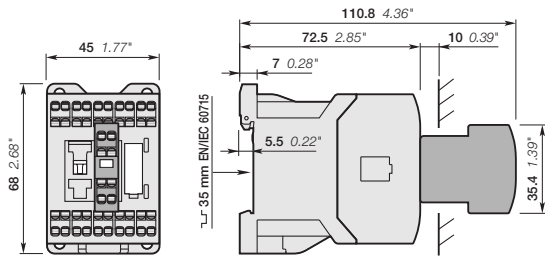
CA3-01S

AS09..S ... AS16..S 3-pole contactors - with spring terminals

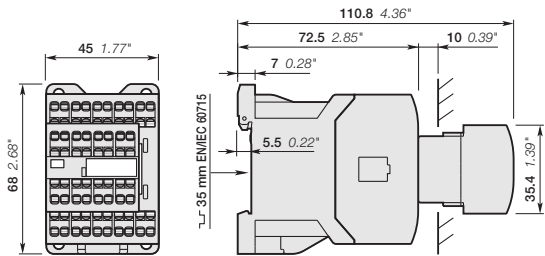
Dimensions



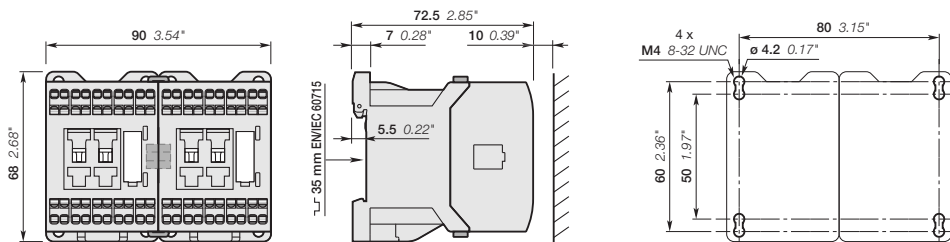
AS09..S, AS12..S, AS16..S



AS09..S, AS12..S, AS16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



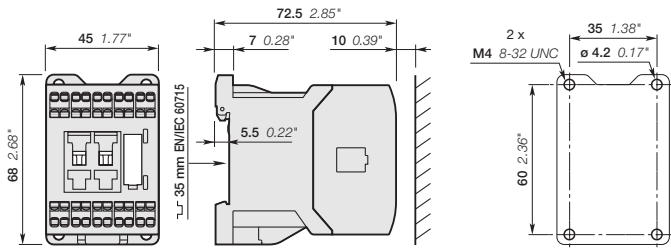
AS09...16-30-32S



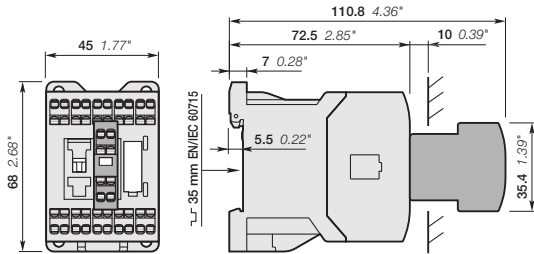
AS09..S, AS12..S, AS16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

ASL09..S ... ASL16..S 3-pole contactors - with spring terminals

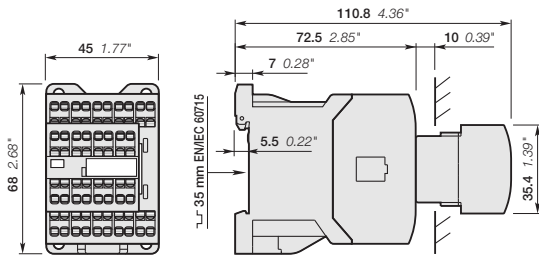
Dimensions



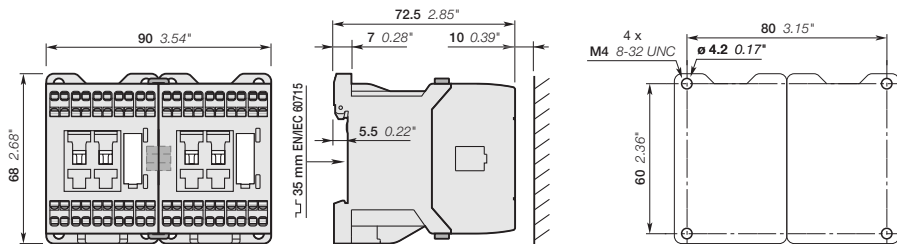
ASL09..S, ASL12..S, ASL16..S



ASL09..S, ASL12..S, ASL16..S
+ CA3..S front-mounted 1-pole auxiliary contact block



ASL09...16-30-32S



ASL09..S, ASL12..S, ASL16..S
+ VM3 mechanical interlock unit including two BB3 fixing clips

NS..S contactor relays - with spring terminals

AC operated



NS22ES

NS..S contactor relays are used for switching auxiliary and control circuits.

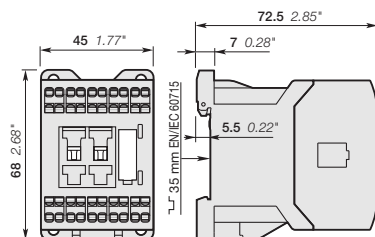
These contactor relays are designed with:

- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: AC operated
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

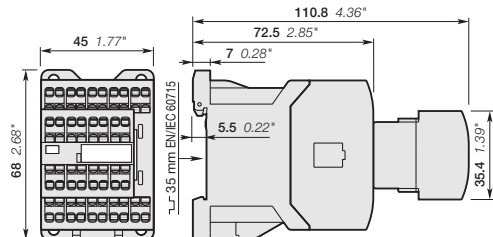
| Number of contacts | | Rated control circuit voltage Uc (1) | | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|-----------|--------------------------------------|---------|-----------|-----------------|-----------------------------|
| 1st stack | 2nd stack | V 50 Hz | V 60 Hz | | | |
| | | 24 | 24 | NS22ES-20 | 1SBH101004R2022 | 0.220 |
| | | 230 | 230 | NS22ES-26 | 1SBH101004R2622 | 0.220 |
| | | 24 | 24 | NS31ES-20 | 1SBH101004R2031 | 0.220 |
| | | 230 | 230 | NS31ES-26 | 1SBH101004R2631 | 0.220 |
| | | 24 | 24 | NS40ES-20 | 1SBH101004R2040 | 0.220 |
| | | 230 | 230 | NS40ES-26 | 1SBH101004R2640 | 0.220 |
| | | 24 | 24 | NS44ES-20 | 1SBH101004R2044 | 0.260 |
| | | 230 | 230 | NS44ES-26 | 1SBH101004R2644 | 0.260 |
| | | 24 | 24 | NS53ES-20 | 1SBH101004R2053 | 0.260 |
| | | 230 | 230 | NS53ES-26 | 1SBH101004R2653 | 0.260 |
| | | 24 | 24 | NS62ES-20 | 1SBH101004R2062 | 0.260 |
| | | 230 | 230 | NS62ES-26 | 1SBH101004R2662 | 0.260 |
| | | 24 | 24 | NS71ES-20 | 1SBH101004R2071 | 0.260 |
| | | 230 | 230 | NS71ES-26 | 1SBH101004R2671 | 0.260 |
| | | 24 | 24 | NS80ES-20 | 1SBH101004R2080 | 0.260 |
| | | 230 | 230 | NS80ES-26 | 1SBH101004R2680 | 0.260 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



NS22ES, NS31ES, NS40ES



NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

Main dimensions mm, inches

NSL..S contactor relays - with spring terminals

DC operated



NSL22ES

NSL..S contactor relays are used for switching auxiliary and control circuits.

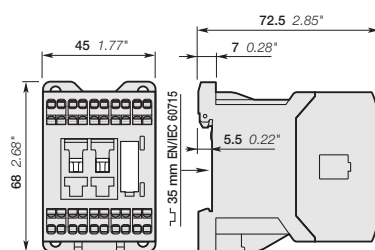
These contactor relays are designed with:

- spring terminals
- 4 poles or 8 poles. Contactor relays have mechanically linked auxiliary contact elements (side-marked symbol)
- control circuit: low coil consumption (3 W at pull-in and holding) DC operated with solid core magnet. Suitable for direct control by PLC outputs (the polarity on the coil terminals A1+ and A2- must be respected)
- add-on auxiliary contact blocks for front mounting and a comprehensive range of accessories.

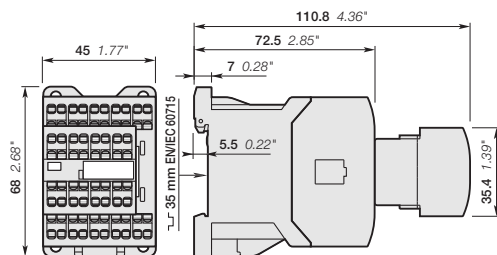
| Number of contacts | | Rated control circuit voltage U _c (1) | Type | Order code | Weight Pkg (1 pce) kg |
|--------------------|-----------|--|------------|-----------------|-----------------------|
| 1st stack | 2nd stack | | | | |
| | | 24 V DC | NSL22ES-81 | 1SBH103004R8122 | 0.280 |
| | | 24 | NSL31ES-81 | 1SBH103004R8131 | 0.280 |
| | | 24 | NSL40ES-81 | 1SBH103004R8140 | 0.280 |
| | | 24 | NSL44ES-81 | 1SBH103004R8144 | 0.320 |
| | | 24 | NSL53ES-81 | 1SBH103004R8153 | 0.320 |
| | | 24 | NSL62ES-81 | 1SBH103004R8162 | 0.320 |
| | | 24 | NSL71ES-81 | 1SBH103004R8171 | 0.320 |
| | | 24 | NSL80ES-81 | 1SBH103004R8180 | 0.320 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



NSL22ES, NSL31ES, NSL40ES



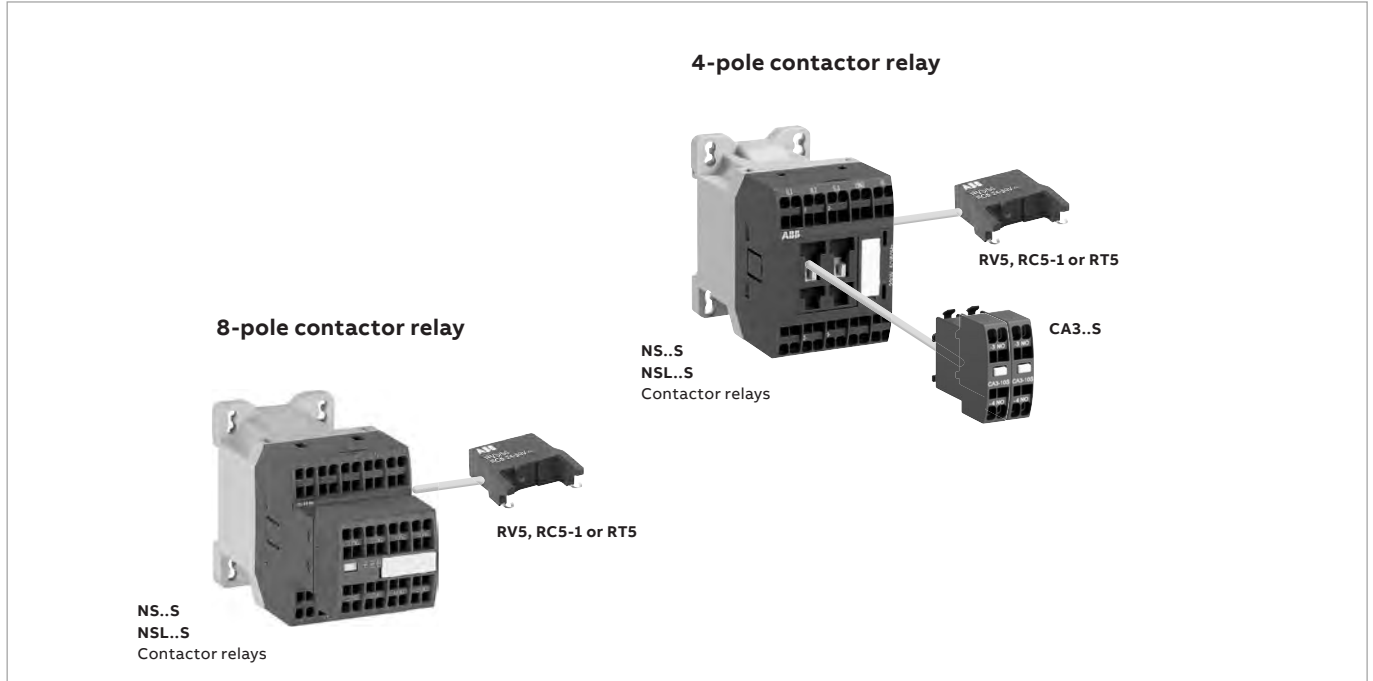
NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Main dimensions mm, inches

NS..S and NSL..S contactor relays - with spring terminals

Main accessories

Contactor relays and main accessories



Main accessory fitting details

| Contactor types | Main poles | Front-mounted accessories | | Side-mounted accessories | |
|-----------------|------------|---------------------------|--|--------------------------|--------------|
| | | Auxiliary contact blocks | | Surge suppressors | |
| | | 1-pole CA3..S | | | |
| NS..S | 2 2 E | 2 max. | | + | RV5 or RC5-1 |
| NS..S | 3 1 E | | | | |
| NS..S | 4 0 E | | | | |
| NS..S | 4 4 E | - | | | RV5 or RC5-1 |
| NS..S | 5 3 E | | | | |
| NS..S | 6 2 E | | | | |
| NS..S | 7 1 E | | | | |
| NS..S | 8 0 E | | | | |
| NSL..S | 2 2 E | 2 max. | | + | RV5 or RT5 |
| NSL..S | 3 1 E | | | | |
| NSL..S | 4 0 E | | | | |
| NSL..S | 4 4 E | - | | | RV5 or RT5 |
| NSL..S | 5 3 E | | | | |
| NSL..S | 6 2 E | | | | |
| NSL..S | 7 1 E | | | | |
| NSL..S | 8 0 E | | | | |

NS..S and NSL..S contactor relays - with spring terminals

Main accessories



CA3-10S

Front mounted instantaneous auxiliary contact blocks

| For contactor relays | Auxiliary contacts | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------------|--------------------|---------|-----------------|---------|----------------|
| | | | | | |
| NS..S, NSL..S | 1 0 | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| | 0 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |



RV5

Surge suppressors

| For contactor relays | Rated control circuit voltage - Uc | | | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------------|------------------------------------|----|----|-----------|-----------------|---------|----------------|
| | V | AC | DC | | | | |
| NS..S, NSL..S | 24...50 | ● | ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | 50...133 | ● | ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | 110...250 | ● | ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | 250...440 | ● | ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| NS..S | 24...50 | ● | - | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | 50...133 | ● | - | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | 110...250 | ● | - | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | 250...440 | ● | - | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| NSL..S | 12...32 | - | ● | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | 25...65 | - | ● | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | 50...90 | - | ● | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | 77...150 | - | ● | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | 150...264 | - | ● | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |

NS..S and NSL..S contactor relays - with spring terminals

Technical data

Contact utilization characteristics according to IEC

| | | |
|--|---|--|
| Contactor relay types | AC operated | NS..S |
| | DC operated | NSL..S |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated operational voltage U _e max. | 690 V | |
| Rated frequency (without derating) | 50 / 60 Hz | |
| Conventional free-air thermal current I _{th} θ ≤ 40 °C | 10 A | |
| I _e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity AC-15 | 10 x I _e AC-15 acc. to IEC 60947-5-1 | |
| Breaking capacity AC-15 | 10 x I _e AC-15 acc. to IEC 60947-5-1 | |
| I _e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device for contactors U _e ≤ 500 V AC - gG type fuse | 10 A | |
| Rated short-time withstand current I _{cw} at 40 °C ambient temperature, in free air from a cold state | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 12 V / 3 mA | |
| Non-overlapping time between N.O. and N.C. contacts | 10-7 | |
| Power dissipation per pole at 6 A | 1.5 ms | |
| Max. electrical switching frequency | AC-15 | 0.1 W |
| | DC-13 | 1200 cycles/h |
| Mechanically linked contacts acc. to annex L of IEC 60947-5-1 | AC-15 | 900 cycles/h |
| | DC-13 | Built-in N.O. or N.C. auxiliary contacts and additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts. |

Contact utilization characteristics according to UL / CSA

| | | |
|--|------------------------|---------------|
| Contactor relay types | AC operated | NS..S |
| | DC operated | NSL..S |
| Standards | UL 508, CSA C22.2 N°14 | |
| Max. operational voltage | 600 V AC, 250 V DC | |
| Pilot duty | A600, Q300 | |
| AC thermal rated current | 10 A | |
| AC maximum volt-ampere making | 7200 VA | |
| AC maximum volt-ampere breaking | 720 VA | |
| DC thermal rated current | 2.5 A | |
| DC maximum volt-ampere making-breaking | 69 VA | |

NS..S and NSL..S contactor relays - with spring terminals

Technical data

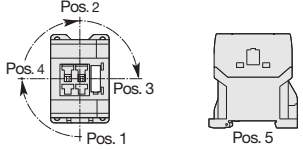
Magnet system characteristics for NS..S contactor relays

| | | | |
|---|--|---|----------------|
| Contactor relay types | AC operated | NS..S | |
| Coil operating limits acc. to IEC 60947-5-1 | AC supply | 0.85...1.1 x U _c (at $\theta \leq 60^\circ\text{C}$); U _c (at $\theta \leq 70^\circ\text{C}$) | |
| AC control voltage | Rated control circuit voltage U _c | at 50 Hz | 24...415 V |
| | | at 60 Hz | 24...415 V |
| Coil consumption | Average pull-in value | 50 Hz | 33 VA |
| | | 60 Hz | 33 VA |
| | | 50/60 Hz | 33 VA |
| | Average holding value | 50 Hz | 6.5 VA / 1.5 W |
| | | 60 Hz | 5 VA / 1.2 W |
| | | 50/60 Hz | 6.5 VA / 1.5 W |
| Drop-out voltage | | Approx. 30...50 % of U _c | |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 9...24 ms | |
| | N.C. contact opening | 6...18 ms | |
| Between coil de-energization and: | N.O. contact opening (1) | 5...19 ms | |
| | N.C. contact closing (1) | 7...22 ms | |
| (1) The use of RC5-1 surge suppressor increases opening time by a factor of 2 to 3. | | | |

Magnet system characteristics for NSL..S contactor relays

| | | | |
|---|--|---|---------------|
| Contactor relay types | DC operated | NSL..S | |
| Coil operating limits acc. to IEC 60947-5-1 | DC supply | 0.85...1.1 x U _c (at $\theta \leq 60^\circ\text{C}$); U _c (at $\theta \leq 70^\circ\text{C}$) | |
| DC control voltage | Rated control circuit voltage U _c | | 12...240 V DC |
| | Coil consumption | Average pull-in value | 3 W |
| Average holding value | | 3 W | |
| Drop-out voltage | | Approx. 10...40 % of U _c | |
| Coil time constant | Open | L/R | 12 ms |
| | Closed | L/R | 40 ms |
| Operating time | | | |
| Between coil energization and: | N.O. contact closing | 36...59 ms | |
| | N.C. contact opening | 31...53 ms | |
| Between coil de-energization and: | N.O. contact opening (1) | 13...17 ms | |
| | N.C. contact closing (1) | 15...20 ms | |
| (1) The use of RT5 surge suppressor increases opening time by a factor of 1.1 to 1.2. | | | |

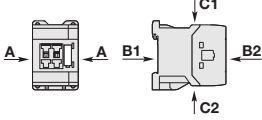
Mounting characteristics and conditions for use

| | | |
|-----------------------|---|---------------------------------|
| Contactor relay types | AC operated | NS..S |
| | DC operated | NSL..S |
| Mounting positions |  | |
| Mounting distances | The contactor relays can be assembled side by side. | |
| Fixing | On rail according to IEC 60715, EN 60715 | 35 x 7.5 mm or 35 x 15 mm |
| | By screws (not supplied) | 2 x M4 screws placed diagonally |





NS..S and NSL..S contactor relays - with spring terminals

Technical data

General technical data

| | | | |
|---|----------------------------|--|---|
| Contactor relay types | AC operated | NS..S | |
| | DC operated | NSL..S | |
| Rated insulation voltage Ui acc. to IEC 60947-5-1 acc. to UL / CSA | | 690 V 600 V | |
| Rated impulse withstand voltage Uimp. | | 6 kV | |
| Ambient air temperature close to contactor relay | Operation in free air | -40...+70 °C | |
| | Storage | -60...+80 °C | |
| Climatic withstand | | Category B according to IEC 60947-1 Annex Q | |
| Maximum operating altitude (without derating) | | 3000 m | |
| Mechanical durability | Number of operating cycles | 20 millions operating cycles | |
| | Max. switching frequency | 3600 cycles/h | |
| Shock withstand acc. to IEC 60068-2-27 and EN 60068-2-27 | Shock direction | 1/2 sinusoidal shock for 11 ms: no change in contact position, closed or open position | |
| | | Mounting position 1 | |
|  | | NS contactor relays - AC operated | NSL contactor relays - DC operated |
| | A | 20 g | 20 g closed position / 10 g open position |
| | B1 | 5 g | 15 g closed position / 5 g open position |
| | B2 | 15 g | 10 g |
| | C1 | 19 g closed position / 8 g open position | 19 g closed position / 8 g open position |
| | C2 | 16 g closed position / 13 g open position | 14 g closed position / 8 g open position |
| Vibration withstand acc. to IEC 60068-2-6 | | 5...300 Hz 3 g closed position / 2 g open position | |

Connecting characteristics

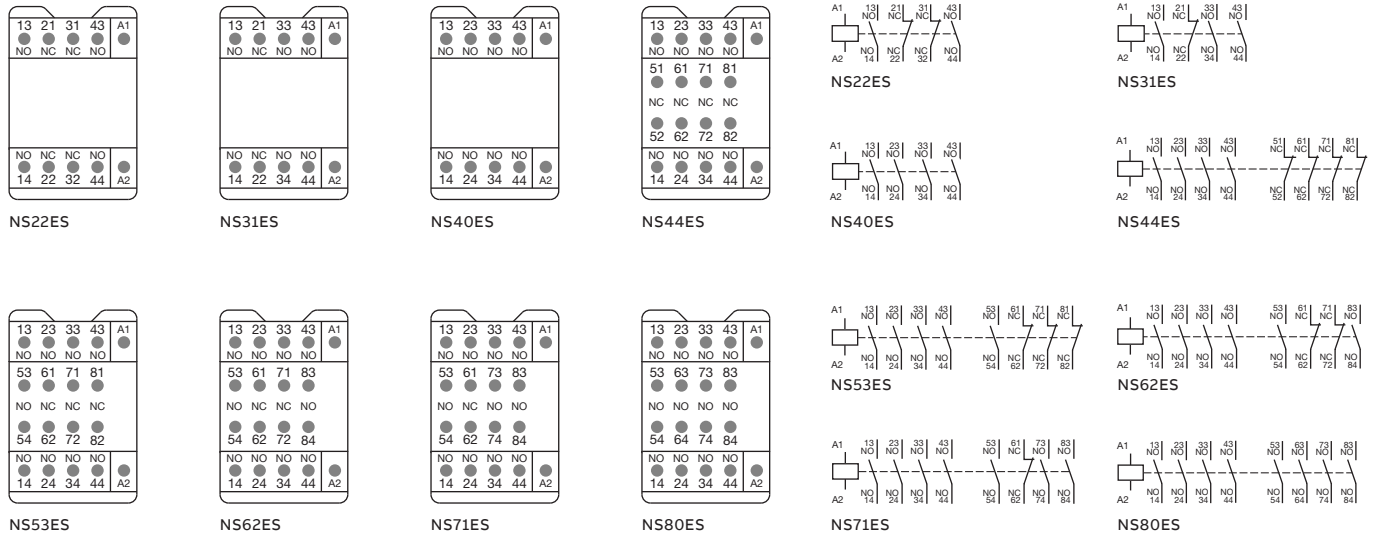
| | | | |
|---|---|---|--------------------------------|
| Contactor relay types | AC operated | NS..S | |
| | DC operated | NSL..S | |
| Main terminals | |  Spring terminals | |
| Connection capacity (min. ... max.) | Pole and coil terminals |  Rigid solid | 1 x 0.75...2.5 mm ² |
| | | | 2 x 0.75...2.5 mm ² |
| |  Flexible with non insulated ferrule | 1 x 0.75...2.5 mm ² | |
| | | 2 x 0.75...2.5 mm ² | |
| |  Flexible with insulated ferrule | 1 x 0.75...1.5 mm ² | |
| | | 2 x 0.75...1.5 mm ² | |
| | Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | | 10 mm | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | | IP20 | |
| All terminals | | IP20 | |
| Screwdriver type | | Flat Ø 3.5 | |

NS..S contactor relays - with spring terminals

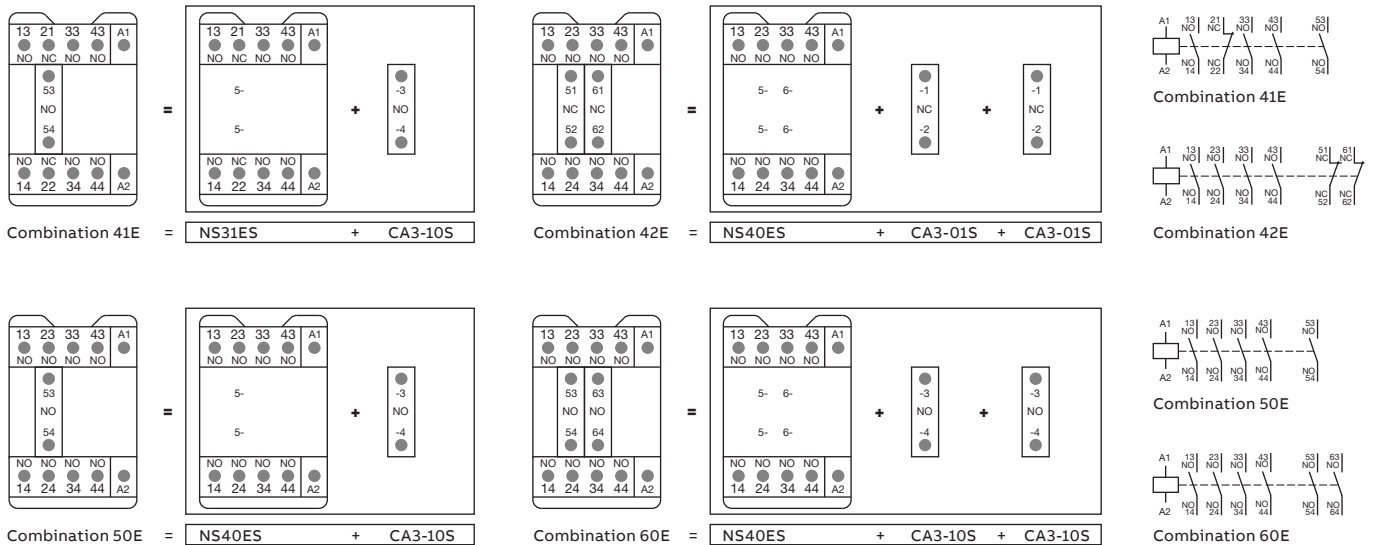
Terminal marking and positioning

NS..S contactor relays - AC operated

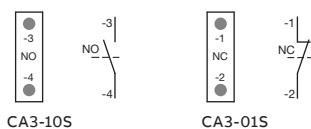
Standard devices without addition of auxiliary contact blocks



Other possible contact combinations with auxiliary contact blocks added by the user



CA3..S 1-pole auxiliary contact blocks

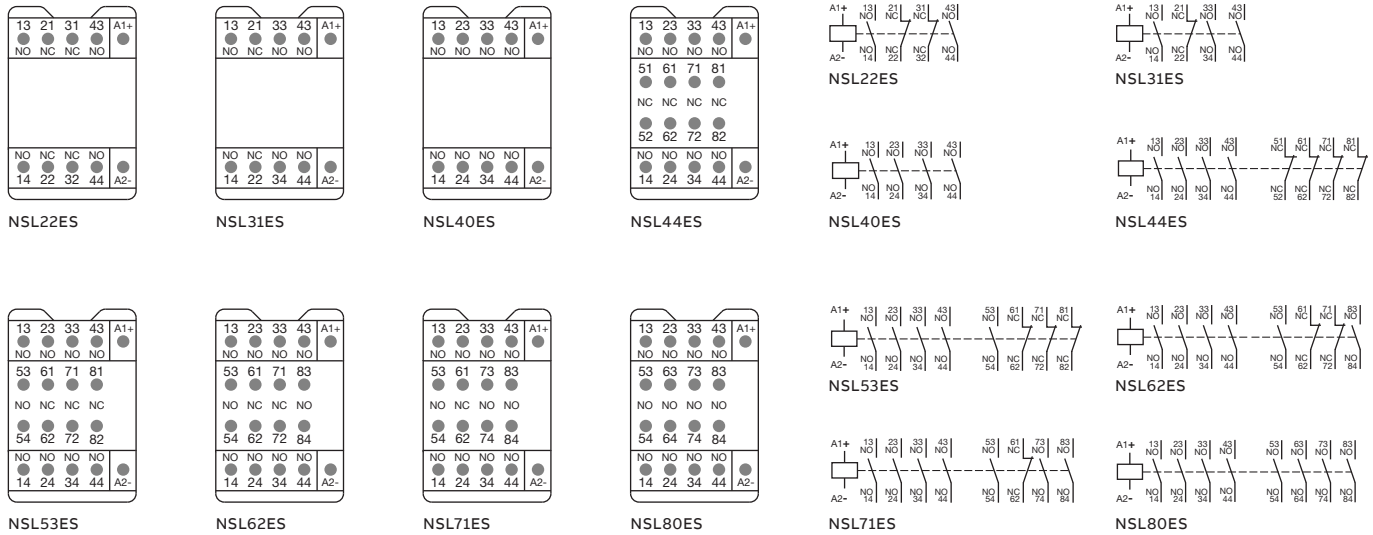


NSL..S contactor relays - with spring terminals

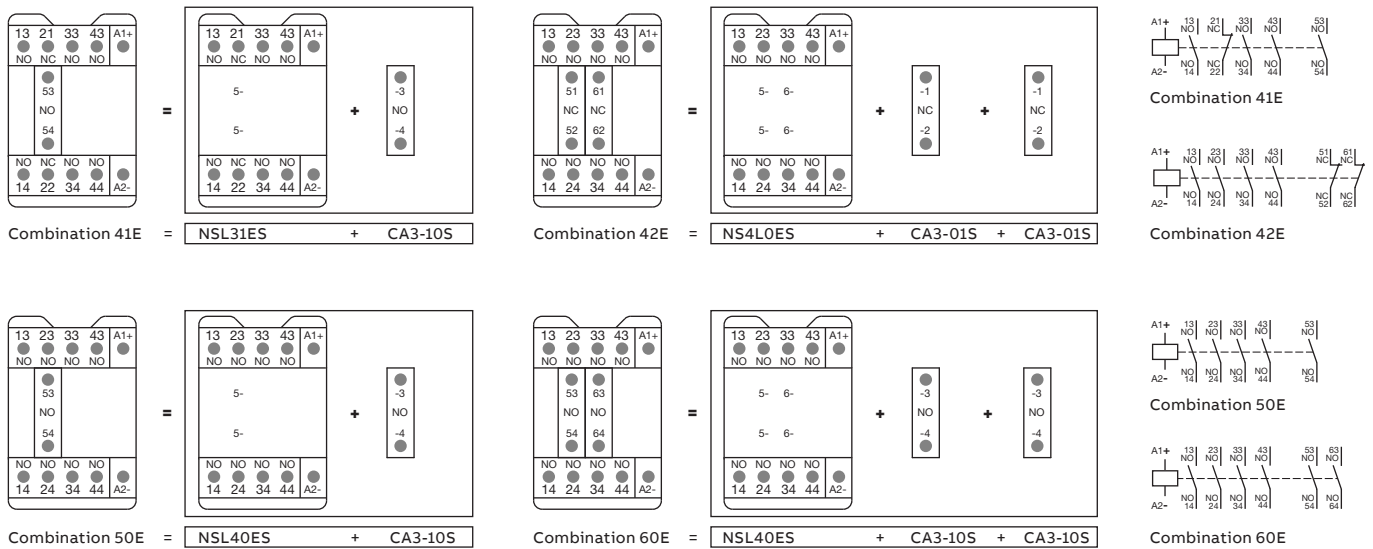
Terminal marking and positioning

NSL..S contactor relays - DC operated (the polarity A1+, A2- must be respected)

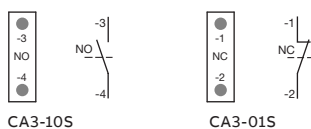
Standard devices without addition of auxiliary contact blocks



Other possible contact combinations with auxiliary contact blocks added by the user



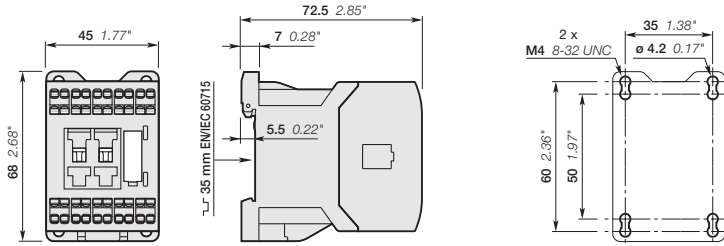
CA3..S 1-pole auxiliary contact blocks



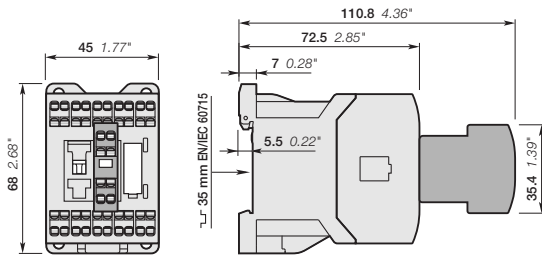
NS..S contactor relays - with spring terminals

Dimensions

4-pole contactor relays

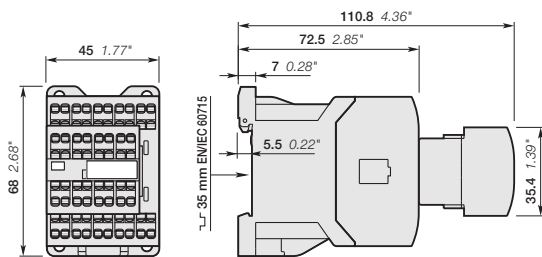


NS22ES, NS31ES, NS40ES



NS22ES, NS31ES, NS40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays

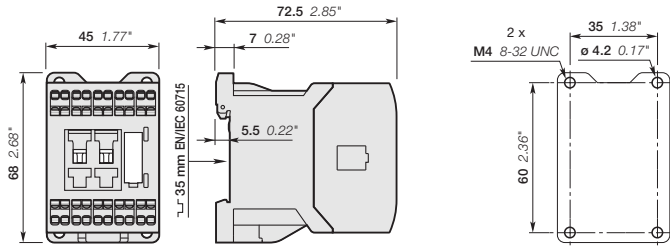


NS44ES, NS53ES, NS62ES, NS71ES, NS80ES

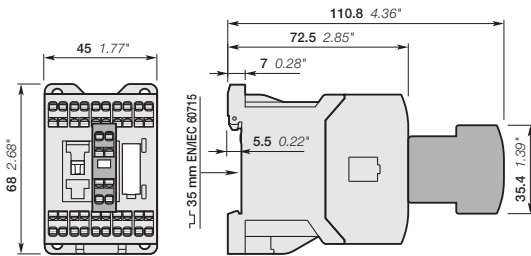
NSL..S contactor relays - with spring terminals

Dimensions

4-pole contactor relays

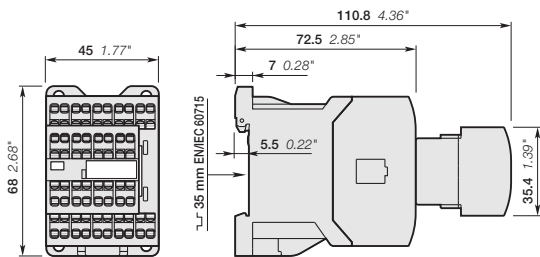


NSL22ES, NSL31ES, NSL40ES



NSL22ES, NSL31ES, NSL40ES
+ CA3..S front-mounted 1-pole auxiliary contact block

8-pole contactor relays



NSL44ES, NSL53ES, NSL62ES, NSL71ES, NSL80ES

Auxiliary contact blocks - with spring terminals

Accessories




CA3-10S

The auxiliary contact blocks are used for the operation of auxiliary circuits and control circuits. CA3 1-pole auxiliary contact blocks, designed for standard industrial environments, are equipped with:

- N.O. or N.C. contacts.
- spring-type connecting terminals.

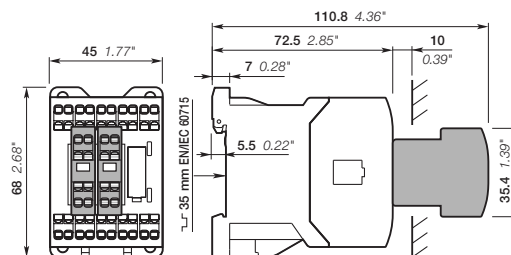
All 1-pole auxiliary contact blocks are protected against accidental direct contact and bear the corresponding function marking.

A maximum of two 1-pole auxiliary contact blocks can be front-mounted on 1-stack contactors or 1-stack contactor relays.

| For contactors | For contactor relays | Contact blocks | Type | Order code | Pkg qty | Weight (1 pce) |
|----------------|----------------------|---|------|------------|---------|----------------|
| | |  | | | | kg |

1-pole auxiliary contact blocks with spring terminals

| | | | | | | |
|-----------------------|---------------|-----|---------|-----------------|----|-------|
| AS09..S ... AS16..S | NS..S, NSL..S | 1 - | CA3-10S | 1SBN011019T1010 | 10 | 0.011 |
| ASL09..S ... ASL16..S | | - 1 | CA3-01S | 1SBN011019T1001 | 10 | 0.011 |



Main dimensions mm, inches

Auxiliary contact blocks - with spring terminals

Front mounting




Technical data

| | | |
|---|--|---------------|
| Types | 1-pole CA3..S | |
| Contact utilization characteristics according to IEC | | |
| Standards | IEC 60947-5-1 and EN 60947-5-1 | |
| Rated insulation voltage U_i acc. to IEC 60947-5-1 | 690 V | |
| Rated impulse withstand voltage U_{imp} | 6 kV | |
| Rated operational voltage U_e max. | 690 V | |
| Conventional thermal current $I_{th} - \theta \leq 40^\circ\text{C}$ | 10 A | |
| I_e / Rated operational current AC-15 acc. to IEC 60947-5-1 | 24-127 V 50/60 Hz | 6 A |
| | 220-240 V 50/60 Hz | 4 A |
| | 400-440 V 50/60 Hz | 3 A |
| | 500 V 50/60 Hz | 2 A |
| | 690 V 50/60 Hz | 2 A |
| Making capacity | 10 x I_e AC-15 acc. to IEC 60947-5-1 | |
| Breaking capacity | 10 x I_e AC-15 acc. to IEC 60947-5-1 | |
| I_e / Rated operational current DC-13 acc. to IEC 60947-5-1 | 24 V DC | 6 A / 144 W |
| | 48 V DC | 2.8 A / 134 W |
| | 72 V DC | 1 A / 72 W |
| | 110 V DC | 0.55 A / 60 W |
| | 125 V DC | 0.55 A / 69 W |
| | 220 V DC | 0.27 A / 60 W |
| | 250 V DC | 0.27 A / 68 W |
| Short-circuit protection device gG type fuse | 10 A | |
| Rated short-time withstand current I_{cw} $\theta = 40^\circ\text{C}$ | for 1.0 s | 100 A |
| | for 0.1 s | 140 A |
| Minimum switching capacity with failure rate acc. to IEC 60947-5-4 | 12 V / 3 mA | |
| | 10-7 | |
| Power dissipation per pole at 6 A | 0.1 W | |
| Mechanical durability | | |
| Number of operating cycles | 10 millions operating cycles | |
| Max. switching frequency | 3600 cycles/h | |
| Max. electrical switching frequency | AC-15 | 1200 cycles/h |
| | AC-13 | 900 cycles/h |
| Mechanically linked contact acc. to annex L of IEC 60947-5-1 | Additional N.O. or N.C. auxiliary contacts (CA3..S aux. contact blocks) are mechanically linked contacts | |
| Mirror contacts acc. to annex F of IEC 60947-4-1 | Additional N.C. auxiliary contacts (CA3..S aux. contact blocks) are mirror contacts | |

Contact utilization characteristics according to UL / CSA

| | |
|--|------------------------|
| Standards | UL 508, CSA C22.2 N°14 |
| Max. operational voltage | 690 V AC, 250 V DC |
| Pilot duty | A600, Q300 |
| AC thermal rated current | 10 A |
| AC maximum volt-ampere making | 7200 VA |
| AC maximum volt-ampere breaking | 720 VA |
| DC thermal rated current | 2.5 A |
| DC maximum volt-ampere making-breaking | 69 VA |

Connecting characteristics

| | | |
|---|------------------|----------------------------|
| Connection capacity (min. ... max.) | | |
|  Rigid solid | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Flexible with non insulated ferrule | 1 x | 0.75...2.5 mm ² |
| | 2 x | 0.75...2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75...1.5 mm ² |
| | 2 x | 0.75...1.5 mm ² |
| Connection capacity acc. to UL / CSA | 1 or 2 x | AWG 18...14 |
| Stripping length | 10 mm | |
| Degree of protection acc. to IEC 60947-1 / EN 60947-1 and IEC 60529 / EN 60529 | IP20 | |
| Screw terminals | | |
| All terminals | Spring terminals | |
| Screwdriver type | Flat Ø 3.5 | |

Auxiliary contact blocks for AS09..S ... AS16..S, ASL09..S ... ASL16..S contactors and NS, NSL contactor relays - with spring terminals

Electrical durability

Electrical durability for AC-15 utilization category - $U_e \leq 400\text{ V}$

AC-15 utilization category according to IEC 60947-5-1 / EN 60947-5-1:

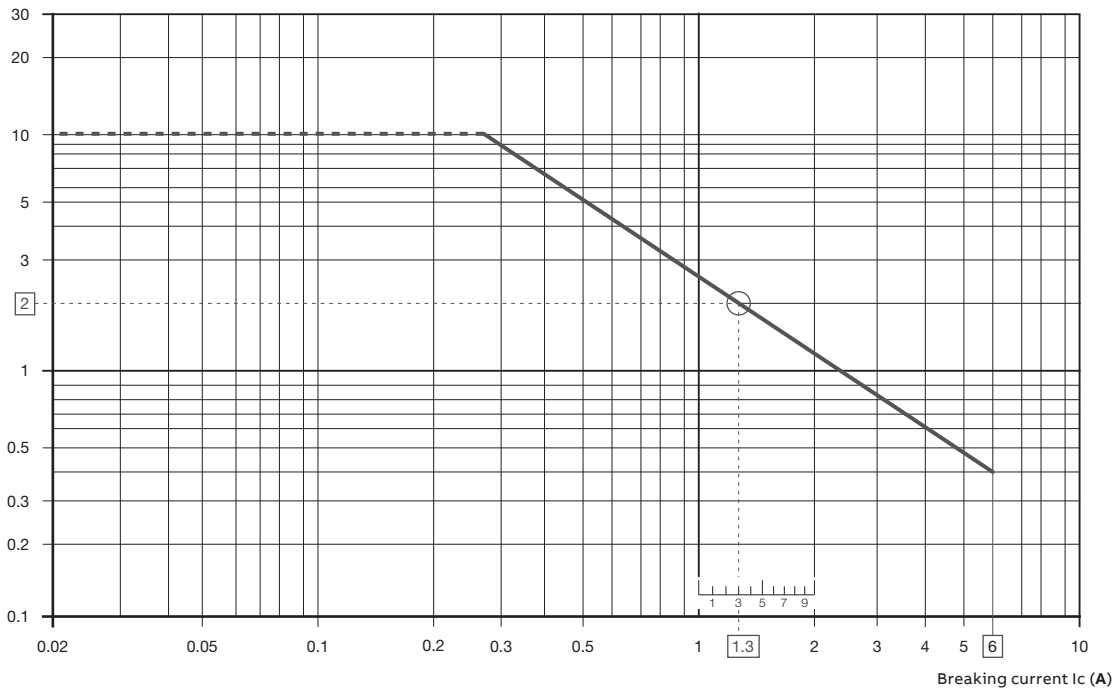
- making current: $10 \times I_e$ with $\cos \phi = 0.7$ and U_e
- breaking current: I_e with $\cos \phi = 0.4$ and U_e .

This curve represents the electrical durability of the built-in or add-on auxiliary contacts in relation to the breaking current.

The curve has been drawn for resistive and inductive loads up to 400 V:

- AS09..S ... AS16..S and ASL09..S ... ASL16..S contactor built-in auxiliary contacts
- 1-pole CA3..S
- NS..S and NSL..S contactor relays.

Millions of operating cycles

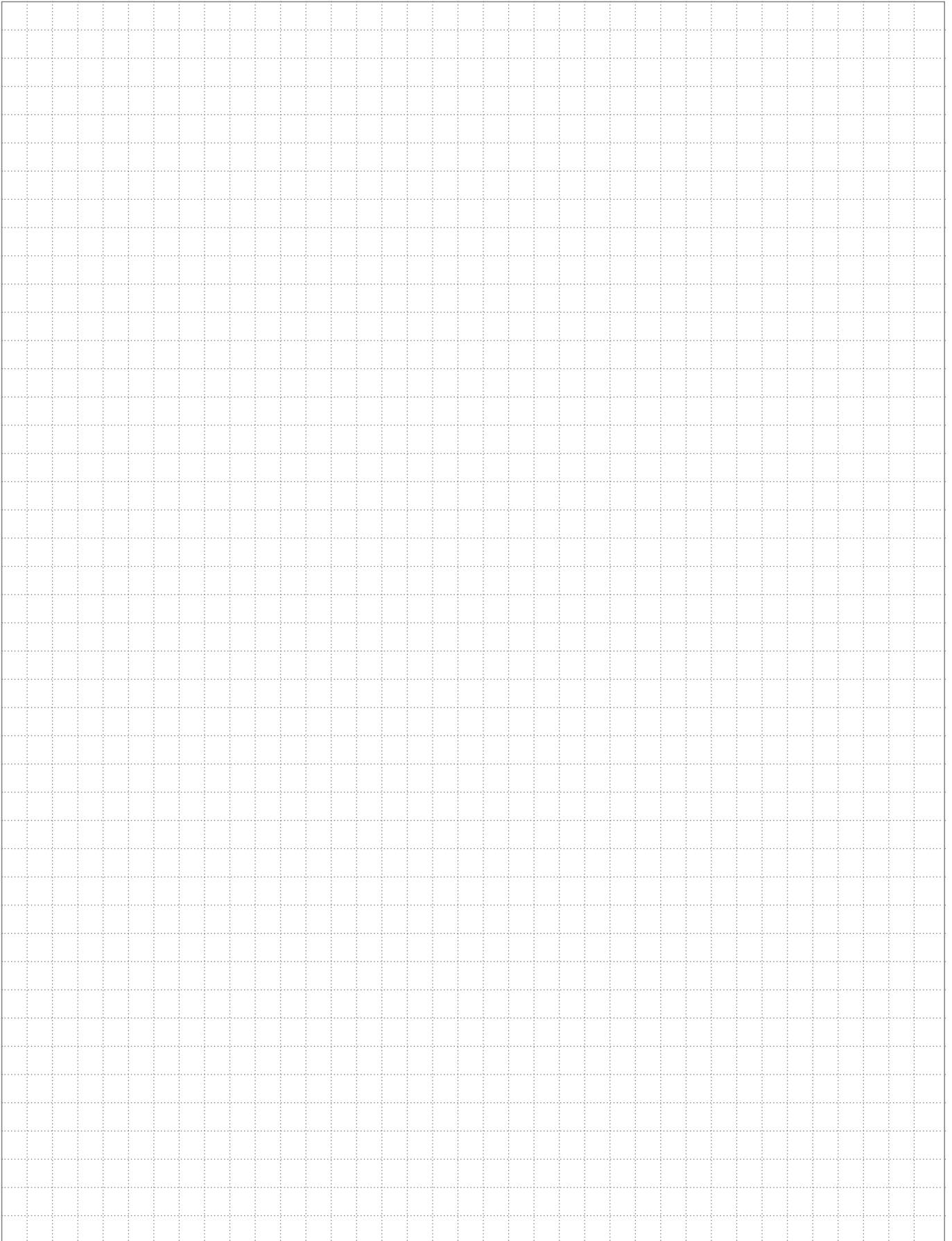


Example:

Breaking current = 1.3 A

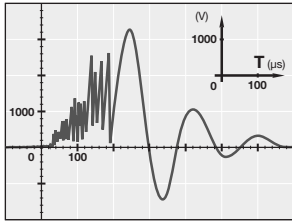
On the opposite curve at intersection "O" 1.3 A the corresponding value for the electrical durability is approximately 2 millions operating cycles.

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.

Surge suppressors for contactor coils

Accessories



The operation of inductive circuits causes overvoltages, in particular on opening the contactor coil. The electromagnetic energy stored in the coil during contactor closing is restored on opening in the form of surges, the slope and amplitude of which may rise to several kilovolts. A number of drawbacks are observed ranging from interference on the electronic devices to the breakdown of insulators and even the destruction of certain sensitive components.

The graph opposite reproduces the oscillogram showing voltage discharges at the terminals of a 42 V / 50 Hz coil without peak clipping. The coil was switched by 8 series-connected poles of a contactor relay.

Following a burst of discharges with a very steep slope, a damped oscillation emerges with a peak value of 3500 V.

Overvoltage Factor

The overvoltage factor k is defined as the ratio of the maximum overvoltage peak value \hat{U}_s to the peak value \hat{U}_c of the coil rated control voltage U_c :

$$k = \frac{\hat{U}_s \text{ max.}}{\hat{U}_c} \quad \text{in DC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c} \quad \text{in AC} \quad k = \frac{\hat{U}_s \text{ max.}}{U_c \sqrt{2}}$$

For example the following is obtained for the above graph: $k = \frac{3500}{42 \sqrt{2}} \approx 60$

To reduce the harmful effects of these overvoltages, ABB has developed a range of surge suppressors designed to reduce the k factor defined above and to limit or even completely eliminate the high pre-damping voltage frequencies.

Each case is different, but the technical data tolerances and generous sizing of parts have enabled us to reduce the number of variants.

We have chosen the following solutions: transil diodes, varistors and RC blocks.

Note: A varistor is a resistor whose value decreases to a very large extent when a certain voltage is applied at its terminals.



RV5

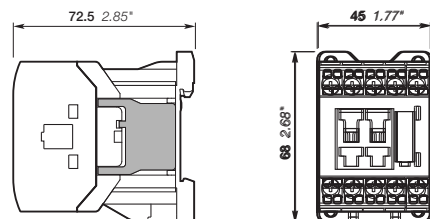


RC5-1



RT5

| For contactors | For contactor relays | Rated control circuit voltage - U_c | | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------|----------------------|---------------------------------------|-------|-----------|-----------------|---------|-------------------|
| | | V | DC AC | | | | |
| AS...S, ASL...S | NS...S, NSL...S | 24...50 | ● ● | RV5/50 | 1SBN050010R1000 | 2 | 0.015 |
| | | 50...133 | ● ● | RV5/133 | 1SBN050010R1001 | 2 | 0.015 |
| | | 110...250 | ● ● | RV5/250 | 1SBN050010R1002 | 2 | 0.015 |
| | | 250...440 | ● ● | RV5/440 | 1SBN050010R1003 | 2 | 0.015 |
| AS...S | NS...S | 24...50 | - ● | RC5-1/50 | 1SBN050100R1000 | 2 | 0.012 |
| | | 50...133 | - ● | RC5-1/133 | 1SBN050100R1001 | 2 | 0.012 |
| | | 110...250 | - ● | RC5-1/250 | 1SBN050100R1002 | 2 | 0.012 |
| | | 250...440 | - ● | RC5-1/440 | 1SBN050100R1003 | 2 | 0.012 |
| ASL...S | NSL...S | 12...32 | ● - | RT5/32 | 1SBN050020R1000 | 2 | 0.015 |
| | | 25...65 | ● - | RT5/65 | 1SBN050020R1001 | 2 | 0.015 |
| | | 50...90 | ● - | RT5/90 | 1SBN050020R1002 | 2 | 0.015 |
| | | 77...150 | ● - | RT5/150 | 1SBN050020R1003 | 2 | 0.015 |
| | | 150...264 | ● - | RT5/264 | 1SBN050020R1004 | 2 | 0.015 |



Main dimensions mm, inches

Easy connection to the coil terminals
(parallel mounting)
Clip-on for both fixing and connection.

No additional space
Clipped onto the right side part of the contactor base without changing contactor overall dimensions and keeping a free access to coil terminals.

Surge suppressors for contactor coils

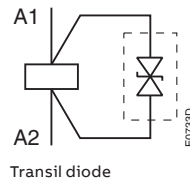
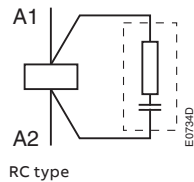
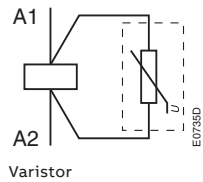
Technical data

| Varistor | RV5/50 | RV5/133 | RV5/250 | RV5/440 |
|---|---|--------------------------------|----------------------------------|----------------------------------|
| Rated control circuit voltage U_c | 24...50 V AC 24...50 V DC | 50...133 V AC 50...133 V DC | 110...250 V AC 110...250 V DC | 250...440 V AC 250...440 V DC |
| Residual overvoltage (clipping voltage) | 132 V AC 132 V DC | 270 V AC 270 V DC | 480 V AC 480 V DC | 825 V AC 825 V DC |
| Opening time growth factor | none | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | High energy absorption: good damping - Unpolarized system. | | | |
| Drawback | Clipping as from U_{vdr}^* , thus voltage front up to this point. | | | |
| | * U_{vdr} = Varistor operating voltage (voltage dependent resistor), tolerance $\pm 10\%$. | | | |

| RC type | RC5-1/50 | RC5-1/133 | RC5-1/250 | RC5-1/440 |
|---|--|---------------|----------------|----------------|
| Rated control circuit voltage U_c | 24...50 V AC | 50...133 V AC | 110...250 V AC | 250...440 V AC |
| Residual overvoltage (clipping voltage) | 2 to 3 x U_c max. | | | |
| Opening time growth factor | 2...3 | | | |
| Operating temperature | -20...+70 °C | | | |
| Advantages | Very fast clipping - Attenuation of steep fronts and thus of high frequencies. | | | |

| Transil diode | RT5/32 | RT5/65 | RT5/90 | RT5/150 | RT5/264 |
|---|--|--------------|--------------|---------------|----------------|
| Rated control circuit voltage U_c | 12...32 V DC | 25...65 V DC | 50...90 V DC | 77...150 V DC | 150...264 V DC |
| Residual overvoltage (clipping voltage) | 50 V DC | 100 V DC | 150 V DC | 210 V DC | 390 V DC |
| Opening time growth factor | 1.1...1.2 | | | | |
| Operating temperature | -20...+70 °C | | | | |
| Advantages | Good energy absorption - Unpolarized system - Simple, reliable system. | | | | |
| Drawback | Delay on drop out which does not however reduce contactor breaking capacity. | | | | |

Wiring diagrams



Connecting links for starting solutions and other accessories



BEA16-3U

1SBRC101384F0010

Connecting links

The BEA16-3U insulated connecting links are used to connect an AS..S AC operated contactor or an ASL..S DC operated contactor with a manual motor starter.

The connecting link ensure the electrical and mechanical connection between the contactor and the manual motor starter.

| For contactors | Manual motor starter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|--|----------|-----------------|---------|-------------------|
| AS09..S ... AS16..S ASL09..S ... ASL16..S | MS116-0.16 ... MS116-16 MS132-0.16 ... MS132-16 | BEA16-3U | 1SBN081020R1000 | 1 | 0.045 |



BDT4

1SBC100043V0014

Test block

BDT4 test block is suitable for switching on contactor off-load.

Marking on the block indicates the contactor type to fit with.

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|------------------------------|------|-----------------|---------|-------------------|
| AS..S, ASL..S, NS..S, NSL..S | BDT4 | 1SBN110122T1000 | 10 | 0.007 |



BA4

1SNC160010F0014

Function markers

Box of 16 blank cards (16 markers by card) printable on HTP500 thermal transfer printer and AMS 500 marking table to identify your contactors, overload relays or manual motor starters.

Marker dimensions: 7 x 20 mm (.276" x .787").

| For contactors | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---------------------------------|------------|-----------------|---------|-------------------|
| AS..S, ASL..S, NS..S, NSL..S | BA4 | 1SNA235156R2700 | 16 | 0.011 |
| AMS 500 support plate for 8 BA4 | SPRC 1 | 1SNA360010R1500 | 1 | 0.220 |
| HTP500 support plate | HTP500-BA4 | 1SNA235712R2400 | 1 | 0.290 |

Voltage code table

The below tables indicate the available coil voltages and corresponding digits for order codes. When placing an order, please give either type or order code. Select a standard contactor from ordering detail pages. Change the coil voltage code in the type or in the order code according to the table below. Example: for contactor AS09-30-10S and coil 42 V 50/60 Hz, type is AS09-30-10S-21 and order code is 1SBL101004R2110.

3-pole contactors - with spring terminals

Type
AS16 - 30 - 10 S - 26

Order code
1SBL121004R 26 10

Contactor type
AS AC operated
ASL DC operated

AC coil code
50 Hz 60 Hz

| | | |
|----|-------|-------|
| 20 | 24 V | 24 V |
| 21 | 42 V | 42 V |
| 22 | 48 V | 48 V |
| 23 | 110 V | 110 V |
| 24 | 115 V | 115 V |
| 16 | - | 120 V |
| 25 | 220 V | 220 V |
| 26 | 230 V | 230 V |
| 27 | 240 V | 240 V |
| 17 | - | 277 V |
| 13 | 380 V | - |
| 28 | 400 V | 400 V |
| 29 | 415 V | 415 V |

DC coil code

| | |
|----|-------|
| 80 | 12 V |
| 81 | 24 V |
| 83 | 48 V |
| 84 | 60 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |
| 89 | 240 V |

Contactor relays - with spring terminals

Type
NS 40 E S - 26

Order code
1SBH101004R 26 40

Contactor type
NS AC operated
NSL DC operated

AC coil code
50 Hz 60 Hz

| | | |
|----|-------|-------|
| 20 | 24 V | 24 V |
| 21 | 42 V | 42 V |
| 22 | 48 V | 48 V |
| 23 | 110 V | 110 V |
| 24 | 115 V | 115 V |
| 16 | - | 120 V |
| 25 | 220 V | 220 V |
| 26 | 230 V | 230 V |
| 27 | 240 V | 240 V |
| 17 | - | 277 V |
| 13 | 380 V | - |
| 28 | 400 V | 400 V |
| 29 | 415 V | 415 V |

DC coil code

| | |
|----|-------|
| 80 | 12 V |
| 81 | 24 V |
| 83 | 48 V |
| 84 | 60 V |
| 86 | 110 V |
| 87 | 125 V |
| 88 | 220 V |
| 89 | 240 V |



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/T16-1.3
www.abb.com/productdetails/1SAZ711201R1025

Overload relays

6/2 Overview

Thermal overload relays

- 6/4 T16 thermal overload relays – 0.10 to 16.0 A
- 6/8 TF42 thermal overload relays – 0.10 to 38.0 A
- 6/13 TF65 thermal overload relays – 22.0 to 67.0 A
- 6/17 TF96 thermal overload relays – 40.0 to 96.0 A
- 6/21 TF140DU thermal overload relays – 66 to 142 A
- 6/25 TA200DU thermal overload relays – 66 to 200 A

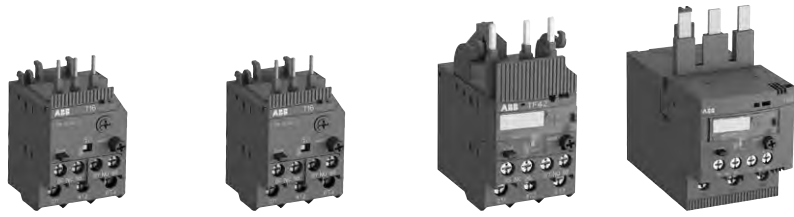
Electronic overload relays

- 6/29 E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A
- 6/34 EF65, EF96, EF146 electronic overload relays – 20 to 150 A
- 6/39 EF205, EF370 electronic overload relays – 63 to 380 A
- 6/43 EF460, EF750, EF1250DU electronic overload relays
150 to 1250 A

6/45 General accessories

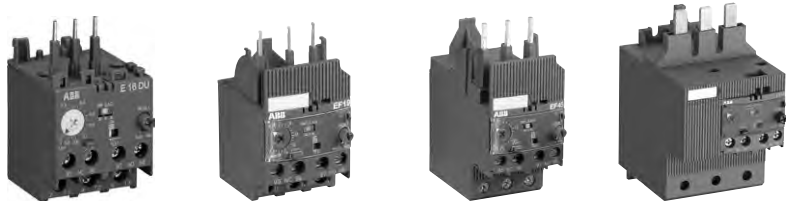
Thermal and electronic overload relays

Thermal overload relays



| | | | | | |
|-----------------------------------|-------|-----------------|-----------------|------------------|------------------|
| IEC: rated operational power AC-3 | 400 V | 0.06 ... 7.5 kW | 0.06 ... 7.5 kW | 0.06 ... 18.5 kW | 11 ... 37 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 1/2 ... 10 hp | 1/2 ... 10 hp | 1/2 ... 25 hp | 15 ... 50 hp |
| Fitting to contactors | | B6, B7 | AS09 ... AS16 | AF09 ... AF38 | AF40, AF52, AF65 |
| Type | | T16 | T16 | TF42 | TF65 |
| Current range | | 0.10 ... 16 A | 0.10 ... 16 A | 0.10 ... 38 A | 22 ... 67 A |
| Trip class | | 10 | 10 | 10 | 10 |
| Single mounting kit | | DB16 | DB16 | DB42 | DB65 |

Electronic overload relays with integrated CT

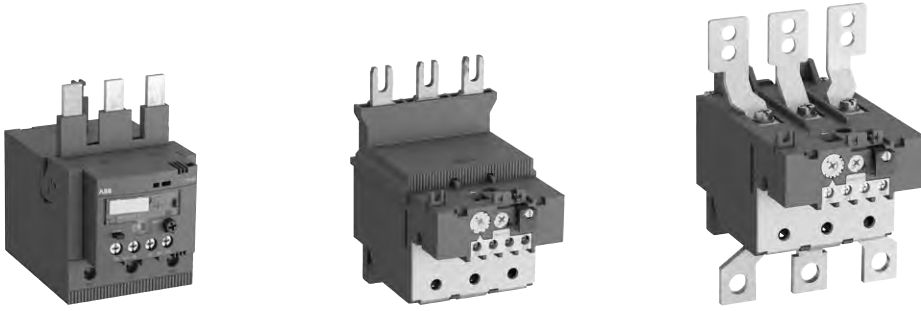


| | | | | | |
|-----------------------------------|-------|--|-----------------|---------------|------------------|
| IEC: rated operational power AC-3 | 400 V | 0.06 ... 7.5 kW | 0.06 ... 7.5 kW | 4 ... 22 kW | 7.5 ... 37 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 1/2 ... 10 hp | 1/2 ... 10 hp | 5 ... 30 hp | 15 ... 50 hp |
| Fitting to contactors | | B6, B7, BC6, BC7, VB6, VB7, VBC6, VBC7 | AF09 ... AF38 | AF26 ... AF38 | AF40, AF52, AF65 |
| Type | | E16DU | EF19 | EF45 | EF65 |
| Current range | | 0.10 ... 18.9 A | 0.10 ... 18.9 A | 9 ... 45 A | 20 ... 70 A |
| Trip class | | 10E, 20E, 30E selectable | | | |
| Single mounting kit | | DB16E | DB19EF | DB45EF | - |

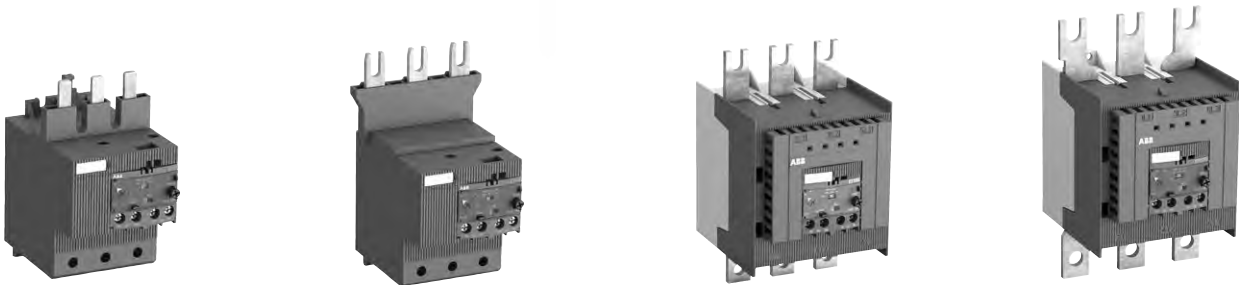
Electronic overload relays with external separate CT



| | | | | |
|-----------------------------------|-------|--------------------------|----------------------|------------------------|
| IEC: rated operational power AC-3 | 400 V | 75 ... 250 kW | 132 ... 400 kW | 250 ... 710 kW |
| UL/CSA: 3-phase hp-ratings | 480 V | 100 ... 400 hp | 200 ... 500 hp | 600 ... 900 hp |
| Fitting to contactors | | AF400, AF460 | AF580, AF750, AF1250 | AF1350, AF1650, AF2050 |
| Type | | EF460 | EF750 | EF1250DU |
| Current range | | 150 ... 500 A | 250 ... 800 A | 375 ... 1250 A |
| Trip class | | 10E, 20E, 30E selectable | | |



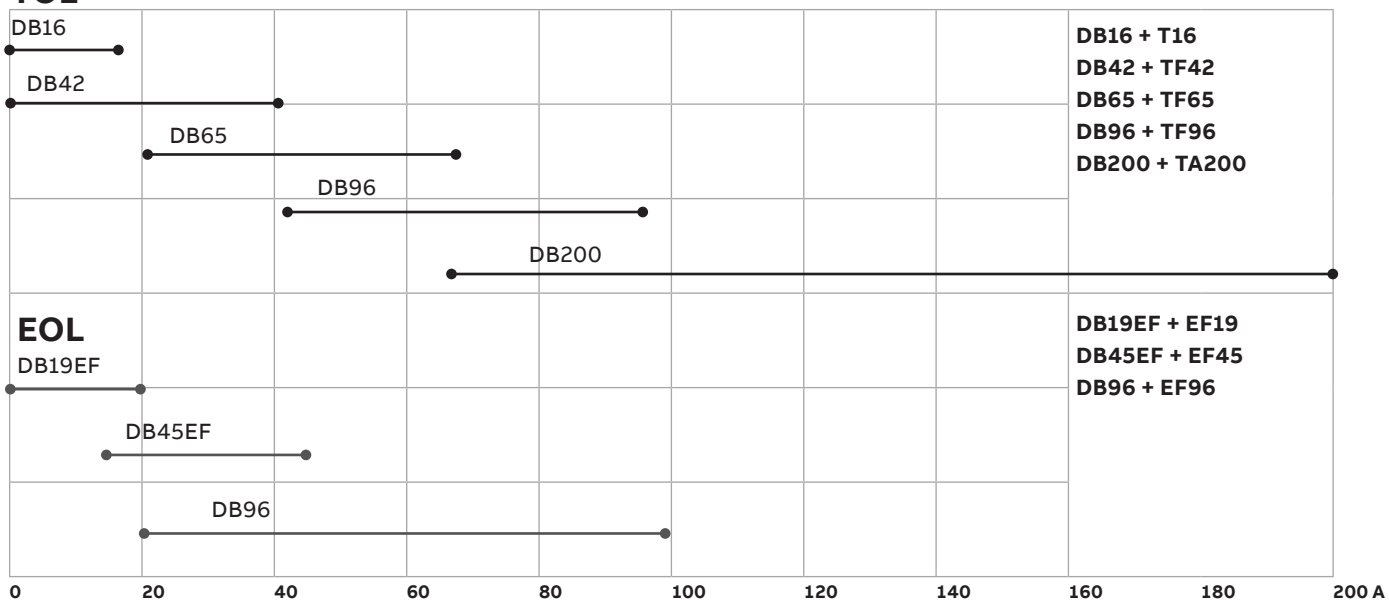
| | | |
|----------------|---------------------|----------------|
| 18.5 ... 45 kW | 37 ... 75 kW | 37 ... 110 kW |
| 30 ... 75 hp | 50 ... 100 hp | 50 ... 150 hp |
| AF80, AF96 | AF116, AF140, AF146 | AF190, AF205 |
| TF96 | TF140DU | TA200DU |
| 40 ... 96 A | 66 ... 142 A | 66 ... 200 A |
| 10 | 10A | 10A |
| DB96 | - | DB200 |



| | | | |
|--------------------------|---------------------|---------------|---------------------|
| 22 ... 55 kW | 30 ... 75 kW | 37 ... 110 kW | 75 ... 200 kW |
| 30 ... 75 hp | 50 ... 100 hp | 50 ... 150 hp | 100 ... 300 hp |
| AF80, AF96 | AF116, AF140, AF146 | AF190, AF205 | AF265, AF305, AF370 |
| EF96 | EF146 | EF205 | EF370 |
| 20 ... 100 A | 54 ... 150 A | 63 ... 210 A | 115 ... 380 A |
| 10E, 20E, 30E selectable | | | |
| DB96 | - | - | - |

Single mounting kit overview

TOL



T16 thermal overload relays – 0.10 to 16.0 A

Ordering details



T16

2CDC231009F0013



T16 + DB16

2CDC231025F0013



KPR-101L

1SFC15124F0002



DB16

2CDC231002F0011

The T16 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications

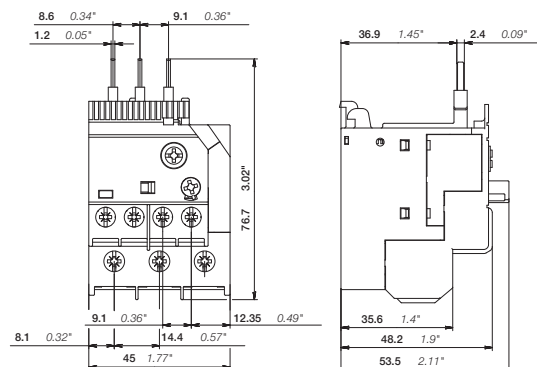
| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AS09...AS16, B6 and B7 all variants

| | | | | | |
|---------------|----------------------|----|----------|-----------------|-------|
| 0.10 ... 0.13 | 0.5 A, fuse type T | 10 | T16-0.13 | 1SAZ711201R1005 | 0.100 |
| 0.13 ... 0.17 | 1.0 A, fuse type T | 10 | T16-0.17 | 1SAZ711201R1008 | 0.100 |
| 0.17 ... 0.23 | 1.0 A, fuse type T | 10 | T16-0.23 | 1SAZ711201R1009 | 0.100 |
| 0.23 ... 0.31 | 1.0 A, fuse type T | 10 | T16-0.31 | 1SAZ711201R1013 | 0.100 |
| 0.31 ... 0.41 | 2.0 A, fuse type gG | 10 | T16-0.41 | 1SAZ711201R1014 | 0.100 |
| 0.41 ... 0.55 | 2.0 A, fuse type gG | 10 | T16-0.55 | 1SAZ711201R1017 | 0.100 |
| 0.55 ... 0.74 | 4.0 A, fuse type gG | 10 | T16-0.74 | 1SAZ711201R1021 | 0.100 |
| 0.74 ... 1.00 | 6.0 A, fuse type gG | 10 | T16-1.0 | 1SAZ711201R1023 | 0.100 |
| 1.00 ... 1.30 | 6.0 A, fuse type gG | 10 | T16-1.3 | 1SAZ711201R1025 | 0.100 |
| 1.30 ... 1.70 | 10.0 A, fuse type gG | 10 | T16-1.7 | 1SAZ711201R1028 | 0.100 |
| 1.70 ... 2.30 | 10.0 A, fuse type gG | 10 | T16-2.3 | 1SAZ711201R1031 | 0.100 |
| 2.30 ... 3.10 | 10.0 A, fuse type gG | 10 | T16-3.1 | 1SAZ711201R1033 | 0.100 |
| 3.10 ... 4.20 | 20.0 A, fuse type gG | 10 | T16-4.2 | 1SAZ711201R1035 | 0.100 |
| 4.20 ... 5.70 | 20.0 A, fuse type gG | 10 | T16-5.7 | 1SAZ711201R1038 | 0.100 |
| 5.70 ... 7.60 | 35.0 A, fuse type gG | 10 | T16-7.6 | 1SAZ711201R1040 | 0.100 |
| 7.60 ... 10.0 | 35.0 A, fuse type gG | 10 | T16-10 | 1SAZ711201R1043 | 0.104 |
| 10.0 ... 13.0 | 40.0 A, fuse type gG | 10 | T16-13 | 1SAZ711201R1045 | 0.104 |
| 13.0 ... 16.0 | 40.0 A, fuse type gG | 10 | T16-16 | 1SAZ711201R1047 | 0.104 |

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---------------------|-------------------------|----------|-----------------|-------------------|
| Single mounting kit | T16 | DB16 | 1SAZ701901R0001 | 0.032 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |



T16

Main dimensions mm, inches

2CDC232009F0008

2CDC106036C0201

T16 thermal overload relays – 0.10 to 16.0 A

Technical data

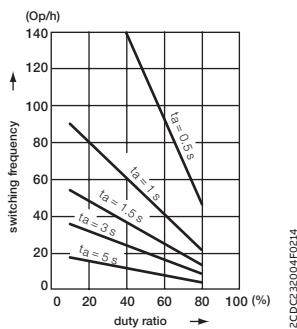
Main circuit – Utilization characteristics according to IEC/EN

| | | |
|--|---|--|
| Type | T16 | |
| Standards | IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1 | |
| Rated operational voltage Ue | 690 V AC - V DC | |
| Rated frequency | 50/60 Hz | |
| Trip class | 10 | |
| Number of poles | 3 | |
| Duty time | 100% | |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" | |
| Rated impulse withstand voltage Uimp | 6 kV | |
| Rated insulation voltage Ui | 690 V AC | |

Auxiliary circuit according to IEC/EN

| | | | | |
|---|---|-------------|-------------------|--------|
| Type | T16 | | | |
| Rated operational voltage Ue | 600 V | | | |
| Conventional free air thermal current Ith | N.C., 95-96 | 6 A | | |
| | N.O., 97-98 | 4 A | | |
| Rated frequency | DC, 50/60 Hz | | | |
| Number of poles | 1 N.O. + 1 N.C. | | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | 110-120 V | N.C., 95-96 | 3.00 A | |
| | | N.O., 97-98 | 0.50 A | |
| | 220-230-240 V | N.C., 95-96 | 3.00 A | |
| | | N.O., 97-98 | 0.50 A | |
| | 440 V | N.C., 95-96 | 0.75 A | |
| | | N.O., 97-98 | 0.50 A | |
| | 480-500 V | N.C., 95-96 | 0.75 A | |
| | | N.O., 97-98 | 0.50 A | |
| | Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | 24 V | N.C., 95-96 | 1.25 A |
| | | | N.O., 97-98 | 1.25 A |
| | | 60 V | N.C., 95-96 | 0.55 A |
| | | | N.O., 97-98 | 0.55 A |
| 110-120-125 V | | N.C., 95-96 | 0.55 A | |
| | | N.O., 97-98 | 0.55 A | |
| 250 V | | N.C., 95-96 | 0.27 A | |
| | | N.O., 97-98 | 0.27 A | |
| Minimum switching capacity | | 17 V / 3 mA | | |
| Short-circuit protective device | | N.C., 95-96 | 6 A, fuse type gG | |
| | | N.O., 97-98 | 4 A, fuse type gG | |
| Rated impulse withstand voltage Uimp | | 6 kV | | |
| Rated insulation voltage Ui | 690 V | | | |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

T16 thermal overload relays – 0.10 to 16.0 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | T16 |
| Standards | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|-------------|------------|
| Type | T16 | |
| Contact rating | N.C., 95-96 | B600, Q300 |
| | N.O., 97-98 | D300, Q300 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device 480 / 600 V AC | | 480 / 600 V AC | |
|----------|----------------------|---|-----------|--------------------------------------|---------------|
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| T16-0.13 | 0.13 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.17 | 0.17 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.23 | 0.23 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| T16-0.31 | 0.31 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.41 | 0.41 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.55 | 0.55 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-0.74 | 0.74 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| T16-1.0 | 1.00 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-1.3 | 1.30 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-1.7 | 1.70 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| T16-2.3 | 2.30 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| T16-3.1 | 3.10 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| T16-4.2 | 4.20 A | 18 kA | 15 A, K5 | 100 kA | 30 A, Class J |
| T16-5.7 | 5.70 A | 18 kA | 20 A, K5 | 100 kA | 30 A, Class J |
| T16-7.6 | 7.60 A | 18 kA | 25 A, K5 | 100 kA | 30 A, Class J |
| T16-10 | 10.0 A | 18 kA | 35 A, K5 | 100 kA | 45 A, Class J |
| T16-13 | 13.0 A | 18 kA | 40 A, K5 | 100 kA | 45 A, Class J |
| T16-16 | 16.0 A | 18 kA | 60 A, K5 | 100 kA | 45 A, Class J |

T16 thermal overload relays – 0.10 to 16.0 A



Technical data

General technical data





| | | |
|--|---|----------------|
| Type | T16 | |
| Pollution degree | 3 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +60 °C |
| Storage | Open | -25 ... +60 °C |
| Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | Acc. to IEC/EN60947-4-1 | |
| Maximum operating altitude permissible | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 3g / 3 ... 150 Hz | |
| Mounting position | Position 1-5 | |
| Mounting | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |

Electrical connection

Main circuit

| | | |
|--|---------------------------------|---|
| Type | T16 | |
| Connecting capacity | | |
|  Rigid | 1 x | 0.75 ... 4 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² or 1.5 ... 4 mm ² (1) |
|  Flexible | 1 x or 2 x | 0.75 ... 4 mm ² |
| | 1 x or 2 x | AWG 18-10 |
| | 1 x or 2 x | AWG 18-10 |
| Stripping length | 12 mm | |
| Tightening torque | 1.1 ... 1.5 Nm / 9 ... 13 lb.in | |
| Recommended screw driver | M4 (Pozidriv 2) | |

Auxiliary circuit

| | | |
|---|---------------------------------|---|
| Type | T16 | |
| Connecting capacity | | |
|  Rigid | 1 x or 2 x | 0.75 ... 4 mm ² |
|  Flexible with ferrule | 1 x or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 x or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² (1) |
| | 1 x or 2 x | AWG 18-12 |
| | 1 x or 2 x | AWG 18-12 |
| Stripping length | 9 mm | |
| Tightening torque | 1.1 ... 1.5 Nm / 9 ... 13 lb.in | |
| Recommended screw driver | M3 (Pozidriv 2) | |

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges

TF42 thermal overload relays – 0.10 to 38.0 A

Ordering details



TF42

2CDC231006F0013



TF42 + DB42

2CDC231006F0013

The TF42 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

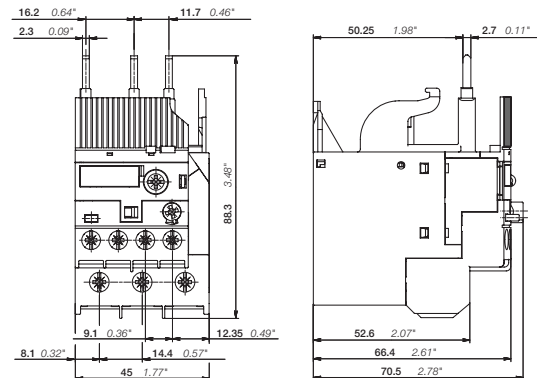
The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AF09...AF38 contactors

| | | | | | |
|--------------------|----------------------|----|-----------|-----------------|-------|
| 0.10 ... 0.13 | 0.5 A, fuse type T | 10 | TF42-0.13 | 1SAZ721201R1005 | 0.130 |
| 0.13 ... 0.17 | 1.0 A, fuse type T | 10 | TF42-0.17 | 1SAZ721201R1008 | 0.130 |
| 0.17 ... 0.23 | 1.0 A, fuse type T | 10 | TF42-0.23 | 1SAZ721201R1009 | 0.130 |
| 0.23 ... 0.31 | 1.0 A, fuse type T | 10 | TF42-0.31 | 1SAZ721201R1013 | 0.130 |
| 0.31 ... 0.41 | 2.0 A, fuse type gG | 10 | TF42-0.41 | 1SAZ721201R1014 | 0.130 |
| 0.41 ... 0.55 | 2.0 A, fuse type gG | 10 | TF42-0.55 | 1SAZ721201R1017 | 0.130 |
| 0.55 ... 0.74 | 4.0 A, fuse type gG | 10 | TF42-0.74 | 1SAZ721201R1021 | 0.130 |
| 0.74 ... 1.00 | 6.0 A, fuse type gG | 10 | TF42-1.0 | 1SAZ721201R1023 | 0.130 |
| 1.00 ... 1.30 | 6.0 A, fuse type gG | 10 | TF42-1.3 | 1SAZ721201R1025 | 0.130 |
| 1.30 ... 1.70 | 10.0 A, fuse type gG | 10 | TF42-1.7 | 1SAZ721201R1028 | 0.130 |
| 1.70 ... 2.30 | 10.0 A, fuse type gG | 10 | TF42-2.3 | 1SAZ721201R1031 | 0.130 |
| 2.30 ... 3.10 | 10.0 A, fuse type gG | 10 | TF42-3.1 | 1SAZ721201R1033 | 0.130 |
| 3.10 ... 4.20 | 20.0 A, fuse type gG | 10 | TF42-4.2 | 1SAZ721201R1035 | 0.130 |
| 4.20 ... 5.70 | 20.0 A, fuse type gG | 10 | TF42-5.7 | 1SAZ721201R1038 | 0.130 |
| 5.70 ... 7.60 | 35.0 A, fuse type gG | 10 | TF42-7.6 | 1SAZ721201R1040 | 0.130 |
| 7.60 ... 10.0 | 35.0 A, fuse type gG | 10 | TF42-10 | 1SAZ721201R1043 | 0.130 |
| 10.0 ... 13.0 | 40.0 A, fuse type gG | 10 | TF42-13 | 1SAZ721201R1045 | 0.130 |
| 13.0 ... 16.0 | 40.0 A, fuse type gG | 10 | TF42-16 | 1SAZ721201R1047 | 0.130 |
| 16.0 ... 20.0 | 63.0 A, fuse type gG | 10 | TF42-20 | 1SAZ721201R1049 | 0.145 |
| 20.0 ... 24.0 | 63.0 A, fuse type gG | 10 | TF42-24 | 1SAZ721201R1051 | 0.145 |
| 24.0 ... 29.0 | 63.0 A, fuse type gG | 10 | TF42-29 | 1SAZ721201R1052 | 0.145 |
| 29.0 ... 35.0 | 80.0 A, fuse type gG | 10 | TF42-35 | 1SAZ721201R1053 | 0.145 |
| 35.0 ... 38.0/40.0 | 80.0 A, fuse type gG | 10 | TF42-38 | 1SAZ721201R1055 | 0.145 |



TF42

Main dimensions mm, inches

2CDC232005F0009

2CDC106046C0201

TF42 thermal overload relays – 0.10 to 38.0 A

Ordering details



DB42

2CDC23100F0011



KPR-101L

15FCL51224F0002



DRS-F

2CDC211002V0017

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|-----------------------------------|-------------------------|-------------|-----------------|-------------------|
| Single mounting kit | TF42 | DB42 | 1SAZ701902R0001 | 0.087 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC/DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V AC/DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC/DC | | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V AC/DC | | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.077 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.077 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.077 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.077 |

TF42 thermal overload relays – 0.10 to 38.0 A

Technical data

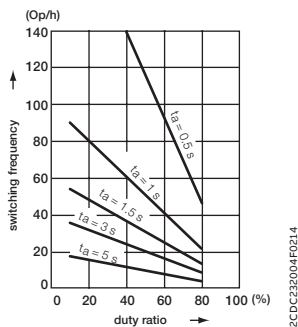
Main circuit – Utilization characteristics according to IEC/EN

| Type | TF42 |
|--|---|
| Standards | IEC/EN 60947-4-1, IEC/EN 60947-5-1, IEC/EN 60947-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | 50/60 Hz |
| Trip class | 10 |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V AC |

Auxiliary circuit according to IEC/EN

| Type | TF42 |
|---|--|
| Rated operational voltage Ue | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 6 A N.O., 97-98 4 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 220-230-240 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 440 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| 480-500 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | N.C., 95-96 1.25 A N.O., 97-98 1.25 A |
| 110-120-125 V | N.C., 95-96 0.55 A N.O., 97-98 0.55 A |
| 250 V | N.C., 95-96 0.27 A N.O., 97-98 0.27 A |
| Minimum switching capacity | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 6 A, fuse type gG N.O., 97-98 4 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF42 thermal overload relays – 0.10 to 38.0 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | TF42 |
| Standards | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|-------------|------------|
| Type | TF42 | |
| Contact rating | N.C., 95-96 | B600, Q300 |
| | N.O., 97-98 | D300, Q300 |
| Conventional thermal current | N.C., 95-96 | 5 A |
| | N.O., 97-98 | 2.5 A |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|-----------|----------------------|--------------------------------------|-----------|--------------------------------------|----------------|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF42-0.13 | 0.13 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.17 | 0.17 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.23 | 0.23 A | 18 kA | 1 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.31 | 0.31 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.41 | 0.41 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.55 | 0.55 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-0.74 | 0.74 A | 18 kA | 3 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.0 | 1.00 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.3 | 1.30 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-1.7 | 1.70 A | 18 kA | 6 A, K5 | 100 kA | 30 A, Class J |
| TF42-2.3 | 2.30 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| TF42-3.1 | 3.10 A | 18 kA | 10 A, K5 | 100 kA | 30 A, Class J |
| TF42-4.2 | 4.20 A | 18 kA | 15 A, K5 | 100 kA | 30 A, Class J |
| TF42-5.7 | 5.70 A | 18 kA | 20 A, K5 | 100 kA | 30 A, Class J |
| TF42-7.6 | 7.60 A | 18 kA | 25 A, K5 | 100 kA | 30 A, Class J |
| TF42-10 | 10.0 A | 18 kA | 35 A, K5 | 100 kA | 45 A, Class J |
| TF42-13 | 13.0 A | 18 kA | 40 A, K5 | 100 kA | 45 A, Class J |
| TF42-16 | 16.0 A | 18 kA | 60 A, K5 | 100 kA | 45 A, Class J |
| TF42-20 | 20.0 A | 18 kA | 80 A, K5 | 100 kA | 60 A, Class J |
| TF42-24 | 24.0 A | 18 kA | 80 A, K5 | 100 kA | 60 A, Class J |
| TF42-29 | 29.0 A | 18 kA | 100 A, K5 | 100 kA | 100 A, Class J |
| TF42-35 | 35.0 A | 18 kA | 150 A, K5 | 100 kA | 175 A, Class J |
| TF42-38 | 38.0 A | 18 kA | 150 A, K5 | 100 kA | 175 A, Class J |

TF42 thermal overload relays – 0.10 to 38.0 A





Technical data

General technical data







| | | |
|--|---|----------------|
| Type | TF42 | |
| Pollution degree | 3 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +60 °C |
| | Open | -25 ... +60 °C |
| Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | Acc. to IEC/EN60947-4-1 | |
| Maximum operating altitude permissible | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 3g / 3 ... 150 Hz | |
| Mounting position | Position 1-5 | |
| Mounting | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |

Electrical connection

Main circuit

| Type | TF42 | | |
|---|--------------------------------|------------------------------|---|
| | (TF42-0.13 ... TF42-16) | (TF42-20 ... TF42-38) | |
| Connecting capacity | | | |
|  Rigid | 1 x or 2 x | 0.75 ... 4 mm ² | 1.5 ... 2.5 mm ² or 2.5 ... 10 mm ² (1) |
|  Flexible with insulated ferrule | 1 x or 2 x | 0.75 ... 4 mm ² | 2.5 ... 4 mm ² or 4 ... 6 mm ² (1) |
|  Stranded acc. to UL/CSA | 1 x or 2 x | AWG 18-10 | AWG 14-6 |
|  Flexible acc. to UL/CSA | 1 x or 2 x | AWG 18-10 | AWG 14-6 |
| Stripping length | 12 mm | | |
| Tightening torque | 1.5 - 2.5 Nm / 13 ... 22 lb.in | 2.5 - 2.7 Nm / 22 lb.in | |
| Recommended screw driver | M4 (Pozidriv 2) | | |

Auxiliary circuit

| Type | TF42 | |
|---|---------------------------------|---|
| Connecting capacity | | |
|  Rigid | 1 x or 2 x | 0.75 ... 4 mm ² |
|  Flexible with ferrule | 1 x or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 x or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² (1) |
|  Stranded acc. to UL/CSA | 1 x or 2 x | AWG 18-12 |
|  Flexible acc. to UL/CSA | 1 x or 2 x | AWG 18-12 |
| Stripping length | 9 mm | |
| Tightening torque | 1.1 ... 1.5 Nm / 9 ... 13 lb.in | |
| Recommended screw driver | M3 (Pozidriv 2) | |

(1) Only connect two different "conductor/wire" cross-sections, if they are within the indicated ranges.

TF65 thermal overload relays – 22.0 to 67.0 A

Ordering details



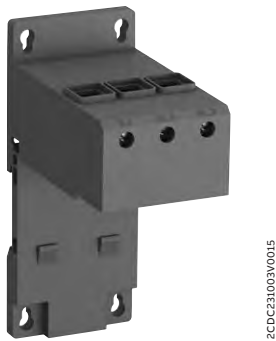
TF65

2CDC231004F0013

The TF65 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)



DB65

2CDC231003V0015

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AF40...AF65 contactors

| | | | | | |
|---------------|----------------------|----|---------|-----------------|-------|
| 22.0 ... 28.0 | 80 A, gG Type Fuses | 10 | TF65-28 | 1SAZ811201R1001 | 0.456 |
| 25.0 ... 33.0 | 80 A, gG Type Fuses | 10 | TF65-33 | 1SAZ811201R1002 | 0.456 |
| 30.0 ... 40.0 | 100 A, gG Type Fuses | 10 | TF65-40 | 1SAZ811201R1003 | 0.456 |
| 36.0 ... 47.0 | 125 A, gG Type Fuses | 10 | TF65-47 | 1SAZ811201R1004 | 0.456 |
| 44.0 ... 53.0 | 125 A, gG Type Fuses | 10 | TF65-53 | 1SAZ811201R1005 | 0.456 |
| 50.0 ... 60.0 | 125 A, gG Type Fuses | 10 | TF65-60 | 1SAZ811201R1006 | 0.466 |
| 57.0 ... 67.0 | 160 A, gG Type Fuses | 10 | TF65-67 | 1SAZ811201R1007 | 0.466 |

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|-------------------------------------|-------------------------|-------------|-----------------|-------------------|
| Single mounting kit | TF65 | DB65 | 1SAZ801901R1001 | 0.132 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC / DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V AC / DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC / DC | | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V AC / DC | | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.077 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.077 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.077 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.077 |

1) ATEX is valid for products, produced from week 26, 2015.



DB65 + TF65

2CDC231004V0015



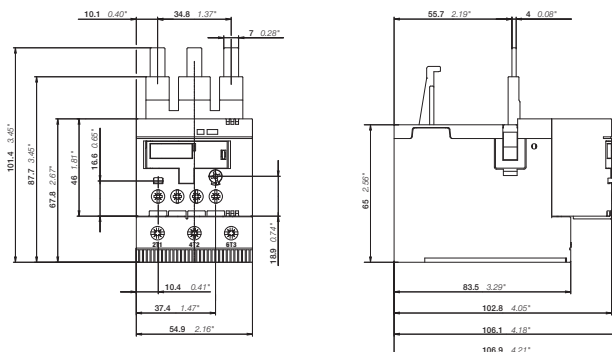
KPR-101L

1SFA616162R1014



DRS-F

2CDC211002V0017



TF65

Main dimensions mm, inches

2CDC232005F0009

TF65 thermal overload relays – 22.0 to 67.0 A

Technical data

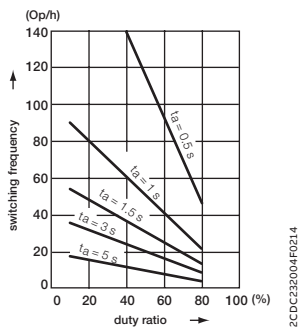
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | TF65 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | 50/60 Hz |
| Trip class | 10 |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 690 V |

Auxiliary circuit according to IEC/EN

| | |
|---|--|
| Type | TF65 |
| Rated operational voltage Ue | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 6 A N.O., 97-98 4 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 220-230-240 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 440 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| 480-500 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | N.C., 95-96 1.25 A N.O., 97-98 1.25 A |
| 110-120-125 V | N.C., 95-96 0.55 A N.O., 97-98 0.55 A |
| 250 V | N.C., 95-96 0.27 A N.O., 97-98 0.27 A |
| Minimum switching capacity | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 6 A, gG Type Fuses N.O., 97-98 4 A, gG Type Fuses |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

2CDC22004FD2.4

TF65 thermal overload relays – 22.0 to 67.0 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | TF65 |
| Standards | UL 60947-1, UL 60947-4-1 |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|-------------|------------|
| Type | TF65 | |
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | D300, Q600 |
| Conventional thermal current | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|---------|----------------------|--------------------------------------|-----------------|--------------------------------------|----------------|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF65-28 | 28 A | 5 kA | 100 A, K5 / RK5 | 100 kA | 110 A, Class J |
| TF65-33 | 33 A | 5 kA | 100 A, K5 / RK5 | 100 kA | 110 A, Class J |
| TF65-40 | 40 A | 5 kA | 100 A, K5 / RK5 | 100 kA | 110 A, Class J |
| TF65-47 | 47 A | 5 kA | 125 A, K5 / RK5 | 100 kA | 125 A, Class J |
| TF65-53 | 53 A | 10 kA | 125 A, K5 / RK5 | 100 kA | 125 A, Class J |
| TF65-60 | 60 A | 10 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |
| TF65-67 | 67 A | 10 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |

TF65 thermal overload relays – 22.0 to 67.0 A

Technical data





General technical data

| | | |
|--|---|----------------|
| Type | TF65 | |
| Pollution degree | 3 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | | |
| Operation (1) | Open - compensated | -40 ... +70 °C |
| | Open | -40 ... +70 °C |
| Storage | -50 ... +80 °C | |
| Ambient air temperature compensation | Acc. to IEC/EN 60947-4-1 | |
| Maximum operating altitude permissible | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | |
| Mounting position | Position 1 to 6 | |
| Mounting | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |





(1) Valid for TF65 produced from week 11, 2016. Otherwise, -25 ... +60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request

Electrical connection

Main circuit

| | | |
|---|--------------------------------|----------------------------|
| Type | TF65 | |
| Connecting capacity | | |
|  Rigid | 1 x or 2 x | 2.5 ... 16 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible with ferrule | 1 x or 2 x | 2.5 ... 10 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible with insulated ferrule | 1 x or 2 x | 2.5 ... 10 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
|  Flexible | 1 x or 2 x | 2.5 ... 16 mm ² |
| | 1 x | 2.5 ... 35 mm ² |
| | Stranded acc. to UL/CSA | 1 x AWG 12 ... 2 |
| | | 2 x AWG 12 ... 6 |
| | Flexible acc. to UL/CSA | 1 x AWG 12 ... 2 |
| | | 2 x AWG 12 ... 6 |
| Stripping length | 17 mm | |
| Tightening torque | 4.0 - 4.5 Nm / 35 ... 40 lb.in | |
| Recommended screw driver | M6 (Pozi driv 2) | |

Auxiliary circuit

| | | |
|---|---------------------------------|---|
| Type | TF65 | |
| Connecting capacity | | |
|  Rigid | 1 x or 2 x | 0.75 ... 4 mm ² |
|  Flexible with ferrule | 1 x or 2 x | 0.75 ... 4 mm ² |
|  Flexible with insulated ferrule | 1 x | 0.75 ... 2.5 mm ² |
| | 2 x | 0.75 ... 1.5 mm ² |
|  Flexible | 1 x or 2 x | 0.75 ... 1 mm ² or 1 ... 2.5 mm ² |
| | Stranded acc. to UL/CSA | 1 x or 2 x AWG 18 ... 12 |
| | Flexible acc. to UL/CSA | 1 x or 2 x AWG 18 ... 12 |
| Stripping length | 9 mm | |
| Tightening torque | 1.1 ... 1.5 Nm / 9 ... 13 lb.in | |
| Recommended screw driver | M3 (Pozi driv 2) | |

TF96 thermal overload relays – 40.0 to 96.0 A

Ordering details



TF96

2CDC231005F0013

The TF96 thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- With ATEX certification (1)

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

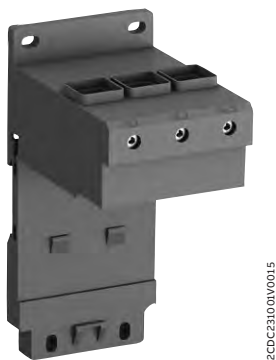
Suitable for AF80, AF96 contactors

| | | | | | |
|---------------|----------------------|----|---------|-----------------|-------|
| 40.0 ... 51.0 | 125 A, gG Type Fuses | 10 | TF96-51 | 1SAZ911201R1001 | 0.620 |
| 48.0 ... 60.0 | 160 A, gG Type Fuses | 10 | TF96-60 | 1SAZ911201R1002 | 0.620 |
| 57.0 ... 68.0 | 160 A, gG Type Fuses | 10 | TF96-68 | 1SAZ911201R1003 | 0.620 |
| 65.0 ... 78.0 | 200 A, gG Type Fuses | 10 | TF96-78 | 1SAZ911201R1004 | 0.620 |
| 75.0 ... 87.0 | 200 A, gG Type Fuses | 10 | TF96-87 | 1SAZ911201R1005 | 0.620 |
| 84.0 ... 96.0 | 250 A, gG Type Fuses | 10 | TF96-96 | 1SAZ911201R1006 | 0.630 |

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|-----------------------------------|-------------------------|-------------|-----------------|-------------------|
| Single mounting kit | TF96, EF96 | DB96 | 1SAZ901901R1001 | 0.190 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V AC/DC | TF42, TF65, TF96 | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V AC/DC | | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V AC/DC | | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V AC/DC | | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V DC | | DRS-F-TF-01 | 1SAZ701904R1001 | 0.077 |
| Remote stop coil 48-60 V DC | | DRS-F-TF-02 | 1SAZ701904R1002 | 0.077 |
| Remote stop coil 110-127 V DC | | DRS-F-TF-03 | 1SAZ701904R1003 | 0.077 |
| Remote stop coil 220-240 V DC | | DRS-F-TF-04 | 1SAZ701904R1004 | 0.077 |

(1) ATEX is valid for products, produced from week 26, 2015.



DB96

2CDC231001V0015



DB96 + TF96

2CDC231005V0015



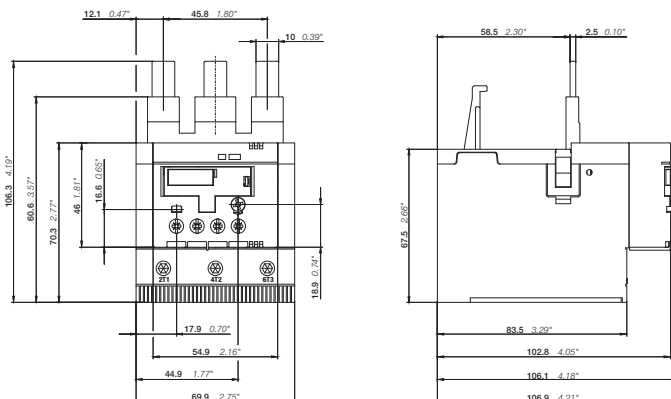
KPR-101L

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DRS-F

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TF96

Main dimensions mm, inches

2CDC232005F0009

TF96 thermal overload relays – 40.0 to 96.0 A

Technical data

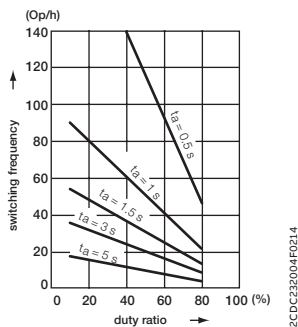
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | TF96 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | 50/60 Hz |
| Trip class | 10 |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 690 V |

Auxiliary circuit according to IEC/EN

| | |
|---|--|
| Type | TF96 |
| Rated operational voltage Ue | 600 V |
| Conventional free air thermal current Ith | N.C., 95-96 6 A N.O., 97-98 4 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 220-230-240 V | N.C., 95-96 3.00 A N.O., 97-98 0.50 A |
| 440 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| 480-500 V | N.C., 95-96 0.75 A N.O., 97-98 0.50 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | N.C., 95-96 1.25 A N.O., 97-98 1.25 A |
| 110-120-125 V | N.C., 95-96 0.55 A N.O., 97-98 0.55 A |
| 250 V | N.C., 95-96 0.27 A N.O., 97-98 0.27 A |
| Minimum switching capacity | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 6 A, fuse type gG N.O., 97-98 4 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF96 thermal overload relays – 40.0 to 96.0 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | TF96 |
| Standards | UL 60947-1, UL 60947-4-1 |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|-------------|------------|
| Type | TF96 | |
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | D300, Q600 |
| Conventional thermal current | N.C., 95-96 | 6 A |
| | N.O., 97-98 | 4 A |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|---------|----------------------|--------------------------------------|-----------------|--------------------------------------|----------------|
| | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type |
| TF96-51 | 51 A | 5 kA | 150 A, K5 / RK5 | 100 kA | 125 A, Class J |
| TF96-60 | 60 A | 10 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |
| TF96-68 | 68 A | 10 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |
| TF96-78 | 78 A | 10 kA | 175 A, K5 / RK5 | 100 kA | 175 A, Class J |
| TF96-87 | 87 A | 10 kA | 200 A, K5 / RK5 | 100 kA | 200 A, Class J |
| TF96-96 | 96 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 200 A, Class J |

TF96 thermal overload relays – 40.0 to 96.0 A

Technical data





General technical data

| Type | | TF96 |
|--|------------------------|---|
| Pollution degree | | 3 |
| Phase loss sensitive | | Yes |
| Ambient air temperature | | |
| Operation (1) | Open - compensated | -40 ... +70 °C |
| | Open | -40 ... +70 °C |
| Storage | | -50 ... +80 °C |
| Ambient air temperature compensation | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz |
| Mounting position | | Position 1 to 6 |
| Mounting | | Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit on DIN rail (35 mm) |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |

(1) Valid for TF96 produced from week 11, 2016. Otherwise, -25 ... +60 °C range is valid.
Derating might be applicable for temperatures > 50°C. Data on request.





Electrical connection

Main circuit

| Type | | TF96 |
|---|---------------------------------|---|
| Connecting capacity | | |
|  | Rigid | 1 x or 2 x 6 ... 35 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible with ferrule | 1 x or 2 x 6 ... 35 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible with insulated ferrule | 1 x or 2 x 6 ... 16 mm ² 1 x 6 ... 50 mm ² |
|  | Flexible | 1 x or 2 x 6 ... 35 mm ² 1 x 6 ... 50 mm ² |
| | Stranded acc. to UL/CSA | 1 x AWG 8 ... 1 2 x AWG 8 ... 3 |
| | Flexible acc. to UL/CSA | 1 x AWG 8 ... 1 2 x AWG 8 ... 3 |
| Stripping length | | 20 mm (1) |
| Tightening torque | | 6 ... 9 Nm / 53 ... 80 lb.in (2) |
| Recommended screw driver | | M8 (Hexagon) |

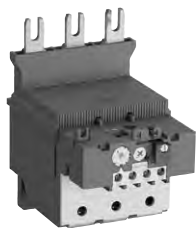
(2) Valid for products, produced from week 27, 2015

Auxiliary circuit

| Type | | TF96 |
|---|---------------------------------|--|
| Connecting capacity | | |
|  | Rigid | 1 x or 2 x 0.75 ... 4 mm ² |
|  | Flexible with ferrule | 1 x or 2 x 0.75 ... 4 mm ² |
|  | Flexible with insulated ferrule | 1 x 0.75 ... 2.5 mm ² 2 x 0.75 ... 1.5 mm ² |
|  | Flexible | 1 x or 2 x 0.75 ... 1 mm ² or 1 ... 2.5 mm ² |
| | Stranded acc. to UL/CSA | 1 x or 2 x AWG 18 ... 12 |
| | Flexible acc. to UL/CSA | 1 x or 2 x AWG 18 ... 12 |
| Stripping length | | 9 mm |
| Tightening torque | | 1.1 ... 1.5 Nm / 9 ... 13 lb.in |
| Recommended screw driver | | M3 (Pozidriv 2) |

TF140DU thermal overload relays – 66 to 142 A

Ordering details



TF140DU

2CDC231012F0012



KPR-101L

1SFCL15124F0002

The TF140DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

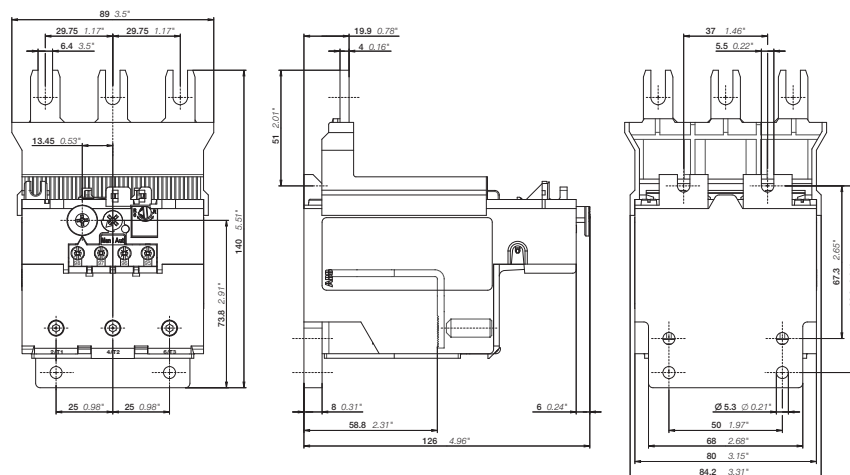
Suitable for AF116...AF140 contactors

| | | | | | |
|-------------|---------------------|-----|--------------------|-----------------|-------|
| 66 ... 90 | 200 A, fuse type gG | 10A | TF140DU-90 | 1SAZ431201R1001 | 0.820 |
| 80 ... 110 | 224 A, fuse type gG | 10A | TF140DU-110 | 1SAZ431201R1002 | 0.820 |
| 100 ... 135 | 224 A, fuse type gG | 10A | TF140DU-135 | 1SAZ431201R1003 | 0.820 |
| 110 ... 142 | 250 A, fuse type gG | 10A | TF140DU-142 | 1SAZ431201R1004 | 0.820 |
| 66 ... 90 | 200 A, fuse type gG | 10A | TF140DU-90-V1000* | 1SAZ431301R1001 | 0.820 |
| 80 ... 110 | 224 A, fuse type gG | 10A | TF140DU-110-V1000* | 1SAZ431301R1002 | 0.820 |
| 100 ... 135 | 224 A, fuse type gG | 10A | TF140DU-135-V1000* | 1SAZ431301R1003 | 0.820 |
| 110 ... 142 | 250 A, fuse type gG | 10A | TF140DU-142-V1000* | 1SAZ431301R1004 | 0.820 |

*Note: ATEX variant

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|-------------------|-------------------------|----------|-----------------|-------------------|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |



TF140DU

Main dimensions mm, inches

2CDC232008F0012

2CDC106054C0201

TF140DU thermal overload relays – 66 to 142 A

Technical data

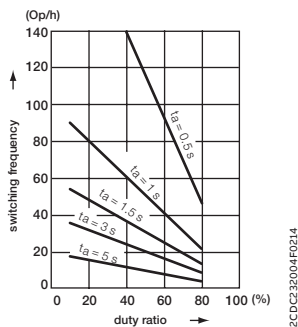
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | TF140DU / TF140DU-V1000 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | DC, 50/60 Hz |
| Frequency range | 0 ... 400 Hz |
| Trip class | 10A |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 690 V |

Auxiliary circuit according to IEC/EN

| | | |
|---|--------------------------------|--------------------|
| Type | TF140DU / TF140DU-V1000 | |
| Rated operational voltage Ue | 500 V AC, 440 V DC | |
| Conventional free air thermal current Ith | N.C., 95-96 | 10 A |
| | N.O., 97-98 | 6 A |
| Rated frequency | DC, 50/60 Hz | |
| Number of poles | 1 N.O. + 1 N.C. | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 110-120 V | N.C., 95-96 | 3.00 A |
| | N.O., 97-98 | 1.50 A |
| 220-230-240 V | N.C., 95-96 | 1.50 A |
| | N.O., 97-98 | 1.50 A |
| 440 V | N.C., 95-96 | 1.00 A |
| | N.O., 97-98 | 1.00 A |
| 480-500 V | N.C., 95-96 | 1.00 A |
| | N.O., 97-98 | 1.00 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | |
| 24 V | N.C., 95-96 | 1.25 A |
| | N.O., 97-98 | 1.25 A |
| 60 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 110-120-125 V | N.C., 95-96 | 0.25 A |
| | N.O., 97-98 | 0.25 A |
| 250 V | N.C., 95-96 | 0.12 A |
| | N.O., 97-98 | 0.04 A |
| Minimum switching capacity | 17 V / 3 mA | |
| Short-circuit protective device | N.C., 95-96 | 10 A, fuse type gG |
| | N.O., 97-98 | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV | |
| Rated insulation voltage Ui | 690 V | |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TF140DU thermal overload relays – 66 to 142 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | TF140DU / TF140DU-V1000 |
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|--------------------------------|------------|
| Type | TF140DU / TF140DU-V1000 | |
| Contact rating | N.C., 95-96 | B600 |
| | N.O., 97-98 | C300 |
| Conventional thermal current | N.C./N.O. | 10 A / 6 A |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---------------------------------|----------------------|---|-----------------|---|----------------|---|---------------------------|
| | | 480 / 600 V AC | | 480 / 600 V AC | | 480 / 600 V AC | |
| | | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Listed circuit breaker |
| TF140DU-90 / TF140DU-90-V1000 | 90 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-110 / TF140DU-110-V1000 | 110 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-135 / TF140DU-135-V1000 | 135 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TF140DU-142 / TF140DU-142-V1000 | 142 A | 10 kA | 250 A, K5 / RK5 | 100 kA | 250 A, Class J | 100 kA | 250 A |

TF140DU thermal overload relays – 66 to 142 A



Technical data

General technical data





| | | |
|--|---|----------------|
| Type | TF140DU / TF140DU-V1000 | |
| Pollution degree | 3 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +55 °C |
| Storage | Open | -25 ... +55 °C |
| Storage | | -40 ... +70 °C |
| Ambient air temperature compensation | Acc. to IEC/EN 60947-4-1 | |
| Maximum operating altitude permissible | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | 12g / 11 ms | |
| Mounting position | Position 1-5 | |
| Mounting | Mount on the contactor and tighten the screws of the main circuit terminals | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP00 |

Electrical connection

Main circuit

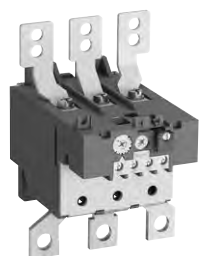
| | | |
|---|--------------------------------|---------------------------|
| Type | TF140DU / TF140DU-V1000 | |
| Connecting capacity | | |
|  Rigid | 1 x | 16 ... 70 mm ² |
| | 2 x | - |
|  Flexible | 1 x | 16 ... 70 mm ² |
| | 2 x | - |
| | Stranded acc. to UL/CSA | 1 x or 2 x AWG 6-2/0 |
| | Flexible acc. to UL/CSA | 1 x or 2 x AWG 6-2/0 |
| Stripping length | 25 mm | |
| Tightening torque | 8 ... 10 Nm / 77 ... 88 lb.in | |
| Recommended screw driver | M8 (Hexagon) | |

Auxiliary circuit

| | | |
|---|--------------------------------|------------------------------|
| Type | TF140DU / TF140DU-V1000 | |
| Connecting capacity | | |
|  Rigid | 1 x or 2 x | 0.75 ... 4 mm ² |
|  Flexible with ferrule | 1 x or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 x or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible | 1 x or 2 x | 0.75 ... 2.5 mm ² |
| | Stranded acc. to UL/CSA | 1 x or 2 x AWG 18-14 |
| | Flexible acc. to UL/CSA | 1 x or 2 x AWG 18-14 |
| Stripping length | 9 mm | |
| Tightening torque | 0.8 ... 1.3 Nm / 12 lb.in | |
| Recommended screw driver | M3.5 (Pozidriv 2) | |

TA200DU thermal overload relays – 66 to 200 A

Ordering details



TA200DU

2CDC23016F0013



KPR-101L

1SFC151224F0002

The TA200DU thermal overload relays are economic electromechanical protection devices for the main circuit. They offer reliable protection for motors in the event of overload or phase failure. The devices have trip class 10A.

The thermal overload relays are three pole relays with bimetal tripping elements. The motor current flows through the bimetal tripping elements and heats them directly and indirectly. In case of an overload (over current), the bimetal elements bent as a result of the heating. This leads to a release of the relay and a change of the contacts switching position (95-96 / 97-98).

- Manual or automatic reset selectable
- Phase loss sensitive acc. to IEC/EN 60947-4-1
- TEST and STOP function – Trip indication on the front
- Temperature compensation
- Suitable for three- and single-phase applications
- ATEX variants available

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

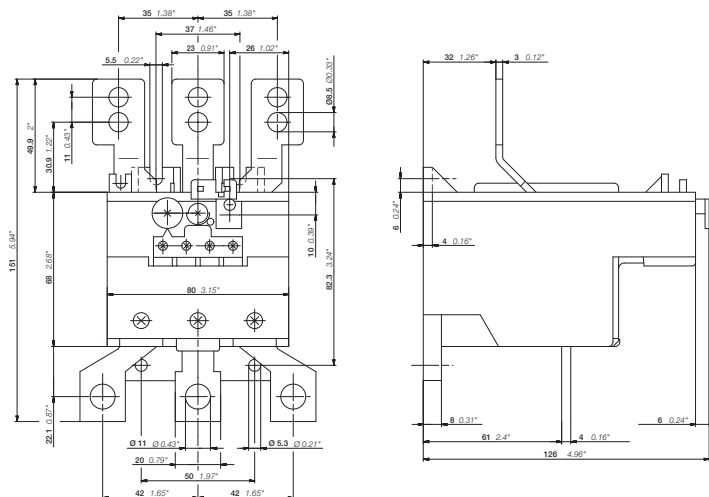
Suitable for AF145...AF2050 contactors

| | | | | | |
|-------------|--------------------------------|-----|-----------------------|-----------------|-------|
| 66 ... 90 | 200 A, fuse type gG / 125 A aM | 10A | TA200DU-90 | 1SAZ421201R1001 | 0.755 |
| 80 ... 110 | 224 A, fuse type gG / 160 A aM | 10A | TA200DU-110 | 1SAZ421201R1002 | 0.760 |
| 100 ... 135 | 224 A, fuse type gG / 200 A aM | 10A | TA200DU-135 | 1SAZ421201R1003 | 0.760 |
| 110 ... 150 | 250 A, fuse type gG / 200 A aM | 10A | TA200DU-150 | 1SAZ421201R1004 | 0.760 |
| 130 ... 175 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-175 | 1SAZ421201R1005 | 0.770 |
| 150 ... 200 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-200 | 1SAZ421201R1006 | 0.785 |
| 66 ... 90 | 200 A, fuse type gG / 125 A aM | 10A | TA200DU-90-V1000 (1) | 1SAZ421301R1001 | 0.755 |
| 80 ... 110 | 224 A, fuse type gG / 160 A aM | 10A | TA200DU-110-V1000 (1) | 1SAZ421301R1002 | 0.760 |
| 100 ... 135 | 224 A, fuse type gG / 200 A aM | 10A | TA200DU-135-V1000 (1) | 1SAZ421301R1003 | 0.760 |
| 110 ... 150 | 250 A, fuse type gG / 200 A aM | 10A | TA200DU-150-V1000 (1) | 1SAZ421301R1004 | 0.760 |
| 130 ... 175 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-175-V1000 (1) | 1SAZ421301R1005 | 0.770 |
| 150 ... 200 | 315 A, fuse type gG / 250 A aM | 10A | TA200DU-200-V1000 (1) | 1SAZ421301R1006 | 0.785 |

(1) ATEX variant

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---------------------|-------------------------|----------|-----------------|-------------------|
| Terminal shroud | TA200DU | LT200/A | 1SAZ401901R1001 | 0.090 |
| Single mounting kit | TA200DU | DB200 | 1SAZ401110R0001 | 0.225 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |



TA200DU

Main dimensions mm, inches

2CDC232021F0011

TA200DU thermal overload relays – 66 to 200 A

Technical data

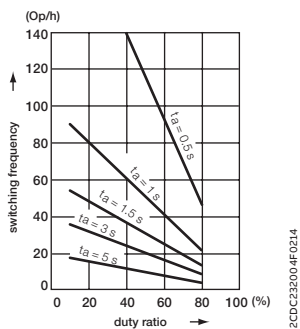
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | TA200DU / TA200DU-V1000 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1 |
| Rated operational voltage Ue | 690 V AC |
| Rated frequency | DC, 50/60 Hz |
| Frequency range | 0 ... 400 Hz |
| Trip class | 10A |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V AC |

Auxiliary circuit according to IEC/EN

| | |
|---|---|
| Type | TA200DU / TA200DU-V1000 |
| Rated operational voltage Ue | 500 V AC, 440 V DC |
| Conventional free air thermal current Ith | N.C., 95-96 10 A N.O., 97-98 6 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.O. + 1 N.C. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | N.C., 95-96 3.00 A N.O., 97-98 1.50 A |
| 220-230-240 V | N.C., 95-96 3.00 A N.O., 97-98 1.50 A |
| 440 V | N.C., 95-96 1.00 A N.O., 97-98 1.00 A |
| 480-500 V | N.C., 95-96 1.00 A N.O., 97-98 1.00 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | N.C., 95-96 1.25 A N.O., 97-98 1.25 A |
| 60 V | N.C., 95-96 0.25 A N.O., 97-98 0.25 A |
| 110-120-125 V | N.C., 95-96 0.25 A N.O., 97-98 0.25 A |
| 250 V | N.C., 95-96 0.12 A N.O., 97-98 0.04 A |
| Minimum switching capacity | 17 V / 3 mA |
| Short-circuit protective device | N.C., 95-96 10 A, fuse type gG N.O., 97-98 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



ta: Motor starting time

TA200DU thermal overload relays – 66 to 200 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | TA200DU / TA200DU-V1000 |
| Standards | UL 508, CSA 22.2 No. 14 |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|-------------------------|------|
| Type | TA200DU / TA200DU-V1000 | |
| Contact rating | N.C., 95-96 | C600 |
| | N.O., 97-98 | B600 |
| Conventional thermal current | 5 A | |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device 480 / 600 V AC | | | | | | |
|------------------------------------|----------------------|---|-----------------|---------------------------|---|----------------|---|---------------------------|
| | | Short circuit rating RMS symmetrical | Fuse type | Listed circuit breaker | Short circuit rating RMS symmetrical | Fuse type | Short circuit rating RMS symmetrical | Listed circuit breaker |
| TA200DU-90 / TA200DU-90-V1000 | 90 A | 10 kA | 250 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-110 / TA200DU-110-V1000 | 110 A | 10 kA | 250 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-135 / TA200DU-135-V1000 | 135 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-150 / TA200DU-150-V1000 | 150 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 250 A, Class J | 100 kA | 250 A |
| TA200DU-175 / TA200DU-175-V1000 | 175 A | 10 kA | 300 A, K5 / RK5 | 225 A | 100 kA | 300 A, Class J | 100 kA | 300 A |
| TA200DU-200 / TA200DU-200-V1000 | 200 A | 10 kA | 400 A, K5 / RK5 | 400 A | 100 kA | 400 A, Class J | 100 kA | 400 A |

TA200DU thermal overload relays – 66 to 200 A



Technical data

General technical data





| Type | | TA200DU / TA200DU-V1000 |
|---|------------------------|-------------------------|
| Pollution degree | | 3 |
| Phase loss sensitive | | Yes |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +55 °C |
| | Open | -25 ... +55 °C |
| Storage | | -40 ... +70 °C |
| Ambient air temperature compensation | | Acc. to IEC/EN60947-4-1 |
| Maximum operating altitude permissible | | 2000 m |
| Resistance to shock acc. to IEC 60068-2-27 | | 12g / 15 ms |
| Mounting position | | Position 1-6 |
| Mounting Mount on the contactor and tighten the screws of the main circuit terminals or with single mounting kit | | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP00 |

Electrical connection

Main circuit

| Type | | TA200DU / TA200DU-V1000 |
|---|-------------------------|--------------------------------|
| Connecting capacity | | |
|  | Rigid | 1 x 25 ... 120 mm ² |
|  | Flexible | 1 x 25 ... 120 mm ² |
| | Stranded acc. to UL/CSA | 1 x AWG 4 ... 0000 |
| | Flexible acc. to UL/CSA | 1 x AWG 4 ... 0000 |
| | Lugs | L > 10 mm |
| Tightening torque | | 25 Nm / 220 lb.in |
| Recommended screwdriver | | Open bars |

Auxiliary circuit

| Type | | TA200DU / TA200DU-V1000 |
|---|---------------------------------|---|
| Connecting capacity | | |
|  | Rigid | 1 x or 2 x 0.75 ... 4 mm ² |
|  | Flexible with ferrule | 1 x or 2 x 0.75 ... 2.5 mm ² |
|  | Flexible with insulated ferrule | 1 x or 2 x 0.75 ... 2.5 mm ² |
|  | Flexible | 1 x or 2 x 0.75 ... 2.5 mm ² |
| | Stranded acc. to UL/CSA | 1 x or 2 x AWG 18 ... 14 |
| | Flexible acc. to UL/CSA | 1 x or 2 x AWG 18 ... 14 |
| Stripping length | | 9 mm |
| Tightening torque | | 0.8 ... 1.3 Nm / 12 lb.in |
| Recommended screwdriver | | M3.5 (Poizidriv 2) |

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Ordering details



2CDC23100F0007

E16DU-1.0



1SBC101147F0010

EF19-18.9



1SBC101148F0010

EF45-30

The E16DU, EF19 and EF45 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF19 and EF45 have ATEX and IECEx certification (1).

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

E16DU electronic overload relays, suitable for B6 & B7

| | | | | | |
|---------------|--------------------|---------------|------------|-----------------|-------|
| 0.10 ... 0.32 | 1 A, fuse type gG | 10E, 20E, 30E | E16DU-0.32 | 1SAX111001R1101 | 0.150 |
| 0.30 ... 1.00 | 4 A, fuse type gG | 10E, 20E, 30E | E16DU-1.0 | 1SAX111001R1102 | 0.150 |
| 0.80 ... 2.70 | 10 A, fuse type gG | 10E, 20E, 30E | E16DU-2.7 | 1SAX111001R1103 | 0.150 |
| 2.00 ... 6.30 | 20 A, fuse type gG | 10E, 20E, 30E | E16DU-6.3 | 1SAX111001R1104 | 0.150 |
| 5.70 ... 18.9 | 50 A, fuse type gG | 10E, 20E, 30E | E16DU-18.9 | 1SAX111001R1105 | 0.150 |

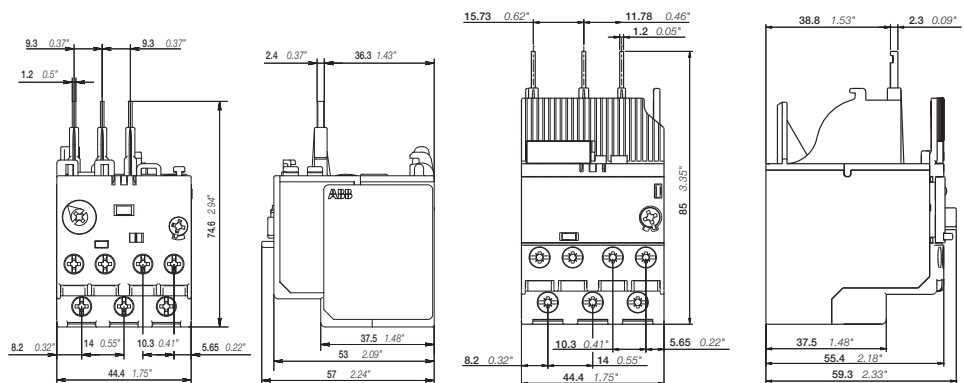
EF19 electronic overload relays, suitable for AF09 ... AF26 (1)

| | | | | | |
|---------------|--------------------|---------------|-----------|-----------------|-------|
| 0.10 ... 0.32 | 1 A, fuse type gG | 10E, 20E, 30E | EF19-0.32 | 1SAX121001R1101 | 0.158 |
| 0.30 ... 1.00 | 4 A, fuse type gG | 10E, 20E, 30E | EF19-1.0 | 1SAX121001R1102 | 0.158 |
| 0.80 ... 2.70 | 10 A, fuse type gG | 10E, 20E, 30E | EF19-2.7 | 1SAX121001R1103 | 0.158 |
| 1.90 ... 6.30 | 20 A, fuse type gG | 10E, 20E, 30E | EF19-6.3 | 1SAX121001R1104 | 0.158 |
| 5.70 ... 18.9 | 50 A, fuse type gG | 10E, 20E, 30E | EF19-18.9 | 1SAX121001R1105 | 0.158 |

EF45 electronic overload relays, suitable for AF26 ... AF38 (1)

| | | | | | |
|---------------|---------------------|---------------|---------|-----------------|-------|
| 9.00 ... 30.0 | 160 A, fuse type gG | 10E, 20E, 30E | EF45-30 | 1SAX221001R1101 | 0.362 |
| 15.0 ... 45.0 | 160 A, fuse type gG | 10E, 20E, 30E | EF45-45 | 1SAX221001R1102 | 0.362 |

(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.



E16DU

EF19, EF45

Main dimensions mm, inches

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Ordering details



DB19EF

2CDC231024V0013



DB45EF

2CDC231002V0014



KPR-101L

1SFC151224-F0002



DRS-F

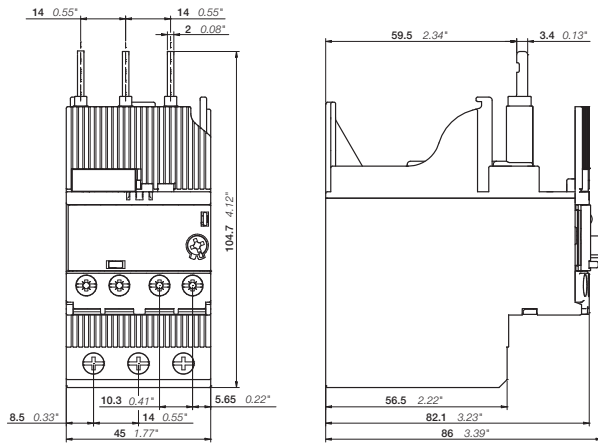
2CDC211006V0017

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|----------------------------------|-------------------------|-------------|-----------------|-------------------|
| Single mounting kit | E16DU | DB16E | 1SAX101110R0001 | 0.035 |
| Single mounting kit | EF19 | DB19EF | 1SAX101910R1001 | 0.046 |
| Single mounting kit | EF45 | DB45EF | 1SAX201910R0001 | 0.100 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | EF460, EF750 | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.077 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.077 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.077 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.077 |

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Technical data



EF45

Main circuit – Utilization characteristics according to IEC/EN

| Type | E16DU | EF19 | EF45 |
|--|---|------|------|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 | | |
| Rated operational voltage Ue | 690 V AC | | |
| Rated frequency | 50/60 Hz – not suitable for DC applications | | |
| Trip class | 10E, 20E, 30E, selectable | | |
| Number of poles | 3 | | |
| Duty time | 100% | | |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" | | |
| Rated impulse withstand voltage Uimp | 6 kV | | |
| Rated insulation voltage Ui | 690 V AC | | |

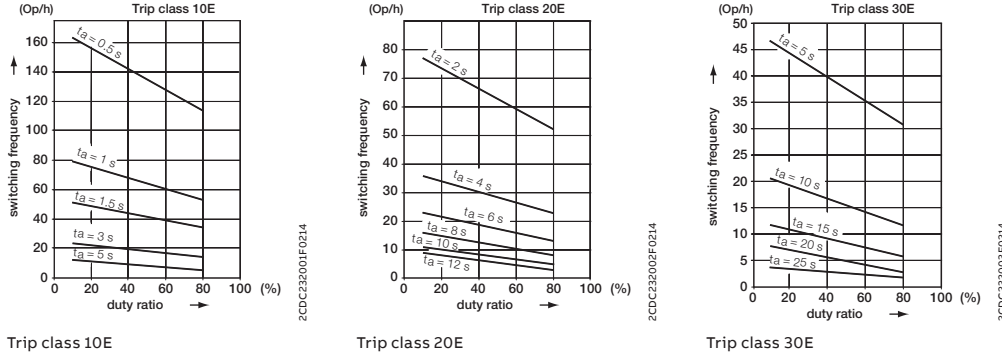
Auxiliary circuit according to IEC/EN

| Type | E16DU | EF19 | EF45 |
|---|-------------------|--------|------|
| Rated operational voltage Ue | 600 V AC / DC | | |
| Conventional free air thermal current Ith | 6 A | | |
| Rated frequency | DC, 50/60 Hz | | |
| Number of poles | 1 N.C. + 1 N.O. | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | | |
| 110-120 V | 50/60 Hz | 3.00 A | |
| 220-230-240 V | 50/60 Hz | 3.00 A | |
| 440 V | 50/60 Hz | 1.10 A | |
| 480-500 V | 50/60 Hz | 0.75 A | |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | | |
| 24 V | | 1.50 A | |
| 60 V | | 0.55 A | |
| 110-120-125 V | | 0.55 A | |
| 250 V | | 0.27 A | |
| Minimum switching capacity | 12 V / 3 mA | | |
| Short-circuit protective devices | 6 A, fuse type gG | | |
| Rated impulse withstand voltage Uimp | 6 kV | | |
| Rated insulation voltage Ui | 690 V | | |

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A

Technical data

Technical diagram – Intermittent periodic duty



Main circuit – Utilization characteristics according to UL/CSA

| | | | |
|--------------------------------------|--|-------------|-------------|
| Type | E16DU | EF19 | EF45 |
| Standards | UL 508, CSA 22.2 No. 14 | | |
| Maximum operational voltage | 600 V AC | | |
| Trip rating | 125% of FLA | | |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" | | |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" | | |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" | | |

Auxiliary circuit according to UL/CSA

| | | | |
|---------------------------------------|----------------------------|--------------------------|-------------|
| Type | E16DU | EF19 | EF45 |
| Contact rating | N.C., 95-96 N.O., 97-98 | B600, Q300 B600, Q600 | |
| Conventional free-air thermal current | 6 A | | |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|------------|----------------------|---------------------------------|----------------|----------|----------------|--------|---------------|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| E16DU-0.32 | 0.32 A | 50 kA | 2 A, Class J | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| E16DU-1.0 | 1.00 A | 50 kA | 2 A, K5 / RK5 | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| E16DU-2.7 | 2.70 A | 50 kA | 4 A, K5 / RK5 | 5 kA | 4 A, K5 / RK5 | 100 kA | 4 A, Class J |
| E16DU-6.3 | 6.30 A | 50 kA | 15 A, K5 / RK5 | 5 kA | 15 A, K5 / RK5 | 100 kA | 15 A, Class J |
| E16DU-18.9 | 18.90 A | 50 kA | 30 A, K5 / RK5 | 5 kA | 30 A, K5 / RK5 | 100 kA | 30 A, Class J |

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|-----------|----------------------|---------------------------------|----------------|----------|----------------|--------|---------------|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF19-0.32 | 0.32 A | 50 kA | 2 A, Class J | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| EF19-1.0 | 1.00 A | 50 kA | 2 A, K5 / RK5 | 5 kA | 2 A, K5 / RK5 | 100 kA | 2 A, Class J |
| EF19-2.7 | 2.70 A | 50 kA | 4 A, K5 / RK5 | 5 kA | 4 A, K5 / RK5 | 100 kA | 4 A, Class J |
| EF19-6.3 | 6.30 A | 50 kA | 15 A, K5 / RK5 | 5 kA | 15 A, K5 / RK5 | 100 kA | 15 A, Class J |
| EF19-18.9 | 18.90 A | 50 kA | 30 A, K5 / RK5 | 5 kA | 30 A, K5 / RK5 | 100 kA | 30 A, Class J |

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|---------|----------------------|---------------------------------|-----------------|----------|-----------------|--------|----------------|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF45-30 | 30 A | 18 kA | 150 A, K5 / RK5 | 18 kA | 150 A, K5 / RK5 | 100 kA | 150 A, Class J |
| EF45-45 | 45 A | 18 kA | 200 A, K5 / RK5 | 18 kA | 200 A, K5 / RK5 | 100 kA | 200 A, Class J |

E16DU, EF19, EF45 electronic overload relays – 0.10 to 45.0 A





Technical data

General data







| Type | E16DU | EF19 | EF45 |
|--|---|-------------------|------|
| Pollution degree | 3 | | |
| Phase loss sensitive | Yes | | |
| Ambient air temperature | | | |
| Operation | Open - compensated | | |
| Storage | -25 ... +70 °C | | |
| Ambient air temperature compensation | -50 ... +85 °C | | |
| Maximum operating altitude permissible | Acc. to IEC/EN60947-4-1 | | |
| Resistance to shock acc. to IEC 60068-2-27 | 2000 m | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 15g / 11 ms pulse | 25g / 11 ms pulse | |
| Mounting position | 5g / 3 ... 150 Hz | | |
| Mounting | Position 1-6 | | |
| Degree of protection | Mount on the contactor and tighten the screws of the main circuit terminals | | |
| Housing | IP20 | | |
| Main circuit terminals | IP20 | | |

Electrical connection

Main circuit

| Type | E16DU | EF19 | EF45 |
|---|---------------------------------------|------------------------------|----------------------------------|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 4 mm ² | 2.5 ... 16 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 2.5 ... 10 mm ² |
|  Stranded acc. to UL/CSA | 1 or 2 x AWG 16-10 | AWG 16-10 | AWG 14-6 |
|  Flexible acc. to UL/CSA | 1 or 2 x AWG 16-10 | AWG 16-10 | AWG 14-6 |
| Stripping length | 9 mm | | |
| Tightening torque | 0.8 ... 1.5 Nm / 7 ... 13 lb.in | | 2.3 ... 2.6 Nm / 20 ... 22 lb.in |
| Recommended screw driver | M3.5 (Pozidriv 2) | | |

Auxiliary circuit

| Type | E16DU | EF19 | EF45 |
|---|---------------------------------------|------------------------------|---------------------------------|
| Connecting capacity | | | |
|  Rigid | 1 or 2 x 1 ... 4 mm ² | 1 ... 4 mm ² | 1 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² | 0.75 ... 2.5 mm ² |
|  Stranded acc. to UL/CSA | 1 or 2 x AWG 16-10 | AWG 18-10 | AWG 18-10 |
|  Flexible acc. to UL/CSA | 1 or 2 x AWG 16-10 | AWG 18-10 | AWG 18-10 |
| Stripping length | 9 mm | | |
| Tightening torque | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | M3 (Pozidriv 2) | | |

EF65, EF96, EF146 electronic overload relays – 20 to 150 A

Ordering details



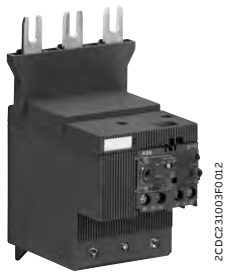
EF65-70

2CDC231001F0012



EF96-100

2CDC231002F0012



EF146-150

2CDC231003F0012

The EF65, EF96 and EF146 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF65, EF96 and EF146 have ATEX and IECEx certification (1).

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AF40, AF52, AF65

| | | | | | |
|-----------|---------------------|---------------|---------|-----------------|-------|
| 20 ... 56 | 160 A, fuse type gG | 10E, 20E, 30E | EF65-56 | 1SAX331001R1102 | 0.821 |
| 25 ... 70 | 160 A, fuse type gG | 10E, 20E, 30E | EF65-70 | 1SAX331001R1101 | 0.821 |

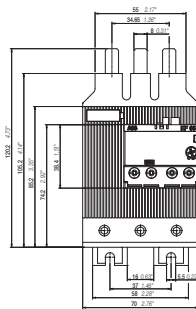
Suitable for AF80, AF96

| | | | | | |
|------------|---------------------|---------------|----------|-----------------|-------|
| 20 ... 56 | 160A, fuse type gG | 10E, 20E, 30E | EF96-56 | 1SAX341001R1102 | 0.802 |
| 36 ... 100 | 200 A, fuse type gG | 10E, 20E, 30E | EF96-100 | 1SAX341001R1101 | 0.802 |

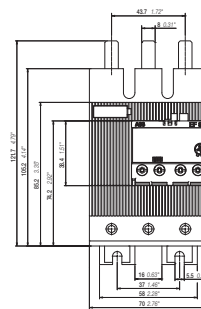
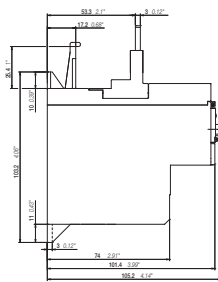
Suitable for AF116, AF140, AF146

| | | | | | |
|------------|---------------------|---------------|-----------|-----------------|-------|
| 54 ... 150 | 315 A, fuse type gG | 10E, 20E, 30E | EF146-150 | 1SAX351001R1101 | 0.879 |
|------------|---------------------|---------------|-----------|-----------------|-------|

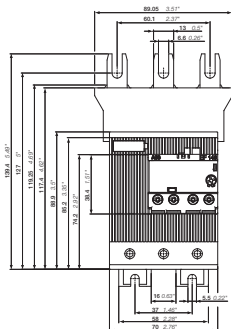
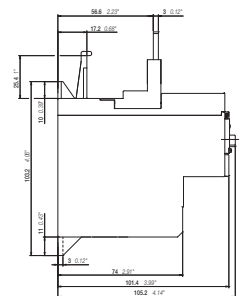
(1) ATEX is valid for products produced from week 42, 2014. ATEX certification is valid for EF65-56 produced from week 47, 2015. IECEx is valid for products produced from week 15, 2017.



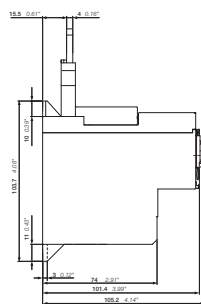
EF65-56 / EF65-70



EF96-56 / EF96-100



EF146-150



Main dimensions mm, inches

EF65, EF96, EF146 electronic overload relays – 20 to 150 A

Ordering details



DB96

2CDC231001V0015



DB96 + EF96

2CDC231002V0015



KPR-101L

15FC151524F0002



DRS-F

2CDC11002V0017

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|----------------------------------|-------------------------|-------------|-----------------|-------------------|
| Single mounting kit | EF96, TF96 | DB96 | 1SAZ901901R1001 | 0.190 |
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.019 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | EF460, EF750 | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.077 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.077 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.077 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.077 |

EF65, EF96, EF146 electronic overload relays – 20 to 150 A

Technical data

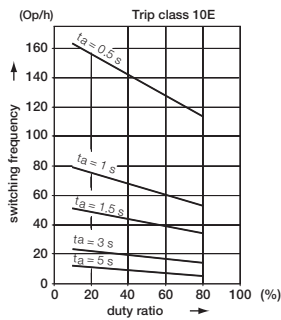
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | EF65, EF96, EF146 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 1000 V AC |
| Rated frequency | 50/60 Hz – not suitable for DC applications |
| Trip class | 10E, 20E, 30E, selectable |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 1000 V |

Auxiliary circuit according to IEC/EN

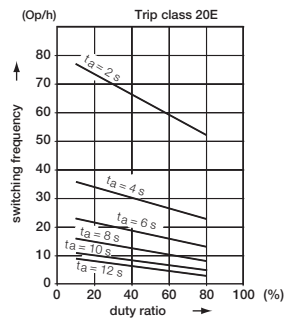
| | |
|---|--------------------------|
| Type | EF65, EF96, EF146 |
| Rated operational voltage Ue | 600 V AC / DC |
| Conventional free air thermal current Ith | 6 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.C. + 1 N.O. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | 50/60 Hz 3.00 A |
| 220-230-240 V | 50/60 Hz 3.00 A |
| 400 V | 50/60 Hz 1.10 A |
| 480-500 V | 50/60 Hz 0.75 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | 1.50 A |
| 60 V | 0.55 A |
| 110-120-125 V | 0.55 A |
| 250 V | 0.27 A |
| Minimum switching capacity | 12 V / 3 mA |
| Short-circuit protective device | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



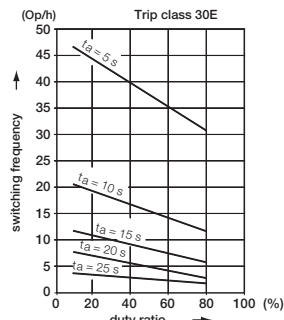
Trip class 10E

2CDC232003F0214



Trip class 20E

2CDC232003F0214



Trip class 30E

2CDC232003F0214

EF65, EF96, EF146 electronic overload relays – 20 to 150 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | EF65, EF96, EF146 |
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|--------------------------|------------|
| Type | EF65, EF96, EF146 | |
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | B600, Q600 |
| Conventional thermal current | 6 A | |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | | | |
|-----------|----------------------|---------------------------------|---------------|----------|---------------|--------|-----------|
| | | 480 V AC | | 600 V AC | | | |
| | | SCCR | Fuse type | SCCR | Fuse type | SCCR | Fuse type |
| EF65-56 | 56 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF65-70 | 70 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF96-65 | 56 A | 10 kA | 150 A, K5/RK5 | 10 kA | 150 A, K5/RK5 | 100 kA | 150 A, J |
| EF96-100 | 100 A | 10 kA | 200 A, K5/RK5 | 10 kA | 200 A, K5/RK5 | 100 kA | 225 A, J |
| EF146-150 | 150 A | 10 kA | 250 A, K5/RK5 | 10 kA | 250 A, K5/RK5 | 100 kA | 350 A, J |

EF65, EF96, EF146 electronic overload relays – 20 to 150 A



Technical data

General data

| | | |
|--|---|----------------|
| Type | EF65, EF96, EF146 | |
| Pollution degree | 3 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | | |
| Operation | Open - compensated | -25 ... +70 °C |
| Storage | | -50 ... +85 °C |
| Ambient air temperature compensation | Acc. to IEC/EN 60947-4-1 | |
| Maximum operating altitude permissible | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | 15g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 5g / 3 ... 150 Hz | |
| Mounting position | Position 1-6 | |
| Mounting | Mount on the contactor and tighten the screws of the main circuit terminals | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP10 |





Electrical connection

Main circuit

| Type | | EF65 | EF96 | EF146 |
|--|-----|----------------------------|--------------------------|---------------------------|
| Connecting capacity | | | | |
|  Rigid (1) | 1 x | 4 ... 35 mm ² | 4 ... 70 mm ² | 10 ... 95 mm ² |
| | 2 x | 4 ... 35 mm ² | 4 ... 35 mm ² | 10 ... 35 mm ² |
|  Flexible (1) | 1 x | 4 ... 35 mm ² | 4 ... 50 mm ² | 10 ... 70 mm ² |
| | 2 x | 2.5 ... 35 mm ² | 4 ... 35 mm ² | 10 ... 35 mm ² |
| Stranded acc. to UL/CSA | 1 x | AWG 10-2 | AWG 10-2 | AWG 6-00 |
| | 2 x | | | AWG 6-2 |
| Flexible acc. to UL/CSA | 1 x | AWG 10-2 | AWG 10-2 | AWG 6-00 |
| | 2 x | | | AWG 6-2 |
| Stripping length | | 20 mm | 20 mm | 20 mm |
| Tightening torque | | 4 Nm / 35 lb.in | 6 Nm / 55 lb.in | 10 Nm / 70 lb.in |
| Recommended screw driver | | M8 (Pozi driv 2) | M8 (Hexagon 4) | M8 (Hexagon 4) |

(1) Only one wire size allowed when using 2 wires

Auxiliary circuit

| | | |
|---|--------------------------|---------------------------------|
| Type | EF65, EF96, EF146 | |
| Connecting capacity | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 |
| Stripping length | | 9 mm |
| Tightening torque | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | M3.5 (Pozi driv 2) |

EF205, EF370 electronic overload relays – 63 to 380 A

Ordering details



EF205-210

2CDC231010V0012



EF370-380

2CDC231013V0012



KPR-101L

1SFC151224F0002



DRS-F

2CDC21002V0017

The EF205 and EF370 are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. The overload relays are connected directly to the contactors. The EF205 and EF370 have ATEX and IECEx certification (1).

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|------|------------|-------------------|
| A | | | | | |

Suitable for AF145, AF185, AF190, AF205

| | | | | | |
|------------|----------------------|---------------|-----------|-----------------|-------|
| 63 ... 210 | 1250 A, fuse type gG | 10E, 20E, 30E | EF205-210 | 1SAX531001R1101 | 1.210 |
|------------|----------------------|---------------|-----------|-----------------|-------|

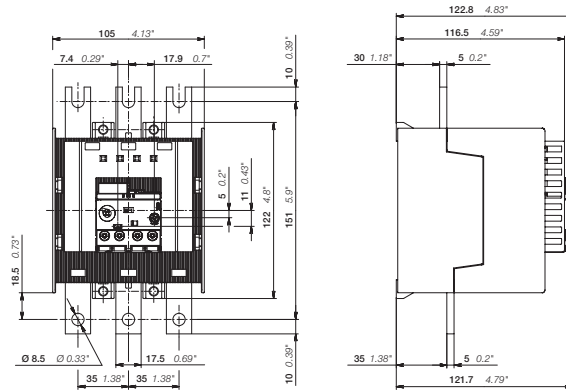
Suitable for AF210, AF260, AF265, AF300, AF305, AF370

| | | | | | |
|-------------|----------------------|---------------|-----------|-----------------|-------|
| 115 ... 380 | 1600 A, fuse type gG | 10E, 20E, 30E | EF370-380 | 1SAX611001R1101 | 1.430 |
|-------------|----------------------|---------------|-----------|-----------------|-------|

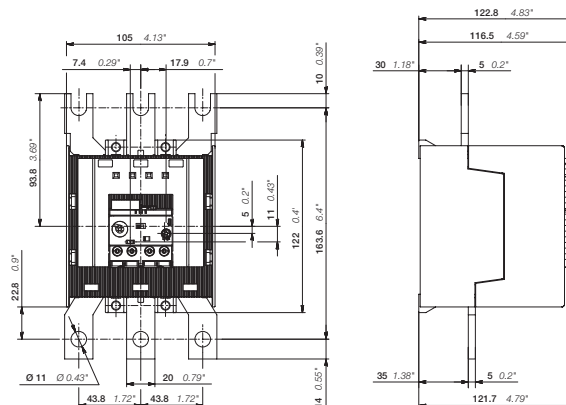
(1) ATEX is valid for products produced from week 42, 2015. IECEx is valid for products produced from week 15, 2017.

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|----------------------------------|-------------------------|-------------|-----------------|-------------------|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |
| Terminal shroud | EF205 | LT200E | 1SAX501904R0001 | 0.085 |
| Terminal shroud | EF370 | LT320E | 1SAX601904R0001 | 0.105 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | EF460, EF750 | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.077 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.077 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.077 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.077 |



EF205-210



EF370-380

Main dimensions mm, inches

EF205, EF370 electronic overload relays – 63 to 380 A

Technical data

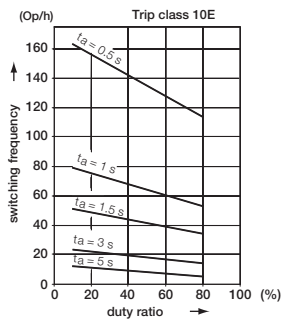
Main circuit – Utilization characteristics according to IEC/EN

| | |
|--|---|
| Type | EF205, EF370 |
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 |
| Rated operational voltage Ue | 1000 V AC |
| Rated frequency | 50/60 Hz – not suitable for DC applications |
| Trip class | 10E, 20E, 30E, selectable |
| Number of poles | 3 |
| Duty time | 100% |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" |
| Rated impulse withstand voltage Uimp | 8 kV |
| Rated insulation voltage Ui | 1000 V |

Auxiliary circuit according to IEC/EN

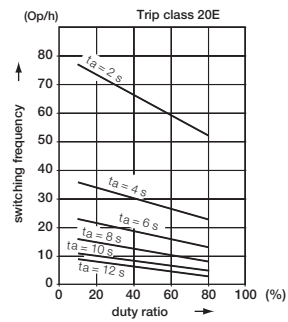
| | |
|---|---------------------|
| Type | EF205, EF370 |
| Rated operational voltage Ue | 600 V AC / DC |
| Conventional free air thermal current Ith | 6 A |
| Rated frequency | DC, 50/60 Hz |
| Number of poles | 1 N.C. + 1 N.O. |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | |
| 110-120 V | 50/60 Hz 3.00 A |
| 220-230-240 V | 50/60 Hz 3.00 A |
| 400 V | 50/60 Hz 1.10 A |
| 480-500 V | 50/60 Hz 0.75 A |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | |
| 24 V | 1.50 A |
| 60 V | 0.55 A |
| 110-120-125 V | 0.55 A |
| 250 V | 0.27 A |
| Minimum switching capacity | 12 V / 3 mA |
| Short-circuit protective device | 6 A, fuse type gG |
| Rated impulse withstand voltage Uimp | 6 kV |
| Rated insulation voltage Ui | 690 V |

Technical diagram – Intermittent periodic duty



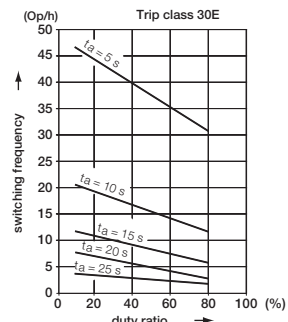
Trip class 10E

2CDC232002F0214



Trip class 20E

2CDC232002F0214



Trip class 30E

2CDC232003F0214

EF205, EF370 electronic overload relays – 63 to 380 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | |
|--------------------------------------|--|
| Type | EF205, EF370 |
| Standards | UL 508, CSA 22.2 No. 14, UL 60947-4-1A |
| Maximum operational voltage | 600 V AC |
| Trip rating | 125% of FLA |
| Full load amps (FLA) | See table "Full load amps and short-circuit protective device" |
| Short-circuit rating RMS symmetrical | See table "Full load amps and short-circuit protective device" |
| Short-circuit protective device | See table "Full load amps and short-circuit protective device" |

Auxiliary circuit according to UL/CSA

| | | |
|------------------------------|---------------------|------------|
| Type | EF205, EF370 | |
| Contact rating | N.C., 95-96 | B600, Q600 |
| | N.O., 97-98 | B600, Q600 |
| Conventional thermal current | 6 A | |

Full load amps and short-circuit protective device

| Type | Full load amps (FLA) | Short-circuit protective device | | | |
|-----------|----------------------|---------------------------------|---------------|----------|---------------|
| | | 480 V AC | | 600 V AC | |
| | | SCCR | Fuse type | SCCR | Fuse type |
| EF205-210 | 210 A | 10 kA | 400 A, R5/RK5 | 10kA | 400 A, R5/RK5 |
| EF370-380 | 380 A | 18 kA | 800 A, L/T | 18kA | 800 A, L/T |

EF205, EF370 electronic overload relays – 63 to 380 A





Technical data

General data





| Type | | EF205 | EF370 |
|--|------------------------|---|-------|
| Pollution degree | | 3 | |
| Phase loss sensitive | | Yes | |
| Ambient air temperature | | | |
| Operation | Open - compensated | -25 ... +70 °C | |
| Storage | | -50 ... +85 °C | |
| Ambient air temperature compensation | | Acc. to IEC/EN 60947-4-1 | |
| Maximum operating altitude permissible | | 2000 m | |
| Resistance to shock acc. to IEC 60068-2-27 | | 25g / 11 ms | |
| Resistance to vibrations acc. to IEC 60068-2-6 | | 5g / 3 ... 150 Hz | |
| Mounting position | | Position 1-6 | |
| Mounting | | Mount on the contactor and tighten the screws of the main circuit terminals | |
| Degree of protection | Housing | IP20 | |
| | Main circuit terminals | IP20 | |

Electrical connection

Main circuit

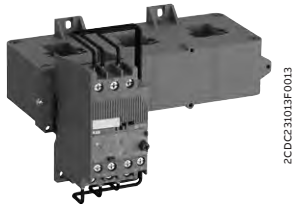
| Type | | EF205 | EF370 |
|---|-----|----------------------------|----------------------------|
| Connecting capacity | | | |
|  Rigid | 1 x | 16 ... 185 mm ² | 50 ... 240 mm ² |
| | 2 x | 16 ... 120 mm ² | 50 ... 150 mm ² |
|  Flexible | 1 x | 16 ... 185 mm ² | 50 ... 240 mm ² |
| | 2 x | 16 ... 120 mm ² | 50 ... 150 mm ² |
|  Lugs | L ≤ | 24 mm | 32 mm |
|  Bars | Ø > | 8 mm | 10 mm |
| Stranded acc. to UL/CSA | 1 x | AWG 6-0000 | AWG 1-500 kcmil |
| | 2 x | AWG 6-0000 | AWG 1-500 kcmil |
| Flexible acc. to UL/CSA | 1 x | AWG 6-0000 | AWG 1-500 kcmil |
| | 2 x | AWG 6-0000 | AWG 1-500 kcmil |
| Stripping length | | - | - |
| Tightening torque | | 18 Nm / 160 lb.in | 28 Nm / 247 lb.in |
| Recommended screw driver | | M8 | M10 |

Auxiliary circuit

| Type | | EF205, EF370 |
|---|----------|---------------------------------|
| Connecting capacity | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² |
| Stranded acc. to UL/CSA | | AWG 18-10 |
| Flexible acc. to UL/CSA | | AWG 18-10 |
| Stripping length | | 9 mm |
| Tightening torque | | 0.8 ... 1.2 Nm / 7 ... 11 lb.in |
| Recommended screw driver | | M3.5 (Poqidriv 2) |

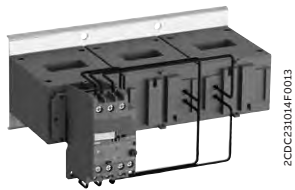
EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details



EF460-500

2CDC23103F0013



EF750-800

2CDC231014F0013



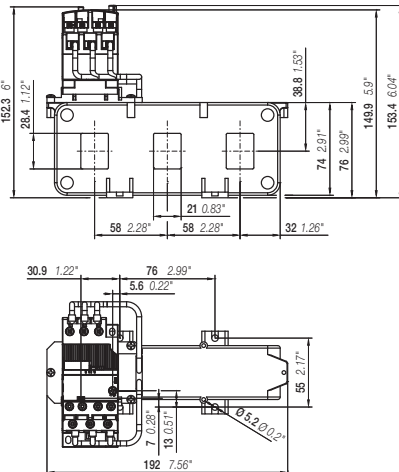
EF1250DU-1250

2CDC231014F0013

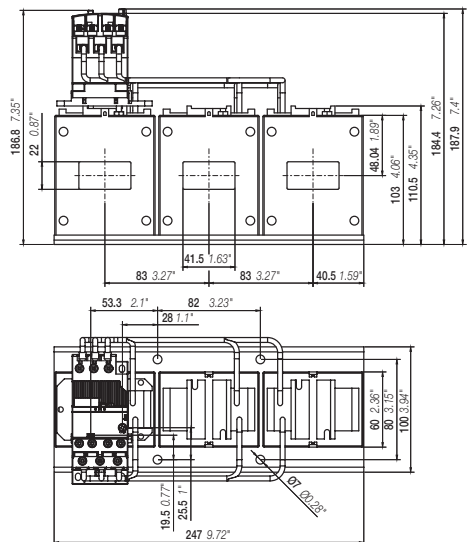
The EF460, EF750 and EF1250DU are self-supplied electronic overload relays, which means no extra external supply is needed. It offers reliable protection for motors in the event of overload or phase failure. Easy to use like a thermal overload relay and compatible with standard motor applications, the electronic overload relay is convincing, above all, due to its wide setting range, high accuracy, high operational temperature range and the possibility to select a trip class (10E, 20E, 30E). Further features are the temperature compensation, trip contact (N.C.), signal contact (N.O.), automatic or manual reset selectable, trip-free mechanism, STOP and TEST function and a trip indication. Busbar kits are available as accessory for contactor mounting. The EF460 and EF750 have ATEX and IECEx certification (1).

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|--|--|---------------|---------------|-----------------|-------------------|
| EF460 electronic overload relay, suitable for AF400, AF460 (1) | | | | | |
| 150 ... 500 | 690 V: 630 A, Type gG 1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF460-500 | 1SAX721001R1101 | 1.170 |
| EF750 electronic overload relay, suitable for AF580, AF750 (1) | | | | | |
| 250 ... 800 | 690 V: 800 A, Type gG 1000 V: 1600 A, Type gG | 10E, 20E, 30E | EF750-800 | 1SAX821001R1101 | 3.905 |
| EF1250DU electronic overload relay, suitable for AF1350, AF1650, AF2050 | | | | | |
| 375 ... 1250 | 500 V: 1600 A, Type gG | 10E, 20E, 30E | EF1250DU-1250 | 1SFA739001R1001 | |

(1) ATEX is valid for products produced from week 42, 2014. IECEx is valid for products produced from week 15, 2017.



EF460-500 Dimensions mm, inches



EF750-800

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Ordering details



KPR-101L

1SFA616162R1014



DRS-F

2CDC11002V0017

Ordering details accessories

| Description | Suitable for | Type | Order code | Weight (1 pce) kg |
|---|-------------------------|---------------|-----------------|----------------------|
| Reset push button | E16, EF, TF, T16, TA200 | KPR-101L | 1SFA616162R1014 | 0.027 |
| Terminal shroud | EF460 | LT460EF | 1SAX701904R0002 | 0.320 |
| Terminal shroud | EF750 | LT750EF | 1SAX801904R0002 | 0.440 |
| DT500/AF460-S Mounting Kit short for mounting of EF460DU on AF460 | EF460 | DT500/AF460-S | 1SAX701902R1011 | 0.635 |
| DT500/AF460-L Mounting Kit long for mounting of EF460DU on AF460 | EF460 | DT500/AF460-L | 1SAX701902R1001 | 0.740 |
| DT800/AF750-S Mounting Kit short for mounting of EF750DU on AF750 | EF750 | DT800/AF750-S | 1SAX801902R1011 | 1.000 |
| DT800/AF750-L Mounting Kit long for mounting of EF750DU on AF750 | EF750 | DT800/AF750-L | 1SAX801902R1001 | 1.475 |
| Remote reset coil 24-30 V DC | EF19, EF45, EF65, | DRS-F-01 | 1SAX101911R1001 | 0.077 |
| Remote reset coil 48-60 V DC | EF96, EF146, | DRS-F-02 | 1SAX101911R1002 | 0.077 |
| Remote reset coil 110-127 V DC | EF205, EF370, | DRS-F-03 | 1SAX101911R1003 | 0.077 |
| Remote reset coil 220-240 V DC | EF460, EF750 | DRS-F-04 | 1SAX101911R1004 | 0.077 |
| Remote stop coil 24-30 V AC/DC | | DRS-F-EF-01 | 1SAX101911R1011 | 0.077 |
| Remote stop coil 48-60 V AC/DC | | DRS-F-EF-02 | 1SAX101911R1012 | 0.077 |
| Remote stop coil 110-127 V AC/DC | | DRS-F-EF-03 | 1SAX101911R1013 | 0.077 |
| Remote stop coil 220-240 V AC/DC | | DRS-F-EF-04 | 1SAX101911R1014 | 0.077 |

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Technical data

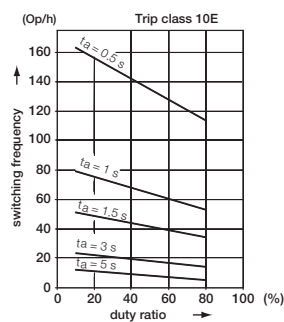
Main circuit – Utilization characteristics according to IEC/EN

| Type | EF460 | EF750 | EF1250DU |
|--|---|-------|----------|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-1, IEC/EN 60947-5-1 | | |
| Rated operational voltage Ue | 1000 V AC | | |
| Rated frequency | 50/60 Hz – not suitable for DC applications | | |
| Trip class | 10E, 20E, 30E, selectable | | |
| Number of poles | 3 | | |
| Duty time | 100% | | |
| Operating frequency without early tripping | Up to 15 operations/h, see "Technical diagram – Intermittent periodic duty" | | |
| Rated impulse withstand voltage Uimp | 8 kV | | |
| Rated insulation voltage Ui | 1000 V AC | | |

Auxiliary circuit according to IEC/EN

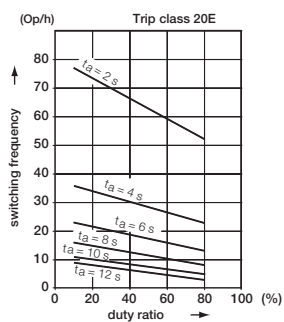
| Type | EF460 | EF750 | EF1250DU |
|---|-------------------|--------|----------|
| Rated operational voltage Ue | 600 V AC / DC | | |
| Conventional free air thermal current Ith | 6 A | | |
| Rated frequency | DC, 50/60 Hz | | |
| Number of poles | 1 N.C. + 1 N.O. | | |
| Ie / Rated operational current AC-15 acc. to IEC/EN 60947-5-1 for utilization category | | | |
| 110-120 V | 50/60 Hz | 3.00 A | |
| 220-230-240 V | 50/60 Hz | 3.00 A | |
| 400 V | 50/60 Hz | 1.10 A | |
| 480-500 V | 50/60 Hz | 0.75 A | |
| Ie / Rated operational current DC-13 acc. to IEC/EN 60947-5-1 for utilization category | | | |
| 24 V | | 1.50 A | |
| 60 V | | 0.55 A | |
| 110-120-125 V | | 0.55 A | |
| 250 V | | 0.27 A | |
| Minimum switching capacity | 12 V / 3 mA | | |
| Short-circuit protective device | 6 A, fuse type gG | | |
| Rated impulse withstand voltage Uimp | 6 kV | | |
| Rated insulation voltage Ui | 690 V | | |

Technical diagram – Intermittent periodic duty



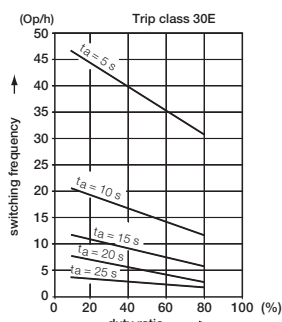
2CDC233200F0214

Trip class 10E



2CDC233200F0214

Trip class 20E



2CDC233200F0214

Trip class 30E

EF460, EF750, EF1250DU electronic overload relays – 150 to 1250 A

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| Type | EF460 | EF750 | EF1250DU |
|-----------------------------|------------------------|-------|----------|
| Standards | UL60947-1, UL60947-4-1 | | |
| Maximum operational voltage | 600 V AC | | |
| Trip rating | 125% of FLA | | |





Auxiliary circuit according to UL/CSA

| Type | EF460 | EF750 | EF1250DU |
|------------------------------|----------------------------|------------|----------|
| Contact rating | N.C., 95-96 N.O., 97-98 | B600, Q300 | |
| Conventional thermal current | 5 A | | |

General data

| Type | EF460 | EF750 | EF1250DU |
|--|-------------------------|-------|----------|
| Pollution degree | 3 | | |
| Phase loss sensitive | Yes | | |
| Ambient air temperature | | | |
| Operation | Open - compensated | | |
| Storage | -25 ... +70 °C | | |
| Ambient air temperature compensation | Acc. to IEC/EN60947-4-1 | | |
| Maximum operating altitude permissible | 2000 m | | |
| Resistance to shock acc. to IEC 60068-2-27 | 25g / 11 ms | | |
| Resistance to vibrations acc. to IEC 60068-2-6 | 3g / 3 ... 150 Hz | | |
| Degree of protection | | | |
| Housing | IP20 | | |
| Main circuit terminals | IP00 | | |

Electrical connection

| Auxiliary circuit | | | |
|---|---------------------------------|------------------------------|----------|
| Type | EF460 | EF750 | EF1250DU |
| Connecting capacity | | | |
|  Rigid | 1 or 2 x | 1 ... 4 mm ² | |
|  Flexible with ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | |
|  Flexible with insulated ferrule | 1 or 2 x | 0.75 ... 2.5 mm ² | |
|  Flexible | 1 or 2 x | 0.75 ... 2.5 mm ² | |
| Stranded acc. to UL/CSA | 1 or 2 x | AWG 18-10 | |
| Flexible acc. to UL/CSA | 1 or 2 x | AWG 18-10 | |
| Stripping length | 9 mm | | |
| Tightening torque | 0.8 ... 1.2 Nm / 7 ... 11 lb.in | | |
| Recommended screw driver | M3.5 (Pozidriv 2) | | |

Thermal and electronic overload relays

General accessories



WRB-400

2CDC231028F0013



WRH-F

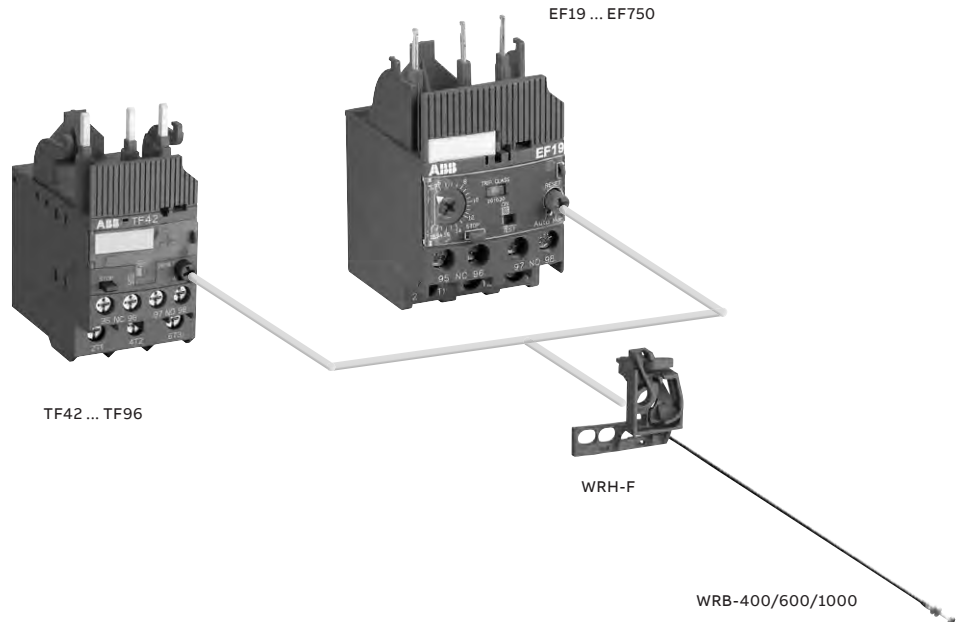
2CDC231027F0013

The wire reset is a general accessory for thermal and electronic overloads relays. In installations which are difficult to access, like a motor control centre or compact cubical, the accessory allows the user to remotely reset the overload relays.

The wire reset consists of two parts, the bowden wire with actuator and the holder. The actuator should be mounted into a door of a panel. The holder will be mounted on the overload relay. The actuator and holder are connected via the bowden wire.

| Suitable for | Description | Length mm | Type | Order code | Weight (1 pce) kg |
|---|--|--------------|----------|-----------------|-------------------------|
| Holder | | | | | |
| TF42, TF65, TF96, EF19, EF45, EF65, EF96, EF146, EF205, EF370, EF460, EF750 | Holder for tool less direct mounting | | WRH-F | 1SAZ701903R1001 | 0.006 |
| Bowden wire with actuator | | | | | |
| WRH-F | Bowden wire with actuator, hole diameter: 7.3 mm, maximum panel thickness: 12 mm | 400 | WRB-400 | 1SAZ701903R1011 | 0.030 |
| | | 600 | WRB-600 | 1SAZ701903R1012 | 0.040 |
| | | 1000 | WRB-1000 | 1SAZ701903R1013 | 0.060 |
| IP54 gasket | | | | | |
| WRB-400 WRB-600 WRB-1000 | IP54 Panel seal gasket | | WRBG | 1SAZ701903R1030 | 0.037 |

Overload relays with accessory wire reset (WRH, WRB)





—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/CM-MSS.11P
www.abb.com/productdetails/1SVR740720R1400

Thermistor motor protection relays

- 7/2 Benefits and advantages, Applications**
- 7/3 Operating controls**
- 7/4 Selection table CM-MSx range**
- 7/5 Ordering details**
- 7/6 Ordering details - PTC temperature sensors C011**
- 7/7 Technical data - CM-MSS**
- 7/10 Technical data - CM-MSE**
- 7/12 Connection diagrams**
- 7/13 Circuit diagram**

Thermistor motor protection relays

Benefits and advantages, Applications

The thermistor motor protection relays of the CM-MSx range protect motors with PTC sensors against high temperature. These sensors are incorporated in the motor windings thus measuring the motor heat directly.

Direct temperature measuring

Generally, motor damages caused by overload or overheating situations can be prevented in different ways. Compared to the indirect temperature measuring which monitors the motor current, the temperature inside the motor can be measured by direct temperature measuring.

This enables direct control and evaluation of the following operating conditions like:

- Heavy duty starting
- Increased switching frequency
- Single phase operation
- Phase unbalance
- High ambient temperature
- Insufficient cooling
- Breaking operation

Therefore the consequences from overheating like abrasion as well as electrical failures can be prevented.

The direct measuring principle is carried out by a combination of the thermistor motor protection relay and 3 PTC sensors which are installed directly in the motor by the manufacturer. Those 3 PTC sensors are placed directly at the thermal hotspots, the motor windings.

Characteristics CM-MSS (1)

- Different types of contacts available
 - 1 x 2 c/o (SPDT) contacts
 - 2 x 1 c/o (SPDT) contact
 - 1 n/o and 1 n/c contact
- 1 or 2 measuring circuits
- Different types of reset functions
 - Automatic
 - Manual
 - Remote
- Rated control supply voltages
 - 24 V AC/DC
 - 24-240 V AC/DC
 - 110-130 V AC, 220-240 V AC
- Approvals / Marks

 (1) / CE

Characteristics CM-MSE

- Auto reset
- Connection of several sensors (max. 6 sensors connected in series)
- Monitoring of bimetals
- 1 n/o contact
- Excellent cost / performance ratio

Monitoring the motor

The thermistor motor protection relay measures the resistance of the PTC sensors which reflects the internal motor temperature permanently.

If the temperature in the motor windings rises excessively and reaches the nominal response temperature (NRT), the thermistor motor protection relay detects this situation and the output relay switches off.

By doing so the motor contactor gets triggered and switches off the motor.

CM-MSS functionality video



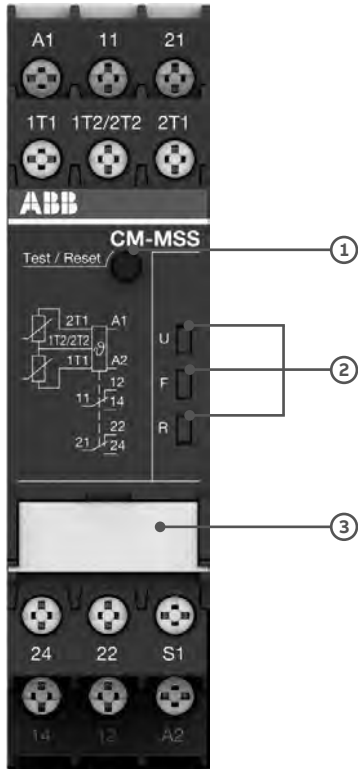
Features (1)

- Additional functions:
 - Dynamic interrupted wire detection
 - Short-circuit monitoring of the sensor circuit
 - Non-volatile fault storage
 - Single or sum evaluation
- Easy configuration via DIP switches
- LEDs to distinguish between different failure causes
- Screw connection technology or Easy Connect Technology available
- Test/Reset button available

(1) Depending on device the characteristics vary, for detailed overview see "Selection table CM-MSx range" on page 4.

Thermistor motor protection relays

Operating controls



- ① **Test / Reset button**
Reset - only possible if measured value < switch-on resistance
- ② **Indication of operational states with LEDs**
U: green LED - Status indication of control supply voltage
Control supply voltage applied
F: red LED - Fault message
R: yellow LED - Status indication of the output relay
- ③ **Marker label / DIP switches (depending on device) e.g.**
 - Single evaluation 2 x 1 c/o (SPDT) contact
 - Accumulative evaluation 1 x 2 c/o (SPDT) contacts
 - Short-circuit detection de-activated
 - Short-circuit detection activated
 - Non-volatile fault storage activated
 - Non-volatile fault storage de-activated
 - Remote Reset
 - Remote Test/Reset

LEDs, status information and fault messages CM-MSS

| Operational state | U: green LED | F: red LED | R: yellow LED |
|---|--------------|------------|---------------|
| Absence of control supply voltage | OFF | OFF | OFF |
| Internal fault (2) | OFF | | |
| Internal fault (2) | | | |
| Control supply voltage not within the tolerance range | | | OFF |
| Short circuit | | | OFF |
| Interrupted wire | | | OFF |
| Measuring circuit 2: Overtemperature | | | OFF |
| Measuring circuit 1: Overtemperature | | | OFF |
| Fault rectified but not confirmed | | -- (1) | |
| Test function | | OFF | OFF |
| Change of configuration not confirmed | | OFF | |
| No fault | | OFF | |

(1) Depending on the fault with the highest priority
 (2) Restart the device. If after restart the same fault is indicated, replace the device.

Thermistor motor protection relays

Selection table CM-MSx range

| Type | Order code |
|------------|-----------------|
| CM-MSE | 1SVR550805R9300 |
| CM-MSE | 1SVR550800R9300 |
| CM-MSE | 1SVR550801R9300 |
| CM-MSS.11P | 1SVR740720R1400 |
| CM-MSS.11S | 1SVR730720R1400 |
| CM-MSS.12P | 1SVR740700R0100 |
| CM-MSS.12S | 1SVR730700R0100 |
| CM-MSS.13P | 1SVR740700R2100 |
| CM-MSS.13S | 1SVR730700R2100 |
| CM-MSS.21P | 1SVR740722R1400 |
| CM-MSS.21S | 1SVR730722R1400 |
| CM-MSS.22P | 1SVR740700R0200 |
| CM-MSS.22S | 1SVR730700R0200 |
| CM-MSS.23P | 1SVR740700R2200 |
| CM-MSS.23S | 1SVR730700R2200 |
| CM-MSS.31P | 1SVR740712R1400 |
| CM-MSS.31S | 1SVR730712R1400 |
| CM-MSS.32P | 1SVR740712R0200 |
| CM-MSS.32S | 1SVR730712R0200 |
| CM-MSS.33P | 1SVR740712R2200 |
| CM-MSS.33S | 1SVR730712R2200 |
| CM-MSS.41P | 1SVR740712R1200 |
| CM-MSS.41S | 1SVR730712R1200 |
| CM-MSS.51P | 1SVR740712R1300 |
| CM-MSS.51S | 1SVR730712R1300 |

Characteristics

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ATEX approval | | | | ■ | ■ | | | | | | ■ | ■ | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Number of sensor circuits | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | |
| Single or accumulative evaluation | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | | |
| Number of LEDs | | | | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | |

Contacts

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|--|---|---|---|---|---|--|---|---|---|---|--|--|---|---|--|--|--|--|--|---|---|--|
| 1 c/o (SPDT) contact | | | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | |
| 2 c/o (SPDT) contacts | | | | | | | | | | | | | ■ | ■ | ■ | ■ | | | | | | | | | | | | |
| 1 n/o | ■ | ■ | ■ | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 n/c and 1 n/o | | | | ■ | ■ | | | | | ■ | ■ | | | | | | | | ■ | ■ | | | | | | | | |
| 2 x 1 c/o or 1 x 2 c/o contacts, configurable | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | |

Reset

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Manual | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Remote | | | | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Auto | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Test button | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Functions

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|---|---|--|--|--|--|---|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|---|---|---|---|---|
| Short-circuit detection | | | | | | | | | | | | ■ | ■ | | | | | | | | | | | | | | | | | |
| Short-circuit detection, configurable | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ | |
| Dynamic interrupted wire detection | | | | ■ | ■ | | | | | ■ | ■ | | | | | | | | | | | | | | | | ■ | ■ | ■ | |
| Non-volatile fault storage | | | | ■ | ■ | | | | | ■ | ■ | | | | | | | | | | | | | | | | | | | |
| Non-volatile fault storage, configurable | | | | | | | | | | | | | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ |

Rated control supply voltage Us

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------------|---|---|---|---|---|---|---|--|--|--|---|---|---|---|--|--|---|---|--|--|--|--|--|--|--|--|---|---|---|---|
| 24 V AC | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 110-130 V AC | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 220-240 V AC | | | ■ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 24-240 V AC/DC | | | | ■ | ■ | | | | | | ■ | ■ | | | | | | | | | | | | | | | ■ | ■ | ■ | ■ |
| 24 V AC/DC | | | | | | ■ | ■ | | | | | | ■ | ■ | | | | | | | | | | | | | | | | |
| 110-130 V AC, 220-240 V AC | | | | | | | | | | | | | | | | | ■ | ■ | | | | | | | | | ■ | ■ | | |

Connection type

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|--|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Push-in terminals | | | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | |
| Double-chamber cage connection terminals | | | | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | | ■ |

(1) For automatic reset, connect terminals S1 to T2.
 (2) For automatic reset, connect Terminals S1 to 1T2/2T2.

07

Thermistor motor protection relays

Ordering details



CM-MSS.12S

2CDC251.004.V0014



CM-MSS.41S

2CDC251.013.V0014



CM-MSS.51S

2CDC251.014.V0014

The thermistor motor protection relay CM-MSS monitors the winding temperature and thus protects the motor from overheating, overload and insufficient cooling in accordance to the product standard IEC 60947-8.

CM-MSx

| Characteristics | Type | Order code | Price 1 pce | Weight (1 pce) kg (lb) |
|-----------------|------------|-----------------|-------------|------------------------|
| | CM-MSE | 1SVR550805R9300 | | 0.11 (0.24) |
| | CM-MSE | 1SVR550800R9300 | | 0.11 (0.24) |
| | CM-MSE | 1SVR550801R9300 | | 0.11 (0.24) |
| | CM-MSS.11P | 1SVR740720R1400 | | 0.119 (0.263) |
| | CM-MSS.11S | 1SVR730720R1400 | | 0.127 (0.280) |
| | CM-MSS.12P | 1SVR740700R0100 | | 0.105 (0.231) |
| | CM-MSS.12S | 1SVR730700R0100 | | 0.113 (0.249) |
| | CM-MSS.13P | 1SVR740700R2100 | | 0.147 (0.324) |
| | CM-MSS.13S | 1SVR730700R2100 | | 0.155 (0.342) |
| | CM-MSS.21P | 1SVR740722R1400 | | 0.118 (0.260) |
| | CM-MSS.21S | 1SVR730722R1400 | | 0.126 (0.278) |
| | CM-MSS.22P | 1SVR740700R0200 | | 0.121 (0.267) |
| | CM-MSS.22S | 1SVR730700R0200 | | 0.132 (0.291) |
| | CM-MSS.23P | 1SVR740700R2200 | | 0.163 (0.359) |
| | CM-MSS.23S | 1SVR730700R2200 | | 0.174 (0.384) |
| | CM-MSS.31P | 1SVR740712R1400 | | 0.120 (0.265) |
| | CM-MSS.31S | 1SVR730712R1400 | | 0.128 (0.282) |
| | CM-MSS.32P | 1SVR740712R0200 | | 0.120 (0.265) |
| | CM-MSS.32S | 1SVR730712R0200 | | 0.130 (0.287) |
| | CM-MSS.33P | 1SVR740712R2200 | | 0.162 (0.357) |
| | CM-MSS.33S | 1SVR730712R2200 | | 0.172 (0.379) |
| | CM-MSS.41P | 1SVR740712R1200 | | 0.130 (0.287) |
| | CM-MSS.41S | 1SVR730712R1200 | | 0.141 (0.311) |
| | CM-MSS.51P | 1SVR740712R1300 | | 0.135 (0.298) |
| | CM-MSS.51S | 1SVR730712R1300 | | 0.145 (0.320) |

See "Selection table CM-MSx range" on page 4.

S: screw connection
P: push-in connection



Further documentation thermistor motor protection monitoring relays on www.abb.com

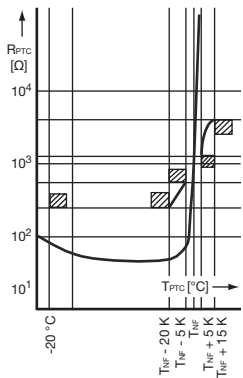
Thermistor motor protection relays

Ordering details - PTC temperature sensors C011



15VCL110 000 F0831

Temperature sensor characteristics



2CDC 252 068 F0208

The PTC temperature sensors (temperature-dependent with positive temperature coefficient) are selected by the manufacturer of the motor depending on:

- the motor insulation class according to IEC/EN 60034-11,
- the special characteristics of the motor, such as the conductor cross-section of the windings, the permissible overload factor etc.
- special conditions prescribed by the user, such as the permissible ambient temperature, risks resulting from locked rotor, extent of permitted overload etc.

One temperature sensor must be embedded in each phase winding. For instance, in case of three-phase squirrel cage motors, three sensors are embedded in the stator windings. For pole-changing motors with one winding (Dahlander connection), 3 sensors are also sufficient. Pole-changing motors with two windings, however, require 6 sensors. If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit. A 14 V varistor can be connected in parallel to protect the sensors from overvoltage. Due to their characteristics, the thermistor motor protection relays can also be used with PTC temperature sensors of other manufacturers which comply with DIN 44 081 and DIN 44 082 6 sensors.

If an additional warning is required before the motor is switched off, separate sensors for a correspondingly lower temperature must be embedded in the winding. They have to be connected to a second control unit.

CM-MSS accessories

| Rated response temperature TNF | Color coding | Type | Order code | Price 1 pce | Weight (1 pce) kg (lb) |
|--------------------------------|--------------|----------------|-----------------|-------------|------------------------|
| 70 °C | white-brown | C011-70 (1) | GHC0110003R0001 | | 0.02 (0.044) |
| 80 °C | white-white | C011-80 (1) | GHC0110003R0002 | | 0.02 (0.044) |
| 90 °C | green-green | C011-90 (1) | GHC0110003R0003 | | 0.02 (0.044) |
| 100 °C | red-red | C011-100 (1) | GHC0110003R0004 | | 0.02 (0.044) |
| 110 °C | brown-brown | C011-110 (1) | GHC0110003R0005 | | 0.02 (0.044) |
| 120 °C | gray-gray | C011-120 (1) | GHC0110003R0006 | | 0.02 (0.044) |
| 130 °C | blue-blue | C011-130 (1) | GHC0110003R0007 | | 0.02 (0.044) |
| 140 °C | white-blue | C011-140 (1) | GHC0110003R0011 | | 0.02 (0.044) |
| 150 °C | black-black | C011-150 (1) | GHC0110003R0008 | | 0.02 (0.044) |
| 160 °C | blue-red | C011-160 (1) | GHC0110003R0009 | | 0.02 (0.044) |
| 170 °C | white-green | C011-170 (1) | GHC0110003R0010 | | 0.02 (0.044) |
| 150 °C | black-black | C011-3-150 (2) | GHC0110033R0008 | | 0.05 (0.11) |

(1) Temperature sensor C011, standard version acc. to DIN 44081

(2) Triple temperature sensor C011-3

Technical data

| Characteristic data | Sensor type C011 |
|---|-------------------|
| Cold-state resistance | 50-100 Ω at 25 °C |
| Warm-state resistance ± 5 up to 6 K of rated response temperature T _{NF} | 10 000 Ω |
| Thermal time constant, sensor open (1) | < 5 s |
| Permitted ambient temperature | +180 °C |

| Rated response temperature ± tolerance T _{NF} ± ΔT _{NF} | PTC resistance R from -20 °C to T _{NF} - 20 K | PTC resistance R ₂ at PTC temperatures of: | | |
|---|--|---|---|---------------------------------------|
| | | T _{NF} - ΔT _{NF} (UPTC ≤ 2.5 V) | T _{NF} + ΔT _{NF} (UPTC ≤ 2.5 V) | T _{NF} + 15 K (UPTC ≤ 7.5 V) |
| 70 ± 5 °C | ≤ 100 Ω | ≤ 570 Ω | ≥ 570 Ω | - |
| 80 ± 5 °C | | | | |
| 90 ± 5 °C | | | | |
| 100 ± 5 °C | | | | |
| 110 ± 5 °C | | | | |
| 120 ± 5 °C | | | | |
| 130 ± 5 °C | | | | |
| 140 ± 5 °C | | | | |
| 150 ± 5 °C | | | | |
| 160 ± 5 °C | | | | |
| 170 ± 7 °C | | ≤ 570 Ω | ≥ 570 Ω | - |

(1) Not embedded in windings.

(2) For triple temperature sensor take values x 3.

Thermistor motor protection relays

Technical data - CM-MSS

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

| Supply circuit - Input circuit | CM-MSS.x1 | CM-MSS.x2 | CM-MSS.x3 |
|--|-------------|----------------|------------|
| Rated control supply voltage U_s | A1-A2 | 24-240 V AC/DC | 24 V AC/DC |
| | A2-A3 | - | - |
| Rated control supply voltage U_s tolerance | -15...+10 % | | |
| Rated frequency | 15-400 Hz | 50-60 Hz | |
| Electrical insulation between supply circuit and measuring circuit | yes | no | yes |
| Power failure buffering time | 20 ms | | |

Supply circuit - Measuring circuit / Sensor circuit

| | | | |
|--|--|--|--|
| Number of circuits | 1 (CM-MSS.51: 2) | | |
| Sensor type | PTC type A (DIN/EN 44081, DIN/EN 44082) | | |
| Max. total resistance of sensors connected in series, cold state | < 750 Ω | | |
| Overtemperature monitoring | switch-off resistance (relay de-energizes) | 2.83 k Ω \pm 1% (CM-MSS.12 /.13 /.22 /.23: 2.7 k Ω \pm 5%) | |
| | switch-on resistance (relay energizes) | 1.1 k Ω \pm 1% (CM-MSS.12 /.13 /.22 /.23: 1.2 k Ω \pm 5%) | |
| Maximum voltage in sensor circuit | 1.33 kW | 2.5 V | |
| | 4 kW | 3.7 V | |
| | ∞ kW | 5.5 V | |
| Maximum current in sensor circuit | 3.7 mA | | |
| Maximum sensor cable length | 2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ² | | |
| Accuracy within the rated control supply voltage tolerance | 0.50 % (CM-MSS.12 /.13 /.22 /.23: 5 %) | | |
| Accuracy within the temperature range | 0.01 %/K (CM-MSS.12 /.13 /.22 /.23: 0.5 %/K) | | |
| Repeat accuracy (constant parameters) | on request | | |
| Reaction time of the safety function | < 100 ms | | |
| Hardware fault tolerance (HFT) | 0 | | |

Control circuit

| | |
|-------------------------|--|
| Control function | see "Selection table CM-MSx range" on page 4 |
| Maximum no-load voltage | 5.5 V |
| Max. current | 0.6 mA (CM-MSS.12 /.13 /.22 /.23: 1.2 mA) |
| Maximum cable length | 2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ² |

Indication of operational states

| | | |
|------------------------|---|------------|
| Control supply voltage | U | LED green |
| Relay status | R | LED yellow |
| Fault message | F | LED red |

Output circuit

| | | | |
|---|--|---|--|
| Kind of output | see "Selection table CM-MSx range" on page 4 | | |
| Operating principle | closed-circuit principle | | |
| Contact material | AgNi alloy, Cd free | | |
| Rated operational voltage U_e (IEC/EN 60947-1) | 250 V AC | | |
| Minimum switching voltage / Minimum switching current | 24 V / 10 mA | | |
| Maximum switching voltage / Maximum switching current | see data sheet | | |
| Rated operating current I_e (IEC/EN 60947-5-1) | AC-12 (resistive) at 230 V | 4 A | |
| | AC-15 (inductive) at 230 V | 3 A | |
| | DC-12 (resistive) at 24 V | 4 A | |
| | DC-13 (inductive) at 24 V | 2 A | |
| AC Rating (UL 508) | utilization category (Control Circuit Rating Code) | B 300 | |
| | maximum rated operational voltage | 300 V AC | |
| | maximum continuous thermal current at B 300 | 5 A | |
| | maximum making/breaking apparent power at B 300 | 3600/360 VA | |
| | general purpose rating | 250 V AC - 4 A | |
| Mechanical lifetime | 30 x 10 ⁶ switching cycles | | |
| Electrical lifetime | at AC12, 230 V AC, 4 A | 0.1 x 10 ⁶ switching cycles | |
| Maximum fuse rating to achieve short-circuit protection | n/c contact | 10 A fast-acting (CM-MSS.12, CM-MSS.13, CM-MSS.51: 6 A) | |
| | n/o contact | 10 A fast-acting | |

Thermistor motor protection relays

Technical data - CM-MSS

| General data | | | |
|--|---|--|---|
| MTBF | | on request | |
| Duty time | | 100 % | |
| Dimensions (W x H x D) | product dimensions | 22.5 x 85.6 x 103.7 mm (0.89 x 3.37 x 4.08 in) | |
| | packaging dimensions | 97 x 109 x 30 mm (3.82 x 4.29 x 1.18 in) | |
| Weight | | see "Ordering details" on page 5 | |
| Mounting | | DIN rail (IEC/EN 60715), snap-on mounting without any tool | |
| Mounting position | | any | |
| Minimum distance to other units | vertical | 10 mm (0.394 in) if switching current > 2 A | |
| | horizontal | 10 mm (0.394 in) if switching current > 2 A | |
| Material of housing | | UL 94 V-0 | |
| Degree of protection | housing | IP50 | |
| | terminals | IP20 | |
| Electrical connection | | | |
| Connection capacity | fine-strand with(out) wire end ferrule | Screw connection technology | Easy Connect Technology (push-in) |
| | | | |
| | | 1 x 0.5-2.5 mm ² (1 x 18-14 AWG) 2 x 0.5-1.5 mm ² (2 x 18-16 AWG) | 2 x 0.5-1.5 mm ² (2 x 18-16 AWG) |
| | rigid | 1 x 0.5-4 mm ² (1 x 20-12 AWG) 2 x 0.5-2.5 mm ² (2 x 20-14 AWG) | 2 x 0.5-1.5 mm ² (2 x 20-16 AWG) |
| Stripping length | | 8 mm (0.32 in) | |
| Tightening torque | | 0.6-0.8 Nm (7.08 lb.in) | - |
| Wire end ferrule | | according to DIN 46228-1-A, DIN 46228-4-E | - |
| Environmental data | | | |
| Ambient temperature ranges | operation | -25...+60 °C (-13...+140 °F) | |
| | storage | -40...+85 °C (-40...+185 °F) | |
| Damp heat, cyclic (IEC/EN 60068-2-30) | | 6 x 24 h cycle, 55 °C, 95 % RH | |
| Climatic class (IEC/EN 60721-3-3) | | 3K5 (no condensation, no ice formation) | |
| Vibration, sinusoidal (IEC/EN 60255-21-1) | | Class 2 | |
| Shock (IEC/EN 60255-21-2) | | Class 2 | |
| Isolation data | | | |
| Rated insulation voltage U _i (IEC/EN 60947-1, IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 300 V AC (CM-MSS.x2: n/a) | |
| | Supply circuit / Output circuits | 300 V AC | |
| | Measuring circuit (1) / Output circuits | 300 V AC | |
| | Output circuit 1 / Output circuit 2 | 300 V AC | |
| Rated impulse withstand voltage U _{imp} (IEC/EN 60947-1, IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 4 kV / 6 kV (CM-MSS.x2: n/a) | |
| | Supply circuit / Output circuits | 4 kV / 6 kV | |
| | Measuring circuit (1) / Output circuits | 4 kV / 6 kV | |
| | Output circuit 1 / Output circuit 2 | 4 kV | |
| Basic insulation (IEC/EN 60664-1) | Supply circuit / Measuring circuit (1) | 600 V AC (CM-MSS.x2: n/a) | |
| | Supply circuit / Output circuits | 600 V AC | |
| | Measuring circuit (1) / Output circuits | 600 V AC | |
| | Output circuit 1 / Output circuit 2 | 300 V AC | |
| Test voltage, routine test (IEC/EN 60255-27) | Supply circuit / Measuring circuit (1) | 2.5 kV, 50 Hz, 1 min. (CM-MSS.x2: n/a) | |
| | Supply circuit / Output circuits | 2.5 kV, 50 Hz, 1 min. | |
| | Measuring circuit (1) / Output circuits | 2.5 kV, 50 Hz, 1 min. | |
| Test voltage, type test (IEC/EN 60255-27) | Supply circuit / Measuring circuit (1) | 6 kV / 1.2 - 50 μs (CM-MSS.x2: n/a) | |
| | Supply circuit / Output circuits | 6 kV / 1.2 - 50 μs | |
| | Measuring circuit (1) / Output circuits | 6 kV / 1.2 - 50 μs | |
| | Output circuit 1 / Output circuit 2 | 6 kV / 1.2 - 50 μs | |
| Protective separation (IEC/EN 61140, EN 50178) | Supply circuit / Measuring circuit (1) | yes, up to 300 V | |
| | Supply circuit / Output circuits | yes (CM-MSS.x2: n/a) | |
| | Measuring circuit (1) / Output circuits | yes | |
| | Output circuit 1 / Output circuit 2 | no | |
| Pollution degree (IEC/EN 60664-1) | | 3 | |
| Overvoltage category (IEC/EN 60664-1) | | III | |

(1) Potential of measuring circuit = Potential of control circuit

Thermistor motor protection relays

Technical data - CM-MSS

Standards

| | |
|-----------------------|--|
| Product standard | EN 60947-5-1, EN 60947-8 |
| Low Voltage Directive | 2014/35/EC |
| EMC directive | 2014/30/EC |
| ATEX directive | 2014/34/EC (only ATEX variants "Selection table CM-MSx range" on page 4) |
| RoHS directive | 2011/65/EC |

Electromagnetic compatibility

| | | |
|---|------------------------|---|
| Interference immunity to | | IEC/EN 61000-6-1, IEC/EN 61000-6-2 |
| electrostatic discharge | IEC/EN 61000-4-2 | Level 3, 6 kV contact discharge, 8 kV air discharge |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | Level 3, 10 V/m (1 GHz), 3 V/m (2 GHz), 1 V/m (2.7 GHz) |
| electrical fast transient / burst | IEC/EN 61000-4-4 | Level 3, 2 kV / 5 kHz |
| surge | IEC/EN 61000-4-5 | Level 3, Installation class 3, supply circuit and measuring circuit 1 kV L-L, 2 kV L-N |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | Level 3, 0.15-80 MHz, 10 V, 80 % AM (1kHz) |
| voltage dips, short interruptions and voltage variations | IEC/EN 61000-4-11 | Class 3 |
| harmonics and interharmonics | IEC/EN 61000-4-13 | Class 3 |
| Additional interference immunity according to product standard EN 60255-1 (reference on EN 60255-26_2011) | | |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | 10 V/m (80 MHz - 3 GHz) |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-6 | 10 V at stated frequencies |
| damped oscillatory waves | IEC/EN 61000-4-18 | Signal lines, symmetric coupling: 1 kV peak voltage Power supply, asymmetric coupling: 2.5 kV peak voltage |
| Interference emissions | | IEC/EN 61000-6-3, IEC/EN 61000-6-4 |
| high-frequency radiated | IEC/CISPR 22, EN 55022 | Class B |
| high-frequency conducted | IEC/CISPR 22, EN 55022 | Class B |
| high-frequency radiated | Germanischer Lloyd | increased requirements in the emergency call frequency band |

Thermistor motor protection relays

Technical data - CM-MSE

Data at $T_a = 25\text{ °C}$ and rated values, unless otherwise indicated

| Supply circuit - Input circuit | | CM-MSE |
|--|--|---|
| Rated control supply voltage U_c , power consumption | 1SVR550805R9300 | 24 V AC approx. 1.5 A |
| | 1SVR550800R9300 | 110-130 V AC approx. 1.5 A |
| | 1SVR550801R9300 | 220-240 V AC approx. 1.5 A |
| Rated control supply voltage U_c tolerance | | -15...+10 % |
| Rated frequency | | 50-60 Hz |
| Measuring circuit | | |
| Monitoring function | T1-T2 | temperature monitoring by means of PTC sensors |
| Number of sensor circuits | | 1 |
| Sensor circuit | | |
| Temperature threshold (relay de-energizes) | | 2.7-3.7 k Ω |
| Temperature hysteresis (relay energizes) | | 1.7-2.3 k Ω |
| Short-circuit threshold (relay de-energizes) | | <18 Ω |
| Short-circuit hysteresis (relay energizes) | | >45 Ω |
| Maximum total resistance of sensors connected in series (cold state) | | \leq 1.5 k Ω |
| Maximum sensor cable length for short-circuit detection | | 2 x 100 m at 0.75 mm ² , 2 x 400 m at 2.5 mm ² |
| Response time | | <100 ms |
| Output circuit | | |
| Kind of output | 13-14 | 1 n/o contact |
| Operational principle | | closed-circuit principle (output relay de-energizes if the measured value exceeds/drops below the adjusted threshold) |
| Contact material | | AgCdO |
| Rated voltage | VDE 0110, IEC 664-1, IEC 60947-1 | 250 V |
| Maximum switching voltage | | 250 V |
| Rated operating current I_n (IEC/EN 60947-5-1) | AC-12 (resistive) at 230 V | 4 A |
| | AC-15 (inductive) at 230 V | 3 A |
| | DC-12 (resistive) at 24 V | 4 A |
| | DC-13 (inductive) at 24 V | 2 A |
| AC Rating (UL 508) | utilization category (Control Circuit Rating Code) | B 300 |
| | maximum rated operational voltage | 300 V AC |
| | maximum continuous thermal current at B 300 | 5 A |
| | maximum making/breaking apparent power at B 300 general purpose rating | 3600/360 VA 250 V AC - 4 A |
| Mechanical lifetime | | 30 x 10 ⁶ switching cycles |
| Electrical lifetime | at AC12, 230 V AC, 4 A | 0.1 x 10 ⁶ switching cycles |
| Maximum fuse rating to achieve short-circuit protection | n/c contact | 10 A fast-acting |
| | n/o contact | 10 A fast-acting |
| General data | | |
| Dimensions (W x H x D) | | 22.5 x 78 x 78.5 mm (0.89 x 3.07 x 3.09 in) |
| Duty time | | 100 % |
| Weight | | approx. 0.11 kg (0.24 lb) |
| Mounting position | | any |
| Degree of protection | housing / terminals | IP50 / IP20 |
| Ambient temperature range | operation | -20...+60 °C |
| | storage | -40...+85 °C |
| Mounting | | DIN rail (IEC/EN 60715) |
| Electrical connection | | |
| Wire size | fine strand with wire end ferrule | 2 x 1.5 mm ² (2 x 16 AWG) |
| | fine strand without wire end ferrule | 2 x 0.75-1.5 mm ² (2 x 18-16 AWG) |
| | rigid | 2 x 1-1.5 mm ² (2 x 18-16 AWG) |
| Stripping length | | 2 x 0.75-1.5 mm ² (2 x 18-16 AWG) |
| Tightening torque | | 0.6-0.8 Nm (5.31-7.08 lb.in) |
| Standards | | |
| Product standard | | IEC 255-6, EN 60255-6 |
| Low Voltage Directive | | 2006/95/EC |
| EMC Directive | | 2004/108/EC, 91/263/EEC, 92/31/EEC, 93/68/EEC, 93/67/EEC |
| Electromagnetic compatibility | | |
| electrostatic discharge | IEC/EN 61000-4-2 | Level 3 (6 kV / 8 kV) |
| radiated, radio-frequency, electromagnetic field | IEC/EN 61000-4-3 | Level 3 (10 V/m) |
| electrical fast transient /burst surge | IEC/EN 61000-4-4 | Level 3 (2 kV / 5 kHz) |
| conducted disturbances, induced by radio-frequency fields | IEC/EN 61000-4-5 | Level 3/4 (1/2 kV) |
| | IEC/EN 61000-4-6 | Level 3 (10 V) |
| Operational reliability (IEC 68-2-6) | | 6 g |
| Resistance to vibration (IEC 68-2-6) | | 10 g |
| Environmental testing (IEC 68-2-30) | | 24 h cycle time, 55 °C, 93 % rel., 96 h |
| Electromagnetic compatibility | | |
| Rated voltage between supply, measuring and output circuit | | 250 V |
| Rated impulse withstand voltage between all isolated circuits | | 4 kV / 1.2 - 50 μ s |
| Test voltage between all isolated circuits | | 2.5 kV, 50 Hz, 1 min. |
| Pollution degree | | 3 |
| Overvoltage category | | III |

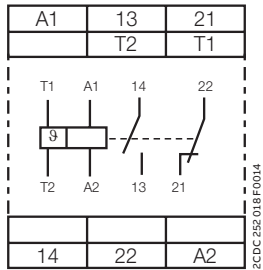
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Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.

Thermistor motor protection relays

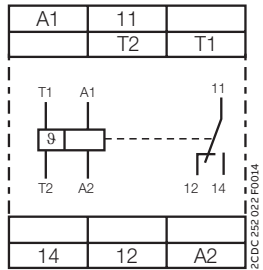
Connection diagrams

CM-MSS.11, CM-MSS.21



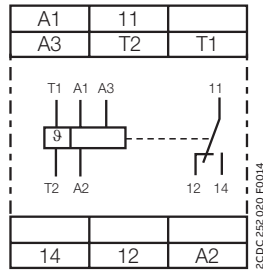
A1 – A2 Control supply voltage
 13 – 14 n/o contact
 21 – 22 n/c contact
 T1 – T2 Measuring circuit

CM-MSS.12



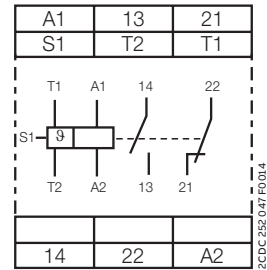
A1 – A2 Control supply voltage
 11 – 12/14 c/o contact
 T1 – T2 Measuring circuit

CM-MSS.13



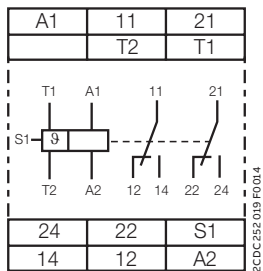
A1 – A2 Control supply voltage 220-240 V AC
 A2 – A3 Control supply voltage 110-130 V AC
 11 – 12/14 c/o contact
 T1 – T2 Measuring circuit

CM-MSS.31



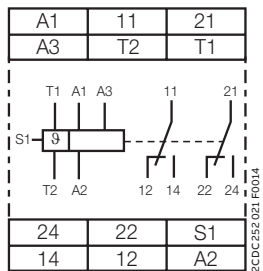
A1 – A2 Control supply voltage
 13 – 14 n/o contact
 21 – 22 n/c contact
 S1 – T2 Automatic reset (jumpered)
 T1 – T2 Measuring circuit

CM-MSS.22, CM-MSS.32, CM-MSS.41



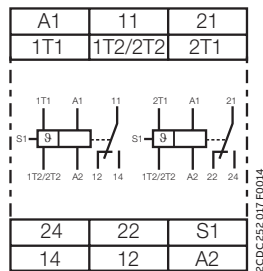
A1 – A2 Control supply voltage 24 V AC/DC
 11 – 12/14 1st c/o (SPDT) contact
 21 – 22/24 2nd c/o (SPDT) contact
 S1 – T2 Automatic reset (jumpered)
 T1 – T2 Measuring circuit

CM-MSS.23, CM-MSS.33



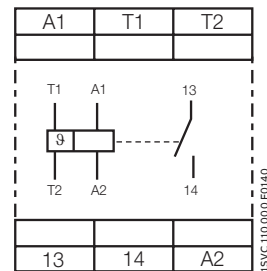
A1 – A2 Control supply voltage 220-240 V AC
 A2 – A3 Control supply voltage 110-130 V AC
 11 – 12/14 1st c/o (SPDT) contact
 21 – 22/24 2nd c/o (SPDT) contact
 S1 – T2 Automatic reset (jumpered)
 T1 – T2 Measuring circuit

CM-MSS.51



A1 – A2 Control supply voltage 220-240 V AC
 11 – 12/14 1st c/o (SPDT) contact
 21 – 22/24 2nd c/o (SPDT) contact
 S1 – 1T2/2T2 Automatic reset (jumpered)
 1T1 – 1T2/2T2 Measuring circuit 1
 2T1 – 1T2/2T2 Measuring circuit 2

CM-MSE

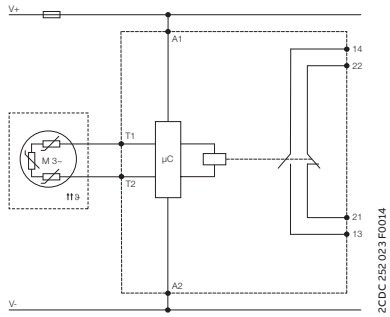


A1 – A2 Control supply voltage 24 V AC
 T1-T2 Sensor circuit
 13-14 Output contact - Closed circuit principle

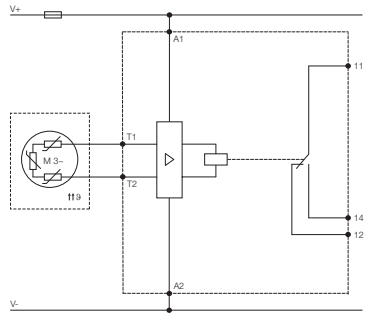
Thermistor motor protection relays

Circuit diagram

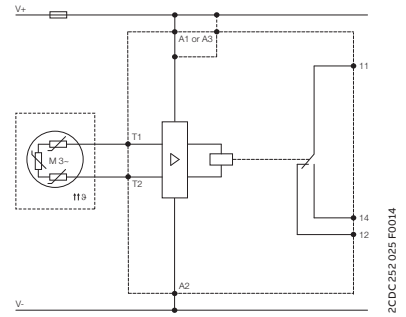
CM-MSS.11, CM-MSS.21



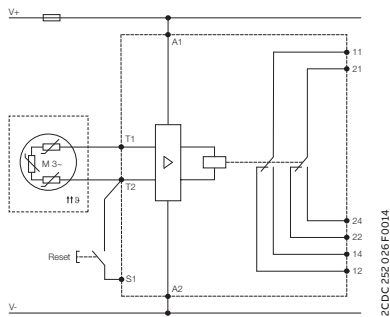
CM-MSS.12



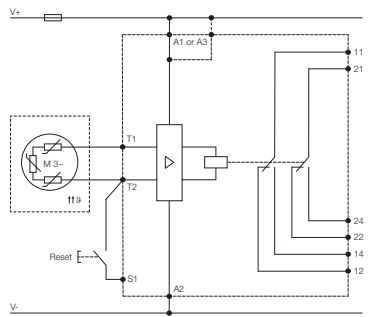
CM-MSS.13



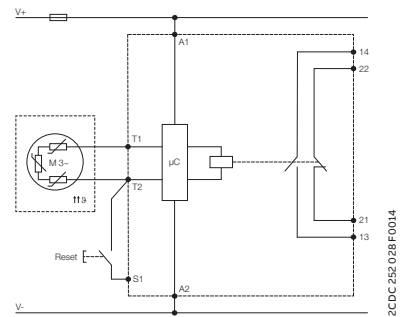
CM-MSS.22



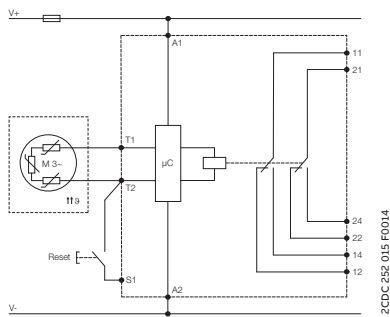
CM-MSS.23



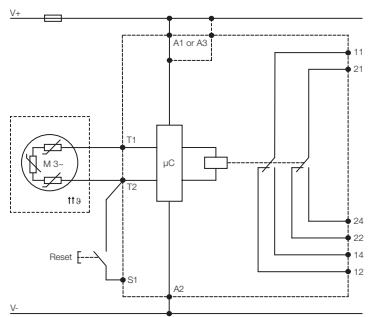
CM-MSS.31



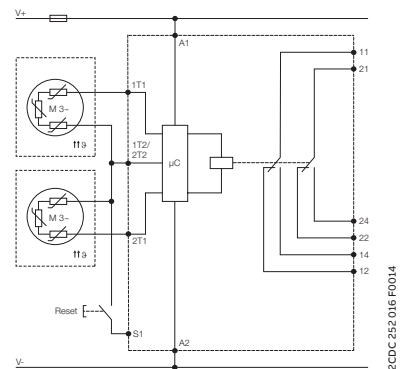
CM-MSS.32, CM-MSS.41



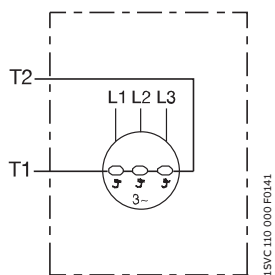
CM-MSS.33



CM-MSS.51



CM-MSE





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For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/S801S-SCL32-SR
www.abb.com/productdetails/2CCS801901R0539

Self resetting current limiting module

8/2

S800-SCL-SR

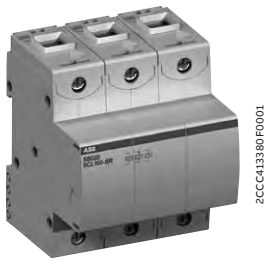
Ordering details

8/3

Technical data

S800-SCL-SR

Self-resetting current limiting module



S800S-SCL-SR

2CC413380P0001



S803W-SCL-SR

2CC413381P0001

S800-SCL-SR is ABB's innovative self-resetting current limiting module which considerably increases the short-circuit breaking capacity of downstream manual motor starters and high performance MCBs. S800-SCL-SR is a self resetting current limiting module based on the S800 technology.

It limits the short-circuit current until the downstream means of protection trips. Its current continuity makes it as the ideal solution for group protection: All parallel branches remain operative. This leads to an Expanded application range of the low voltage switchgear whose short-circuit capabilities are usually limited. S800-SCL-SR can be combined with S800S high performance MCB or with manual motor starters. S800-SCL-SR can also back up a single circuit breaker or a group of circuit breakers or motor starters (group protection). Terminals and outside dimensions are identical to the S800 range.

| Self-resetting short-circuit limiter IEC version A | Type designation | Product number | EAN number | Weight kg | Pack. unit |
|--|------------------|----------------|------------|-----------|------------|
| | | | 7612271 | | |

1-pole

| | | | | | |
|-----|-----------------|-----------------|--------|------|---|
| 32 | S801S-SCL32-SR | 2CCS801901R0539 | 412012 | 0.25 | 1 |
| 63 | S801S-SCL63-SR | 2CCS801901R0599 | 412036 | 0.25 | 1 |
| 100 | S801S-SCL100-SR | 2CCS801901R0639 | 411992 | 0.25 | 1 |

2-pole

| | | | | | |
|-----|-----------------|-----------------|--------|-----|---|
| 32 | S802S-SCL32-SR | 2CCS802901R0539 | 412074 | 0.5 | 1 |
| 63 | S802S-SCL63-SR | 2CCS802901R0599 | 412098 | 0.5 | 1 |
| 100 | S802S-SCL100-SR | 2CCS802901R0639 | 412050 | 0.5 | 1 |

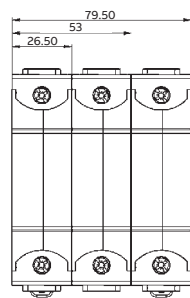
3-pole

| | | | | | |
|-----|-----------------|-----------------|--------|------|---|
| 32 | S803S-SCL32-SR | 2CCS803901R0539 | 411930 | 0.75 | 1 |
| 63 | S803S-SCL63-SR | 2CCS803901R0599 | 411947 | 0.75 | 1 |
| 100 | S803S-SCL100-SR | 2CCS803901R0639 | 411954 | 0.75 | 1 |

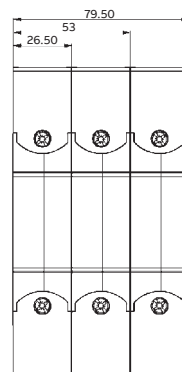
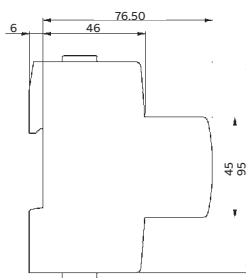
| Self-resetting short-circuit limiter IEC/UL version A | Type designation | Product number | EAN number | Weight kg | Pack. unit |
|---|------------------|----------------|------------|-----------|------------|
| | | | 7612271 | | |

3-pole

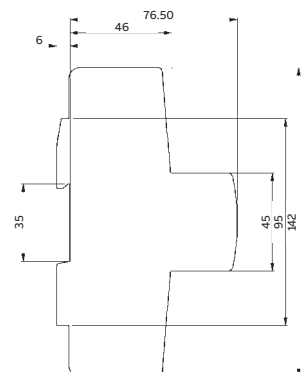
| | | | | | |
|-----|-----------------|-----------------|--------|------|---|
| 32 | S803W-SCL32-SR | 2CCS803917R0539 | 412319 | 0.75 | 1 |
| 63 | S803W-SCL63-SR | 2CCS803917R0599 | 412326 | 0.75 | 1 |
| 100 | S803W-SCL100-SR | 2CCS803917R0639 | 412302 | 0.75 | 1 |



S800S-SCL-SR/S803S-SCL



S803W-SCL-SR



Main dimensions mm, inches

2CC413012B0201

S800S-SCL-SR/S803W-SCL-SR

Technical data

| | S800S-SCL-SR | S803W-SCL-SR |
|---|---------------------|--------------|
| Rated operational current I _e | [A] 32, 63, 100 | 32, 63, 100 |
| Pole | 1, 2, 3 | 3 |
| Rated operational voltage U _e (AC) according to IEC 60947-2 | 50/60Hz [V] 400/690 | 690 |
| (AC) according to UL 508 | 50/60Hz [V] | 600 |
| Rated insulation voltage U _i | [V] 690 | 690 |
| Rated impulse withstand voltage U _{imp} | [kV] 8 | 8 |
| Rated ultimate short-circuit breaking capacity | | |

I_{cu} = I_{cs} according to IEC 60947-2*

| | | |
|-----------------------|----------|-----|
| (AC) 50/60Hz 240/415V | [kA] 100 | 100 |
| (AC) 50/60Hz 254/440V | [kA] 100 | 100 |
| (AC) 50/60Hz 277/480V | [kA] 65 | 65 |
| (AC) 50/60Hz 289/500V | [kA] 65 | 65 |
| (AC) 50/60Hz 346/600V | [kA] 65 | 65 |
| (AC) 50/60Hz 400/690V | [kA] 50 | 50 |

Short-circuit rating according to UL 508, CSA 22.2*

| | | |
|-------------------|---------|----|
| (AC) 50/60Hz 480V | [kA] 65 | 65 |
| (AC) 50/60Hz 600V | [kA] 65 | 65 |

* Valid only for approved combinations

| | | |
|---|---|---|
| Rated frequency | [Hz] 50/60 | 50/60 |
| Mounting position | any | any |
| Connections Cu | | |
| | [mm ²] 1 ... 50 rigid (solid/stranded) | 1 ... 50 rigid (solid/stranded) |
| | [mm ²] 1 ... 70 flexible | 1 ... 70 flexible |
| | | 14-1 AWG |
| Tightening torque | | |
| | [Nm] min. 3 / max. 4 | min. 3 / max. 4 |
| | [in. lbs.] | min. 26.5 / max. 25 |
| Feeding | optional | optional |
| Mouting on DIN top hat rail | EN 60715 | EN 60715 |
| Ambient air temperature | [°C] -40 ... +70 | -40 ... +70 |
| Storage temperature | [°C] -40 ... +85 | -40 ... +85 |
| Degree of protection | IP20 | IP20 |
| Classification acc. to NF F 16-101, NF F 16-102 | I3, F2 | I3, F2 |
| Damp Heat | IEC 60068-2-30, 55°C / 95% r.h. | IEC 60068-2-30, 55°C / 95% r.h. |
| Vibration | IEC 60068-2-6, 5-10Hz / 3mm and 10-500Hz / 2g at 0.5 x I _e | IEC 60068-2-6, 5-10Hz / 3mm and 10-500Hz / 2g at 0.5 x I _e |
| Random Vibration | IEC 60068-2-64, 5-500Hz / 2g at 0.5 x I _e | IEC 60068-2-64, 5-500Hz / 2g at 0.5 x I _e |
| Resistance to climatic conditions | IEC 60068-2-1 /-2-2 /-2-30 | IEC 60068-2-1 /-2-2 /-2-30 |
| Standard | IEC 60947-2 IEC 60947-4-1 | IEC 60947-2 IEC 60947-4-1 UL 508, CSA 22.2 No. 14 |

Internal resistance at 25°C ambient temperature and nominal power losses

| Rated current I _n A | Internal resistance R _i mΩ/pole | Power losses P _{vn} W/pole |
|-----------------------------------|---|--|
| 32 | 2.8 | 3.6 |
| 63 | 1.3 | 5.7 |
| 100 | 0.7 | 7.8 |

Influence of ambient temperature – single mounted devices

| Rated current I _n A | 10°C | 15°C | 20°C | 25°C | 30°C | 35°C | 40°C | 45°C | 50°C | 55°C | 60°C | 65°C | 70°C |
|-----------------------------------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|
| 32 | 38.2 | 37.2 | 35.8 | 35.2 | 34.2 | 33.3 | 32 | 30.7 | 29.8 | 28.8 | 27.8 | 26.5 | 25.1 |
| 63 | 75.3 | 73.2 | 70.6 | 69.3 | 67.4 | 65.5 | 63 | 60.5 | 58.6 | 56.7 | 54.8 | 52.3 | 49.8 |
| 100 | 119.5 | 116.2 | 112 | 110 | 107 | 104 | 100 | 96 | 93 | 90 | 87 | 84 | 80 |

S800-SCL-SR

Technical data

Short circuit breaking capacity

| | S800S-SCL-SR | S803W-SCL-SR |
|--|--------------|--------------|
| Rated ultimate short-circuit breaking capacity | | |

I_{cu} = I_{cs} according to IEC 60947-2

| | | | |
|-----------------------|------|-----|-----|
| (AC) 50/60Hz 240/415V | [kA] | 100 | 100 |
| (AC) 50/60Hz 254/440V | [kA] | 100 | 100 |
| (AC) 50/60Hz 277/480V | [kA] | 65 | 65 |
| (AC) 50/60Hz 289/500V | [kA] | 65 | 65 |
| (AC) 50/60Hz 346/600V | [kA] | 65 | 65 |
| (AC) 50/60Hz 400/690V | [kA] | 50 | 50 |

Short-circuit rating according to UL 508, CSA 22.2

| | | |
|-------------------|------|----|
| (AC) 50/60Hz 480V | [kA] | 65 |
| (AC) 50/60Hz 600V | [kA] | 65 |

Coordination

| Type | 230 V AC | | | | | | 400 V AC | | | | | | 440 V AC | | | | | |
|------------|-----------------------|-----------------------|-----------|---------|----------------------|--------|-----------------------|-----------------------|-----------|---------|----------------------|--------|-----------------------|-----------------------|-----------|---------|----------------------|-----------|
| | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | |
| | I _{cs} kA | I _{cu} kA | gG, kA | aM A | S803x-SCL-SR kA A | | I _{cs} kA | I _{cu} kA | gG, kA | aM A | S803x-SCL-SR kA A | | I _{cs} kA | I _{cu} kA | gG, kA | aM A | S803x-SCL-SR kA A | |
| MS132-0.16 | | | | | | | | | | | | | | | | | | |
| MS132-0.25 | | | | | | | | | | | | | | | | | | |
| MS132-0.4 | | | | | | | | | | | | | | | | | | |
| MS132-0.63 | | | | | | | | | | | | | | | | | | |
| MS132-1.0 | No back-up required | | | | | | No back-up required | | | | | | No back-up required | | | | | |
| MS132-1.6 | | | | | | | | | | | | | | | | | | |
| MS132-2.5 | | | | | | | | | | | | | | | | | | |
| MS132-4.0 | | | | | | | | | | | | | 20 | 20 | 100 | 63 | 100 | 32,63,100 |
| MS132-6.3 | | | | | | | | | | | | | 20 | 20 | 100 | 100 | 100 | 32,63,100 |
| MS132-10 | | | | | | | | | | | | | 20 | 20 | 100 | 100 | 100 | 32,63,100 |
| MS132-12 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-16 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-20 | | | | | | | | | | | | | 20 | 20 | 100 | 125 | 100 | 32,63,100 |
| MS132-25 | 50 | 50 | 100 | 125 | 100 | 63,100 | 50 | 50 | 100 | 125 | 100 | 63,100 | 20 | 20 | 100 | 125 | 100 | 63,100 |
| MS132-32 | 25 | 50 | 100 | 125 | 100 | 63,100 | 25 | 50 | 100 | 125 | 100 | 63,100 | 20 | 20 | 100 | 125 | 100 | 63,100 |

| Type | 500 V AC | | | | | | 690 V AC | | | | | |
|------------|-----------------------|-----------------------|-----------|---------|----------------------|------------|-----------------------|-----------------------|-----------|---------|----------------------|------------|
| | | | Fuse | | Current Limiter | | | | Fuse | | Current Limiter | |
| | I _{cs} kA | I _{cu} kA | gG, kA | aM A | S803x-SCL-SR kA A | | I _{cs} kA | I _{cu} kA | gG, kA | aM A | S803x-SCL-SR kA A | |
| MS132-0.16 | | | | | | | | | | | | |
| MS132-0.25 | | | | | | | | | | | | |
| MS132-0.4 | | | | | | | | | | | | |
| MS132-0.63 | | | | | | | | | | | | |
| MS132-1.0 | No back-up required | | | | | | No back-up required | | | | | |
| MS132-1.6 | | | | | | | | | | | | |
| MS132-2.5 | 20 | 20 | 100 | 35 | 65* | 32, 63,100 | 3 | 3 | 80 | 35 | 50** | 32, 63,100 |
| MS132-4.0 | 20 | 20 | 100 | 63 | 65* | 32, 63,100 | 3 | 3 | 80 | 63 | 50** | 32, 63,100 |
| MS132-6.3 | 20 | 20 | 100 | 100 | 65* | 32, 63,100 | 3 | 3 | 80 | 100 | 50** | 32, 63,100 |
| MS132-10 | 20 | 20 | 100 | 100 | 65* | 32, 63,100 | 3 | 3 | 80 | 100 | 50** | 32, 63,100 |
| MS132-12 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-16 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-20 | 20 | 20 | 100 | 125 | 65* | 32, 63,100 | 3 | 3 | 80 | 125 | 50** | 32, 63,100 |
| MS132-25 | 10 | 10 | 100 | 125 | 65* | 63,100 | 3 | 3 | 80 | 125 | 50** | 63,100 |
| MS132-32 | 10 | 10 | 100 | 125 | 65* | 63,100 | 3 | 3 | 80 | 125 | 50** | 63,100 |

* 100 kA when two current limiters are used in series.

** 80 kA when two current limiters are used in series.

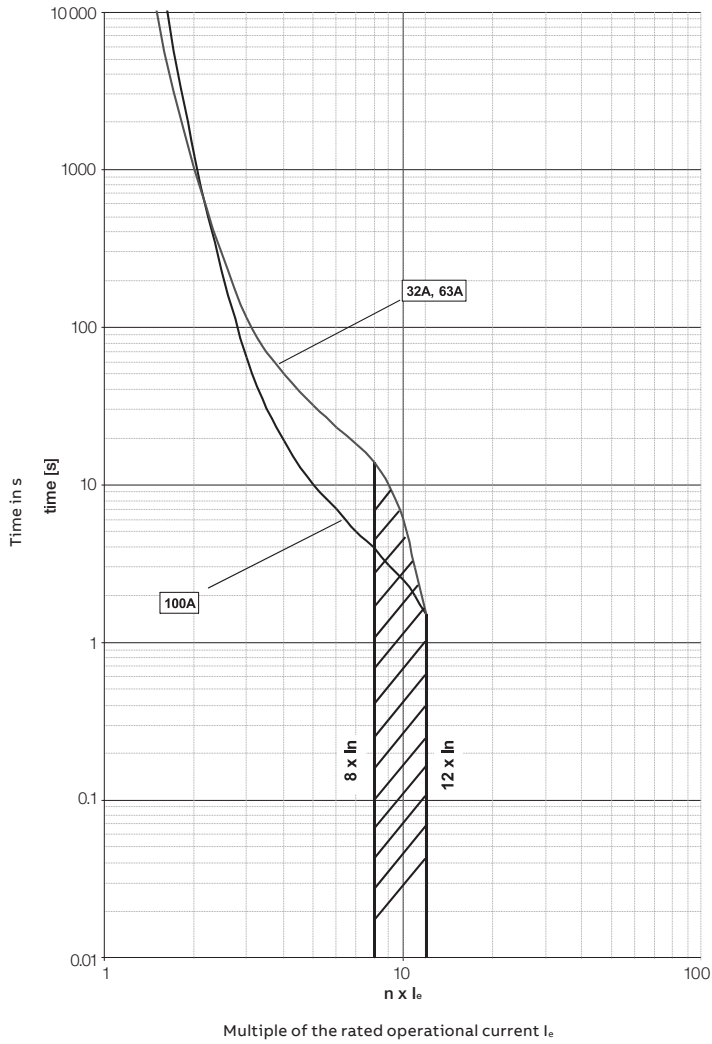
S800-SCL-SR and S803S-SCL

Technical data

Installation requirements

The total sum of the rated currents of all downstream motor starters or circuit breakers shall not exceed the rated current of the S800-SCL-SR. Furthermore the sum of all load currents including inrush currents shall not exceed the maximum permissible load of the S800-SCL-SR.

Maximum load





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For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/DRAS09-20S
www.abb.com/productdetails/1SBK104235R2000

DRAS and DRAF enclosed starters

DRAS enclosed starter

- 9/2** Ordering details
- 9/3** Control supply wiring versions
- 9/3** Wiring diagram
- 9/3** Main dimensions
- 9/4** Voltage code table

DRAF enclosed starter

- 9/6** Experience reliable and easy to install motor starting
- 9/8** Ordering details
- 9/10** Control supply wiring versions
- 9/10** Wiring diagram
- 9/10** Main dimensions

DRAS09 ... DRAS16 enclosed direct-on-line starters

4 to 7.5 kW, protected by thermal overload relays
AC or DC operated



DRAS
+ T16 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP65 compact plastic enclosure with double insulation, equipped with:
 - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
 - 2 quarter-turn, quick fastening screws and a base with 6 cable inlets and outlets via knockouts.
- 1 AS or ASL 3-pole contactor with holding contact
- 1 PE and 1 neutral terminal.

3 versions of control supply wiring are available: phase-to-phase, separate supply or phase-to-neutral.

T16 thermal overload relay has to be ordered separately and chosen according to motor's nominal current (see table below).

DRAS, DRASL enclosed DOL starters

| IEC - AC-3 | | | | Rated control circuit voltage Uc Other control voltages see AS voltage code table | Control supply wiring | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|-------|-------|-----------------------|---|-----------------------|------|------------|-----------------------------|
| Rated operational power | 400 V | 500 V | max. current | | | | | |
| 220 V | | | θ ≤ 40 °C Ue=400 V | V 50/60 Hz | V DC | | | |
| 230 V | | | | | | | | |
| 240 V | | | | | | | | |
| kW | kW | kW | A | | | | | |

AC operated with AS 3-pole contactors

| 2.2 | 4 | 4 | 9 | 24 | - | Separate supply | DRAS09-20S | 1SBK104235R2000 | 0.650 |
|-----|-----|-----|------|-----|---|------------------|------------|-----------------|-------|
| | | | | 230 | - | Phase-to-neutral | DRAS09-26N | 1SBK104135R2600 | 0.650 |
| | | | | 240 | - | Phase-to-neutral | DRAS09-27N | 1SBK104135R2700 | 0.650 |
| | | | | 400 | - | Phase-to-phase | DRAS09-28P | 1SBK104035R2800 | 0.650 |
| | | | | 415 | - | Phase-to-phase | DRAS09-29P | 1SBK104035R2900 | 0.650 |
| 3 | 5.5 | 5.5 | 12 | 24 | - | Separate supply | DRAS12-20S | 1SBK114235R2000 | 0.650 |
| | | | | 230 | - | Phase-to-neutral | DRAS12-26N | 1SBK114135R2600 | 0.650 |
| | | | | 240 | - | Phase-to-neutral | DRAS12-27N | 1SBK114135R2700 | 0.650 |
| | | | | 400 | - | Phase-to-phase | DRAS12-28P | 1SBK114035R2800 | 0.650 |
| | | | | 415 | - | Phase-to-phase | DRAS12-29P | 1SBK114035R2900 | 0.650 |
| 4 | 7.5 | 7.5 | 15.5 | 24 | - | Separate supply | DRAS16-20S | 1SBK124235R2000 | 0.650 |
| | | | | 230 | - | Phase-to-neutral | DRAS16-26N | 1SBK124135R2600 | 0.650 |
| | | | | 240 | - | Phase-to-neutral | DRAS16-27N | 1SBK124135R2700 | 0.650 |
| | | | | 400 | - | Phase-to-phase | DRAS16-28P | 1SBK124035R2800 | 0.650 |
| | | | | 415 | - | Phase-to-phase | DRAS16-29P | 1SBK124035R2900 | 0.650 |

DC operated with ASL 3-pole contactors

| | | | | | | | | | |
|-----|-----|-----|------|---|----|-----------------|-------------|-----------------|-------|
| 2.2 | 4 | 4 | 9 | - | 24 | Separate supply | DRASL09-81S | 1SBK104335R8100 | 0.700 |
| | | | | - | 48 | | DRASL09-83S | 1SBK104335R8300 | 0.700 |
| 3 | 5.5 | 5.5 | 12 | - | 24 | Separate supply | DRASL12-81S | 1SBK114335R8100 | 0.700 |
| | | | | - | 48 | | DRASL12-83S | 1SBK114335R8300 | 0.700 |
| 4 | 7.5 | 7.5 | 15.5 | - | 24 | Separate supply | DRASL16-81S | 1SBK124335R8100 | 0.700 |
| | | | | - | 48 | | DRASL16-83S | 1SBK124335R8300 | 0.700 |

T16 thermal overload relays to be ordered separately

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|-----------------|-----------------|----------------------|
| A | | | | | |
| 0.10...0.13 | 0.5 A, Fuse type T | 10 | T16-0.13 | 1SAZ711201R1005 | 0.100 |
| 0.13...0.17 | 1.0 A, Fuse type T | | T16-0.17 | 1SAZ711201R1008 | 0.100 |
| 0.17...0.23 | | | T16-0.23 | 1SAZ711201R1009 | 0.100 |
| 0.23...0.31 | | | T16-0.31 | 1SAZ711201R1013 | 0.100 |
| 0.31...0.41 | 2.0 A, Fuse type gG | | T16-0.41 | 1SAZ711201R1014 | 0.100 |
| 0.41...0.55 | | | T16-0.55 | 1SAZ711201R1017 | 0.100 |
| 0.55...0.74 | 4.0 A, Fuse type gG | | T16-0.74 | 1SAZ711201R1021 | 0.100 |
| 0.74...1.00 | 6.0 A, Fuse type gG | | T16-1.0 | 1SAZ711201R1023 | 0.100 |
| 1.00...1.30 | | | T16-1.3 | 1SAZ711201R1025 | 0.100 |
| 1.30...1.70 | 10.0 A, Fuse type gG | | T16-1.7 | 1SAZ711201R1028 | 0.100 |
| 1.70...2.30 | | T16-2.3 | 1SAZ711201R1031 | 0.100 | |
| 2.30...3.10 | | T16-3.1 | 1SAZ711201R1033 | 0.100 | |
| 3.10...4.20 | 20.0 A, Fuse type gG | T16-4.2 | 1SAZ711201R1035 | 0.100 | |
| 4.20...5.70 | | T16-5.7 | 1SAZ711201R1038 | 0.100 | |
| 5.70...7.60 | 35.0 A, Fuse type gG | T16-7.6 | 1SAZ711201R1040 | 0.100 | |
| 7.60...10.0 | | T16-10 | 1SAZ711201R1043 | 0.104 | |
| 10.0...13.0 | 40.0 A, Fuse type gG | T16-13 | 1SAZ711201R1045 | 0.104 | |
| 13.0...16.0 | | T16-16 | 1SAZ711201R1047 | 0.104 | |

Empty enclosure with push-button

| | | | | | |
|---|---|---|---------------|-----------------|-------|
| - | - | - | FR16AS-12VARS | 1SBN101035R1000 | 0.394 |
|---|---|---|---------------|-----------------|-------|

To be completed with AS or ASL contactor, T16 thermal overload relay and MCB-10B (1SFA611610R2001) contact block.



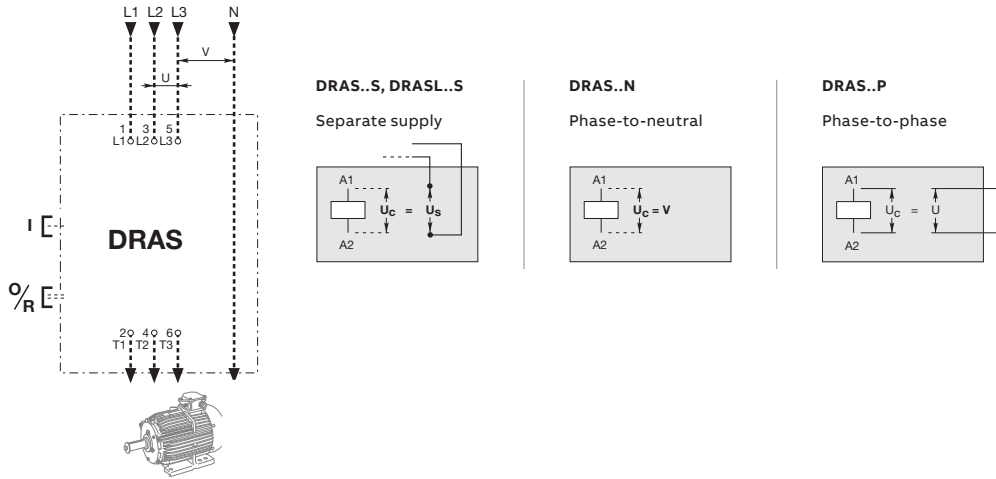
T16



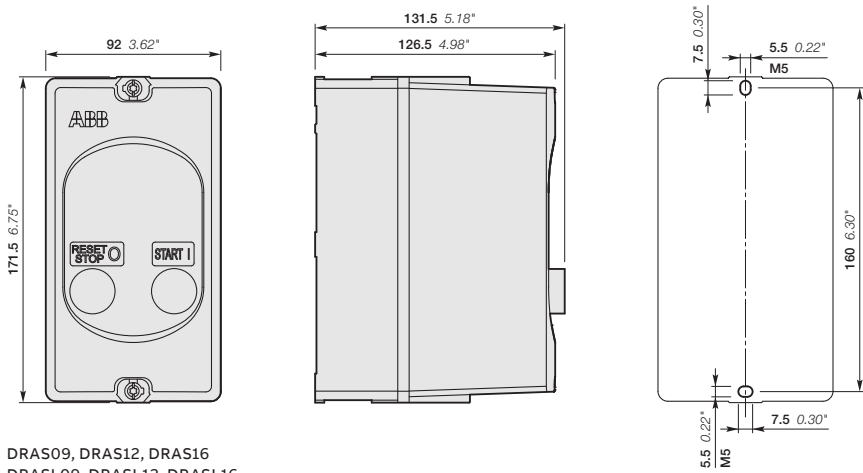
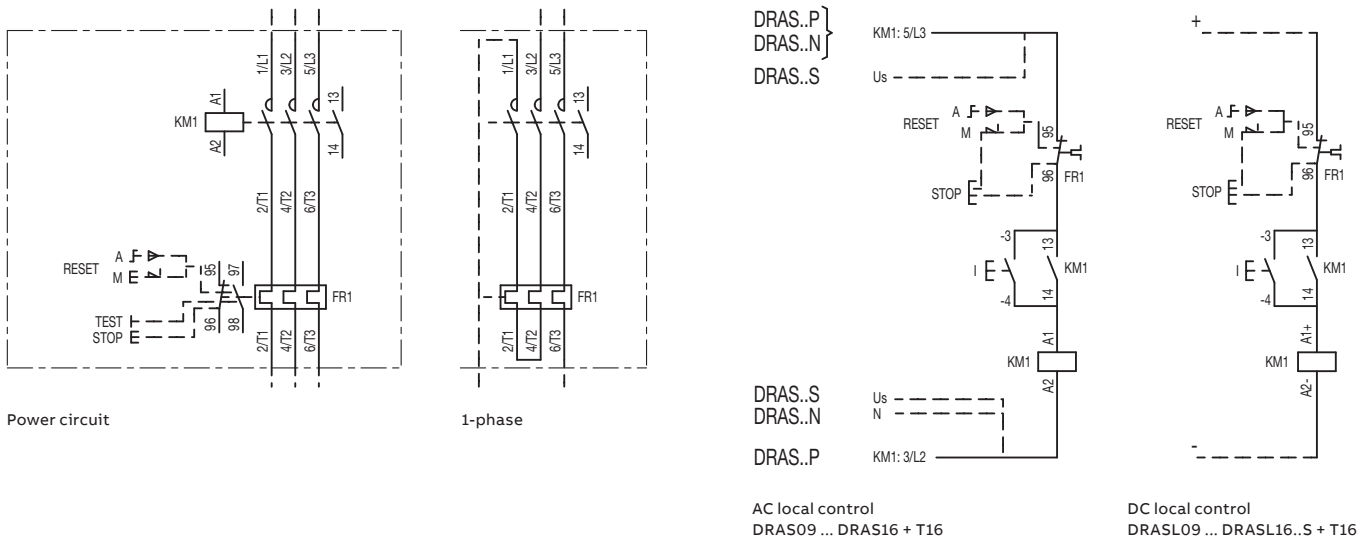
Empty enclosure with push-button

DRAS09 ... DRAS16 and DRASL09 ... DRASL16 enclosed direct-on-line starters

Control supply wiring versions



Wiring diagram



DRAS09, DRAS12, DRAS16
DRASL09, DRASL12, DRASL16

Main dimensions mm, inches

| Cable inlets | | Cable outlet |
|--------------------|----------------|--------------------|
| Enclosure top | Enclosure back | Enclosure bottom |
| 2 x ø 20.5/25.5 mm | 2 x ø 20.5 mm | 2 x ø 20.5/25.5 mm |
| 2 x ø 0.81/1.00" | 2 x ø 0.81" | 2 x ø 0.81/1.00" |

ø 20.5mm - ø 0.81" for ISO M20
ø 25.5mm - ø 1.00" for ISO M25

Voltage code table

DRAS09 ... DRAS16 and
DRASL09 ... DRASL16 enclosed DOL starters

Type

DR **AS16** - **26N**

AS
ASL

Contactor type
AC operated
DC operated

AS contactors
AC coil code

| | 50 Hz | 60 Hz |
|------|-------|-------|
| 20 S | 24 V | 24 V |
| 21 S | 42 V | 42 V |
| 22 S | 48 V | 48 V |

| | | |
|------|-------|-------|
| 16 N | - | 120 V |
| 23 N | 110 V | 110 V |
| 24 N | 115 V | 115 V |
| 25 N | 220 V | 220 V |
| 26 N | 230 V | 230 V |
| 27 N | 240 V | 240 V |

| | | |
|------|-------|-------|
| 13 P | 380 V | 380 V |
| 17 P | - | 277 V |
| 28 P | 400 V | 400 V |
| 29 P | 415 V | 415 V |

ASL contactors
DC coil code

| | |
|------|------|
| 81 S | 24 V |
| 83 S | 48 V |

Control supply wiring

S Separate supply

N Phase-to-neutral

P Phase-to-phase

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for writing notes.

DRAF enclosed direct-on-line starters

Experience reliable and easy to install motor starting



Improve installation efficiency

- Easy to connect and to operate
- Pre-wired control circuit and easy to follow wiring instructions
- Coil energy consumption down by 80%.



Reliable in harsh condition

- High number of electrical and mechanical operations
- Robust IP66 and type 4X enclosure
- Double electrical insulation.



Continuous operation

- AF contactors manage voltage fluctuation, chattering free
- Protected motor with thermal overload relay
- Safety through coordinated product.



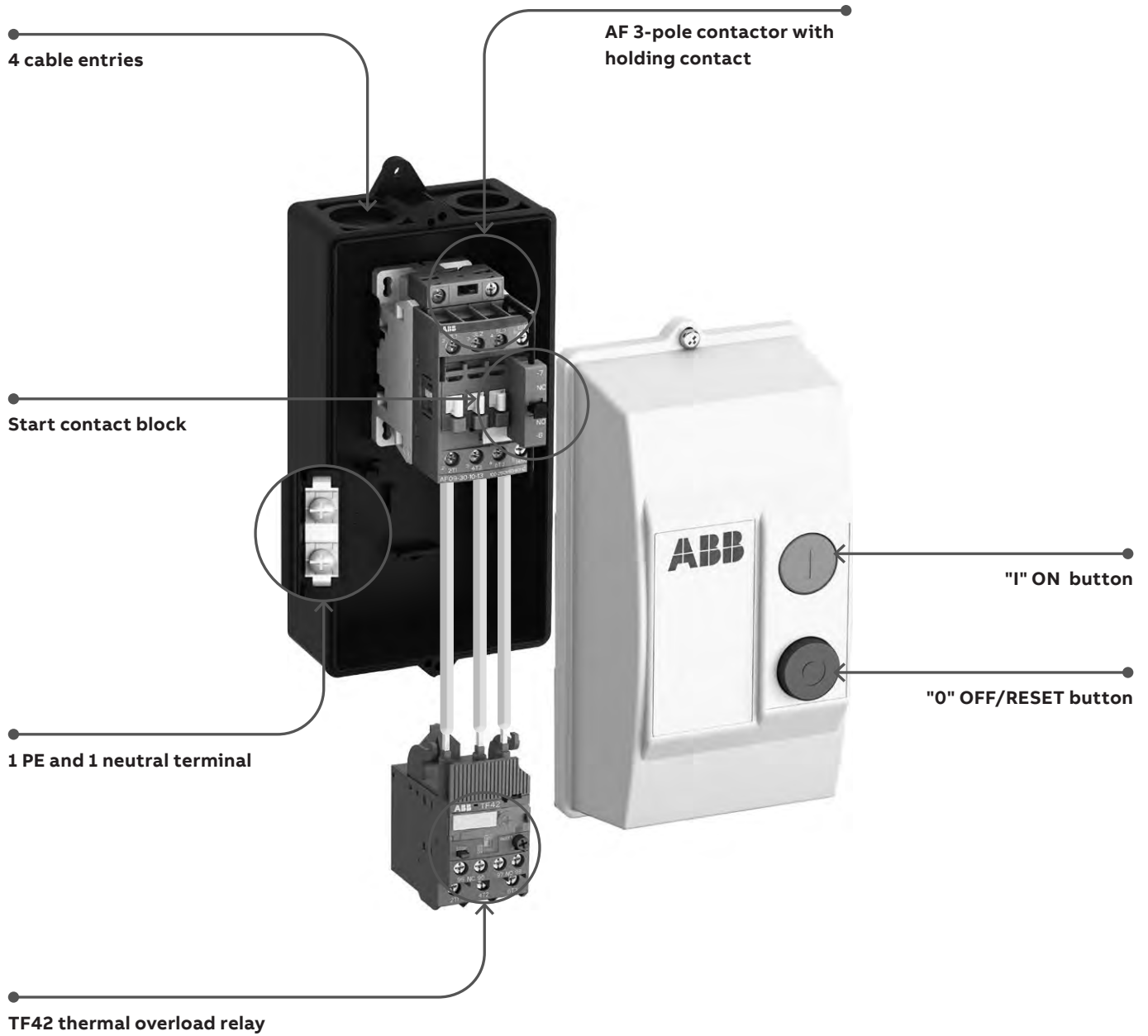
For machine or wall mounting

Main applications

Control of stand alone motors like for heat pumps, air conditioning units, small machine tools, compressors, pumping, irrigation...



Motor starting solutions up to 7.5 kW and 10 hp



DRAF09 ... DRAF16 enclosed direct-on-line starters

Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated



1SBK133005V0014

DRAF
+ TF42 to be ordered separately

Enclosed direct-on-line (DOL) starters are used for controlling 3-phase asynchronous motors up to 690 V AC.

Each starter is delivered assembled and wired. It contains:

- IP66 and type 4X plastic enclosure with double insulation, equipped with:
 - 1 green flush "I" ON button and 1 red protruding "O" OFF/RESET button
 - 4 cable inlets and outlets via knockouts.
- 1 AF 3-pole contactor with holding contact
- 1 CB5-10 start contact block
- 1 PE and 1 neutral terminal.

Control supply wiring:

IEC starters type: phase-to-phase, separate supply or phase-to-neutral.
UL starters type: separate supply.

TF42 thermal overload relay to be ordered separately and chosen according to motor's nominal current (see table in the next page).

DRAF enclosed DOL starters

| IEC - AC-3 | | | | | Control supply wiring | Rated control circuit voltage Uc min ... Uc max (1) | Type | Order code | Weight Pkg (1 pce) kg |
|-------------------------|-------|-------------|-------------|--|-----------------------|--|------|------------|-----------------------------|
| Rated operational power | | 500 V kW | 690 V kW | max. current θ ≤ 40 °C Ue=400 V A | | | | | |
| 220 V | 380 V | | | | | | | | |
| 230 V | 400 V | | | | | | | | |
| 240 V | | | | | | | | | |
| kW | kW | | | | | V 50/60 Hz | | | |

IEC starters type

| 2.2 | 4 | 5.5 | 5.5 | 9 | Control supply wiring | | | Type | Order code | Weight kg |
|------------------|-----------|------------|-----------------|-------|-----------------------|-----------|------------|-----------------|------------|-----------------|
| | | | | | Separate supply | 24...60 | DRAF09-11S | | | |
| | | | | | Phase-to-neutral | 100...250 | DRAF09-13N | 1SBK134137R1300 | 0.820 | |
| | | | | | Phase-to-phase | 250...500 | DRAF09-14P | 1SBK134037R1400 | 0.820 | |
| | | | | | | | | | | Separate supply |
| Phase-to-neutral | 100...250 | DRAF12-13N | 1SBK154137R1300 | 0.820 | | | | | | |
| Phase-to-phase | 250...500 | DRAF12-14P | 1SBK154037R1400 | 0.820 | | | | | | |
| | | | | | Separate supply | 24...60 | DRAF16-11S | 1SBK174237R1100 | 0.820 | |
| | | | | | Phase-to-neutral | 100...250 | DRAF16-13N | 1SBK174137R1300 | 0.820 | |
| | | | | | Phase-to-phase | 250...500 | DRAF16-14P | 1SBK174037R1400 | 0.820 | |

(1) Select DRAF..S with separate supply for 24...60 V DC control circuit voltage (change A2 - Us wire to blue color acc. to IEC 60947-4-1).

UL starter type with separate control supply wiring

| UL / CSA | | | | | | Rated control circuit voltage Uc min ... Uc max | Type | Order code | Weight Pkg (1 pce) kg |
|---|-------|-------------------|-------|-------|-------|--|------|------------|-----------------------------|
| Horse power ratings Single phase motor | | Three phase motor | | | | | | | |
| 120 V | 240 V | 200 V | 220 V | 440 V | 550 V | V 50/60 Hz | | | |
| hp | hp | 208 V | 240 V | 480 V | 600 V | | | | |
| hp | hp | hp | hp | hp | hp | | | | |

UL starters type

| 0.75 | 1.5 | 2 | 2 | 5 | 7.5 | Control supply wiring | | | Type | Order code | Weight kg |
|-----------|------------|-----------------|-------|---|-----|-----------------------|------------|-----------------|-------|------------|--------------|
| | | | | | | Separate supply | 24...60 | DRAF09-11U | | | |
| | | | | | | 100...250 | DRAF09-13U | 1SBK134238R1300 | 0.820 | | |
| | | | | | | 250...500 | DRAF09-14U | 1SBK134238R1400 | 0.820 | | |
| | | | | | | | | | | | |
| 100...250 | DRAF12-13U | 1SBK154238R1300 | 0.820 | | | | | | | | |
| 250...500 | DRAF12-14U | 1SBK154238R1400 | 0.820 | | | | | | | | |
| | | | | | | 24...60 | DRAF16-11U | 1SBK174238R1100 | 0.820 | | |
| | | | | | | 100...250 | DRAF16-13U | 1SBK174238R1300 | 0.820 | | |
| | | | | | | 250...500 | DRAF16-14U | 1SBK174238R1400 | 0.820 | | |

DRAF09 ... DRAF16 enclosed direct-on-line starters

Up to 7.5 kW and 10 hp, protected by thermal overload relays
AC operated



TF42

TF42 thermal overload relays to be ordered separately

| Setting range | Short-circuit protective device | Trip class | Type | Order code | Weight (1 pce) kg |
|---------------|---------------------------------|------------|-----------|-----------------|-------------------|
| A | | | | | |
| 0.10 ... 0.13 | 0.5 A, Fuse type T | 10 | TF42-0.13 | 1SAZ721201R1005 | 0.130 |
| 0.13 ... 0.17 | 1.0 A, Fuse type T | 10 | TF42-0.17 | 1SAZ721201R1008 | 0.130 |
| 0.17 ... 0.23 | 1.0 A, Fuse type T | 10 | TF42-0.23 | 1SAZ721201R1009 | 0.130 |
| 0.23 ... 0.31 | 1.0 A, Fuse type T | 10 | TF42-0.31 | 1SAZ721201R1013 | 0.130 |
| 0.31 ... 0.41 | 2.0 A, Fuse type gG | 10 | TF42-0.41 | 1SAZ721201R1014 | 0.130 |
| 0.41 ... 0.55 | 2.0 A, Fuse type gG | 10 | TF42-0.55 | 1SAZ721201R1017 | 0.130 |
| 0.55 ... 0.74 | 4.0 A, Fuse type gG | 10 | TF42-0.74 | 1SAZ721201R1021 | 0.130 |
| 0.74 ... 1.00 | 6.0 A, Fuse type gG | 10 | TF42-1.0 | 1SAZ721201R1023 | 0.130 |
| 1.00 ... 1.30 | 6.0 A, Fuse type gG | 10 | TF42-1.3 | 1SAZ721201R1025 | 0.130 |
| 1.30 ... 1.70 | 10.0 A, Fuse type gG | 10 | TF42-1.7 | 1SAZ721201R1028 | 0.130 |
| 1.70 ... 2.30 | 10.0 A, Fuse type gG | 10 | TF42-2.3 | 1SAZ721201R1031 | 0.130 |
| 2.30 ... 3.10 | 10.0 A, Fuse type gG | 10 | TF42-3.1 | 1SAZ721201R1033 | 0.130 |
| 3.10 ... 4.20 | 20.0 A, Fuse type gG | 10 | TF42-4.2 | 1SAZ721201R1035 | 0.130 |
| 4.20 ... 5.70 | 20.0 A, Fuse type gG | 10 | TF42-5.7 | 1SAZ721201R1038 | 0.130 |
| 5.70 ... 7.60 | 35.0 A, Fuse type gG | 10 | TF42-7.6 | 1SAZ721201R1040 | 0.130 |
| 7.60 ... 10.0 | 35.0 A, Fuse type gG | 10 | TF42-10 | 1SAZ721201R1043 | 0.130 |
| 10.0 ... 13.0 | 40.0 A, Fuse type gG | 10 | TF42-13 | 1SAZ721201R1045 | 0.130 |
| 13.0 ... 16.0 | 40.0 A, Fuse type gG | 10 | TF42-16 | 1SAZ721201R1047 | 0.130 |
| 16.0 ... 20.0 | 63.0 A, Fuse type gG | 10 | TF42-20 | 1SAZ721201R1049 | 0.145 |

Empty enclosure with push-button

| | | | | |
|---|---|------------|-----------------|------|
| mm cable inlet/outlet suitable for IEC starter types | - | FR16AF-12 | 1SBN101337R1000 | 0.53 |
| Inch cable inlet/outlet suitable for UL starter types | - | FR16AF-12U | 1SBN101338R1000 | 0.53 |

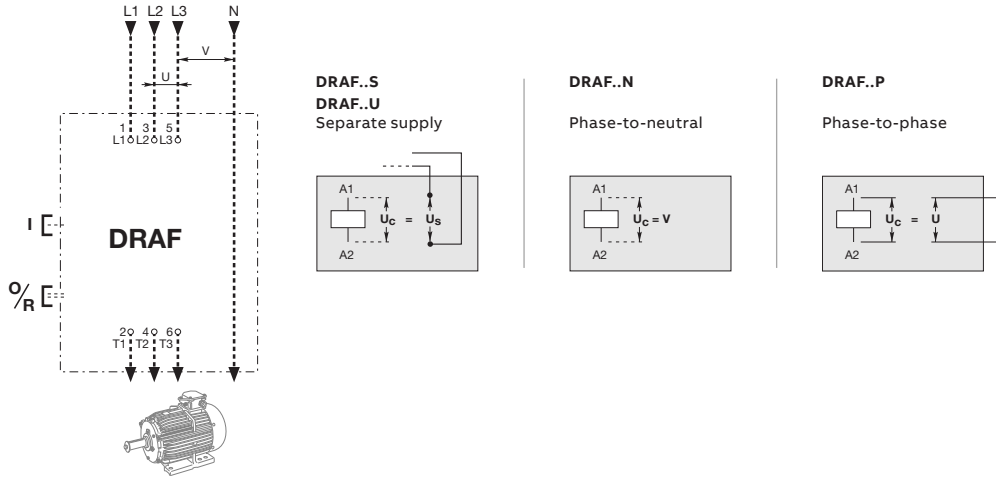
To be completed with AF contactor, TF42 thermal overload relay and CB5-10 (1SBN010013R1010) start contact block.



Empty enclosure with push-button

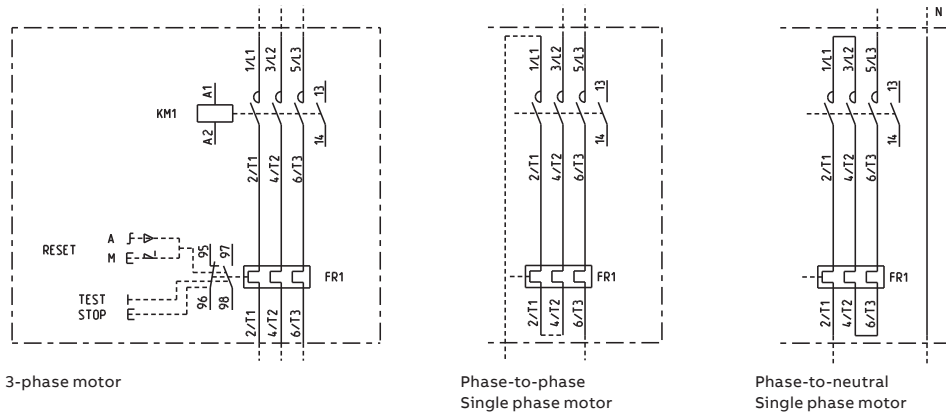
DRAF09 ... DRAF16 enclosed direct-on-line starters

Control supply wiring versions



Wiring diagram

Power circuit

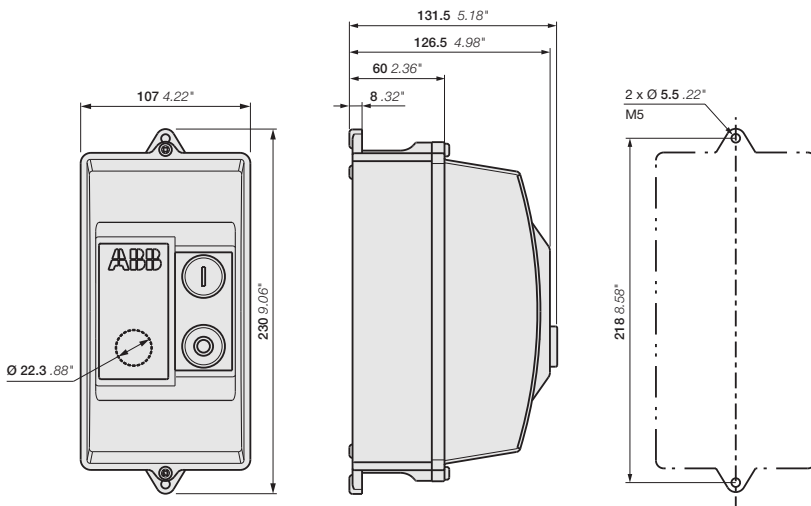
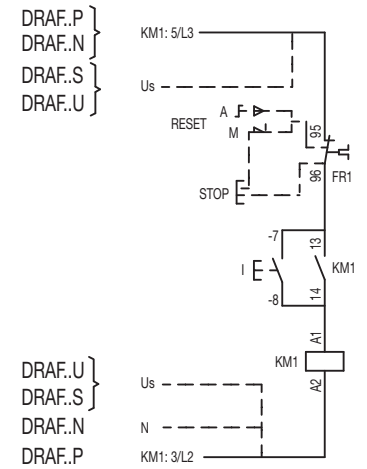


3-phase motor

Phase-to-phase Single phase motor

Phase-to-neutral Single phase motor

AC local control



DRAF09, DRAF12, DRAF16
Main dimensions mm, inches

IEC starter types - ISO M20

| Cable inlet | Cable outlet |
|---------------|------------------|
| Enclosure top | Enclosure bottom |
| 2 x Ø 20 mm | 2 x Ø 20 mm |
| 2 x Ø 0.79" | 2 x Ø 0.79" |

UL starter types - NPT

| Cable inlet | Cable outlet |
|---------------|------------------|
| Enclosure top | Enclosure bottom |
| 1 x 3/4" | 1 x 3/4" |
| 1 x 1/2" | 1 x 1/2" |

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/HF2.4-ROL-24VDC
www.abb.com/productdetails/1SAT25000R1011

Electronic compact starters: HF range

- 10/3** **Overview**
 - HF0.6, HF2.4, HF9 electronic compact starters**
 - 10/8** Direct-on-line starter
 - 10/8** Direct-on-line starter with emergency stop
 - 10/9** Reversing starter
 - 10/9** Reversing starter with emergency stop
- 10/10** **Technical data**
- 10/14** **Technical diagrams**

Electronic compact starters: HF range

A compact solution with great functionality

ABB's electronic compact starter packs more functions into less space. The compact unit is just 22.5 mm wide and is suitable for three-phase motor loads up to 3 kW - 400 V AC. Direct-on-line and reversed starter with overload protection and emergency stop versions are available, making the range a perfect fit for high frequent and reliable long life switching of e.g. paper machines, conveyors, pumps, compressors and machine tools.



Saving space

Up to 90% less space required

ABB's electronic compact starter saves cabinet space, and is especially effective for group mounting. The starter is just 22.5 mm wide and yet still provides motor starting functionalities with motor protection and safety embedded.



Safety and protection

Integrated safety function

Protect your people with an emergency stop version that complies with SIL 3, PL e safety standards. Extend the life of your equipment and reduce maintenance costs with service lives that are ten times higher than electromechanical solutions.



Easy to install

Up to 75% reduced time in wiring

Wiring time during installation is cut to a minimum with motor protection, reversing function and emergency stop already integrated in the product. With just one component to install, the risk of wiring errors is lower. Separate overload protection is no longer needed.

Electronic compact starters

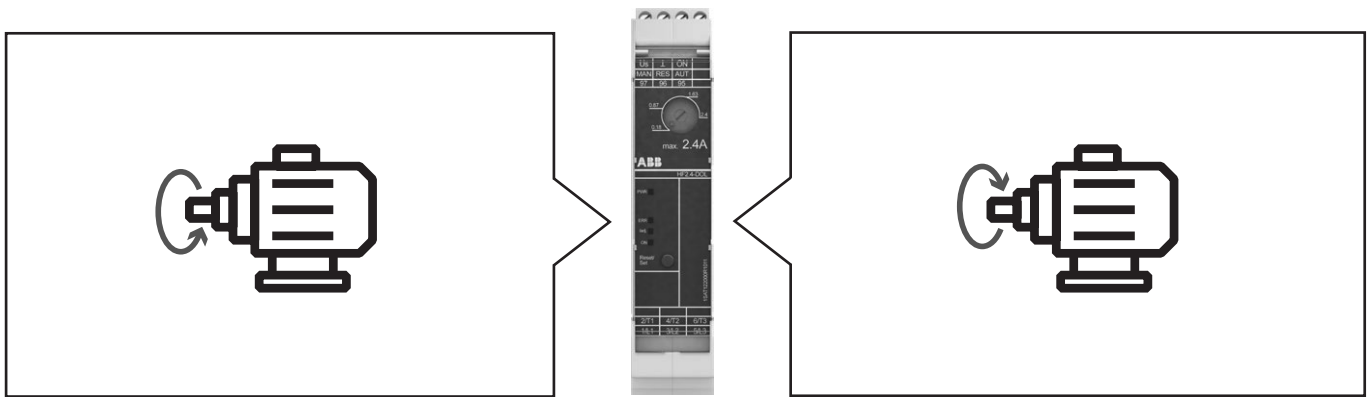
All-in-one: four functions in one starter

Direct-on-line

ABB's direct-on-line starter comes with a function that runs the motor in a forward direction. An integrated electronic overload relay also helps protect the motor.

Reversing capability

Reversing functionality is already integrated in our hybrid starter. This results in avoiding wiring faults and additionally saving time and space.



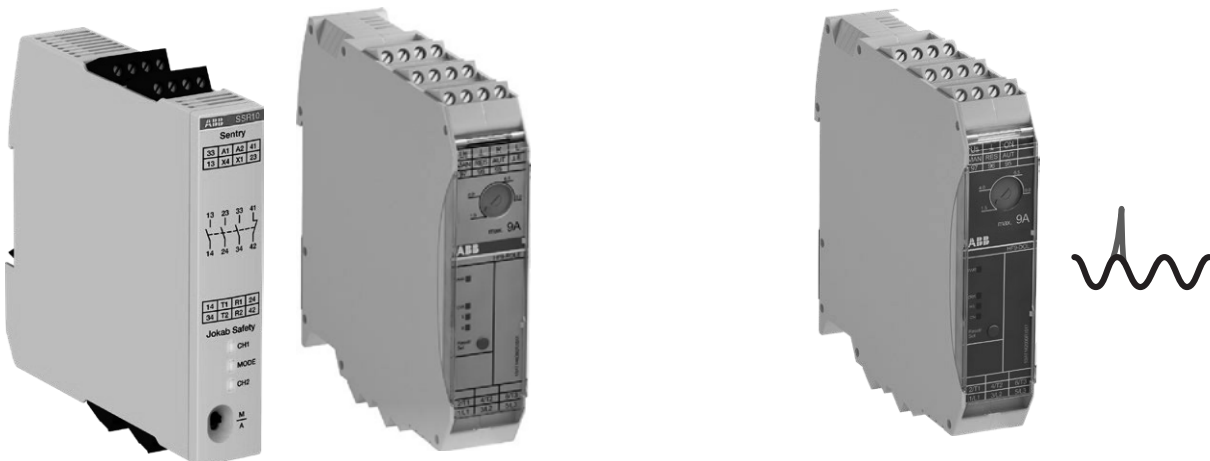
Direct-on-line and reversing function in only one product

Emergency stop

ABB's HF safety range supports safety applications complying to SIL3 and PL e safety level in combination with modular safety relays such as ABB's Sentry SSR10.

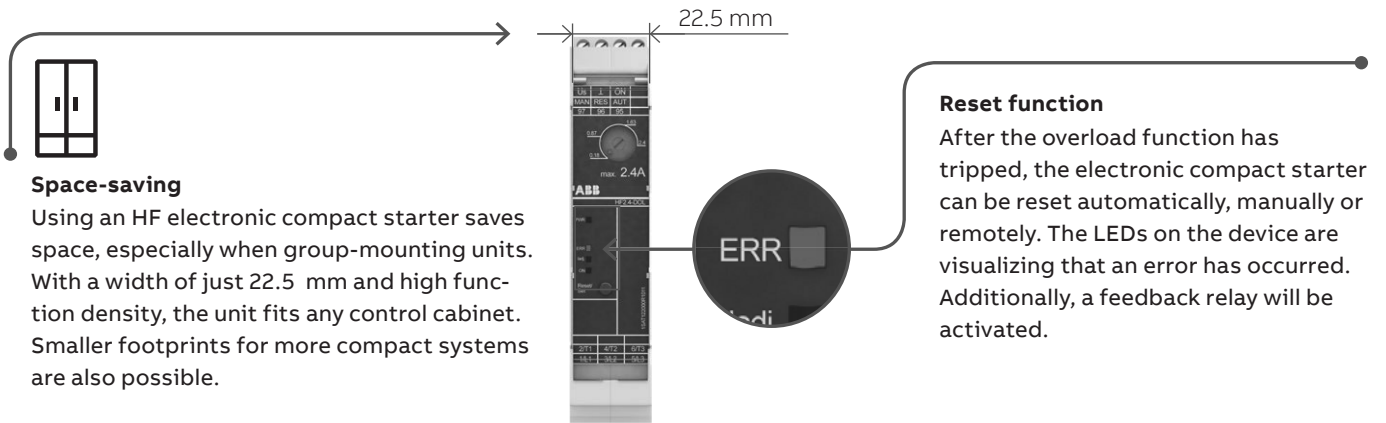
Overload protection

ABB offers three variants with wide setting ranges, using an electronic relay to protect the motor from overload. Protection against phase asymmetry and phase failure is also integrated.



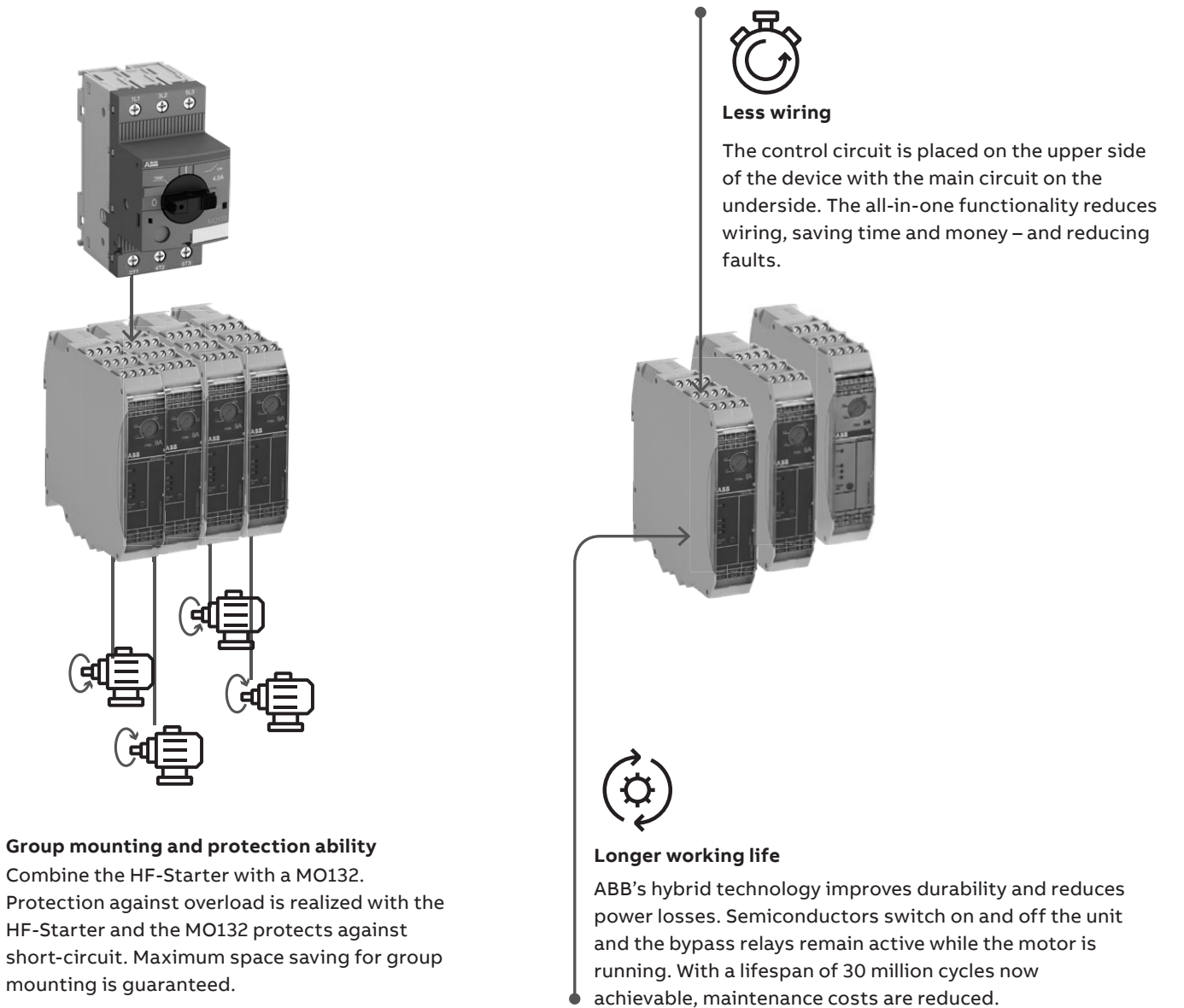
Electronic compact starters

Features and benefits



Space-saving
Using an HF electronic compact starter saves space, especially when group-mounting units. With a width of just 22.5 mm and high function density, the unit fits any control cabinet. Smaller footprints for more compact systems are also possible.

Reset function
After the overload function has tripped, the electronic compact starter can be reset automatically, manually or remotely. The LEDs on the device are visualizing that an error has occurred. Additionally, a feedback relay will be activated.



Group mounting and protection ability
Combine the HF-Starter with a MO132. Protection against overload is realized with the HF-Starter and the MO132 protects against short-circuit. Maximum space saving for group mounting is guaranteed.

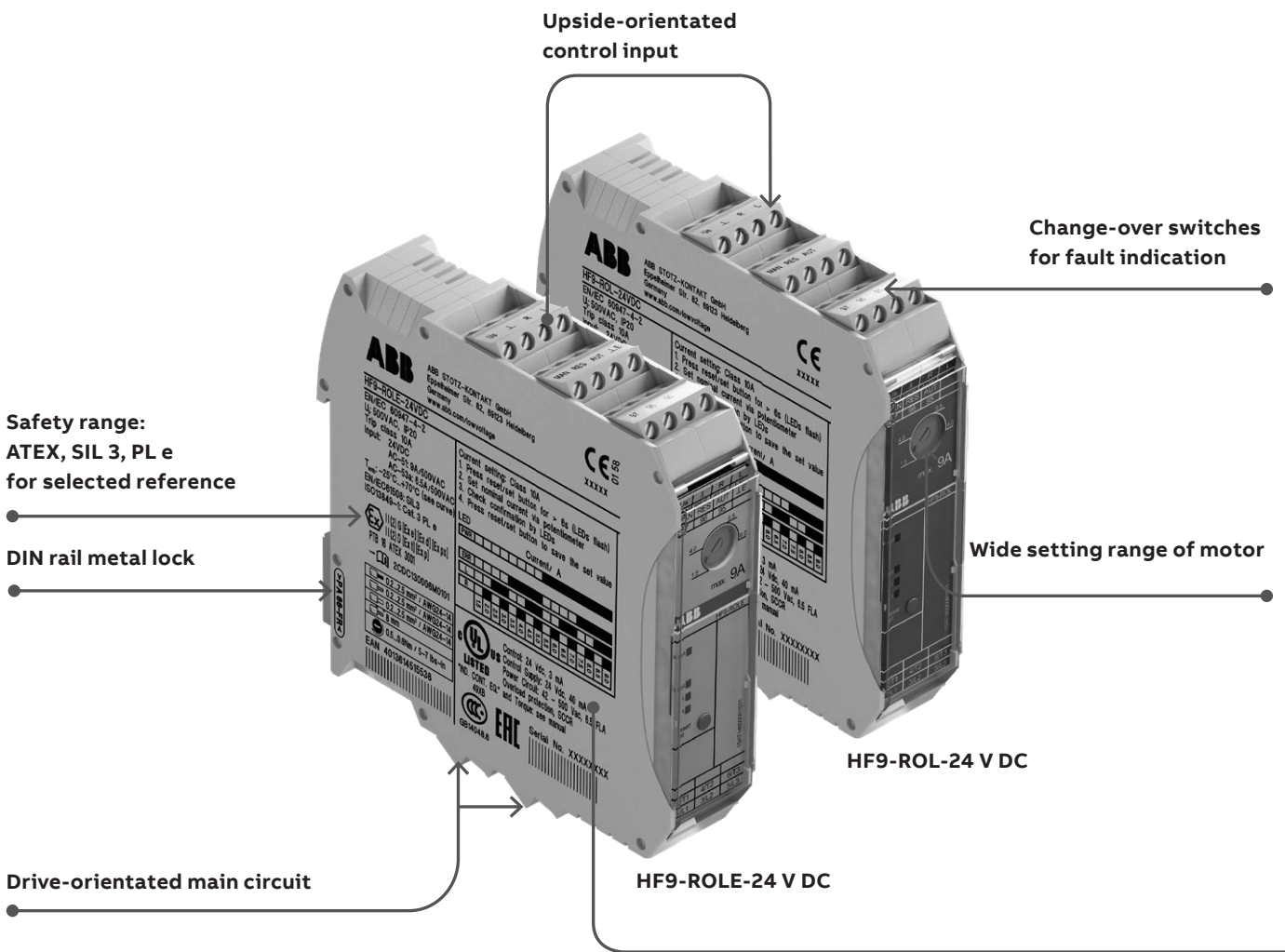
Less wiring
The control circuit is placed on the upper side of the device with the main circuit on the underside. The all-in-one functionality reduces wiring, saving time and money – and reducing faults.

Longer working life
ABB's hybrid technology improves durability and reduces power losses. Semiconductors switch on and off the unit and the bypass relays remain active while the motor is running. With a lifespan of 30 million cycles now achievable, maintenance costs are reduced.

Electronic compact starters

Hybrid technology

Hybrid technology – efficient, durable and compact – is the key feature of this range. Smart use of semiconductors with a bypass relay eliminates the wearing of contact materials. A microcontroller ensures the precise interaction of the components, providing the smoother switching that helps extend its long lifespan.



10

Electronic compact starters - HF range

Hybrid technology

Thanks to laser labeling and fewer connection points compared to conventional solutions, hybrid technology makes wiring easy. The screw connections for both the control and the main circuit have an optimized angle to provide access.

Only one component for up to four functions leads to shorter wiring time

Easy-to-read starter status with LED indicators: Precise current setting with LED confirmation Users can easily adjust the current and get visual feedback via the LEDs.

For example, if 6.5 A is set, the LED's on the front side confirm the selection:

| LED | Current A | | | | | | | | | | | | | | | | | | | | | |
|-------|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|--|
| PWR | | | | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| ERR | | | | | | | | | | | | | | | | | | | | | | |
| ladj. | | | | | | | | | | | | | | | | | | | | | | |
| ON | | | | | | | | | | | | | | | | | | | | | | |
| | 1.5 | 2.2 | 2.5 | 3.0 | 3.5 | 4.0 | 4.5 | 5.0 | 5.5 | 6.0 | 6.5 | 7.0 | 7.5 | 8.0 | 8.5 | 9.0 | | | | | | |

22.5 mm

Group mounting in confined spaces is no problem

Reset: direct manual reset of device with button, convenient remote or automatic reset after thermal trip

Note: PWR: Control supply voltage, ERR : Error/Message, ladj.: Current setting, ON: Motor is running

HF0.6, HF2.4, HF9 electronic compact starters

Direct-on-line starter



HF9-DOL-24VDC

2CDC24009V0016



HF9-DOLE-24VDC

2CDC2402V0016

The HF-DOL-range is used for the direct-on-line start of motors and the switching of non-resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-DOLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

| Rated operational current AC-53a | Rated operational power AC-53a | Rated operational current AC-51 | Setting range | Full load amps motor use | Type | Order code | Weight (1 pce) |
|----------------------------------|--------------------------------|---------------------------------|---------------|--------------------------|------|------------|----------------|
| A | kW | A | A | A | | | kg |

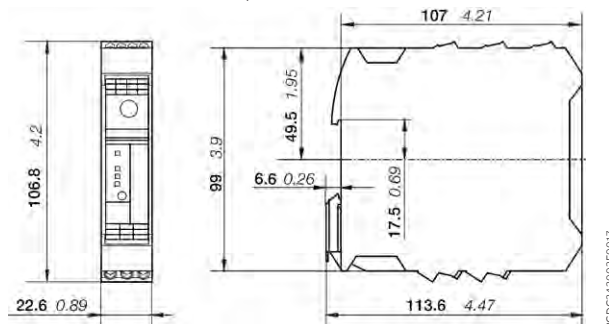
Direct-on-line starter with overload protection

| | | | | | | | |
|-----|-------------|-----|---------------|-----|-----------------|-----------------|-------|
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-DOL-24VDC | 1SAT112000R1011 | 0.205 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-DOL-24VDC | 1SAT122000R1011 | 0.218 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-DOL-24VDC | 1SAT142000R1011 | 0.206 |

Direct-on-line starter with overload protection and emergency stop

| | | | | | | | |
|-----|-------------|-----|---------------|-----|------------------|-----------------|-------|
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-DOLE-24VDC | 1SAT113000R1011 | 0.205 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-DOLE-24VDC | 1SAT123000R1011 | 0.218 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-DOLE-24VDC | 1SAT143000R1011 | 0.206 |

Main dimensions mm, inches



HF0.6, HF2.4, HF9

2CDC240203R0017

HF0.6, HF2.4, HF9 electronic compact starters

Reversing starter



2CDC241003V0016

HF9-R-24VDC



2CDC241006V0016

HF9-ROL-24VDC



2CDC241003V0016

HF9-ROLE-24VDC

The HF-ROL-range is used for forward and reverse running motors, as well as for switching non resistive loads. With contactor and overload relay functionalities integrated into one device, the results are faster wiring times and fewer faults. The range covers 0.6 A, 2.4 A and up to 9 A - for motors up to 3 kW – 400 V AC. The integrated electronic overload protection with tripping class 10A has a wide setting range that enables just three models to cover all requirements. The control supply voltage is 24 V DC. For the control and main connection points ABB offers screw connections.

ABB also offers a HF-ROLE safety range with emergency stop function. This offers Safety Integrity Level 3, in accordance with functional safety standard IEC 61508-1 and Performance Level 'e' in accordance with ISO 13849-1 all in combination with a safety relay like ABB's Sentry SSR10. The safety range is ATEX-certified.

| Rated operational current AC-53a | Rated operational power AC-53a | Rated operational current AC-51 | Setting range | Full load amps motor use | Type | Order code | Weight (1 pce) |
|----------------------------------|--------------------------------|---------------------------------|---------------|--------------------------|------|------------|----------------|
| A | kW | A | A | A | | | kg |

Reversing starter with no monitoring and no overload functionality

| | | | | | | | |
|-----|-------------|-----|---|-----|-------------|-----------------|-------|
| 6.5 | 3.00 (400V) | 9.0 | - | 6.5 | HF9-R-24VDC | 1SAT144000R1011 | 0.174 |
|-----|-------------|-----|---|-----|-------------|-----------------|-------|

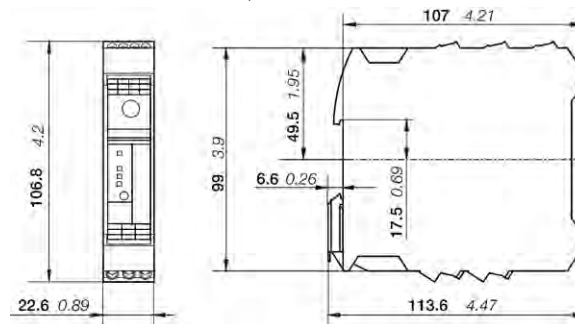
Reversing starter with overload protection

| | | | | | | | |
|-----|-------------|-----|---------------|-----|-----------------|-----------------|-------|
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-ROL-24VDC | 1SAT115000R1011 | 0.217 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-ROL-24VDC | 1SAT125000R1011 | 0.219 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-ROL-24VDC | 1SAT145000R1011 | 0.218 |

Reversing starter with overload protection and emergency stop

| | | | | | | | |
|-----|-------------|-----|---------------|-----|------------------|-----------------|-------|
| 0.6 | 0.18 (400V) | 0.6 | 0.075 ... 0.6 | 0.6 | HF0.6-ROLE-24VDC | 1SAT116000R1011 | 0.218 |
| 2.4 | 0.75 (400V) | 2.4 | 0.18 ... 2.4 | 2.4 | HF2.4-ROLE-24VDC | 1SAT126000R1011 | 0.270 |
| 6.5 | 3.00 (400V) | 9.0 | 1.5 ... 9.0 | 6.5 | HF9-ROLE-24VDC | 1SAT146000R1011 | 0.289 |

Main dimensions mm, inches



HF0.6, HF2.4, HF9

2CDC242003F0017

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Main circuit – Utilization characteristics according to IEC/EN

| Type | HF-DOL/ROL | HF-DOLE/ROLE | HF-R |
|--|--|---|-----------------------------------|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-2 | IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, ISO 13849 | IEC/EN 60947-1, IEC/EN 60947-4-2 |
| Rated operational voltage U _e | 500 V AC | | |
| Operational voltage | 42 V AC, Minimum 550 V AC, Maximum | | |
| Setting range | see ordering details | | |
| Rated frequency | 50/60 Hz | | |
| Trip class | 10A | | |
| Number of poles | 3 | | |
| Number of protected poles | 3 | | |
| Mechanical durability | 10000 cycles | | |
| Electrical durability | 30 Mio. cycles | | |
| Rated impulse withstand voltage U _{imp} | 6 kV | | |
| Rated insulation voltage U _i | 500 V | | |
| Rated operational current I _e AC-51 | see ordering details | | |
| Rated operational current I _e AC-53a | see ordering details | | |
| Rated uninterrupted current I _u | see ordering details, Rated operational current I _e | | |
| Overvoltage category | III | | |
| Delay time | Off, minimum, switched off with pushbutton | 1 s | - |
| | Off, maximum, switched off with pushbutton | 3 s | - |
| | Off, typical, switched off via control input voltage | 30 ms | 30 ms |
| | Off, maximum, switched off via control input voltage | - | HF0.6, HF2.4: 60 ms HF9: 80 ms |
| | Off, typical, switched off via supply voltage | 25 ms | 25 ms |
| | Off, maximum, switched off via supply voltage | - | 500 ms |
| Switch off time | By phase failure | 1.8 s | - |
| | By phase asymmetry at 33% | 120 s | - |
| | By phase asymmetry at 67% | 1.8 s | - |
| Overspeed tripping | Operating threshold | HF9-DOL/ROL/DOLE/ROLE: >45 A | |
| | Response time | HF9-DOL/ROL/DOLE/ROLE: 2 s | |
| Power loss | Minimum | 1.1 W | |
| | Maximum | HF0.6: 1.5 W HF2.4: 3.3 W HF9: 14.6 W | |
| Switching frequency | ≤ 2 Hz; 120 starts/min; 7200 starts/h | | |
| Overvoltage category | III | | |

Short circuit protection with MO132 for single mounting, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power | Rated motor current | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter | Max. allowed setting current for AC-53a |
|-------------------|---------------------|-----------------------------|-----------------|------------|-------------------------------------|---|
| kW | A | | | | A | A |
| 0.18 | 0.48 | DOL, ROL, DOLE, ROLE (1) | MO132-0.63 | HF0.6 | 0.075 - 0.6 | 0.6 |
| 1.1 | 2.2 | DOL, ROL, DOLE, ROLE (1) | MO132-2.5 | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 5.2 | DOL, ROL, DOLE, ROLE, R (1) | MO132-6.3 | HF9 | 1.5 - 9 (1) | 6.5 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a.

Short circuit protection with MO132 for single mounting, IEC Type 1, 415 V AC, 70 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power | Rated motor current | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter | Max. allowed setting current for AC-53a |
|-------------------|---------------------|-----------------------------|-----------------|------------|-------------------------------------|---|
| kW | A | | | | A | A |
| 0.18 | 0.58 | DOL, ROL, DOLE, ROLE (1) | MO132-0.63 | HF0.6 | 0.075 - 0.6 | 0.6 |
| 0.75 | 1.8 | DOL, ROL, DOLE, ROLE (1) | MO132-2.5 | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 6.3 | DOL, ROL, DOLE, ROLE, R (1) | MO132-6.3 | HF9 | 1.5 - 9 (1) | 6.5 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Short circuit protection with MO132 for group mounting, IEC Type 1, 500 V AC, EN/IEC 60947-4-2

| Max. sum of current of HF-Starter in group | Iq kA | HF-Starter Type | SCPD A |
|--|----------|-----------------------------|-----------|
| 6.5 | 35 | DOL, ROL, DOLE, ROLE, R (1) | MO132-6.3 |
| 10 | 3 | | MO132-10 |
| 12 | 3 | | MO132-12 |
| 16 | 3 | | MO132-16 |
| 20 | 3 | | MO132-20 |
| 25 | 3 | | MO132-25 |
| 32 | 3 | | MO132-32 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

Short circuit protection with MO132 for group mounting, IEC Type 1, 415 V AC, EN/IEC 60947-4-2

| Max. sum of current of HF-Starter in group | Iq kA | HF-Starter Type | SCPD A |
|--|----------|-----------------------------|-----------|
| 6.5 | 70 | DOL, ROL, DOLE, ROLE, R (1) | MO132-6.3 |
| 10 | 35 | | MO132-10 |
| 12 | 3 | | MO132-12 |
| 16 | 3 | | MO132-16 |
| 20 | 3 | | MO132-20 |
| 25 | 3 | | MO132-25 |
| 32 | 3 | | MO132-32 |

(1) HF9 is able to switch 9A in AC-51, 6.5A in AC-53a

Single mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power kW | Rated motor current A | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter A | Max. allowed setting current for AC-53a A |
|-------------------------|--------------------------|-----------------------------|-----------------|------------|---|---|
| 0.18 | 0.48 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF0.6 | 0.075 - 0.6 | 0.6 |
| 1.1 | 2.2 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 5.2 | DOL, ROL, DOLE, ROLE, R (1) | Fuse 25A gG | HF9 | 1.5 - 91) | 6.5 |

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

Single mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Rated motor power kW | Rated motor current A | Starter Type | Protection type | HF-Starter | Current setting range of HF-Starter A | Max. allowed setting current for AC-53a A |
|-------------------------|--------------------------|-----------------------------|-----------------|------------|---|---|
| 0.18 | 0.58 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF0.6 | 0.075 - 0.6 | 0.6 |
| 0.75 | 1.8 | DOL, ROL, DOLE, ROLE (1) | Fuse 25A gG | HF2.4 | 0.18 - 2.4 | 2.4 |
| 3.0 | 6.3 | DOL, ROL, DOLE, ROLE, R (1) | Fuse 25A gG | HF9 | 1.5 - 91) | 6.5 |

(1) HF9 variants can switch 6.5A in utilization category AC-53a and 9A in AC-51.

Group mounting fused design, IEC Type 1, 500 V AC, 35 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Iq kA | SCPD A | Max. sum of current of used devices A | HF-Starter |
|----------|-------------|--|------------|
| 35 | Fuse 25A gG | 25 | HF0.6 |
| 35 | Fuse 25A gG | 25 | HF2.4 |
| 35 | Fuse 25A gG | 25 | HF9 |

Group mounting fused design, IEC Type 1, 415 V AC, 50 kA, 50 Hz, AC-53a, EN/IEC 60947-4-2

| Iq kA | SCPD A | Max. sum of current of used devices A | HF-Starter |
|----------|-------------|--|------------|
| 50 | Fuse 25A gG | 25 | HF0.6 |
| 50 | Fuse 25A gG | 25 | HF2.4 |
| 50 | Fuse 25A gG | 25 | HF9 |

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Main circuit – Utilization characteristics according to UL/CSA

| | | |
|--|--|---|
| Type | HF | |
| Standards | UL 60947-1; UL 60947-4-2 | |
| Rated operational voltage | 500 V AC | |
| Operational voltage | Minimum | 42 V AC |
| | Maximum | 550 V AC |
| Ampere Rating UL/CSA | see ordering details, Full load amps motor use | |
| Horse power rating | Nominal switching performance full load (power factor = 0.4) | HF0.6: 0.4 hp HF2.4: 1.2 hp HF9: 3.0 hp |
| | Nominal switching performance full load (power factor = 0.8) | HF0.6: 0.6 hp HF2.4: 2.2 hp HF9: 6.1 hp |
| Full loads Amps (FLA) | see ordering details | |
| Short-circuit current rating (SCCR) (500 V AC, 30 A Class J or CC) | 100 kA | |

General technical data

| | | |
|-------------------------|---|----------------|
| Type | HF | |
| Utilization category | AC51, AC53a | |
| Pollution degree | 2 | |
| Phase loss sensitive | Yes | |
| Ambient air temperature | Operation | -25 ... +70 °C |
| | Operation compensated | -40 ... +80 °C |
| Mounting position | Position 1, load side bottom | |
| Mounting in DIN Rail | TH35-15 (35 x 15 mm Mounting Rail) acc. to IEC 60715, TH35-7.5 (35 x 7.5 mm Mounting Rail) acc. to IEC 60715 | |
| Degree of protection | Housing | IP20 |
| | Main circuit terminals | IP20 |

Control circuit

| | | |
|--|-----------------------------------|---------------|
| Type | HF | |
| Rated control circuit voltage U _c | 24 V DC | |
| Input voltage U _{in} | Switching Threshold at Signal <0> | -3 ... 9.6 V |
| | Switching Threshold at Signal <1> | 19.2 ... 30 V |
| Input current I _c | 3 mA | |

Supply circuit

| | | |
|---|------------------|--|
| Type | HF | |
| Rated control supply voltage U _s | 24 V DC | |
| Control supply voltage | 19.2 ... 30 V DC | |
| Rated control supply current I _s | 0.04 A | |

Single and group mounting HF-Starter, Type 1 coordination with fuse class J or CC according to UL60947-1/-4-1

| HF-Starter | FLA | I _q | SCPD | Max. current | Max. Voltage |
|------------|-----------|----------------|--------------------|--------------|--------------|
| | A / V AC | kA | | A | V AC |
| HF0.6 | 0.6 / 500 | 100 | Fuse class J or CC | 30 | 480 |
| HF2.4 | 2.4 / 500 | 100 | Fuse class J or CC | 30 | 480 |
| HF9 | 6.5 / 500 | 100 | Fuse class J or CC | 30 | 480 |

Single and group mounting HF-Starter, Type 1 coordination with fuse RK 5 according to UL60947-1/-4-1

| HF-Starter | FLA | I _q | SCPD | Max. current | Max. Voltage |
|------------|-----------|----------------|-----------|--------------|--------------|
| | A / V AC | kA | | A | V AC |
| HF0.6 | 0.6 / 500 | 5 | Fuse RK 5 | 20 | 480 |
| HF2.4 | 2.4 / 500 | 5 | Fuse RK 5 | 20 | 480 |
| HF9 | 6.5 / 500 | 5 | Fuse RK 5 | 20 | 480 |

HF0.6, HF2.4, HF9 electronic compact starters

Technical data

Safety related data




| Type | HF-DOLE/ROLE |
|---|---|
| Standards | IEC/EN 60947-1, IEC/EN 60947-4-2, IEC/EN 61508, ISO 13849 |
| Safe shut down for ambient temperature 40°C ... 60°C | |
| Safety integrity level acc. to IEC 61508-1 | SIL 3 |
| Performance level | Up to e |
| Mean time to failure (MTTF) acc. to IEC60050-191-12-07 | DOLE: 43 years ROLE: 39.3 years |
| Mean time to dangerous failure, motor protection | 447 years |
| Mean time to dangerous failure, safe shutdown | DOLE: 518 years ROLE: 517 years |
| Failure in time | |
| Safe, detectable λ_{sd} | DOLE: 543 FIT ROLE: 664 FIT |
| Safe, undetectable λ_{su} | DOLE: 852 FIT ROLE: 968 FIT |
| Dangerous, detectable λ_{dd} | 218 FIT |
| Dangerous, undetectable λ_{du} | DOLE: 2.4 FIT ROLE: 2.67 FIT |
| Safe failure fraction (SFF) | DOLE: 99.85% ROLE: 99.86% |
| Diagnostic coverage (DC) | DOLE: 98.91% ROLE: 98.79% |
| Probability of dangerous failure per hour (PFH) | DOLE: 2.4 ROLE: 2.67 |
| Motor overload protection for ambient temperature 40°C ... 60°C | |
| Safety integrity level acc. to IEC 61508-1 | SIL 3 |
| Performance level | Up to e |
| Mean time to failure (MTTF) acc. to IEC60050-191-12-07 | DOLE: 43 years ROLE: 39.3 years |
| Mean time to dangerous failure, safe shutdown | DOLE: 518 years ROLE: 517 years |
| Failure in time | |
| Safe, detectable | DOLE: 517 FIT ROLE: 637 FIT |
| Safe, undetectable | DOLE: 809 FIT ROLE: 870 FIT |
| Dangerous, detectable | 239 FIT |
| Dangerous, undetectable | 17 FIT |
| Safe failure fraction (SFF) | DOLE: 98.92% ROLE: 99.03% |
| Diagnostic coverage | DOLE: 98.91% ROLE: 98.79% |

HF0.6, HF2.4, HF9 electronic compact starters




Technical data

Connecting characteristics

Main circuit

| Type | HF |
|---|---------------------------|
| Connecting capacity | |
|  Rigid 1 x | 2 ... 2.5 mm ² |
|  Flexible 1 x | 2 ... 2.5 mm ² |
|  Flexible with ferrule 1 x | 2 ... 2.5 mm ² |
| Connecting capacity acc. to UL/CSA | |
| Rigid 1 x | 24 ... 14 AWG |
| Flexible 1 x | 24 ... 14 AWG |
| Flexible with ferrule 1 x | 24 ... 14 AWG |
| Stripping length | 8 mm |
| Tightening torque | 0.5 ... 0.6 N·m |
| Tightening torque UL/CSA | 5 ... 7 in·lb |
| Terminal type | Screw terminals |
| Recommended screw driver | M3 |

Control circuit

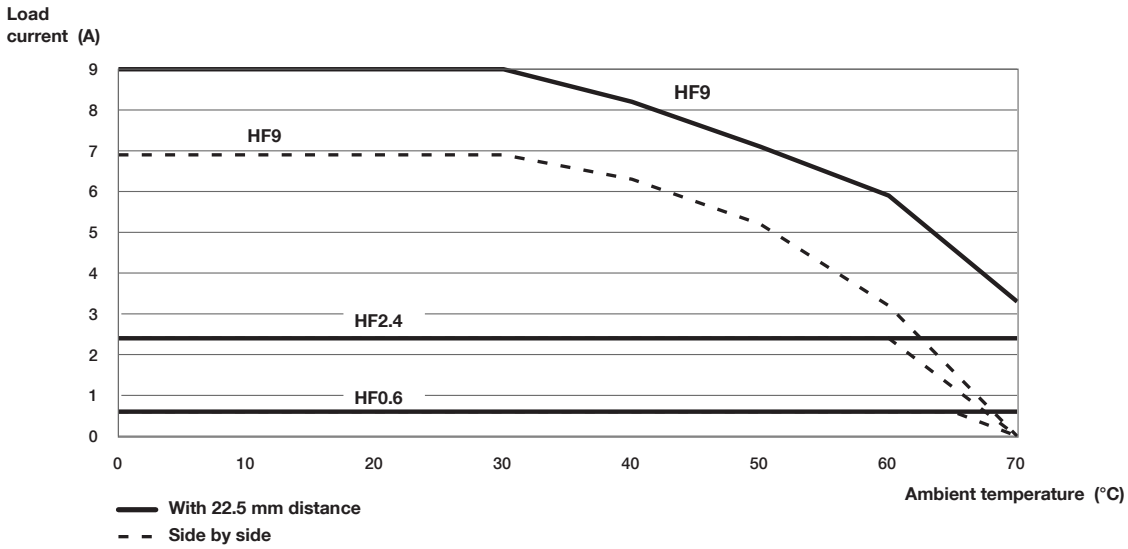
| Type | HF |
|---|---------------------------|
| Connecting capacity | |
|  Rigid 1 x | 2 ... 2.5 mm ² |
|  Flexible 1 x | 2 ... 2.5 mm ² |
|  Flexible with ferrule 1 x | 2 ... 2.5 mm ² |
| Connecting capacity acc. to UL/CSA | |
| Rigid 1 x | 24 ... 14 AWG |
| Flexible 1 x | 24 ... 14 AWG |
| Flexible with ferrule 1 x | 24 ... 14 AWG |
| Stripping length | 8 mm |
| Tightening torque | 0.5 ... 0.6 Nm |
| Tightening torque UL/CSA | 5 ... 7 in·lb |
| Terminal type | Screw terminals |
| Recommended screw driver | M3 |

HF0.6, HF2.4, HF9 electronic compact starters

Technical diagrams

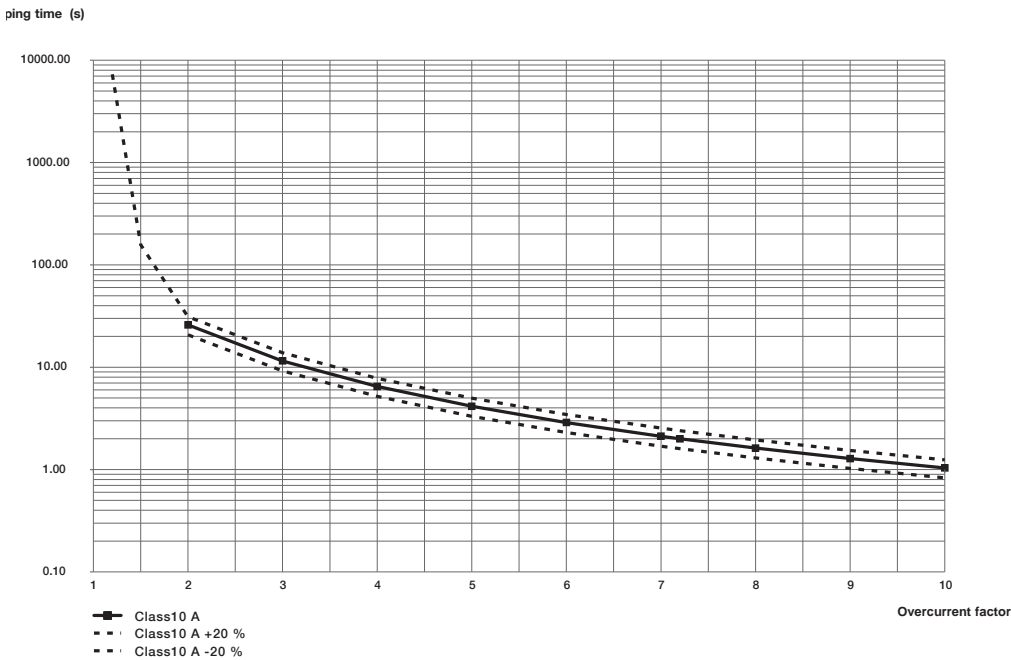
Derating curve

Please consider the derating curves for group mounting with and without ≥ 22.5 mm distance and the overload protection for tripping class 10A.



Derating curve HF range - electronic compact starters

Tripping characteristics



Tripping characteristics class 10A HF range - electronic compact starters



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For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/UMC100.3 DC
www.abb.com/productdetails/1SAJ530000R0100

Universal Motor Controller

| | |
|--------------|-----------------------------|
| 11/2 | Overview |
| 11/4 | Functions |
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| 11/6 | Components |
| 11/8 | Ordering details |
| 11/17 | Technical data |
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Keep motors running 24 hours a day

Secure uptime for your application

ABB's control products protect, control and automate critical business processes to make any application more productive. Rely on ABB as the partner to provide flexible, universal products. The Universal Motor Controller is an easy-to-use device that keeps your application running.



Continuous operation

The Universal Motor Controller (UMC) provides comprehensive, electronic motor protection. It ensures the motor is protected at all times, even if the control system or fieldbus breaks down. The precise electronic measurement system enables optimal utilization of the motors. Continuous trip behavior is supported by the long-term, high stability of the tripping characteristics. A comprehensive diagnostic system facilitates fault localization and rectification to help keep the system running and reduce downtime.



Speed up your projects

The system's modular approach means it can expand and adapt to provide the optimal solution for any situation, with an entry-level device that fulfills requirements for most applications. All of the control functions required in the field are integrated and easy to configure via parameters. Application-specific control functions can be readily achieved using the programmable logic system.



Easy to install

The universal and modular structure of the UMC benefits the entire planning, design and maintenance process. It significantly reduces the amount of wiring required, as all the necessary protection, monitoring and control functions are integrated into a single device. The complete range of currents and communication: fieldbuses and Ethernet is covered in a single version, simplifying planning, inventory and servicing.

Flexible motor management system

Proven in use around the world

Unplanned or sudden motor stops can lead to costly faults in process sequences. ABB's Universal Motor Controllers stand for reliable motor protection, motor control, fieldbus and Ethernet communication and fault diagnosis. The UMC is used and trusted in countless applications with thousands of devices installed worldwide.



Optimal solution for motor control center applications

ABB's UMC is a flexible, modular and expandable motor management system for constant-speed, low-voltage range motors. Its most important tasks include motor protection, prevention of plant standstills and the reduction of down time. Early information relating to potential motor problems and swift diagnosis ensure continuous operation. The UMC is proven in a wide range of segments and in large projects using several thousand motor controllers.



High plant availability

The UMC continuously transmits comprehensive operational, service and diagnostic data from the motor to the control system. This means faults are detected early on and their effects limited or even avoided entirely by timely countermeasures, increasing plant availability.



The highlights

- Compact design with integrated measuring system
- Suitable for three-phase and single-phase motors
- Standard device meets most feature requirements
- Easy to extend for more advanced functionalities
- Perfect solution for motor control centers (MCCs)
- Worldwide approvals, including ATEX explosive atmosphere certification
- Fieldbus systems:
 - Profibus DP, DeviceNet and Modbus RTU
- Ethernet systems:
 - Modbus TCP, Profinet IO, EtherNet/IP™



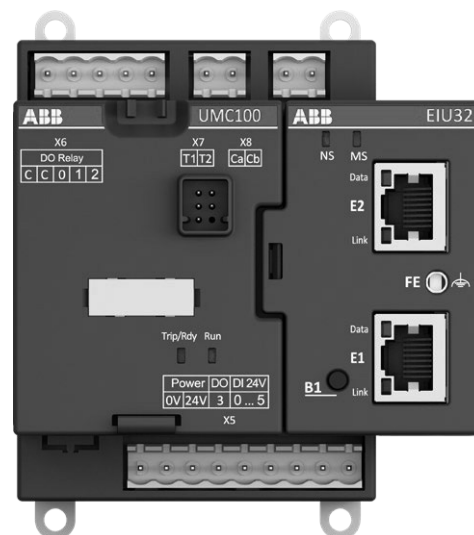
Open communication

The UMC is equipped with an interface for mounting a communication adapter. Selecting the relevant adapter enables the Universal Motor Controller to communicate using the popular fieldbuses, Profibus DP, DeviceNet or Modbus RTU. Communication via Ethernet networks is possible using the EtherNet/IP™, Modbus TCP or Profinet protocol. The device can also be used without a communication interface as a stand-alone motor controller, such as in simple pump stations.



Made in Germany, approved worldwide

ABB's Universal Motor Controller is engineered and manufactured in Germany. Approvals and certificates ensure the worldwide use of the product and with our long experience of project management, ABB gives you the best possible support.



Universal Motor Controller UMC100.3 with EtherNet/IP™ interface EIU32.0

The functions in detail

Universal Motor Controller UMC100.3



Motor protection

- The UMC provides comprehensive motor protection
- Overload protection for single and three-phase AC motors according to EN/IEC 60947-4-1
- Rated motor currents from 0.24 to 63 A with an integrated measuring system in a single version
- Rated motor currents up to 850 A with external current transformer CT4L/CT5L
- Selectable tripping classes 5E, 10E, 20E, 30E or 40E
- Locked rotor protection
- Phase failure, asymmetry and sequence protection
- Under-/ overcurrent protection
- Thermistor motor protection
- Ground leakage detection – internally or using CEM11-FBP.xxx sensors
- Limitation of motor starts per time
- Motor protection independent from bus communication

In combination with voltage module VI150/VI155-FBP.0

- Undervoltage/overvoltage protection
- Power supervision
- Power factor supervision ($\cos \varphi$)
- Voltage-based detection of phase failure, asymmetry and sequence



Motor control

- Integration of the most important motor control functions as ready, easily parameterizable blocks
- Direct, reversing, star-delta starters
- Pole changing/Dahlander Actuator mode
- Inching/jog mode
- Adjustable restart strategy (load shedding)

Extended motor control

- Freely programmable for special, application-specific control functions
- Simple adaptation to specified control functions
- Comprehensive library
- Blocks for logic, counters, timing
- Access to all I/Os and internal signals



Service data

- Counter for motor operating and standstill hours
- Number of starts
- Number of overload trips
- Energy

Diagnostic data

- Comprehensive and detailed error messages and warnings
- Log for previous 16 errors
- Plain text display on the control panel

Open communication

The UMC is a basic device that can use various communication methods; the communication protocol is selected by plugging-on the right fieldbus communication interface or connecting an Ethernet communication interface.



Control stations and operation modes

- Individual and flexible configuration
- Remote operation via DCS or PLC
- Local control via pushbuttons
- Local control via operations panel UMC100-PAN
- Force local via input signal

Motor status/communication

Quick and comprehensive access to all data via control station, fieldbus, Ethernet and/or laptop

Operating data

- Motor status
- Motor current
- Thermal load
- Maximum starting current
- Run-up time
- Time to trip
- Remaining cool-down time

Operating data with voltage module VI150/VI155-FBP.0

- Phase voltages
- Active power
- Apparent power
- Power factor
- Energy

Main areas of application

Benefit from ABB's Universal Motor Controller functionality in a wide variety of segments. Its flexibility, global recognition and comprehensive certification make it the top choice, no matter where you are.

—
01 Water supply and treatment plants

—
02 Mining facilities

—
03 Cement plants

Cement factories

- Robust and compact design
- Several inputs, e.g. for querying the position of the damper limit switches

Oil & gas, chemicals

- Programmability
- Ground fault monitoring
- Undervoltage detection and configurable restart following voltage restart
- Protection of motors in hazardous environments (ATEX)
- Use in IT networks

Pulp and paper

- Conformal coating
- Modular design
- Flexible communication

Mining

- Rated motor voltage of up to 1000 V
- Can be used at altitudes of up to 5000 m
- Ground fault monitoring

Water supply and treatment

- Pump controls as required
- Underload detection with Cos φ measuring
- Pump cleaning application

Others

- Steel plants
- Ships



01



02

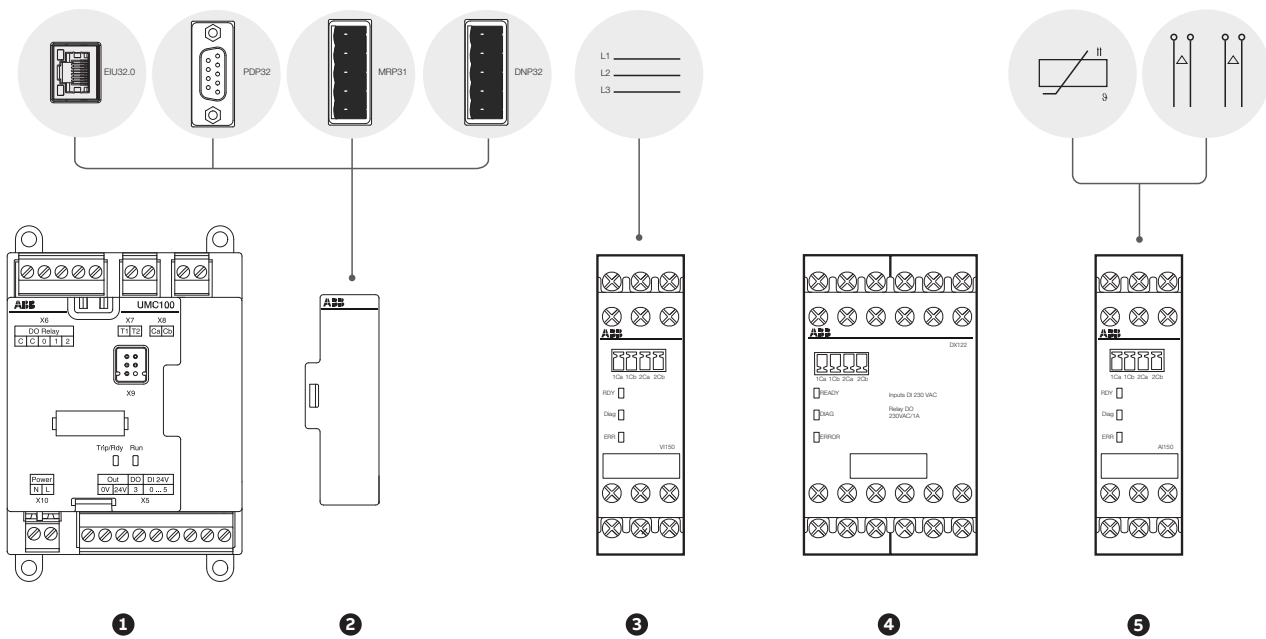


03

Components

The basic device can be expanded with several modules: digital expansion modules, analog and temperature modules, voltage modules and a range of communication interfaces, guaranteeing full flexibility and covering a wide range of applications.

MAIN COMPONENTS



1

UNIVERSAL MOTOR CONTROLLER UMC100.3

Basic device, expandable with different modules

- Voltage: max. 1000 V AC
- Tripping classes: 5E, 10E, 20E, 30E, 40E in accordance with IEC/EN 60947-4-1
- Built-in wide range measuring system, up to 63 A with one single version
- Supply voltages: 24 V DC, 110-240 V AC/DC
- Inputs: six digital inputs 24 V DC, one PTC input
- Outputs: four digital outputs



2

COMMUNICATION INTERFACES

Directly connect a variety of communication interfaces to the UMC

- Fieldbus interfaces:
 - PDP32.0: Profibus DP, DNP31.0: DeviceNet, MRP31.0: Modbus RTU
- Ethernet Interfaces:
 - MTQ22-FBP.0: Modbus TCP, PNQ22-FBP.0: Profinet IO, EIU32.0: EtherNet/IP™



3

VOLTAGE MODULES VI150/VI155-FBP.0

Voltage modules for determining phase voltages, power factor (cos φ), active power, apparent power, energy, harmonic content (THD)

- Supply voltage: 24 V DC
- 3-phase voltage measurement, up to 690 V in grounded and ungrounded networks
- Voltage dependent protection functions

A control panel with a backlit LDC display and a choice of nine different languages ensures easy operation of the UMC, wherever you are. Sensors detect earth leakages; current transformers increase the current measuring range.



DIGITAL MODULES DX111/DX122-FBP.0

Compact modules that increase the number of digital inputs and outputs

- Supply voltage 24 V DC
- Inputs: DX111 eight digital inputs 24 V DC, DX122 eight digital inputs 110/230 V AC
- Outputs: four digital relay outputs, one configurable analog output

4



ANALOG/TEMPERATURE MODULE AI111.0

Expand the UMC with analog and temperature inputs

- Supply voltage: 24 V DC
- Three analog inputs
- Configurable for temperature sensors and standard signals
- Two modules AI111 can be connected to one UMC

5

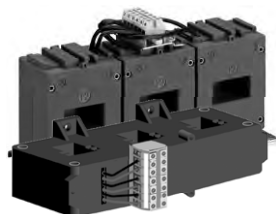
ACCESSORIES



OPERATING PANEL UMC100-PAN

Installation on the UMC or on the control cabinet door

- Graphics-enabled, backlit display with three LEDs for status indication
- Monitors all values, shows the status and diagnostic data
- Speaks your language - choice of nine menu languages
- USB-port for connection to a PC
- Up/download of parameters and custom application logic



CURRENT TRANSFORMERS CT4L/CT5L

Extend the integrated measuring system for larger motors

- For nominal motor currents > 63 A up to 850 A
- Linear transformer, 3-phase with terminal block, designed for connecting leads Cu 2.5 mm²



EARTH LEAKAGE SENSORS CEM11-FBP.XXX

Summation current transformer for connecting to a digital input. Mounting with bracket on DIN busbar or wall

- Four versions available with diameters from 20 mm to 120 mm
- Simple residual current adjustment with rotary switch, including test position
- Direct connected to a digital input of the motor controller
- Flexible mounting

Universal Motor Controller UMC100.3

Ordering details



UMC100.3

Description

Intelligent motor management system for single and three-phase motors with $I_e = 0.24 - 63$ A in a single device. Compact housing with integrated current transformer for cable cross sections up to 25 mm^2 (max. \varnothing with insulation 11 mm). Higher currents with additional external current transformer. Thermal overload protection according to EN/IEC 60947-4-1, selectable trip classes 5E, 10E, 20E, 30E, 40E. Some functions require an additional expansion module.

- Motor protection functions:
 - Over-/underload, over-/undercurrent, over-/undervoltage, rotor blocking, phase failure/imbalance/sequence
 - Earth fault detection integrated or with external sensor CEM11-FBP.0
 - Hot motor protection with thermistor or temperature measurement
- Motor control functions:
 - Easily configurable motor control functions: direct, reverse, star-delta starter, pole-changing, overload relay, actuator mode, softstarter mode. Additionally free programmable application specific logic with function blocks
- Service and diagnostic data:
 - Operating hours, number of motor starts and overload trips, energy, standstill and operation hours supervision, motor status, faults and warnings, fault history (16 events)
 - Motor current, phase voltages, thermal load, power factor ($\cos \varphi$), active power, apparent power, energy, total harmonic distortion (THD).
- Integrated I/Os: six digital inputs, one PTC input, four digital outputs. Maximum number of I/Os with expansion modules: 14 digital inputs, one PTC input, nine digital outputs, six analog inputs, one analog output
- Communication interfaces for fieldbuses and Ethernet networks, Interface for operator panel UMC100-PAN, bus interface for connection of expansion modules
- Versions for supply voltage 24 V DC and 110 – 240 V AC/DC, with ATEX approval and with ATEX plus conformal coating for applications in aggressive atmosphere

| Description | Supply voltage | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|-----------------|-----------------------|-----------------|---------|-------------------|
| Universal Motor Controller | 24 V DC | UMC100.3 DC | 1SAJ530000R0100 | 1 | 0.275 |
| Universal Motor Controller | 110-240 V AC/DC | UMC100.3 UC | 1SAJ530000R1100 | 1 | 0.315 |
| Universal Motor Controller, ATEX | 24 V DC | UMC100.3 DC EX | 1SAJ530000R0200 | 1 | 0.275 |
| Universal Motor Controller, ATEX | 110-240 V AC/DC | UMC100.3 UC EX | 1SAJ530000R1200 | 1 | 0.315 |
| Universal Motor Controller, ATEX conformal coating | 24 V DC | UMC100.3 DC EX Coated | 1SAJ530000R0210 | 1 | 0.275 |
| Universal Motor Controller, ATEX conformal coating | 110-240 V AC/DC | UMC100.3 UC EX Coated | 1SAJ530000R1210 | 1 | 0.315 |

Operating panel and cables

Ordering details



UMC100-PAN

2CDC341008W0014

Description

Operating panel for Universal Motor Controller UMC100.3. Backlit graphical and multilingual full-text display, LEDs for status display. Assembly directly on UMC100.3 or on the control cabinet door via door mounting set (includes the connection cable).

Functions

- Monitor: Shows motor status, diagnostics and maintenance data
- Operate: Start, stop, fault reset
- Parametrize: Setting and changing of all motor and fieldbus parameters (password protection possible); all settings are performed in the selected language
- Memory: Copy settings from one UMC100.3 to another
- USB port for up/download of parameters and logic from PC with PBDTM software



UMC100-PAN CAP

2CDC341001V0017

Supports nine languages: English, Finnish, French, German, Italian, Polish, Portuguese, Russian, Spanish

The protection cap UMC100-PAN increases the degree of protection for the operator panel from IP52 to IP54. It consists of transparent and flexible silicone material making it easy to read text messages, checking the LED status and use the buttons. It is removable to access the micro-USB port for parameter up/download.

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|----------------|-----------------|---------|-------------------|
| Operating panel | UMC100-PAN | 1SAJ590000R0103 | 1 | 0.047 |
| 0.7 m ext. cable with door mounting set | UMCPAN-CAB.070 | 1SAJ510003R0002 | 1 | 0.070 |
| 1.5 m ext. cable with door mounting set | UMCPAN-CAB.150 | 1SAJ510004R0002 | 1 | 0.088 |
| 3 m ext. cable with door mounting set | UMCPAN-CAB.300 | 1SAJ510002R0002 | 1 | 0.176 |
| Protection cap for operating panel | UMC100-PAN CAP | 1SAJ510005R0001 | 10 | 0.013 |

Expansion modules

Ordering details



DX111-FBP.0

2CDC3410050009



DX122-FBP.0

2CDC34100450009



VI150-FBP.0

2CDC34100150011



AI111.0

2CDC34100150015

Description

Up to four expansion modules can be connected to one UMC100.3:

- One digital expansion module DX111-FBP.0 or DX122-FBP.0
- One voltage expansion module VI150-FBP.0 or VI155-FBP.0
- Two analog/temperature expansion modules AI111.0

The supply voltage is 24 V DC; the 110-240 V AC/DC version of the UMC100.3 provides the 24 V DC supply for expansion modules

DX111-FBP.0

I/O-expansion module with eight digital inputs 24 V DC, four relay outputs, one analog output 0/4-20 mA or 0...10 V

DX122-FBP.0

I/O-expansion module with eight digital inputs 110/230 V AC, four relay outputs, one analog output 0/4-0 mA or 0-10 V.

VI15x-FBP.0

Voltage modules for the determination of phase voltages, power factor ($\cos \varphi$), apparent power, energy, total harmonic distortion (THD). For use in grounded networks (VI150-FBP.0) or in all networks (VI155-FBP.0), 150-690 V AC.

AI111.0

Analog/temperature expansion module, three inputs PT100, PT1000, KTY83, KTY84, NTC, 0-10 V, 0/4-20 mA one or two modules AI111.0 can be connected to an UMC100.3.

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|---------------|-----------------|---------|-------------------|
| I/O module for UMC100, 24 V DC digital input | DX111-FBP.0 | 1SAJ611000R0101 | 1 | 0.220 |
| I/O module for UMC100, 110 - 230 V AC digital input | DX122-FBP.0 | 1SAJ622000R0101 | 1 | 0.220 |
| 3-phase voltage module for grounded networks | VI150-FBP.0 | 1SAJ650000R0100 | 1 | 0.110 |
| 3-phase voltage module for all networks | VI155-FBP.0 | 1SAJ655000R0100 | 1 | 0.110 |
| Analog/temperature module 3 analog inputs | AI111.0 | 1SAJ613000R0101 | 1 | 0.116 |
| Connection cable UMC100 - I/O module, length 0.3 m | UMCIO-CAB.030 | 1SAJ691000R0001 | 1 | 0.011 |
| Connection cable IO-module - IO-module, length 0.3 m | IOIO-CAB.030 | 1SAJ692000R0001 | 1 | 0.011 |
| Terminal set for UMC100.3 DC (spare parts) | UMCTB-FBP.0 | 1SAJ929160R0001 | 1 | 0.043 |
| Terminal set for UMC100.3 UC (spare parts) | UMCTB.1 | 1SAJ929160R0002 | 1 | 0.045 |

Fieldbus interfaces

Ordering details



PDP32.0



MRP31.0



DNP31.0



PDR31.0

Description

Fieldbus communication interfaces enable the UMC100.3 to communicate via fieldbus. The interfaces can be used in two ways:

- Mounted directly on an UMC100.3 – the interface is supplied from the UMC100.3 and no additional accessory is required
- Mounted separately on a SMK3.0 adapter in the cable chamber of an MCC, the interface plugged on SMK3.0 requires a 24 V DC supply. Ready-made cables for applications in withdrawable systems are available, as well as terminal blocks for other cables:
CDP18.150: Cable for use inside the drawer CDP24.150: Cable from SMK3.0 to drawer outside

PDP32.0

- Communication interface for PROFIBUS DP; supports the protocols PROFIBUS DP/V0 and V1
- PNO-certified PROFIBUS slave
- Data transfer rate up to 12 Mbit/s
- Diagnostic LEDs
- Fieldbus connection via nine-pole Sub-D connector or terminal blocks
- GSD download from UMC100.3 webpage

MRP31.0

- Communication interface for Modbus RTU
- Data transfer rate up to 57.6 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks

DNP31.0

- Communication interface for DeviceNet
- ODVA-certified DeviceNet slave
- Data transfer rate up to 500 kbit/s
- Diagnostic LEDs
- Fieldbus connection via terminal blocks
- EDS download from UMC100.3 webpage

PDR31.0

- External active fieldbus termination for Profibus DP; the PDR31.0 needs to be mounted on a SMK3.0 adapter and supplied by 24 V DC

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|---------|-----------------|---------|-------------------|
| Profibus DP communication interface | PDP32.0 | 1SAJ242000R0001 | 1 | 0.050 |
| Modbus RTU communication interface; terminal block for fieldbus connection included | MRP31.0 | 1SAJ251000R0001 | 1 | 0.039 |
| DeviceNet communication interface; terminal block for fieldbus connection included | DNP31.0 | 1SAJ231000R0001 | 1 | 0.039 |
| Profibus DP active bus termination | PDR31.0 | 1SAJ243000R0001 | 1 | 0.030 |

Adapter and accessories

Ordering details



SMK3.0



CDP18.150



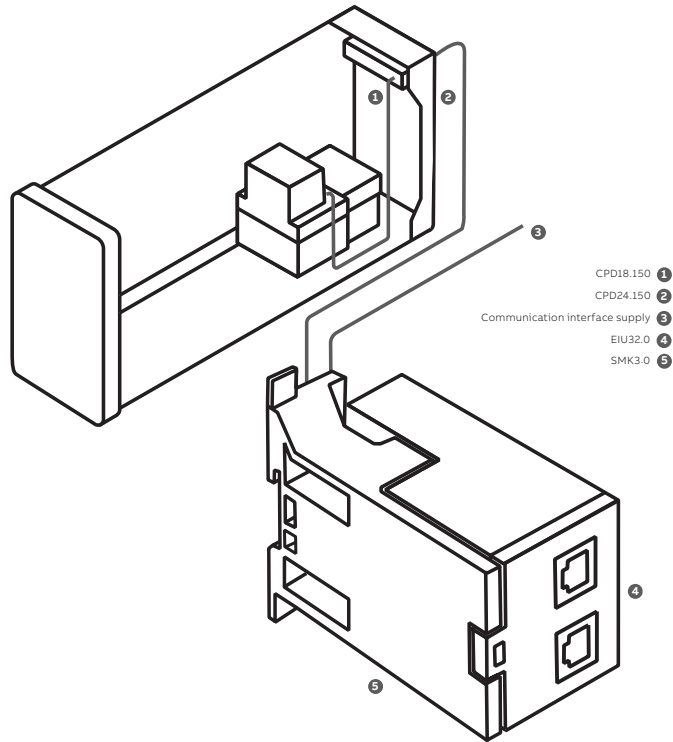
PDP32.0 on SMK3.0



EIU32.0 on SMK3.0

Adapter and ready-made cables

Adapter SMK3.0 for external mounting of a fieldbus or EtherNet/IP™ interface EIU32.0 outside a drawer. SMK3.0 can be mounted on a DIN-rail or fixed by screws. 24 V DC supply is required. Ready-made cables for inside and outside the drawer, including a terminal block on one side and open end on the other. Terminal blocks are also separately available for making own cables.



Separate wiring of the EtherNet/IP™ communication interface EIU32.0

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--|------------|-----------------|---------|-------------------|
| Adapter for separate mounting of a communication interface; terminal block for 24 V DC supply included | SMK3.0 | 1SAJ929600R0001 | 1 | 0.038 |
| Cable for use inside drawer, length 1.5 m | CDP18.150 | 1SAJ929180R0015 | 1 | 0.060 |
| Cable from SMK3.0 to drawer's outside, length 1.5 m | CDP24.150 | 1SAJ929240R0015 | 1 | 0.060 |
| Terminal block 2-pole for SMK3.0 supply (spare parts) | SMK3-X2.10 | 1SAJ929610R0001 | 10 | 0.017 |
| Terminal block 5-pole for SMK3.0 comm. (spare parts) | SMK3-X1.10 | 1SAJ929620R0001 | 10 | 0.041 |

Ethernet interfaces

Ordering details



MTQ22-FBP.0

2CDC34100350012



PNQ22-FBP.0

2CDC34100150014



EIU32.0

2CDC341009V0018

Description

Ethernet communication interfaces enable the UMC100.3 to communicate via an Ethernet network. There are two types of interfaces:

Interfaces for the connection of one to four Universal Motor Controllers UMC100.3:

- MTQ22-FBP.0 for Modbus TCP
- PNQ22-FBP.0 for Profinet IO

Interface for a single universal motor controller UMC100.3:

- EIU32.0 for EtherNet/IP™

MTQ22-FBP.0

- Protocol Modbus TCP
- For one to four UMC100.3
- Master supervision with timeout control for up to four masters
- Micro USB-port for configuration via PC (configuration software downloaded from UMC100.3 webpage)
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- 24 V DC supply voltage
- DIN-rail mounting

PNQ22-FBP.0

- Protocol Profinet IO
- PNO-certified
- For one to four UMC100.3 devices
- Integrated Ethernet switch
- Supports all network topologies
- Ring topology with redundancy (MRP protocol)
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- Fully integrated into ABB 800xA
- Time-stamped events with ABB 800xA
- 24 V DC supply voltage
- DIN-rail mounting
- GSDML downloaded from UMC100.3 webpage

EIU32.0

- Protocol EtherNet/IP™
- ODVA-certified
- For one motor controller UMC100.3
- Mounting directly on an UMC100.3 (supplied by UMC100.3) or remotely on a SMK3.0 adapter (24 V DC supply required)
- Integrated Ethernet switch
- Supports all network topologies
- DLR (Device Level Ring) function for redundancy
- Easy to use in withdrawable applications
- No special Ethernet connectors required in MCCs
- EDS download from UMC100.3 webpage

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------------|-------------|-----------------|---------|-------------------|
| Ethernet Modbus TCP interface | MTQ22-FBP.0 | 1SAJ260000R0100 | 1 | 0.172 |
| Ethernet Profinet IO interface | PNQ22-FBP.0 | 1SAJ261000R0100 | 1 | 0.172 |
| EtherNet/IP™ interface | EIU32.0 | 1SAJ262000R0100 | 1 | 0.110 |

Ready-made cables, terminal blocks

Ordering details



CDP18.150

2CDC34100FF0018



Terminal blocks ETHTB-FBP.xx

2CDC34100BF0018

Ready-made cables

Ready-made cables are available for application in withdrawable systems as well as for fixed installations. Cables include ready-mounted terminal blocks. All connectors are also available as spare parts for creating individual cable connections.

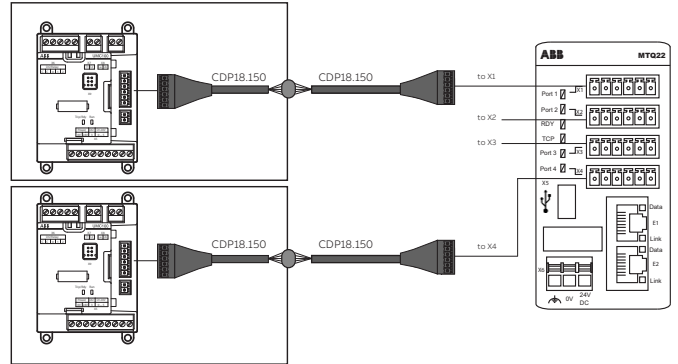
Terminal blocks for making own cables are also available:

MTQ22-FBP.0, PNQ22-FBP.0

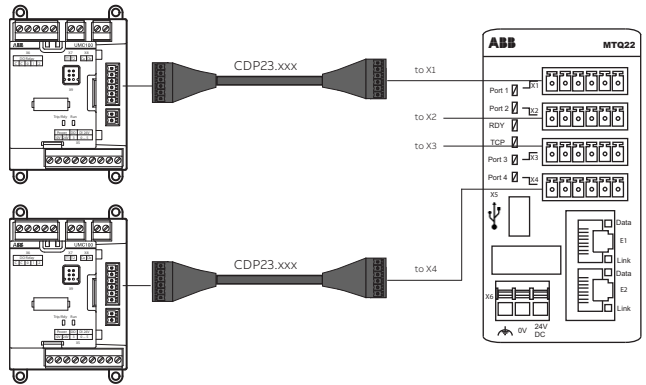
- CDP18.150 cable for use inside and outside a drawer
- CDP23.150, CDP23.300 cables from Ethernet interface to UMC100.3

EIU32.0

- CDP18.150 cable for use inside a drawer
- CDP24.150 cable for use outside a drawer and connection to a SMK3.0 adapter



UMC100.3, withdrawable application with MTQ22-FBP.0/PNQ22-FBP.0



UMC100.3, fix mounted application with solution MTQ22-FBP.0/PNQ22-FBP.0

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|--------------|-----------------|---------|-------------------|
| Cable for inside and outside drawer, length 1.5 m | CDP18.150 | 1SAJ929180R0015 | 1 | 0.060 |
| Cable Ethernet interface - UMC100.3, length 1.5 m | CDP23.150 | 1SAJ929230R0015 | 1 | 0.100 |
| Cable Ethernet interface - UMC100.3, length 3 m | CDP23.300 | 1SAJ929230R0030 | 1 | 0.160 |
| Cable from SMK3.0 to drawer's outside, length 1.5 m | CDP24.150 | 1SAJ929240R0015 | 1 | 0.060 |
| Terminal blocks for MTQ22/PNQ22 X1...X4 | ETHTB-FBP.4 | 1SAJ929200R0001 | 4 | 0.015 |
| Terminal blocks for MTQ22/PNQ22 X1...X4 | ETHTB-FBP.50 | 1SAJ929200R0002 | 50 | 0.015 |

Configuration software

Ordering details



Configuration software example



UTP22-FBP.0

FIM UMC EDITION configuration software for the UMC100.3 motor management system

The FIM UMC Edition is based on the Field Device Integration (FDI) standard. This latest standard combines the benefits of both major former technologies, EDD and FDT/DTM. It is the perfect tool for configuration of the UMC100.3 universal motor controller in large applications in the process industry and also in smaller projects such as the water industry. The FIM UMC Edition is equipped with a high-performance graphical user interface which is quick to install. It scans, identifies and enables access to devices within three minutes. It provides effective basic functionality for configuration, diagnosis and maintenance, during commissioning, in the workshop or as second master in a Profibus network of a process control system.

Overview of features

- Online/offline configuration and parameterization of UMC100.3
- Maximum number of tags is 2500
- Reading parameterization and configuration information from the device
- Online display of measuring, status and diagnostics data
- Online operation and error acknowledgment
- Creation of custom application logics
- Archiving

Supported languages

| | |
|------------------------------------|---|
| FIM basic package | Chinese, English, German |
| UMC100.3 Device Package | Chinese, English, Spanish, German, Italian, Polish, Portuguese, Russian |
| UMC100.3 Custom Application Editor | English |

System requirements

- Windows 7 (64 bit)/Windows 8.1, Windows 10, admin rights
- 10 GB storage space
- Minimum of 1 GB RAM

Connection to UMC100.3 can be done either via PROFIBUS DP or as a point-to-point connection

Connection to Profibus DP network: UTP22-FBP.0

Connection to UMC100.3: With micro-USB cable via control panel UMC100-PAN

A trial version with limited functionality can be downloaded from <https://new.abb.com/control-systems/fieldbus-solutions/fim>

The single user license in the FIM UMC Edition package upgrades the trial version to a full version

| Description | Type | Order code | Pkg qty | Weight (1 pce) kg |
|--------------------------------------|-------------|-----------------|---------|-------------------|
| USB interface for Profibus networks | UTP22-FBP.0 | 1SAJ924013R0001 | 1 | 0.261 |
| FIM UMC Edition, Single user license | PBDM-FBP.0 | 1SAJ925000R0001 | 1 | n.a. |

Earth fault monitors, current transformers

Ordering details



CEM11-FBP.xxx

2CDC345011F0006

Earth fault monitors CEM11-FBP.xxx for use with the Universal Motor Controller UMC100.3

The CEM11-FBP.xxx device monitors if the sum of the currents flowing through it is zero (factorial addition). If the sum is zero, no residual current is present. If the residual current is above an adjusted threshold value, the output signal of the CEM11-FBP.xxx changes. It can be used in motor feeders to detect leakage currents, as well as ground faults, caused for example by insulation breakdowns.

- CEM11-FBP.xxx is connected to a digital input of the UMC100.3
- Earth fault current threshold can be set in eight steps with a screwdriver
- Test position for easy control of the wiring

CEM11-FBP.xxx is delivered with adapters for DIN-rail or wall mounting.
CEM-11.FBP.120 is for wall-mounting only.



CT4L185R/4, CT4L310R/4

2CDC34400150012



CT5L500R/4, CT5L850R/4

2CDC34100250012

| Earth fault currents [mA] | Through-hole diameter | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---|--------------------------|---------------|-----------------|------------|-------------------------|
| 80 ¹⁾ , 300, 550, 750, 1000, 1200, 1500, 1700 | 20 mm | CEM11-FBP.20 | 1SAJ929200R0020 | 1 | 0.130 |
| 100 ¹⁾ , 500, 1000, 1400, 2000, 2400, 3000, 3400 | 35 mm | CEM11-FBP.35 | 1SAJ929200R0035 | 1 | 0.200 |
| 120 ¹⁾ , 1000, 2000, 2800, 4000, 4800, 6000, 6800 | 60 mm | CEM11-FBP.60 | 1SAJ929200R0060 | 1 | 0.330 |
| 300 ¹⁾ , 2000, 4000, 5600, 8000, 9600, 12000, 13600 | 120 mm | CEM11-FBP.120 | 1SAJ929200R0120 | 1 | 0.940 |

¹⁾ Lower values have higher inaccuracy

Current transformers for use with the Universal Motor Controller UMC100.3

Linear type three-phase transformers, for use with the UMC100.3 and nominal motor currents >63 A. Terminal blocks for conductors Cu 2.5 mm² for wiring on the UMC100.3 side.

| Description | Recommended current range | Type | Order code | Pkg qty | Weight (1 pce) kg |
|---------------------|------------------------------|------------|-----------------|------------|-------------------------|
| Current transformer | 60...185 A AC | CT4L185R/4 | 1SAJ929500R0185 | 1 | 1.600 |
| Current transformer | 180...310 A AC | CT4L310R/4 | 1SAJ929500R0310 | 1 | 1.500 |
| Current transformer | 300...500 A AC | CT5L500R/4 | 1SAJ929501R0500 | 1 | 1.700 |
| Current transformer | 500...850 A AC | CT5L850R/4 | 1SAJ929501R0850 | 1 | 1.900 |

UMC100-FBP.0 and FBP system accessories are being phased out. Please contact your local ABB contact for spare parts or retrofit solutions.

Universal Motor Controller UMC100.3

Technical data

Control voltage circuit

| Type | UMC100.3 DC | UMC100.3UC |
|--|--|----------------------------------|
| Supply voltage | 24 V DC (+30 % ... -20 %) (19,2 ... 31,2 V DC) including ripple | 110V - 240V AC/DC -15% / +10% |
| Total power dissipation Conditions: all digital inputs high, all relay outputs activated* | min. 3 W | min P: 3.5 W / S: 8 W |
| Reverse polarity protection | yes | not relevant |

Controller unit

| | |
|------|--|
| LEDs | Red: Motor has been tripped due to a thermal overload condition or another fault Yellow: Motor is running Green: Ready for operation |
|------|--|

Digital inputs

| | |
|-------------------------------------|---|
| Number of digital inputs | 6 (DI0 ... D15) Type 1 accord. to EN 61131-2 |
| Supply for digital inputs | 24 V DC |
| Isolation | No |
| Input signal bounce suppression | Typ. 2 ms |
| Signal 0 range including ripple | -31.2 ... +5 V |
| Signal 1 range including ripple | +15 ... +31.2 V |
| Input current per channel (24 V DC) | Typ. 6.0 mA |
| Input resistor to 0 V | 3.9 k Ω |
| Cable length | Unshielded max. 600 m Shielded max. 1000 m |

Relay outputs

| | |
|---|---|
| Number of relay outputs | 3 x monostable with one common root |
| Voltage range of contacts | 12-250 V AC/DC |
| Lowest switched power for correct signals | 1 W or 1 VA |
| Switching capacity per relay contact according to EN 60947-5-1 (electromagnetic load) | AC-15 240 V AC max. 1.5 A AC-15 120 V AC max. 3 A DC-13 250 V DC max. 0.11 A DC-13 25 V DC max. 0.22 A DC-13 24 V DC max. 1 A |
| Short circuit protection | 6 A gG |
| Rated impulse withstand voltage U_{imp} | 4 kV |
| Switching of inductive power | Inductive loads need additional measures for spark suppression Diodes for DC voltage and varistors / RC elements for AC voltage are suitable Some DC coil contactors contain rectifiers which suppress sparks perfectly |
| Relay contact service life | Mechanical 500 000 switching cycles Electrical (250 V AC): 0.5 A; 100 000 cycles 1.5 A 50 000 switching |
| Internal clearance and creepage distances relay contacts to 24 V circuits | > 5.5 mm (safety insulation up to 250 V AC) (EN 60947-1, Pollution degree 2) |
| Pollution degree terminals | 3 |
| Supply power down/up, behaviour: Valid for all motor control functions, except transparent and overload relay | Whenever the supply voltage of the UMC is switched off and on, the starting of the motor needs a new RUN signal |

*Please refer to the product manual for more detailed information.

Universal Motor Controller UMC100.3

Technical data

Transistor output

| Type | UMC100.3 DC | UMC100.3 UC |
|-------------------------|--|------------------|
| Max. output current | 200 mA | 50 mA |
| Short circuit protected | Yes | Yes |
| Output voltage if high | UMC100.3 supply voltage, nominal 24 V DC | nominal 24 V DC |
| Isolation | No | Yes, to AC mains |

Thermistor motor protection (PTC - binary) type A

| | |
|---|--|
| Broken wire resistance | > 4.8 k Ω |
| Voltage at broken wires between terminals T1/T2 | 12 V DC (typ.) |
| Response resistance | 3.4-3.8 k Ω |
| Reset resistance | 1.5-1.65 k Ω |
| Short circuit resistance | < 21 Ω |
| Current at short circuit conditions | 1.5 mA (typ.) |
| Response time | 800 ms |
| Max. cold resistance of PTC sensor chain | < 1.5 k Ω |
| Line length | 2.5 mm ² : 2 x 250 m 1.5 mm ² : 2 x 150 m 0.5 mm ² : 2 x 50 m |
| Isolation | No |

Environmental and mechanical data

| Type | UMC100.3 DC | UMC100.3 UC |
|--------------------------------------|---|--|
| Mounting | On DIN-rail (EN 50022-35) or with four screws M4 | |
| Mounting position | Any | |
| Dimensions (W x H x D) | 70 x 105 x 106 mm | |
| Net weight | 0.3 kg | 0.35 kg |
| Tightening torque | \varnothing 3.5 mm / 0.138 in ; 0.5 Nm, 4.5 in.lb | |
| Wire size with wire end ferrule | 1 x 0.2-2.5mm ² (1 x 28 ... 12 AWG) | |
| Wire size with rigid | 1 x 0.2-2.5mm ² (1 x 28 ... 12 AWG) | |
| Tightening torque for screw mounting | 0.8 Nm | |
| Degree of protection | IP20 | |
| Temperature range storage | -25 ... +70 °C | |
| Temperature range operation | 0 ... +60 °C with two output relays activated | 0 ... +60°C with two relay outputs activated and 24 V DC supply output loaded with 200 mA 0 ... +50°C with two relay outputs activated and 24 V DC supply output loaded with 400 mA |

Performance data

| | |
|--|---|
| Reaction time UMC100 DI to UMC100 Relay Output (incl. hardware delays) | typ. 10 ms (Transparent Control Function) |
| Reaction time UMC100 DI to DX111 Relay Output (incl. hardware delays) | typ. 10 ms (Transparent Control Function) |
| Reaction time from DX111 DI to UMC100 Relay Output (incl. hardware delays) | typ. 14 ms (Transparent Control Function) |
| Number of supported function blocks | See 2CDC135014D02xx |

Digital expansion modules DX111-FBP.0, DX122-FBP.0

Technical data

Digital inputs

| Type | DX111-FBP.0 | DX122-FBP.0 |
|------------------------------|---|---|
| Number of inputs | Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs) Insulation: Type 1 acc. to EN 61131-1 | Eight inputs in two groups of common reference potential (One group with five inputs, one group with three inputs) Insulation: Type 2 acc. to EN 61131-1 |
| Input voltage | 24 V DC | 110 V AC ... 240 V AC |
| Input delay | 6 ms typ. | 20 ms typ. |
| Signal levels | 0 state - 31.2 ... + 5 V 1 state + 15 ... + 31.2 V | 0 ... 40 V AC 74 ... 265 V AC |
| ON current per channel | 6.0 mA typ. (24 V DC) | 10.0 mA typ. (230 V AC) |
| Input resistance against 0 V | 3.9 k Ω | |
| Frequency range | | 45 ... 65 Hz |

Digital output

| | |
|--------------------------------------|--|
| Number of digital outputs | 4 relay outputs with 2 common supplies (1DO0 & 1DO1 by 1DOC; 2DO2 & 2DO3 by 2DOC) |
| Voltage switching capacity | 12 ... 250 V AC/DC |
| Load current via common | $I_{max} = 6 \text{ A gL} / \text{gG}$ per common supply (1DOC, 2DOC) |
| Minimum load for proper switching | 1 W or 1 VA |
| Contact wiring for inductive load | Free-wheeling diode for direct current, varistors/VDRs for alternating current |
| Current switching capacity per relay | EN 60947-5-1 |
| | 240 V AC (AC-15) max. 1.5 A |
| | 120 V AC (AC-15) max. 3 A |
| | 250 V DC (DC-13) max. 0.11 A |
| | 125 V DC (DC-13) max. 0.22 A |
| | 24 V DC (DC-13) max. 1 A |
| Relay contact lifetime | > 500.000 switching cycles – mechanical, > 100.000 switching cycles – at 250 V AC, 0.5 A > 50.000 switching cycles – at 250 V AC, 1.5 A |

Analog output

| | |
|--------------------------|---|
| Number of analog outputs | 1 |
| Connection type | 2-wire, for motor current indication on an external analog instrument |
| Output ranges | Configurable: 0/4 ... 20 mA or 0 ... 10 V |
| Cable specification | < 30 m outside the control cabinet; > 30 m if shielded |
| Max. output voltage | 10 V |
| Accuracy | < 5% |
| Output load | 500 Ω max. if configured for 0/4 ... 20 mA output; 1 k Ω min. if configured for 0 ... 10 V output |
| Resolution | 8 bits |
| Short-circuit detection | Yes, if configured for 0 ... 10 V output |
| Wire break detection | Yes, if configured for 4 ... 20 mA output |
| Insulation | none |

Interfaces

| | |
|---------------------------------|---|
| Interface for I/O expansion | 1 for connection to UMC100 and/or other expansion modules |
| Integrated diagnostic functions | Green LED: Device ready for operation, Yellow LED: Wire break or short circuit indication Red LED: Error (loss of communication, failure, ...) |

Digital expansion modules DX111-FBP.0, DX122-FBP.0

Technical data

General data

| Type | DX111-FBP.0 | DX122-FBP.0 |
|-------------------------|---|-------------------------|
| Supply voltage | 24 V DC (+ 30%, – 20%) (19.2 ... 31.2 V DC incl. residual ripple) | |
| Conductor cross section | max. 2 x 0.75 - 2.5 mm ² | |
| Mounting | Snap-on mounting on DIN rail, any mounting position | |
| Dimensions | 45 x 77 x 100 mm (without communication plug) | |
| Weight | 0.220 kg | |
| Degree of protection | IP20 | |
| Temperature range | Storage: -25 ... +70 °C | Storage: -25 ... +70 °C |
| | Operation: 0 ... +60 °C | Operation: 0 ... +55 °C |
| Approvals | ATEX, CCC, CE, cUL, EAC (other approvals on request) Shipping ABS, DNV, GL | |

Voltage expansion modules VI150-FBP.0, VI155-FBP.0

Technical data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|-------------|---------------------------|-------------------------------------|
| Application | only in grounded networks | in grounded and ungrounded networks |

Electrical data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|--|---|---------------------------|
| Supply voltage | 24 V DC (+ 30 %, - 20 %) (19.2 ... 31.2 V DC including ripple) | |
| Current consumption relay energized | max. 40 mA | max. 55 mA |
| Voltage input | L1, L2, L3 | L1, L2, L3 |
| Overvoltage category | III in grounded networks | |
| | | II in ungrounded networks |
| Nominal voltage input range (phase to phase) | 90 - 690 V AC | |
| U_{imp} | 8 kV | |
| Accuracy voltage | +/- 2% in nominal input range | |
| Accuracy power factor | +/- 3.5 % in range 0.4 ... 0.95, I > 0.75 A | |
| Accuracy real power kW | +/- 5 % typ. | |
| Accuracy energy kWh | +/- 5 % typ. | |
| Total Harmonic Distortion THD | in % | |
| Rated operational voltage U_e | 690 V AC | |
| Voltage supply cables | connection cables for voltage measurement may require additional cable protection | |

Digital output

| | |
|-----------------------------------|--|
| Number | 1 relay output |
| Voltage switching capacity | 12 ... 250 V AC/DC |
| Current switching capacity | EN 60947-5-1 |
| | 240 V AC (AC-15) max. 1.5 A |
| | 120 V AC (AC-15) max. 3 A |
| | 250 V DC (DC-13) max. 0.11 A |
| | 125 V DC (DC-13) max. 0.22 A |
| | 24 V DC (DC-13) max. 1 A |
| Minimum load for proper switching | 1 W or 1 VA |
| Contact wiring for inductive load | Free-wheeling diode for DC, Varistors/VDRs for AC |
| Relay contact lifetime | > 500.000 switching cycles – mechanical > 100.000 switching cycles – at 250 V AC, 0.5 A > 50.000 switching cycles – at 250 V AC, 1.5 A |

Interfaces

| | |
|---------------------------------|--|
| Interface for I/O expansion | 1 for connection to UMC100.3 and/or other expansion modules |
| Integrated diagnostic functions | Green LED: Device ready Yellow LED: Diagnostics Red LED: Fault |

General data

| Type | VI150-FBP.0 | VI155-FBP.0 |
|------------------------------------|--|------------------------------|
| Conductor cross section | 2 x 0.75 - 2.5 mm ² max. | |
| Mounting | Snap-on mounting on DIN-rail, any mounting position Min. 10 mm distance left and right to the L1 and L3 terminals required for voltages > 230 / 400 V | |
| Dimensions (W x H x D) | 22.5 x 77 x 100 mm (excl. communication connector) | |
| Weight | 0.110 kg | |
| Degree of protection | IP20 | |
| Temperature range | Storage: - 25 ... + 70 °C, operation: 0 ... + 60 °C | |
| Operation altitude above sea level | Max. 2000 m | Max. 4000 m without derating |
| Approvals | ATEX, CCC, CE, cUL, EAC (other approvals on request) Shipping: ABS, DNV, GL | |

Analog/temperature expansion module AI111.0

Technical data

General

| Type | AI111.0 |
|---|---|
| Mounting | On DIN rail (EN 50022-35) |
| Mounting position | Any |
| Dimensions (W x H x D) | See dimensions of expansion modules |
| LEDs: Red/yellow/green | Red: Hardware error of module Yellow: Diagnosis available Green: Ready for operation |
| Supply voltage | 24 V DC (+30 % ... -20 %) (19.2 ... 31.2 V DC) including ripple |
| Supply current | Max. 40 mA (at 19.2 ... 31.2 V DC) |
| Tightening torque for the communication terminals | See section DX1xx |
| Tightening torque for the input, output and supply terminals | See section DX1xx |
| Net weight | 0.118 kg (0.260 lb) |
| Degree of protection | IP20 |
| Temperature range | Storage -25 ... +70 °C Operation 0 ... +60 °C |
| Marks, Approvals | CE, cUL Further in preparation. Ask your local sales representative for other marks/approvals. |
| Functional isolation between analog inputs and 24 V DC supply / communication interface | Yes |
| Individual configuration of each analog input | Yes |
| U _{imp} sensor analog inputs | 0.5 kV |
| Pollution degree terminals | 3 |
| Operation altitude above sea level | Up to 5000 m |

Temperature inputs

| Type | AI111.0 |
|---|--|
| Type of connection | 2 or 3 wire |
| Number of input channels | 3 (one AI111.0) / 6 (two AI111.0) |
| Type of temperature inputs (adjustable per channel) | PT100 -50 °C...+400 °C PT100 -50 °C...+70 °C PT1000 -50 °C...+400 °C KTY83-110 -50 °C...+175 °C KTY84-130 -40 °C...+300 °C NTC +80...+160 °C [B75227-K333-A1] |
| Accuracy at 20 °C (T20) | ≤ ± 2 K |
| Temperature coefficient | 0.1 K per K deviation from T20 |
| Out of range detection | Yes |
| Max. cable length | Max. cable resistance: 50R (single wire) [e.g. with copper wire 1.5 mm ² : 1900 m cable length] |
| Cable shielding | Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m |
| Update rate | Typ. 600 ms |
| Sensor current (typ.) | PT100 1 mA PT1000/KTY83/KTY84/NTC 0.2 mA |

— Analog/temperature expansion module AI111.0

Technical data

Analog inputs

| Type | AI111.0 |
|------------------------------------|-----------------------------------|
| Number of inputs | 3 (one AI111.0) / 6 (two AI111.0) |
| Type of analog inputs (adjustable) | 0/4 mA - 20 mA / 0-10 V |
| Resolution | 15 Bit |

Measuring ranges

| Type | AI111.0 |
|----------------------------------|--|
| 0...20 mA and 0...10 V | 0 27648 dec (6C00 hex) |
| 4...20 mA | 0 27648 dec (6C00 hex) |
| Max. input current for 0/4-20 mA | 60 mA (destruction limit) |
| Accuracy at 20 °C (T20) | ±1 % from full scale value |
| Temperature coefficient | 0.05 / K deviation from T20 |
| Input resistance | ≤ 300 Ohm at 0/4 -20 mA ≥ 10 k Ohm at 0-10 V |
| Wire break detection | In operation mode: 4 mA - 20 mA |
| Cable shielding | Recommended for up to 30 m and outside the switchgear cabinet; shielding mandatory for cables over 30 m |

Fieldbus communication interfaces PDP32.0, MRP31.0, DNP31.0, PDR31.0

Technical data

General data

| Type | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|---|--|--|--|--|
| Supply voltage | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20% / - 20% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC (11 ... 24,7 V DC) according to DeviceNet specification | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple |
| Current consumption | 55 mA (excl. load on 5 V supply for termination resistors) | Typ. 30 mA | Typ. 18.5 mA (from DeviceNet) | 28 mA |
| Communication protocol | Profibus DP-V0/DP-V1 | Modbus RTU | DeviceNet | Active Profibus DP termination |
| Certificate | Yes, PNO | - | Yes, ODVA | - |
| Fieldbus connection | 9-pole Sub-D connector or terminal blocks | Removable 5-pole terminal blocks | Removable 5-pole terminal blocks | 9-pole Sub-D connector or terminal blocks |
| Integrated termination resistors | No | No | No | Yes |
| Possible bus addresses (set via UMC100.3) | 1 ... 125 | 1 ... 125 | 0 ... 63 | - |
| Max. baud rate | 12 MBit/s | 57.6 kbaud | 500 kbaud | - |
| Isolated +5 V supply available for bus termination circuitry (X3 pins 5 and 6) | 30 mA max. - | - | - | - |

Standards / directives

| Type | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|----------------|------------|------------|------------|------------|
| EMC Directive | 2014/30/EC | 2014/30/EC | 2014/30/EC | 2014/30/EC |
| RoHS Directive | 2011/65/EU | 2011/65/EU | 2011/65/EU | 2011/65/EU |

Environmental and mechanical data

| Type | PDP32.0 | MRP31.0 | DNP31.0 | PDR31.0 |
|---|----------------------------------|----------------------------------|----------------------------------|------------------------|
| Mounting | On UMC100.3 or SMK3.0 adapter | On UMC100.3 or SMK3.0 adapter | On UMC100.3 or SMK3.0 adapter | On SMK3.0 adapter |
| Mounting position | Any | Any | Any | Any |
| Ambient air temperature | Operation | 0 ... +60 °C | 0 ... +60 °C | 0 ... +60 °C |
| | Storage | -25 ... +70 °C | -25 ... +70 °C | -25 ... +70 °C |
| Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc) | 0.7 g / 10 150 Hz | 0.7 g / 10 150 Hz | 0.7 g / 10 150 Hz | 0.7 g / 10 150 Hz |
| Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea) | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms |
| Degree of protection | IP20 | IP20 | IP20 | IP20 |
| Pollution degree | 3 | 3 | 3 | 3 |
| Operation altitude above sea level | 4000 m | 4000 m | 4000 m | 4000 m |
| Duty cycle | 100 % | 100 % | 100 % | 100 % |
| Weight | 0.051 kg | 0.039 kg | 0.042 kg | 0.047 kg |

Ethernet communication interfaces MTQ22-FBP.0, PNQ22-FBP.0, EIU32.0

Technical data

General data

| Type | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 |
|--|--|--|--|
| Supply voltage | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple | 24 V DC -20 ... +30% (19.2 ... 31.2 V DC) incl. ripple |
| Current consumption | Max. 180 mA | Max. 180 mA | Typ 90 mA, max. 130 mA |
| Total power dissipation | Max. 3.5 W | Max. 3.5 W | Typ. 2.2 W, max. 2.5 W |
| Short circuit protection at port 1 ... 4 | PTC resistor | Yes, PTC resistor | - |
| Connection between Ethernet interface and UMC100.3 | Max. 3 m | Max. 3 m | Max. 3 m |
| Communication protocol | Modbus TCP | Profinet IO | EtherNet/IP™ |
| Certificate | - | Yes, PNO | Yes, ODVA |
| Integrated Ethernet switch | Yes | Yes | - |
| Supported bit rates | 10 / 100 Mbit/s | 100 Mbit/s | 10 / 100 Mbit/s |
| Network redundancy protocol | MRP client acc. to EN/IEC 62439-2 | MRP client acc. to EN/IEC 62439-2 | DLR (Device Level Ring) |
| USB port | For configuration via PC and software tool | Reserved | Reserved |

Standards / directives

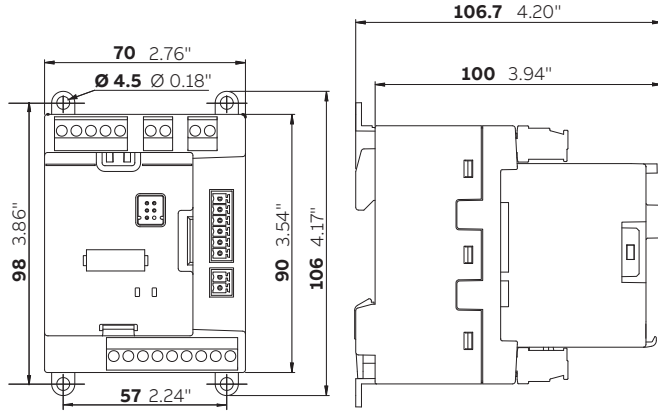
| Type | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 |
|----------------|-------------|-------------|------------|
| EMC Directive | 2014/30/EC | 2014/30/EC | 2014/30/EU |
| RoHS Directive | 2011/65/EU | 2011/65/EU | 2011/65/EU |

Environmental and mechanical data

| Type | MTQ22-FBP.0 | PNQ22-FBP.0 | EIU32.0 |
|--|-----------------------|-----------------------|--|
| Mounting | DIN-rail | DIN-rail | Directly on the UMC100.3 or remotely on SMK3.0 adapter |
| Mounting position | Any | Any | Any |
| Ambient air temperature | Operation | 0 ... +60 °C | 0 ... +60 °C |
| | Storage | -25 ... +70 °C | -25 ... +70 °C |
| Dimensions (W x H x D) | 45 mm x 90 mm x 96 mm | 45 mm x 90 mm x 96 mm | 42.5 mm x 64 mm x 96 mm |
| Vibration (sinusoidal) acc. to IEC/EN 60068-2-6 (Fc) | 0.7 g / 10 ... 150 Hz | 0.7 g / 10 ... 150 Hz | 0.7 g / 10 ... 150 Hz (mounted on UMC100.3/SMK3.0) |
| Shock (half-sine) acc. to IEC/EN 60068-2-27 (Ea) | 15 g / 11 ms | 15 g / 11 ms | 15 g / 11 ms |
| Degree of protection | IP20 | IP20 | IP20 |
| Pollution degree | 3 | 3 | 3 |
| Operation altitude above sea level | 2000 m | 2000 m | 2000 m |
| Duty cycle | 100 % | 100 % | 100 % |
| Weight | 0.172 kg | 0.172 kg | 0.110 kg |

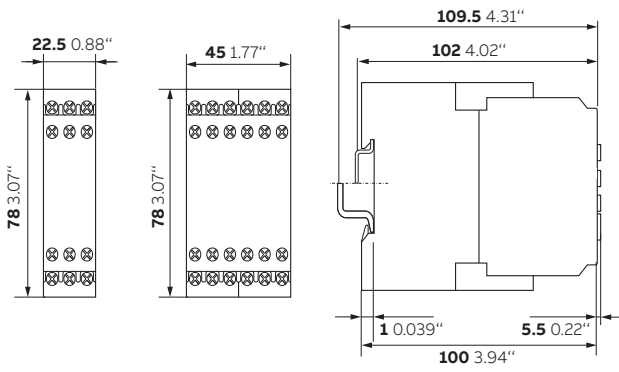
Dimensional drawings

Universal Motor Controller UMC100.3



UMC100.3

Expansion modules

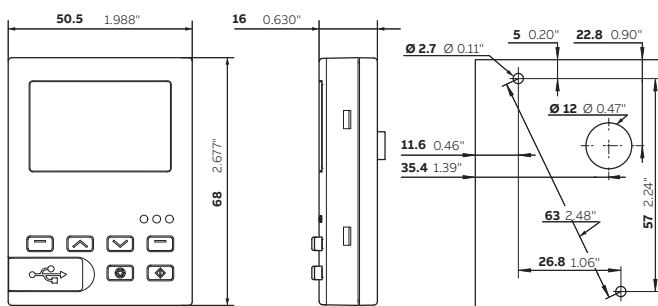


VI150-FBP.0
VI155-FBP.0
AI111.0

DX111-FBP.0,
DX122-FBP.0

DX111-FBP.0, DX122-FBP.0
VI150-FBP.0, VI155-FBP.0
AI111.0

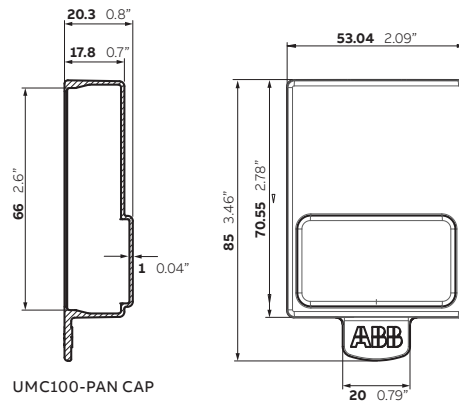
Operating panel



UMC100.3-PAN

UMC100.3-PAN
drilling instruction

Operating panel protection cap

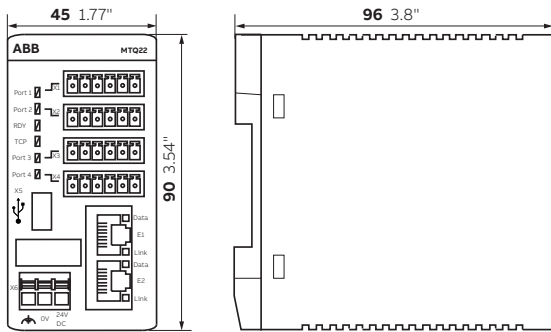


UMC100-PAN CAP

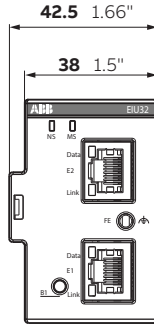
ABB

Dimensional drawings

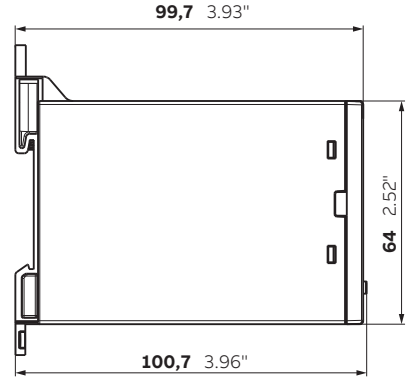
Ethernet communication interfaces



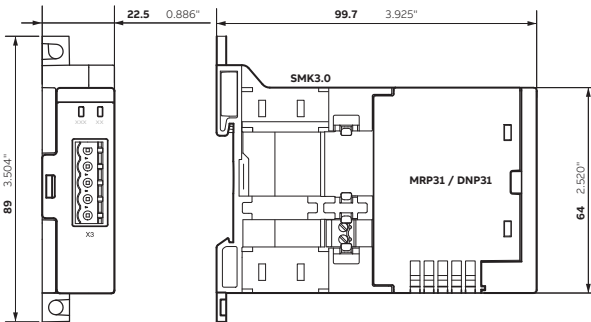
MTQ22-FBP.0
PNQ22-FBP.0



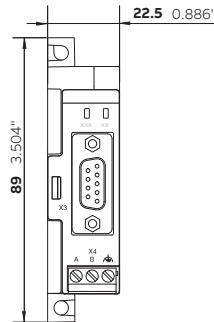
EIU32.0



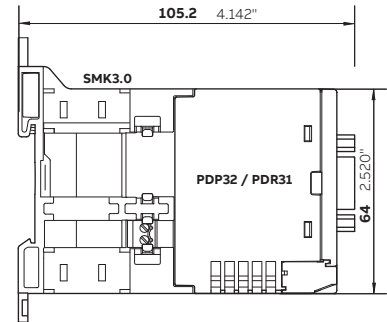
Fieldbus communication interfaces



DNP31.0, MRP31.0, SMK3.0

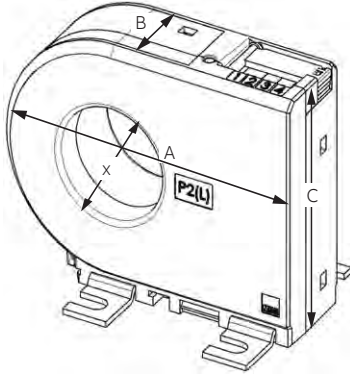


PDP32.0, PDR31.0



Dimensional drawings

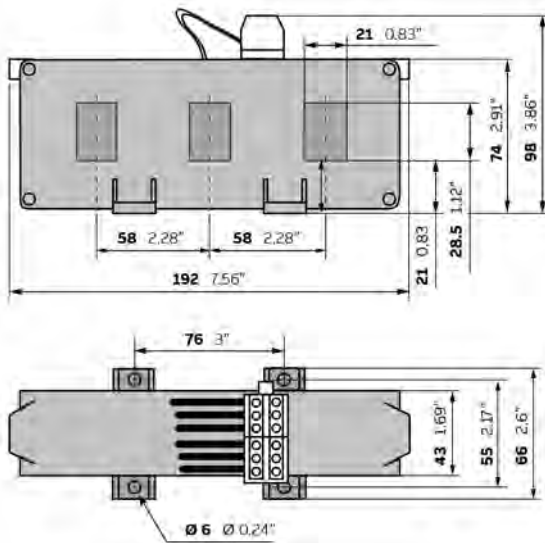
Earth fault monitor



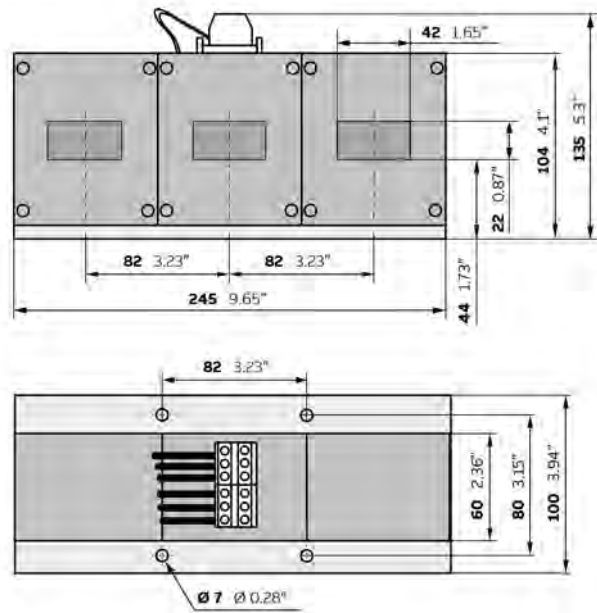
CEM11-FBP.xx

| Type | Width (A) | Depth (B) | Height (C) | Ø |
|---------------|-------------|-----------|------------|------------|
| CEM11-FBP.20 | 76.4 (3.01) | 30 (1.18) | 56 (2.20) | 20 (0.79) |
| CEM11-FBP.35 | 99.5 (1.38) | 30 (1.18) | 79 (3.11) | 35 (1.38) |
| CEM11-FBP.60 | 135 (5.31) | 38 (1.46) | 116 (4.57) | 60 (2.36) |
| CEM11-FBP.120 | 210 (8.27) | 38 (1.46) | 190 (7.48) | 120 (4.72) |

Current transformer



CT4L185R/4, CT4L310R/4



CT5L500R/4, CT5L850R/4

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.



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For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/AF09-30-10-13
www.abb.com/productdetails/1SBL137001R1310

Customer made Motor starting solution with AF contactors

- 12/2 Motor rated operational powers and currents**
- 12/3 Customer assembled motor starting solutions**
 - DOL and reversing starters protected by manual motor starters**
 - 12/4 General
 - 12/6 Selection tables
 - 12/10 Wiring diagrams
 - 12/11 Main dimensions
 - DOL starters protected by moulded-case circuit-breakers and overload relays**
 - 12/18 General
 - 12/20 Selection tables
 - 12/24 Wiring diagrams
 - Main dimensions, starter protected by**
 - 12/25 MCCB including motor protection
 - 12/27 MCCB (magnetic only) and thermal overload relays
 - 12/30 MCCB (magnetic only) and electronic overload relays
 - DOL and reversing starters protected by overload relays**
 - 12/34 General
 - 12/36 Selection tables
 - 12/40 Switching frequency diagrams for overload relays
 - 12/41 Wiring diagrams
 - Main dimensions, starter protected by**
 - 12/42 Thermal overload relays
 - 12/48 Electronic overload relays
 - Star-delta starters protected by overload relays**
 - 12/58 General
 - 12/60 Selection tables
 - 12/64 Switching frequency diagrams
 - 12/65 Wiring diagrams
 - Main dimensions, Star-delta starters protected by**
 - 12/67 Thermal overload relays
 - 12/72 Electronic overload relays

Motor rated operational powers and currents

The currents given below concern standard three-phase four-pole cage motors (1500 r.p.m. at 50 Hz 1800 r.p.m. at 60 Hz). These values are given for guidance and may vary according to the motor manufacturer and depending on the number of poles.

| IEC Motor nominal current: standardized values in grey (according to IEC 60947-4-1 Annex G) | | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---|
| Motor power | 220 V | 230 V | 240 V | 380 V | 400 V | 415 V | 440 V | 500 V | 660 V | 690 V | |
| kW | A | A | A | A | A | A | A | A | A | A | A |
| 0.06 | 0.37 | 0.35 | 0.34 | 0.21 | 0.2 | 0.19 | 0.18 | 0.16 | 0.13 | 0.12 | |
| 0.09 | 0.54 | 0.52 | 0.50 | 0.32 | 0.3 | 0.29 | 0.26 | 0.24 | 0.18 | 0.17 | |
| 0.12 | 0.73 | 0.7 | 0.67 | 0.46 | 0.44 | 0.42 | 0.39 | 0.32 | 0.24 | 0.23 | |
| 0.18 | 1 | 1 | 1 | 0.63 | 0.6 | 0.58 | 0.53 | 0.48 | 0.37 | 0.35 | |
| 0.25 | 1.6 | 1.5 | 1.4 | 0.9 | 0.85 | 0.82 | 0.74 | 0.68 | 0.51 | 0.49 | |
| 0.37 | 2.0 | 1.9 | 1.8 | 1.2 | 1.1 | 1.1 | 1 | 0.88 | 0.67 | 0.64 | |
| 0.55 | 2.7 | 2.6 | 2.5 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 0.91 | 0.87 | |
| 0.75 | 3.5 | 3.3 | 3.2 | 2.0 | 1.9 | 1.8 | 1.7 | 1.5 | 1.15 | 1.1 | |
| 1.1 | 4.9 | 4.7 | 4.5 | 2.8 | 2.7 | 2.6 | 2.4 | 2.2 | 1.7 | 1.6 | |
| 1.5 | 6.6 | 6.3 | 6 | 3.8 | 3.6 | 3.5 | 3.2 | 2.9 | 2.2 | 2.1 | |
| 2.2 | 8.9 | 8.5 | 8.1 | 5.2 | 4.9 | 4.7 | 4.3 | 3.9 | 2.9 | 2.8 | |
| 3 | 11.8 | 11.3 | 10.8 | 6.8 | 6.5 | 6.3 | 5.7 | 5.2 | 4 | 3.8 | |
| 4 | 15.7 | 15 | 14.4 | 8.9 | 8.5 | 8.2 | 7.4 | 6.8 | 5.1 | 4.9 | |
| 5.5 | 20.9 | 20 | 19.2 | 12.1 | 11.5 | 11.1 | 10.1 | 9.2 | 7 | 6.7 | |
| 7.5 | 28.2 | 27 | 25.9 | 16.3 | 15.5 | 14.9 | 13.6 | 12.4 | 9.3 | 8.9 | |
| 11 | 39.7 | 38 | 36.4 | 23.2 | 22 | 21.2 | 19.3 | 17.6 | 13.4 | 12.8 | |
| 15 | 53.3 | 51 | 48.9 | 30.5 | 29 | 28 | 25.4 | 23 | 17.8 | 17 | |
| 18.5 | 63.8 | 61 | 58.5 | 36.8 | 35 | 33.7 | 30.7 | 28 | 22 | 21 | |
| 22 | 75.3 | 72 | 69 | 43.2 | 41 | 39.5 | 35.9 | 33 | 25.1 | 24 | |
| 30 | 100 | 96 | 92 | 57.9 | 55 | 53 | 48.2 | 44 | 33.5 | 32 | |
| 37 | 120 | 115 | 110 | 69 | 66 | 64 | 58 | 53 | 40.8 | 39 | |
| 45 | 146 | 140 | 134 | 84 | 80 | 77 | 70 | 64 | 49.1 | 47 | |
| 55 | 177 | 169 | 162 | 102 | 97 | 93 | 85 | 78 | 59.6 | 57 | |
| 75 | 240 | 230 | 220 | 139 | 132 | 127 | 116 | 106 | 81 | 77 | |
| 90 | 291 | 278 | 266 | 168 | 160 | 154 | 140 | 128 | 97 | 93 | |
| 110 | 355 | 340 | 326 | 205 | 195 | 188 | 171 | 156 | 118 | 113 | |
| 132 | 418 | 400 | 383 | 242 | 230 | 222 | 202 | 184 | 140 | 134 | |
| 160 | 509 | 487 | 467 | 295 | 280 | 270 | 245 | 224 | 169 | 162 | |
| 200 | 637 | 609 | 584 | 368 | 350 | 337 | 307 | 280 | 212 | 203 | |
| 250 | 782 | 748 | 717 | 453 | 430 | 414 | 377 | 344 | 261 | 250 | |
| 315 | 983 | 940 | 901 | 568 | 540 | 520 | 473 | 432 | 327 | 313 | |
| 355 | 1109 | 1061 | 1017 | 642 | 610 | 588 | 535 | 488 | 370 | 354 | |
| 400 | 1255 | 1200 | 1150 | 726 | 690 | 665 | 605 | 552 | 418 | 400 | |
| 500 | 1545 | 1478 | 1416 | 895 | 850 | 819 | 745 | 680 | 515 | 493 | |
| 560 | 1727 | 1652 | 1583 | 1000 | 950 | 916 | 832 | 760 | 576 | 551 | |
| 630 | 1928 | 1844 | 1767 | 1116 | 1060 | 1022 | 929 | 848 | 643 | 615 | |
| 710 | 2164 | 2070 | 1984 | 1253 | 1190 | 1147 | 1043 | 952 | 721 | 690 | |
| 800 | 2446 | 2340 | 2243 | 1417 | 1346 | 1297 | 1179 | 1076 | 815 | 780 | |
| 900 | 2760 | 2640 | 2530 | 1598 | 1518 | 1463 | 1330 | 1214 | 920 | 880 | |
| 1000 | 3042 | 2910 | 2789 | 1761 | 1673 | 1613 | 1466 | 1339 | 1014 | 970 | |

| UL/CSA Motor nominal current: single and three phase (according to UL 60947-4-1A) | | | | | | | | | | | |
|--|------------|------------|------------|------------|------------|----------------|----------------|----------------|----------------|----------------|---|
| Motor power | 120 V 1-ph | 200 V 1-ph | 200 V 3-ph | 208 V 1-ph | 208 V 3-ph | 220-240 V 1-ph | 220-240 V 3-ph | 380-415 V 3-ph | 440-480 V 3-ph | 550-600 V 3-ph | |
| hp | A | A | A | A | A | A | A | A | A | A | A |
| 1/10 | 3 | - | - | - | - | 1.5 | - | - | - | - | |
| 1/8 | 3.8 | - | - | - | - | 1.9 | - | - | - | - | |
| 1/6 | 4.4 | 2.5 | - | 2.4 | - | 2.2 | - | - | - | - | |
| 1/4 | 5.8 | 3.3 | - | 3.2 | - | 2.9 | - | - | - | - | |
| 1/3 | 7.2 | 4.1 | - | 4 | - | 3.6 | - | - | - | - | |
| 1/2 | 9.8 | 5.6 | 2.5 | 5.4 | 2.4 | 4.9 | 2.2 | 1.3 | 1.1 | 0.9 | |
| 3/4 | 13.8 | 7.9 | 3.7 | 7.6 | 3.5 | 6.9 | 3.2 | 1.8 | 1.6 | 1.3 | |
| 1 | 16 | 9.2 | 4.8 | 8.8 | 4.6 | 8 | 4.2 | 2.3 | 2.1 | 1.7 | |
| 1-1/2 | 20 | 11.5 | 6.9 | 11 | 6.6 | 10 | 6 | 3.3 | 3 | 2.4 | |
| 2 | 24 | 13.8 | 7.8 | 13.2 | 7.5 | 12 | 6.8 | 4.3 | 3.4 | 2.7 | |
| 3 | 34 | 19.6 | 11 | 18.7 | 10.6 | 17 | 9.6 | 6.1 | 4.8 | 3.9 | |
| 5 | 56 | 32.2 | 17.5 | 30.8 | 16.7 | 28 | 15.2 | 9.7 | 7.6 | 6.1 | |
| 7-1/2 | 80 | 46 | 25.3 | 44 | 24.2 | 40 | 22 | 14 | 11 | 9 | |
| 10 | 100 | 57.5 | 32.2 | 55 | 30.8 | 50 | 28 | 18 | 14 | 11 | |
| 15 | 135 | - | 48.3 | - | 46.2 | 68 | 42 | 27 | 21 | 17 | |
| 20 | - | - | 62.1 | - | 59.4 | 88 | 54 | 34 | 27 | 22 | |
| 25 | - | - | 78.2 | - | 74.8 | 110 | 68 | 44 | 34 | 27 | |
| 30 | - | - | 92 | - | 88 | 136 | 80 | 51 | 40 | 32 | |
| 40 | - | - | 120 | - | 114 | 176 | 104 | 66 | 52 | 41 | |
| 50 | - | - | 150 | - | 143 | 216 | 130 | 83 | 65 | 52 | |
| 60 | - | - | 177 | - | 169 | - | 154 | 103 | 77 | 62 | |
| 75 | - | - | 221 | - | 211 | - | 192 | 128 | 96 | 77 | |
| 100 | - | - | 285 | - | 273 | - | 248 | 165 | 124 | 99 | |
| 125 | - | - | 359 | - | 343 | - | 312 | 208 | 156 | 125 | |
| 150 | - | - | 414 | - | 396 | - | 360 | 240 | 180 | 144 | |
| 200 | - | - | 552 | - | 528 | - | 480 | 320 | 240 | 192 | |
| 250 | - | - | - | - | - | - | 604 | 403 | 302 | 242 | |
| 300 | - | - | - | - | - | - | 722 | 482 | 361 | 289 | |
| 350 | - | - | - | - | - | - | 828 | 560 | 414 | 336 | |
| 400 | - | - | - | - | - | - | 954 | 636 | 477 | 382 | |
| 450 | - | - | - | - | - | - | 1030 | - | 515 | 412 | |
| 500 | - | - | - | - | - | - | 1180 | 786 | 590 | 472 | |

Customer assembled motor starting solutions

ABB Expertise

ABB has acquired years of experience with respect to problems of coordination and is able to make a complete offer based on tests performed in its qualified laboratories. This offer covers 400 V AC, 500 V AC, 690 V AC networks.

A complete database of coordination tables, according to IEC 60947-4-1 (EN 60947-4-1), and UL 60947-4-1 between the branch circuit protective device and the motor starter is available on the ABB Website.

In the coordination tables the following short-circuit protection devices are recommended:

- Case circuit-breakers (MCCBs)
- Miniature circuit-breakers (MCBs)
- Switch-disconnector-fuses (aM, gG and BS)
- Manual motor starters (MMS).

Select Optimized Coordination tool (SOC)

Selected Optimized Coordination is a web tool for the selection of ABB products to be used in the following applications:

- Motor starting and protection
- Selectivity between protection devices
- Back-up protection
- Other devices protection.

In order to guarantee the best performance and the longest lifetime, devices involved into the applications mentioned above (short-circuit protection devices, contactors, overload relays, softstarters, ...) need to be coordinated.

- The coordination among devices cannot be determined directly: tests in power laboratories shall be carried out to qualify the coordination type at low fault and high fault currents, according to IEC or UL standards.
- ABB coordination tables are the results of such tests and represent the ABB offerings in terms of motor starting and protection, selectivity, back-up and switch-disconnector protection.
- In Selected Optimized Coordination all available ABB coordination tables are stored and easily accessible.

Website access:

<http://applications.it.abb.com/SOC/Page/Selection.aspx>

How to combine assemble and wire starter components

The section "customer assembled motor starting solutions" in this catalog gives the components lists and wiring diagrams to assemble the most typical motor starting solutions.

It covers direct-on-line Starters, reversing starters or star-delta starters protected with manual motor starters or with thermal overload relays for Type I or type II coordination for normal starting time.

Note:

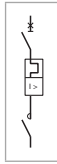
In order to confirm your starter combination ratings according to ABB's latest coordination test results, or to see other coordination of components please refer to the above mentioned SOC tool. SOC tool get constant updates and additions

General remarks applicable to all tables

- Each table is defined for a maximum ambient temperature of 40 °C. For higher temperatures, apply a derating factor according to the following rules:
- Fuses: factor of 0.8 applied to In for an ambient temperature of 70 °C
- MCCBs and MCBs: factor of 0.8 applied to In for an ambient temperature of 60 °C
- The starter derating factor depends on the operating conditions of thermal overload relays:
- Factor of 0.9 applied to In for an ambient temperature of 70 °C.
- Each table is defined for motor currents: 3-phase motors, 4-pole
- Normal starting means a starting time < 2 s. - Difficult starting means an accelerating time 10 s < ts < 30 s
- Tripping classes of thermal overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10A and 10
- Tripping classes of electronic overload relays according to IEC 60947-4-1 (EN 60947-4-1): 10E, 20E, 30E selectable
- In the tables with MCCBs, these are fitted with the magnetic relay alone. Setting is always carried out at > 12.3 le AC-3 so that the transient current peak occurring during starting does not lead to tripping.

DOL and reversing starters protected by manual motor starters

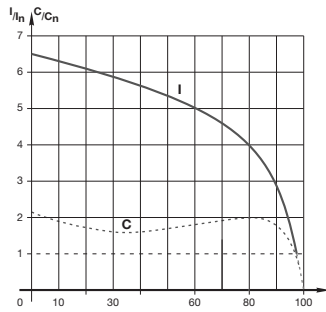
With AF contactors - open type version in kit form



DOL starter
MS132-10 + BEA16-4 + AF09-30-10

Application

Full voltage direct-on-line (DOL) starting and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



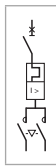
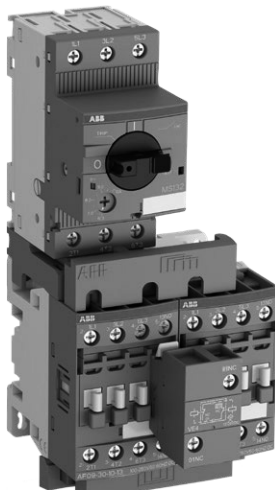
I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

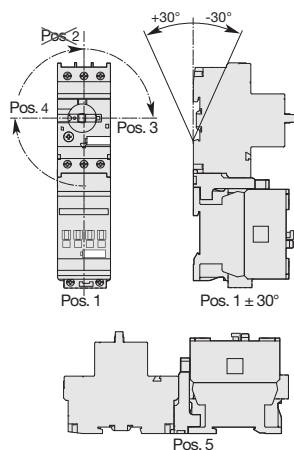


Reversing starter
MS132-10 + BEA16-4 + BER16-4 + VEM4 + AF09-30-10

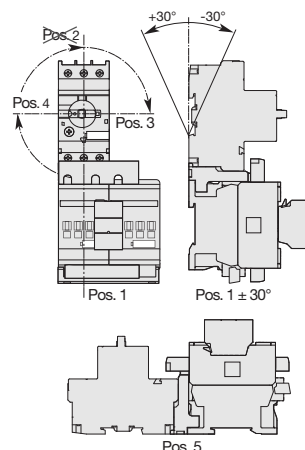
Main Technical Data

| | | |
|-----------------------------------|--|---------|
| Standards | IEC 60947-4-1 / EN 60947-4-1 | |
| Rated operational voltage Ue max. | 690 V - 50/60 Hz | |
| Rated insulation voltage Ui | 690 V | |
| acc. to IEC 60947-4-1 | 600 V | |
| acc. to UL / CSA | 600 V | |
| Switching frequency | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time | |
| | ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time | |
| Ambient air temperature | ≤ 55 °C | |
| Close to the device | use with MS116 | ≤ 55 °C |
| | use with MS132, MS165, MS495 | ≤ 60 °C |
| Degree of protection | IP20 | |

Mounting positions



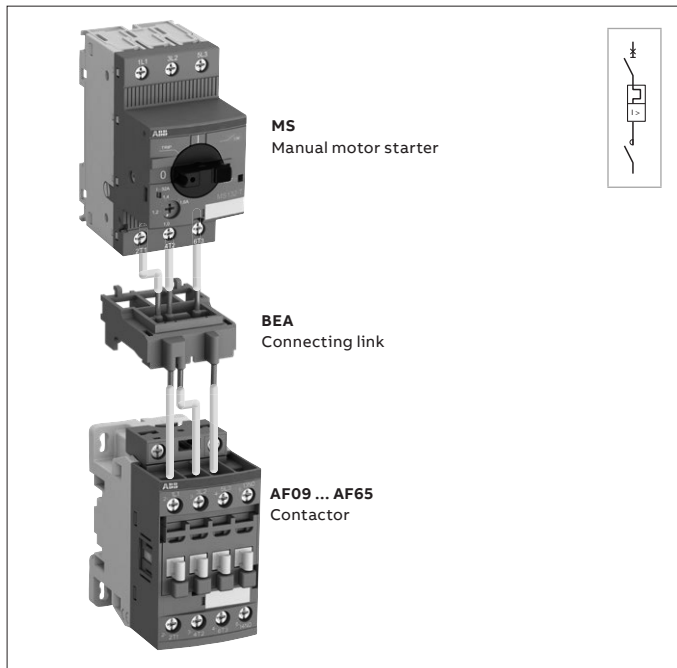
DOL starters



Reversing starters

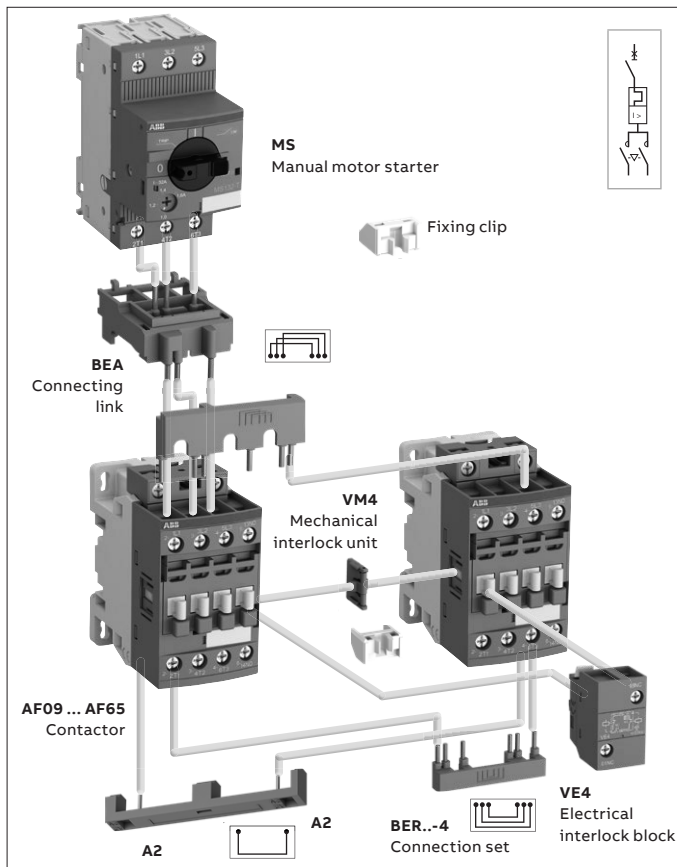
DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form



Direct-on-line starters

You can easily assemble a direct-on-line starter by using the BEA...-4 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated.



Reversing starters

You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA...-4 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116, MS132 or MS165 manual motor starter and AF09 ... AF65 contactor, AC or DC operated
- For AF09 ... AF38, use VM4 mechanical and electrical interlock set for reversing starter in 90 mm width. It includes:
 - VM4 mechanical interlock unit including 2 fixing clips
 - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF96, use VM96-4 mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking
- BER...-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

Note: for direct mounting on 2 rails 35 mm of MS165 manual motor starter with AF40 ... AF65 contactors, BEA65-4 connecting link must be associated with BPR65-4 35 mm rail hook fixed on each contactor base. Starter combination using BPR65-4 are applicable for MS165 manufactured after week 31, 2016 (date code > 16214).

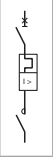
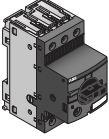
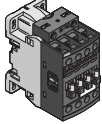


Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, Iq = 16 kA up to 18.5 kW and Iq = 50 kA up to 45 kW.

For the full coordination tables, please visit our SOC tool : <https://applications.it.abb.com/SOC/Selectivity>

DOL starters protected by MS manual motor starters

Coordination type 1

Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

| | | Manual motor starters | | | | Contactors | | | | Accessories | |
|---|-------------------------|---|---------------|--|-------------------------------|---|----------------|-----------------|-------------------------|---|------------------------------------|
|  | |  | | | |  | | | |   | |
| IEC | Type | Order code | Setting range | Rated instantaneous short-circuit current I _i | Rated control circuit voltage | | Type (3) | Order code | Allowed setting current | Type | Order code |
| | | | | | Uc min. | Uc max. | | | | | |
| AC-3, 400 V | Rated operational power | current | A | A | V 50/60 Hz | V DC | | A | | | |
| 0.06 | 0.2 | MS132-0.25 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 (5) | AF09Z-30-10-11 | 1SBL136001R1110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.09 | 0.3 | MS132-0.4 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 (5) | AF09Z-30-10-11 | 1SBL136001R1110 | 0.4 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 2.5 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 4 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.5 | 3.6 | MS132-4.0 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 4 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 2.2 | 4.9 | MS132-6.3 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 6.3 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 3 | 6.5 | MS132-10 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 9 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 4 | 8.5 | MS132-10 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 9 | | |
| | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | MS132-12 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF12Z-30-10-11 | 1SBL156001R1110 | 12 | | |
| | | | | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | MS132-16 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF16Z-30-10-11 | 1SBL176001R1110 | 16 | | |
| | | | | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | MS132-25 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 25 | BEA38-4 + CA4-10 | 1SBN082306T2000 1SBN010110R1010 |
| | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 15 | 29 | MS132-32 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 32 | | |
| | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | MS165-42 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 BPR65-4 (4) CA4-10 | 1SBN083406R1000 1SBN113405R1000 |
| | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | |
| 22 | 41 | MS165-54 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | | |
| | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | MS165-65 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | | |
| | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | MS497-75 1SAM580000R1008 | 57.0...75.0 | 975 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | | |
| | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | MS495-90 1SAM550000R1009 | 70.0...90.0 | 1170 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | | |
| | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
 - 15 kW, 400 V - AC-3 at 16 kA
 - 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

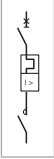
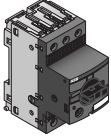
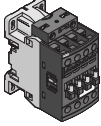
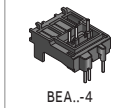

(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

DOL starters protected by MS manual motor starters

Coordination type 2

Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

| | | Manual motor starters | | | | | Contactors | | | | | Accessories | |
|---|-------------|---|------------------|--|--|----------------|---|-------------------------------|----------------------------------|---|---|---|---|
|  | |  | | | | |  | | | | |   | |
| IEC AC-3, 400 V Rated operational power current | Type (1) | Order code | Setting range | Rated instantaneous short-circuit current setting Ii | Rated control circuit voltage Uc min. ... Uc max. (2) | Type (3) | Order code | Allowed setting current | Type | Order code | | | |
| | kW | | | | | | | | | | A | A | A |
| 0.06 | 0.2 | MS132-0.25 1SAM35000R1002 | 0.16...0.25 | 3.13 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.25 | BEA16-4 | 1SBN081306T1000 | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.09 | 0.3 | MS132-0.4 1SAM35000R1003 | 0.25...0.40 | 5 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.4 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.12 | 0.44 | MS132-0.63 1SAM35000R1004 | 0.40...0.63 | 7.88 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.18 | 0.6 | MS132-0.63 1SAM35000R1004 | 0.40...0.63 | 7.88 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.25 | 0.85 | MS132-1.0 1SAM35000R1005 | 0.63...1.00 | 12.5 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.37 | 1.1 | MS132-1.6 1SAM35000R1006 | 1.00...1.60 | 20 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.55 | 1.5 | MS132-1.6 1SAM35000R1006 | 1.00...1.60 | 20 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 0.75 | 1.9 | MS132-2.5 1SAM35000R1007 | 1.60...2.50 | 31.25 | 24...60 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 2.5 | | | | | |
| | | | | | 100...250 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | | |
| 1.1 | 2.7 | MS132-4.0 1SAM35000R1008 | 2.50...4.00 | 50 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 4 | BEA26-4 + CA4-10 | 1SBN082306T1000 1SBN010110R1010 | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 1.5 | 3.6 | MS132-4.0 1SAM35000R1008 | 2.50...4.00 | 50 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 4 | | | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 2.2 | 4.9 | MS132-6.3 1SAM35000R1009 | 4.00...6.30 | 78.75 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 6.3 | | | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 3 | 6.5 | MS132-10 1SAM35000R1010 | 6.30...10.0 | 150 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 10 | | | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 4 | 8.5 | MS132-10 1SAM35000R1010 | 6.30...10.0 | 150 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 10 | | | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 5.5 | 11.5 | MS132-12 1SAM35000R1012 | 8.00...12.0 | 180 | 24...60 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 12 | BEA38-4 + CA4-10 | 1SBN082306T2000 1SBN010110R1010 | | | |
| | | | | | 100...250 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | | |
| 7.5 | 15.5 | MS132-16 1SAM35000R1011 | 10.0...16.0 | 240 | 24...60 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 16 | | | | | |
| | | | | | 100...250 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | | |
| 11 | 22 | MS132-25 1SAM35000R1014 | 20.0...25.0 | 375 | 24...60 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 25 | | | | | |
| | | | | | 100...250 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | | |
| 15 | 29 | MS132-32 1SAM35000R1015 | 25.0...32.0 | 480 | 24...60 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 32 | | | | | |
| | | | | | 100...250 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | | |
| 18.5 | 35 | MS165-42 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 BPR65-4 (5) CA4-10 | 1SBN083406R1000 1SBN113405R1000 1SBN010110R1010 | | | |
| | | | | | 100...250 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | | | |
| 22 | 41 | MS165-54 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | | | | | |
| | | | | | 100...250 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | | | | |
| 30 | 55 | MS165-65 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | | | | | |
| | | | | | 100...250 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | | | | |
| 37 | 66 | MS497-75 1SAM58000R1008 | 57.0...75.0 | 975 | 24...60 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | | | | | |
| | | | | | 100...250 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | | | | |
| 45 | 80 | MS495-90 1SAM55000R1009 | 70.0...90.0 | 1170 | 24...60 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | | | | | |
| | | | | | 100...250 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | | | | |

- (1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to - 15 kW 400V - AC-3 at 16 kA - 4 kW, 400 V - AC-3 at 50 kA.
- (2) For other control voltages, see "Voltage code table".
- (3) AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3. AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).
- (4) BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38. BEA38-4 can only be selected with MS116-20 ... MS116-32.
- (5) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).
- (6) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by MS manual motor starters

Coordination type 1

Coordination type 1, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

| | | Manual motor starters | | | | Contactors | | | | Accessories | |
|---|-------------|----------------------------|-----------------------|---|--|------------|----------------|-----------------|------------------------------------|----------------|---|
| | | | | | | | | | | | |
| IEC AC-3, 400 V Rated operational power kW | Type (1) | Order code | Setting range A | Rated instantaneous short-circuit current setting I _n A | Rated control circuit voltage U _c min. ... U _c max. (2) | | Type (3) | Order code | Allowed setting current A | Type | Order code |
| | | | | | V 50/60 Hz | V DC | | | | | |
| 0.06 | 0.2 | MS132-0.25 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.25 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 0.09 | 0.3 | MS132-0.4 1SAM350000R1003 | 0.25...0.40 | 5 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 0.4 | | |
| 0.12 | 0.44 | MS132-0.63 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 0.18 | 0.6 | MS132-0.63 1SAM350000R1004 | 0.40...0.63 | 7.88 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 0.63 | | |
| 0.25 | 0.85 | MS132-1.0 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 0.37 | 1.1 | MS132-1.6 1SAM350000R1006 | 1.00...1.60 | 20 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 1 | | |
| 0.55 | 1.5 | MS132-1.6 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 0.75 | 1.9 | MS132-2.5 1SAM350000R1007 | 1.60...2.50 | 31.25 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 1.6 | | |
| 1.1 | 2.7 | MS132-4.0 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 2.5 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 1.5 | 3.6 | MS132-4.0 1SAM350000R1008 | 2.50...4.00 | 50 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 2.5 | | |
| 2.2 | 4.9 | MS132-6.3 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 4 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 3 | 6.5 | MS132-10 1SAM350000R1010 | 6.30...10.0 | 150 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 4 | | |
| 4 | 8.5 | MS132-10 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 6.3 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 5.5 | 11.5 | MS132-12 1SAM350000R1012 | 8.00...12.0 | 180 | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | 6.3 | | |
| 7.5 | 15.5 | MS132-16 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF12-30-10-13 | 1SBL157001R1310 | 9 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 11 | 22 | MS132-25 1SAM350000R1014 | 20.0...25.0 | 375 | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | 9 | | |
| 15 | 29 | MS132-32 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 9 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 18.5 | 35 | MS165-42 1SAM451000R1015 | 30.0...42.0 | 630 | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | 9 | | |
| 22 | 41 | MS165-54 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 12 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 30 | 55 | MS165-65 1SAM451000R1017 | 52.0...65.0 | 975 | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | 12 | | |
| 37 | 66 | MS497-75 1SAM580000R1008 | 57.0...75.0 | 975 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 16 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| 45 | 80 | MS495-90 1SAM550000R1009 | 70.0...90.0 | 1170 | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | 16 | | |
| | | | | | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 25 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | 25 | | |
| | | | | | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 32 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | 32 | | |
| | | | | | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 40 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | 40 | | |
| | | | | | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 53 | + + VEM4 | 1SBN081306T1000 1SBN081311R1000 1SBN030111R1000 |
| | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | 53 | | |

(1) MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to:
 - 15 kW, 400 V - AC-3 at 16 kA
 - 4 kW, 400 V - AC-3 at 50 kA.

(2) For other control voltages, see "Voltage code table".

(3) AF38 3-pole contactor can be selected for coordination type 1, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).

(4) For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).

(5) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by MS manual motor starters

Coordination type 2

Coordination type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

| | | Manual motor starters | | | | Contactors | | | | Accessories | | |
|---|-------------|-----------------------|-----------------------|--|--|------------|-------------|----------------|------------------------------------|-------------|--------------|-----------------|
| | | | | | | | | | | | | |
| IEC AC-3, 400 V Rated operational power kW | Type (1) | Order code | Setting range A | Rated instantaneous short-circuit current li | Rated control circuit voltage Uc min. ... Uc max. (2) | | Type (3) | Order code | Allowed setting current A | Type (4) | Order code | |
| | | | | | V 50/60 Hz | V DC | | | | | | |
| 0.06 | 0.2 | MS132-0.25 | 1SAM350000R1002 | 0.16...0.25 | 3.13 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.25 | BEA16-4 | 1SBN081306T1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | + BER16-4 | 1SBN081311R1000 |
| 0.09 | 0.3 | MS132-0.4 | 1SAM350000R1003 | 0.25...0.40 | 5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.4 | + VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.12 | 0.44 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.18 | 0.6 | MS132-0.63 | 1SAM350000R1004 | 0.40...0.63 | 7.88 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 0.63 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.25 | 0.85 | MS132-1.0 | 1SAM350000R1005 | 0.63...1.00 | 12.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.37 | 1.1 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.55 | 1.5 | MS132-1.6 | 1SAM350000R1006 | 1.00...1.60 | 20 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 1.6 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 0.75 | 1.9 | MS132-2.5 | 1SAM350000R1007 | 1.60...2.50 | 31.25 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 2.5 | | |
| | | | | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 1.1 | 2.7 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 4 | BEA26-4 | 1SBN082306T1000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | + BER38-4 | 1SBN082311R1000 |
| 1.5 | 3.6 | MS132-4.0 | 1SAM350000R1008 | 2.50...4.00 | 50 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 4 | + VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | + 2x CA4-10 | 1SBN010110R1010 |
| 2.2 | 4.9 | MS132-6.3 | 1SAM350000R1009 | 4.00...6.30 | 78.75 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 6.3 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 3 | 6.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 4 | 8.5 | MS132-10 | 1SAM350000R1010 | 6.30...10.0 | 150 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 10 | | |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 5.5 | 11.5 | MS132-12 | 1SAM350000R1012 | 8.00...12.0 | 180 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 12 | BEA38-4 | 1SBN082306T2000 |
| | | | | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | + BER38-4 | 1SBN082311R1000 |
| 7.5 | 15.5 | MS132-16 | 1SAM350000R1011 | 10.0...16.0 | 240 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 16 | + VEM4 | 1SBN030111R1000 |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | + 2x CA4-10 | 1SBN010110R1010 |
| 11 | 22 | MS132-25 | 1SAM350000R1014 | 20.0...25.0 | 375 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 25 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 15 | 29 | MS132-32 | 1SAM350000R1015 | 25.0...32.0 | 480 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 32 | | |
| | | | | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | MS165-42 | 1SAM451000R1015 | 30.0...42.0 | 630 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 40 | BEA65-4 | 1SBN083406R1000 |
| | | | | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | + 2x BPR65-4 | 1SBN113405R1000 |
| | | | | | | | | | | | (5) | 1SBN083411R1000 |
| 22 | 41 | MS165-54 | 1SAM451000R1016 | 40.0...54.0 | 810 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 53 | + BER65-4 | 1SBN033405T1000 |
| | | | | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | + VM96-4 | 1SBN010110R1010 |
| 30 | 55 | MS165-65 | 1SAM451000R1017 | 52.0...65.0 | 975 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 65 | + 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | + 2x CA4-01 | 1SBN010110R1001 |
| 37 | 66 | MS497-75 | 1SAM580000R1008 | 57.0...75.0 | 975 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 75 | BER96-4 | 1SBN083911R1000 |
| | | | | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | + VM96-4 | 1SBN033405T1000 |
| 45 | 80 | MS495-90 | 1SAM550000R1009 | 70.0...90.0 | 1170 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 90 | + 2x CA4-10 | 1SBN010110R1010 |
| | | | | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | + 2x CA4-01 | 1SBN010110R1001 |

- MS116 manual motor starter can be selected according to the current setting range indicated on the coordination line, up to - 15 kW 400V - AC-3 at 16 kA - 4 kW, 400 V - AC-3 at 50 kA.
- For other control voltages, see "Voltage code table".
- AF26 3-pole contactor can be selected for coordination type 2, 16 kA, 7.5 kW, 400 V - AC-3. AF38 3-pole contactor can be selected for coordination type 2, 16 kA and 50 kA, 18.5 kW, 400 V - AC-3 (BEA65-4 available for AF40 ... AF65 only).
- BEA26-4 should be selected with MS116-12 ... MS116-16 and AF26 ... AF38. BEA38-4 can only be selected with MS116-20 ... MS116-32.
- For direct mounting on 2 rails 35 mm of MS165 with AF40 ... AF65: BEA65-4 must be associated with BPR65-4 fixed on each contactor base. Applicable for MS165 manufactured after week 31, 2016 (date code > 16114).
- AF ... -11 not suitable for direct control by PLC-output.

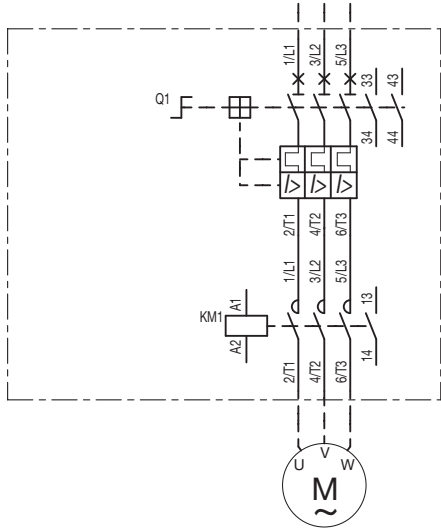
DOL and reversing starters protected by manual motor starters

With AF contactors - open type version in kit form

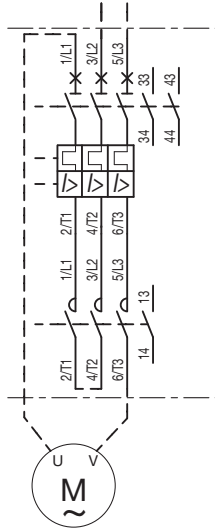
Wiring diagrams

Direct-on-line starters

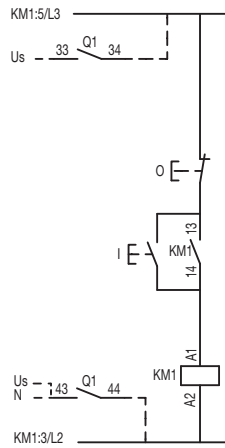
Power circuit



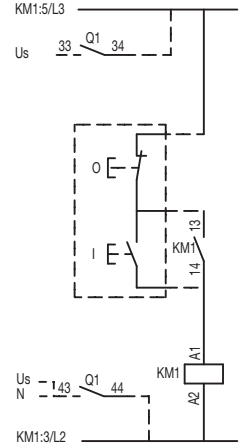
1-phase



AC or DC local control



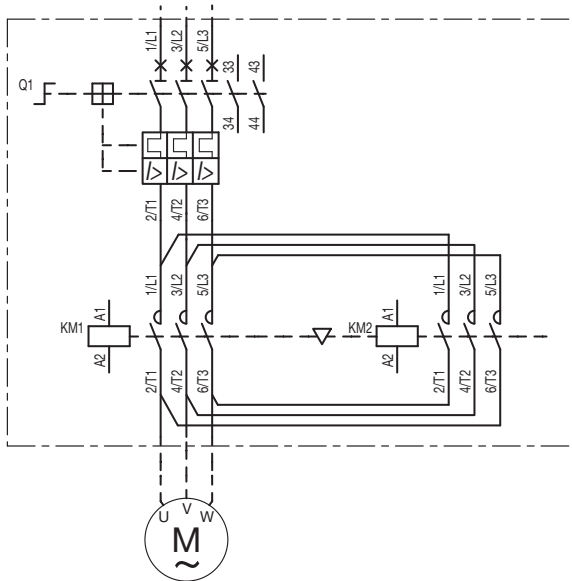
AC or DC remote control



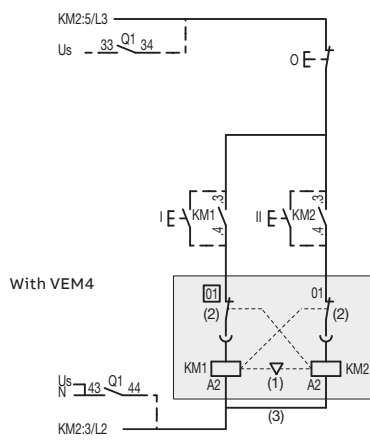
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

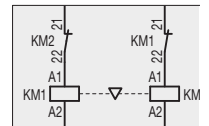
Power circuit



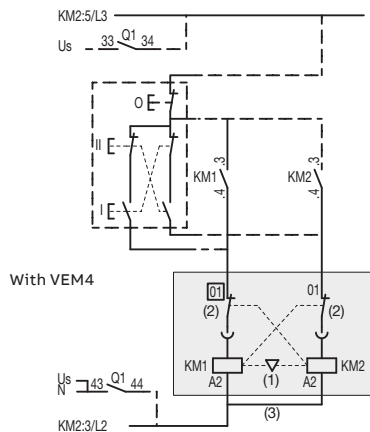
AC or DC local control



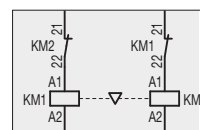
With VM



AC or DC remote control



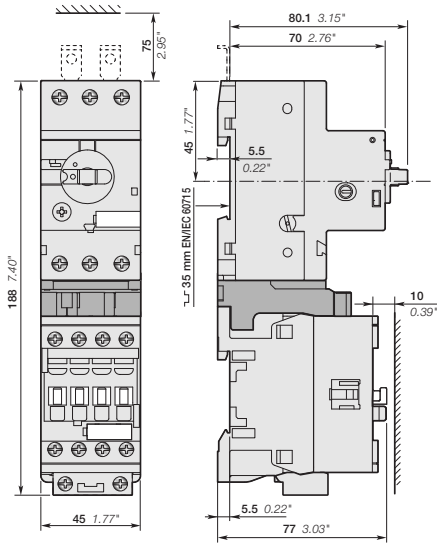
With VM



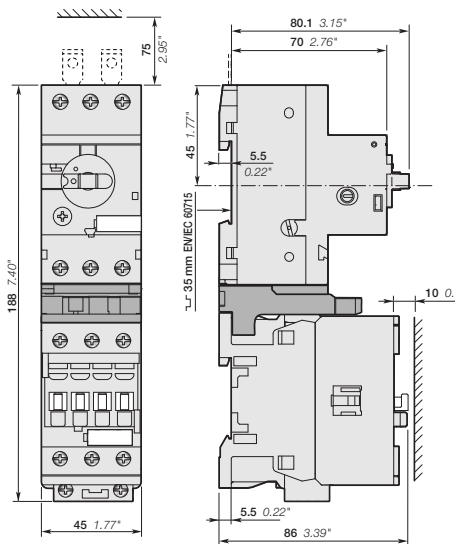
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
 (Except for coil Uc 12-20 V DC : use VM4 with CA4).
 - coil Uc 12-20 V DC : A1+, A2-

DOL starters protected by MS16 manual motor starters

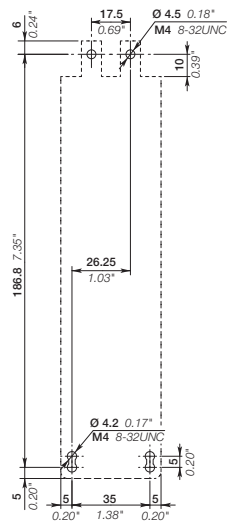
With AF contactors - open type version in kit form



MS116-0.16 ... MS116-16
+ BEA16-4
+ AF09, AF12, AF16



MS116-0.16 ... MS116-16
+ BEA26-4
+ AF26, AF30, AF38



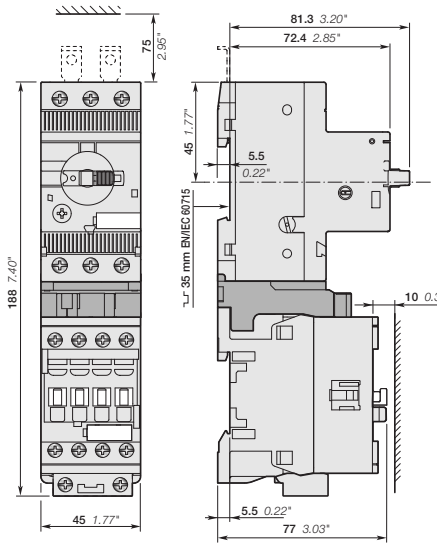
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

Coordination tables for MS166 available is our SOC tool :

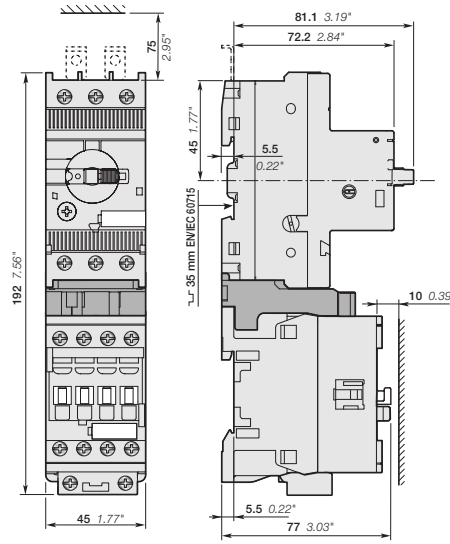
<https://applications.it.abb.com/SOC/Selectivity>

DOL starters protected by MS132 manual motor starters

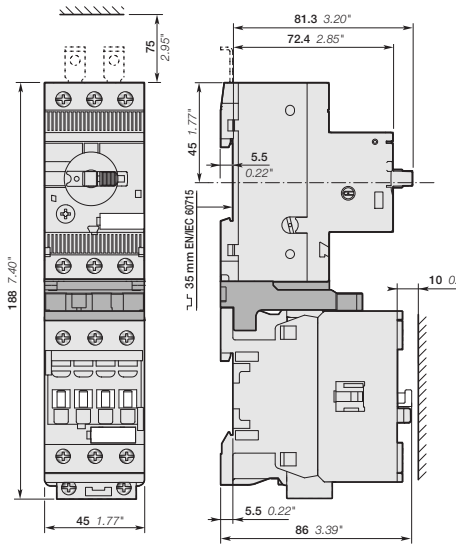
With AF contactors - open type version in kit form



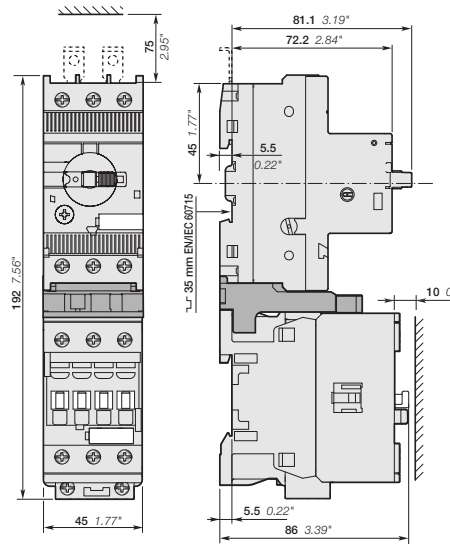
MS132-0.16 ... MS132-10
+ BEA16-4
+ AF09, AF12, AF16



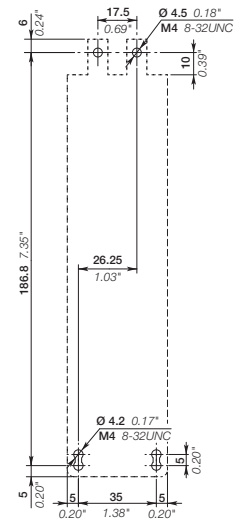
MS132-12 ... MS132-25
+ BEA16-4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4
+ AF26, AF30, AF38



MS132-12 ... MS132-32
+ BEA38-4
+ AF26, AF30, AF38

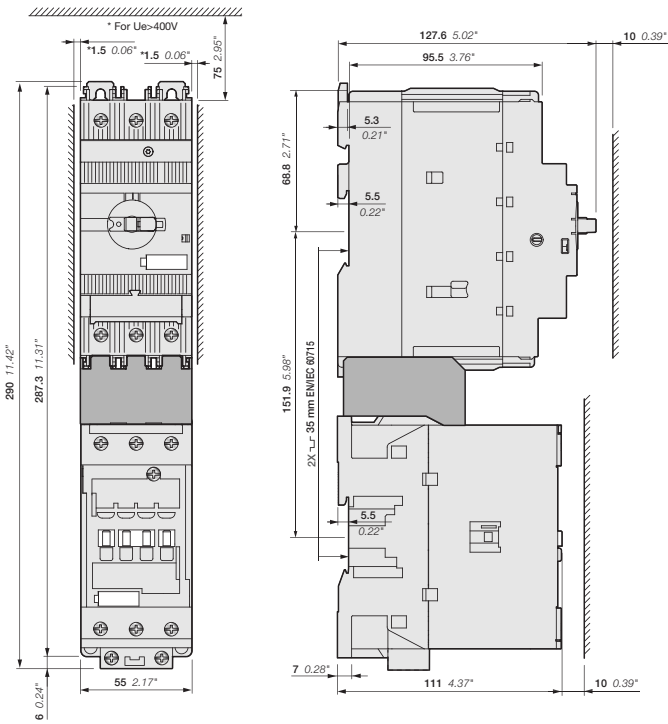


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

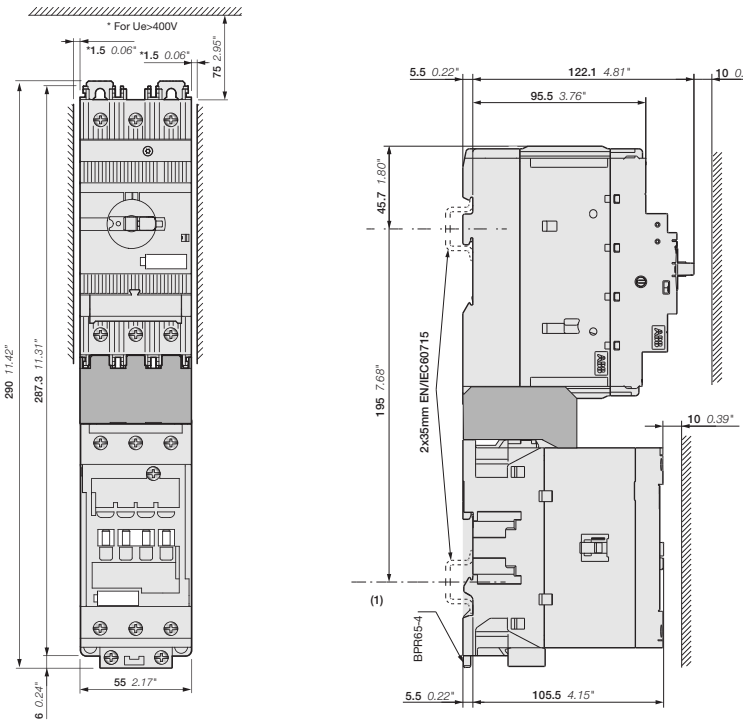
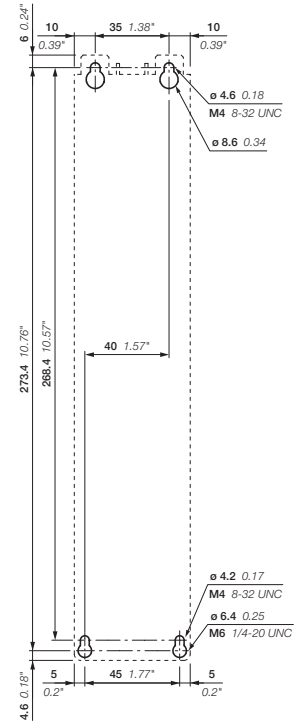
Main dimensions mm, inches

DOL starters protected by MS165 manual motor starters

With AF contactors - open type version in kit form



MS165
+ BEA65-4
+ AF40, AF52, AF65



MS165
+ BEA65-4
+ AF40, AF52, AF65 + BPR65-4

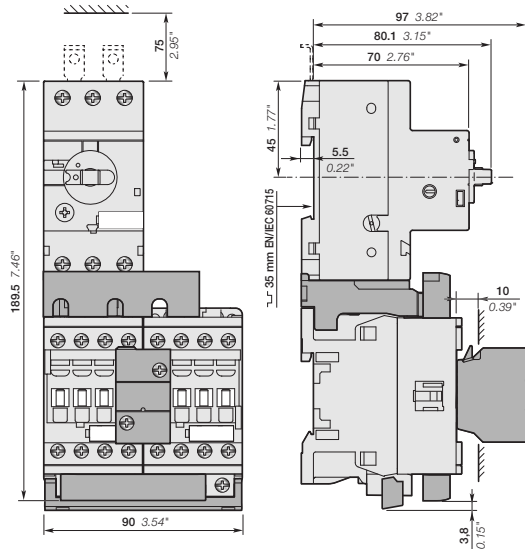
Note: for Ue > 400 V, contactor lateral distance to grounded component 1.5 mm 0.06" min.

(1) Assembly on fixed DIN Rails for DOL starter with BPR65-4 rail hook

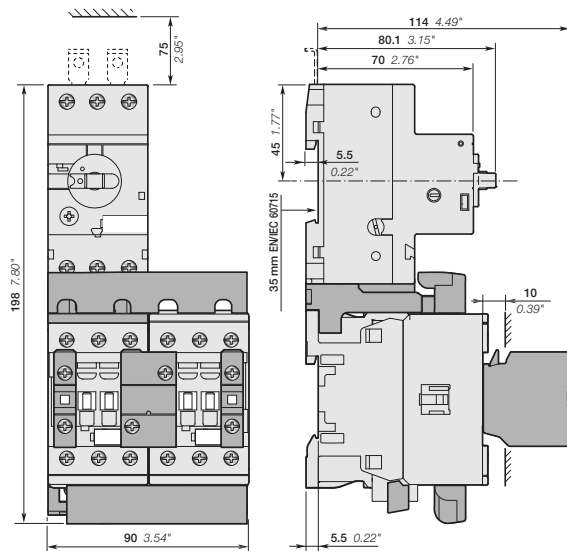
Main dimensions mm, inches

Reversing starters protected by MS116 manual motor starters

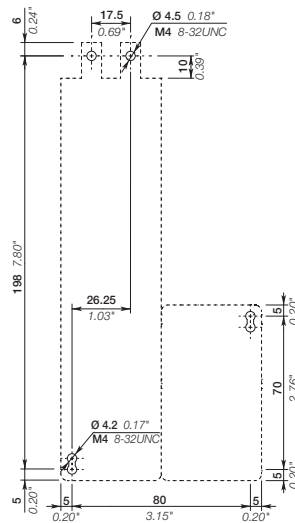
With AF contactors - open type version in kit form



MS116-0.16 ... MS116-16
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS116-0.16 ... MS116-16
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38



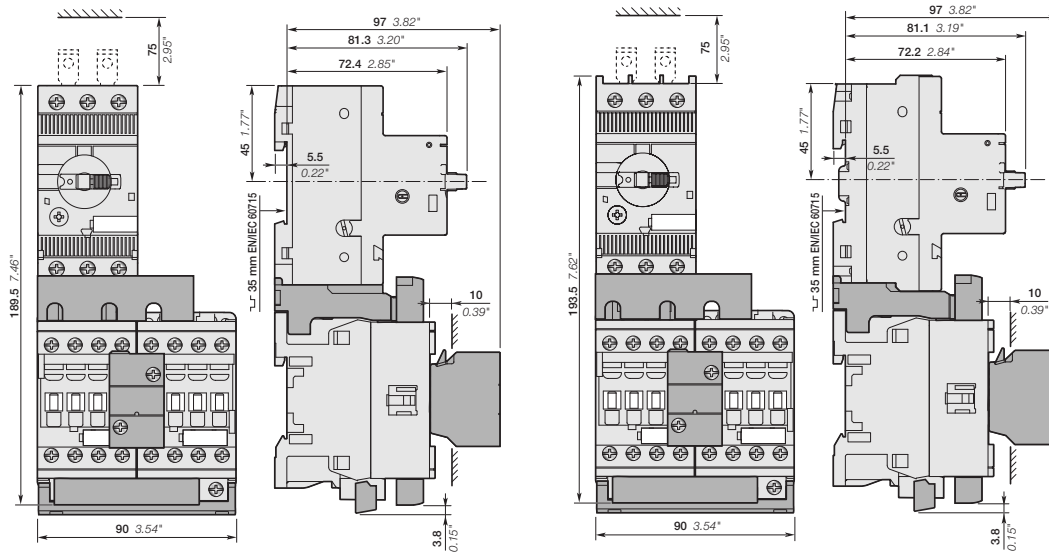
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

Coordination tables for MS166 available in our SOC tool :

<https://applications.it.abb.com/SOC/Selectivity>

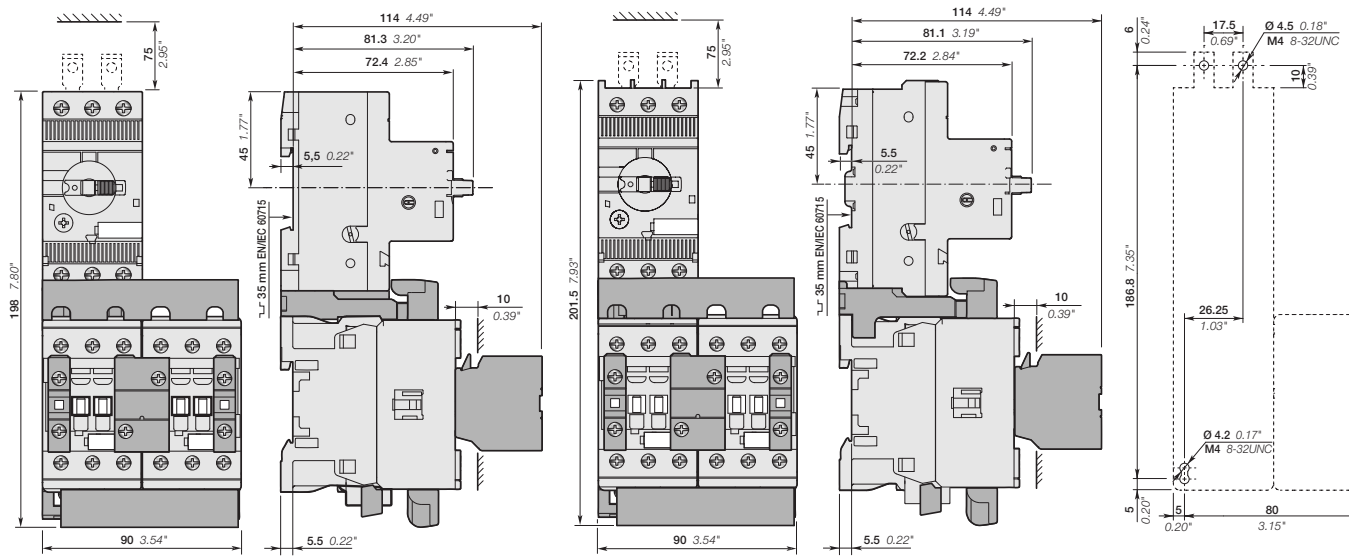
Reversing starters protected by MS132 manual motor starters

With AF contactors - open type in kit form



MS132-0.16 ... MS132-10
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16

MS132-12 ... MS132-25
+ BEA16-4, BER16-4, VEM4
+ AF09, AF12, AF16



MS132-0.16 ... MS132-10
+ BEA26-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

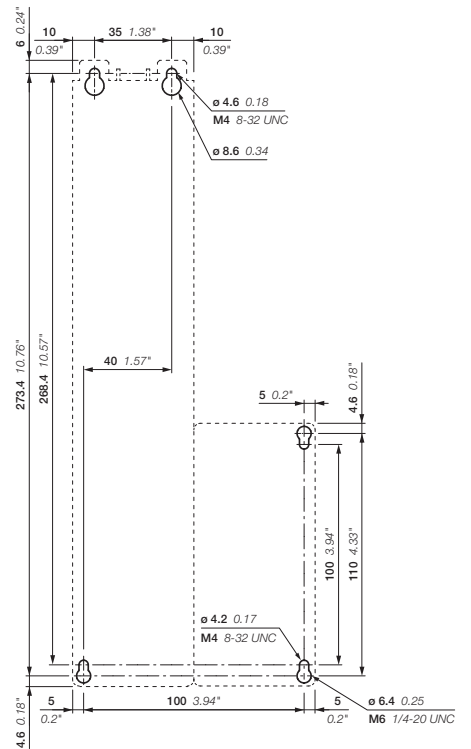
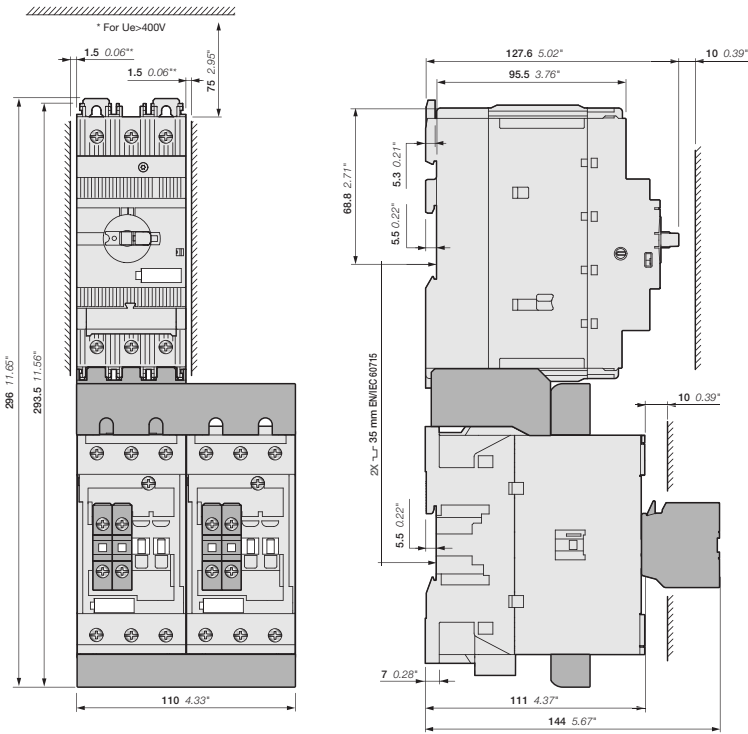
MS132-12 ... MS132-32
+ BEA38-4, BER38-4, VEM4, CA4-10
+ AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

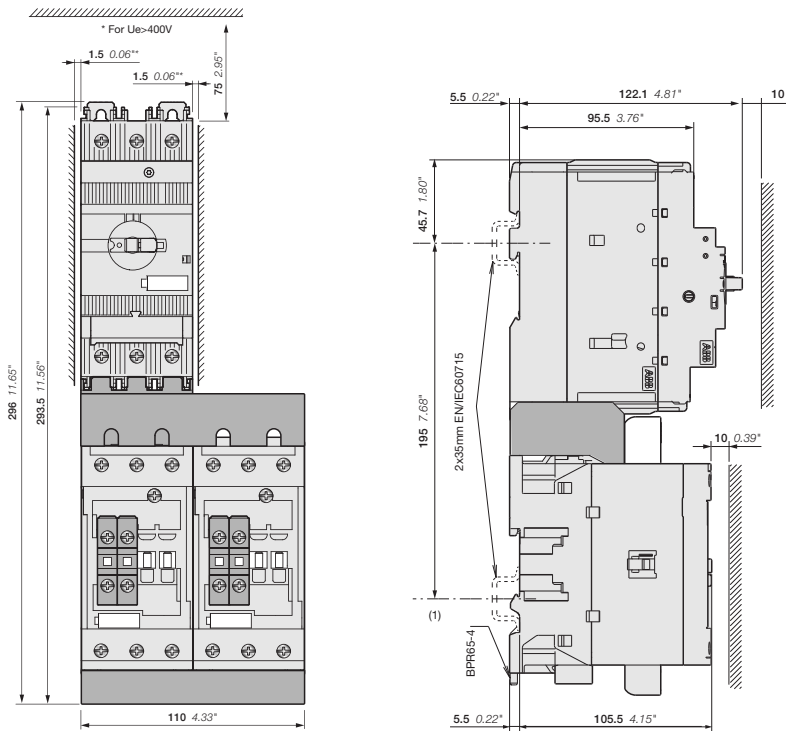
Main dimensions mm, inches

Reversing starters protected by MS165 manual motor starters

With AF contactors - open type version in kit form



MS165
+ BEA65-4, BER65-4, VM96-4
+ AF40, AF52, AF65



MS165
+ BEA65-4,
+ AF40, AF52, AF65 + 2x BPR65-4

Note: for U_e > 400 V, contactor lateral distance to grounded component 1.5 mm 0.06" min.

(1): Assembly on fixed DIN Rails for reverser starter with BPR65-4 rail hook

Main dimensions mm, inches

DOL starters protected by moulded-case circuit-breakers and overload relays

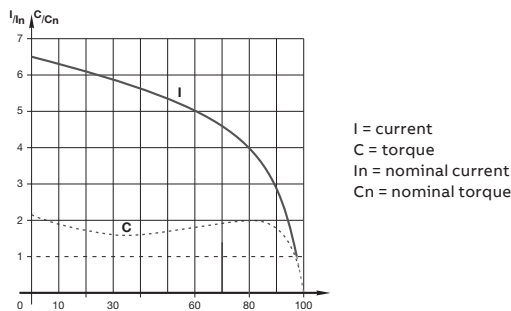
With AF contactors - open type version in kit form



XT2S 160 + BEA140/XT2 + AF140-30-11

Application

Full voltage direct-on-line (DOL) starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



Coordination types

The contactor and the moulded-case circuit-breaker control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1/ EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

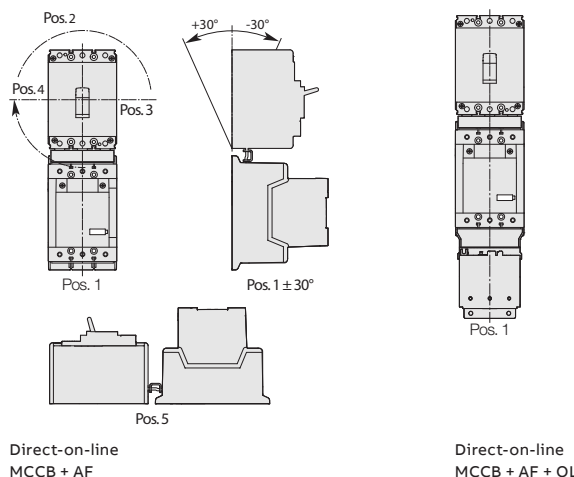
Main Technical Data

| Standards | IEC 60947-4-1 / EN 60947-4-1 |
|--------------------------------------|--|
| Rated operational voltage U_e max. | 400 V - 50/60 Hz |
| Rated insulation voltage U_i | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Switching frequency | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature | |
| Close to the device | < 55 °C |
| Degree of protection | IP20 |



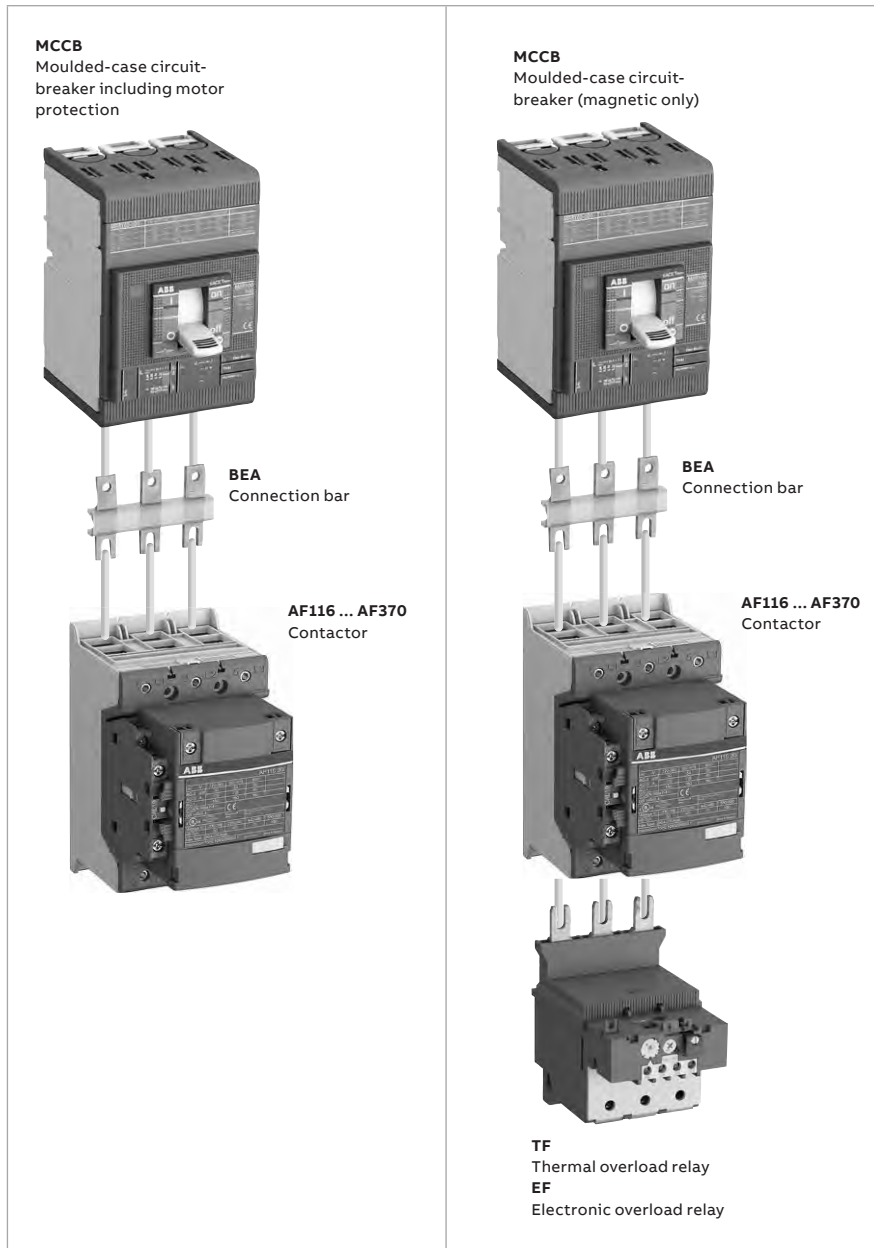
XT2S 160 + BEA140/XT2 + AF140-30-11 + EF146

Mounting positions



DOL starters protected by moulded-case circuit-breakers and overload relays

With AF contactors - open type version in kit form



You can easily assemble a direct-on-line starter by using the BEA connection bars. It is used to electrically connect MCCB moulded-case circuit-breaker and AF116 ... AF370 contactor, AC or DC operated.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50/60 Hz, I_q = 50 kA up to 200 kW.

For the full coordination tables, please visit our SOC tool : <https://applications.it.abb.com/SOC/Selectivity>



DOL starters protected by MCCB including motor protection

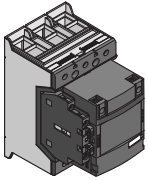
Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz



| IEC | | Magnetic tripping current setting A | Max. allowed thermal setting | Base | | Trip unit | |
|-------------------|--------------------|--|------------------------------|-----------------------|--------------|-----------|----------------------------------|
| AC-3, 400 V | | | | Type | Order code | Type | Order code |
| Rated power kW | Rated current A | | | | | | |
| 55 | 97 | 1440 | 116 | XT2S 160 | 1SDA068164R1 | + | Ekip M-LIU In160 1SDA067355R1 |
| 75 | 132 | 1920 | 140 | XT2S 160 | 1SDA068164R1 | + | Ekip M-LIU In160 1SDA067355R1 |
| 90 | 160 | 2400 | 190 | T4S 250 PR222MP In200 | 1SDA054527R1 | | Included - |
| 110 | 195 | 2880 | 205 | T5S 400 PR222MP In320 | 1SDA054553R1 | | Included - |
| 132 | 230 | 3600 | 265 | T5S 400 PR222MP In400 | 1SDA054554R1 | | Included - |
| 160 | 280 | 4400 | 305 | T5S 400 PR222MP In400 | 1SDA054554R1 | | Included - |

Contactors



Connection bars

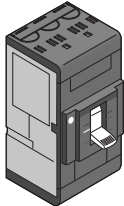
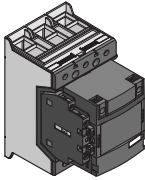


| Control voltage Uc min. ... Uc max. | | Type | Order code | Type | Order code |
|--|-----------|----------------|-----------------|------------|-----------------|
| V 50/60 Hz | V DC | | | | |
| 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | BEA140/XT2 | 1SFN084206R1000 |
| 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | |
| 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | BEA205/T4 | 1SFN084806R1001 |
| 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | |
| 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | BEA370/T5 | 1SFN085406R1000 |
| 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | |
| 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | BEA370/T5 | 1SFN085406R1000 |
| 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | |
| 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | BEA370/T5 | 1SFN085406R1000 |
| 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | | |
| 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | BEA370/T5 | 1SFN085406R1000 |
| 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 | | |

DOL starters protected by MCCB (magnetic only) and overload relays

Coordination type 1 or 2

Coordination type 1 or 2, AC-3, 50 kA, 400 V, 50/60 Hz

| MCCB | Contactors |
|---|---|
|  |  |

Thermal overload relays

| IEC AC-3, 400 V Rated power kW | Rated current A | Magnetic tripping current A | Type | Order code | Control voltage Uc min. ... Uc max. | | Type | Order code |
|--|-----------------------|--------------------------------------|-----------------------|--------------|--|-----------|----------------|-----------------|
| | | | | | V 50/60 Hz | V DC | | |
| 55 | 97 | 1600 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 |
| | | | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 |
| 75 | 132 | 1920 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 |
| | | | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 |
| 90 | 160 | 2250 | XT4S 250 Ekip I In250 | 1SDA068480R1 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 |
| | | | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 |
| 110 | 195 | 2720 | T4S 320 PR221-I In320 | 1SDA054126R1 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 |
| | | | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 |

Electronic overload relays

| | | | | | | | | |
|-----|-----|------|-----------------------|--------------|-----------|-----------|----------------|-----------------|
| 55 | 97 | 1600 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 |
| | | | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 |
| 75 | 132 | 1920 | XT2S 160 MA 160 | 1SDA076530R1 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 |
| | | | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 |
| 90 | 160 | 2250 | XT4S 250 Ekip I In250 | 1SDA068480R1 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 |
| | | | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 |
| 110 | 195 | 2720 | T4S 320 PR221-I In320 | 1SDA054126R1 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 |
| | | | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 |
| 132 | 230 | 3200 | T5S 400 PR221-I In400 | 1SDA054335R1 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 |
| | | | | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 |
| 160 | 280 | 4000 | T5S 400 PR221-I In400 | 1SDA054335R1 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 |
| | | | | | 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 |
| 200 | 350 | 5040 | T5S 630 PR221-I In630 | 1SDA054405R1 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 |
| | | | | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 |

| | |
|---|---|
| <p>Overload relays</p>  | <p>Connection bars</p>  |
|---|---|

| Setting ranges | Max. allowed setting current | Type | Order code | Type | Order code |
|----------------|------------------------------|-------------|-----------------|------------|-----------------|
| A | A | | | | |
| 80...110 | 110 | TF140DU-110 | 1SAZ431201R1002 | BEA140/XT2 | 1SFN084206R1000 |
| 110...142 | 140 | TF140DU-142 | 1SAZ431201R1004 | | |
| 130...175 | 175 | TA200DU-175 | 1SAZ421201R1005 | BEA205/XT4 | 1SFN084806R1000 |
| 155...200 | 200 | TA200DU-200 | 1SAZ421201R1006 | BEA205/T4 | 1SFN084806R1001 |
| 54...150 | 116 | EF146-150 | 1SAX351001R1101 | BEA140/XT2 | 1SFN084206R1000 |
| 54...150 | 140 | EF146-150 | 1SAX351001R1101 | | |
| 63...210 | 190 | EF205-210 | 1SAX531001R1101 | BEA205/XT4 | 1SFN084806R1000 |
| 63...210 | 205 | EF205-210 | 1SAX531001R1101 | BEA205/T4 | 1SFN084806R1001 |
| 115...380 | 265 | EF370-380 | 1SAX611001R1101 | BEA370/T5 | 1SFN085406R1000 |
| 115...380 | 305 | EF370-380 | 1SAX611001R1101 | | |
| 115...380 | 350 | EF370-380 | 1SAX611001R1101 | | |

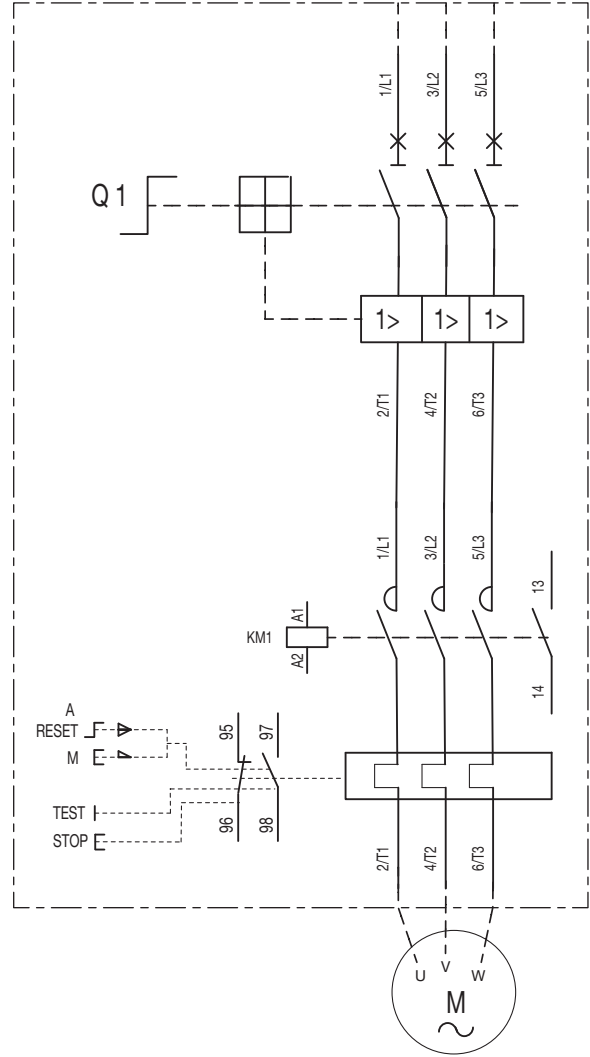
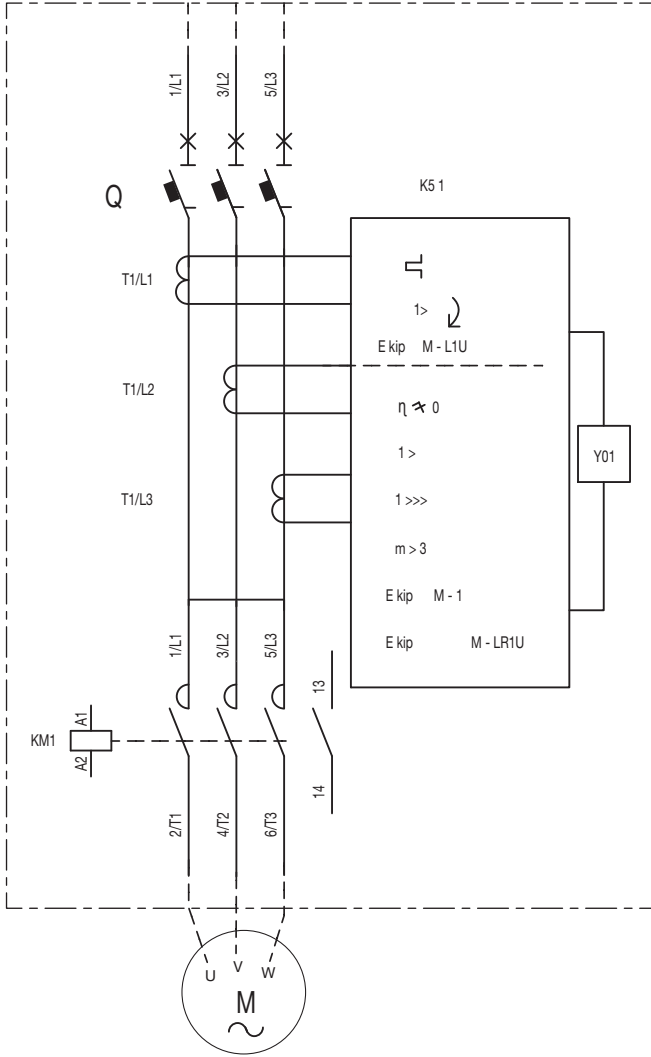
DOL starters protected by moulded-case circuit-breakers and overload relays

With AF contactors - Open type version in kit form

Direct-on-line starters

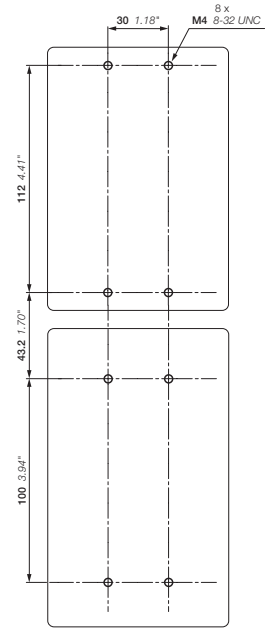
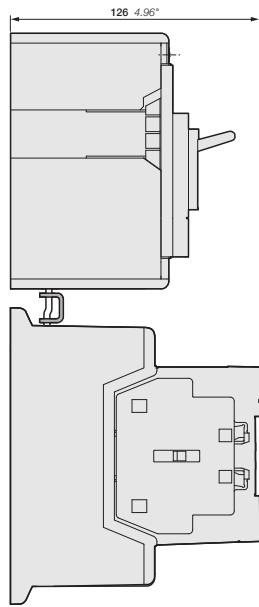
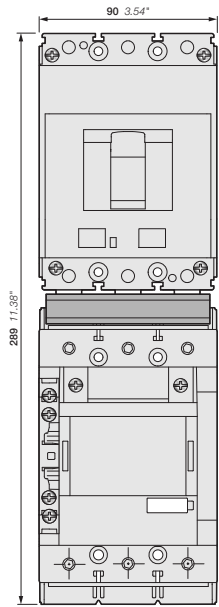
Protected by MCCB including motor protection

Protected by MCCB (magnetic only) and overload relays

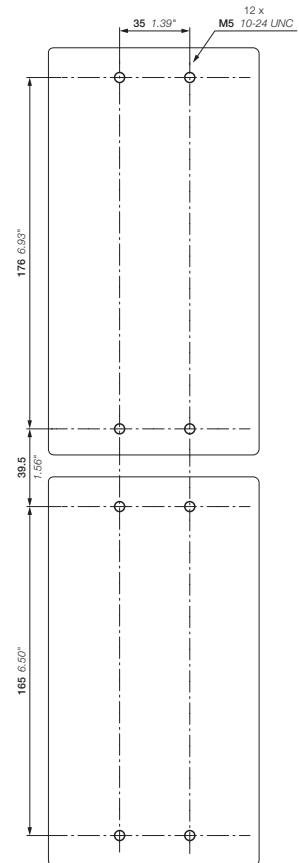
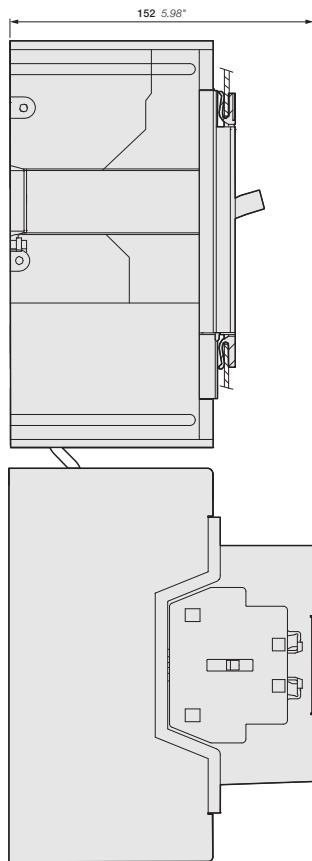
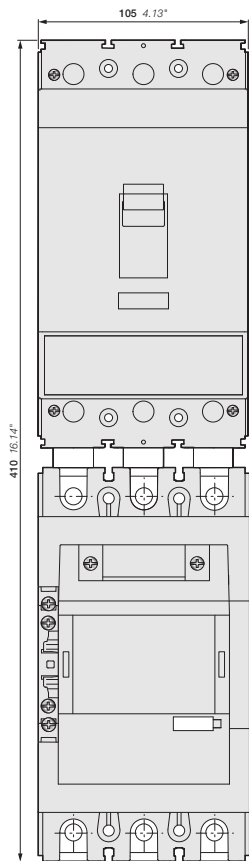


DOL starters protected by MCCB, including motor protection

With AF contactors - Open type version in kit form



XT2S 160 + Ekip M-LIU In160
+ BEA140/XT2
+ AF116, AF140, AF146

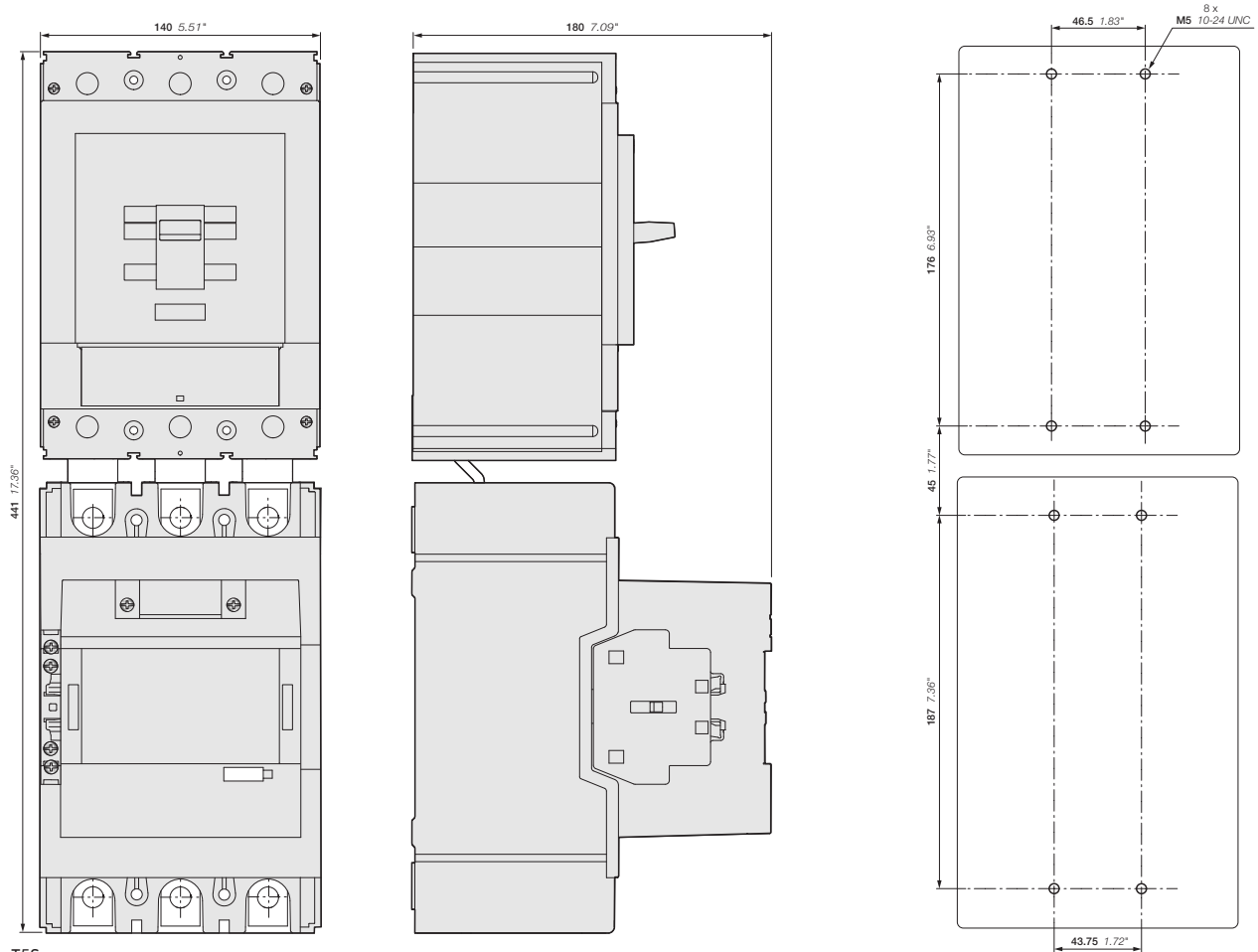


T4S
+ BEA205/T4
+ AF190, AF205

Main dimensions mm, inches

DOL starters protected by MCCB, including motor protection

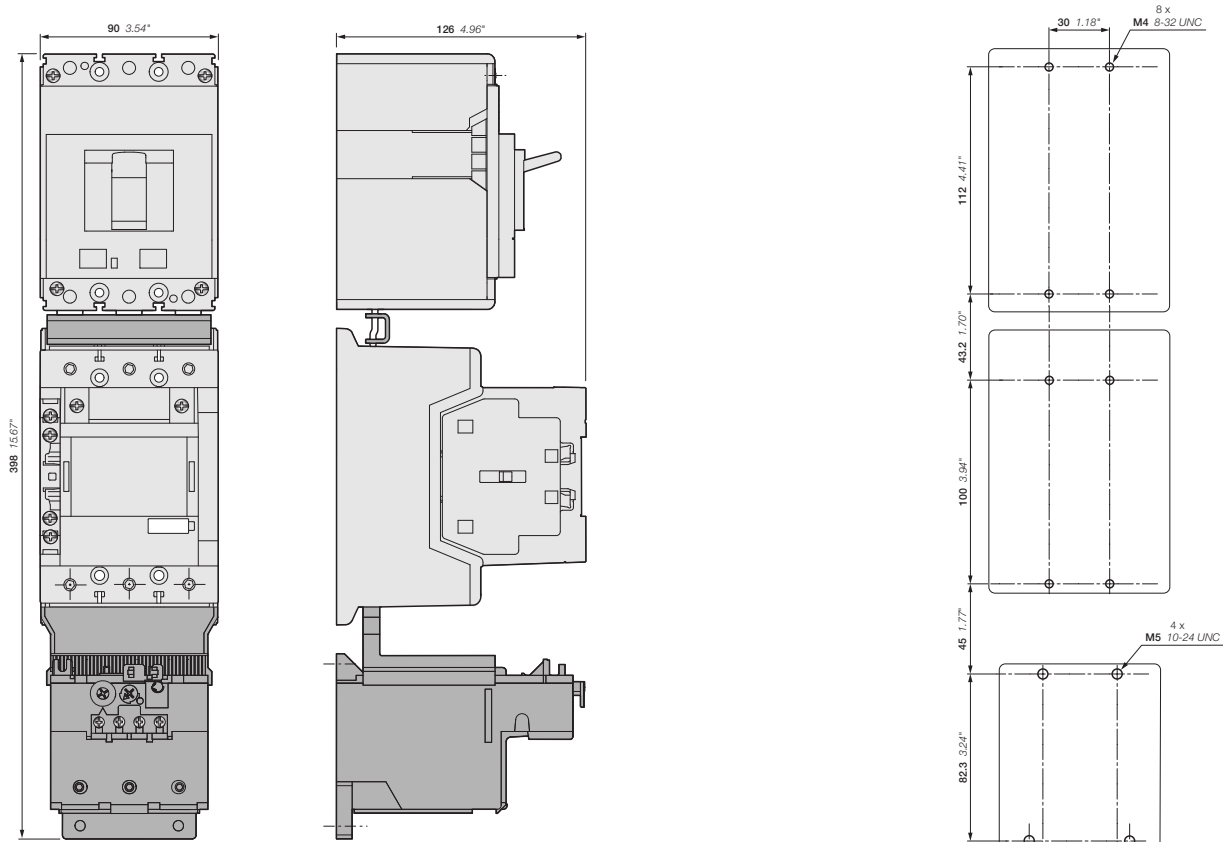
With AF contactors - Open type version in kit form



T5S
 + BEA370/T5
 + AF265, AF305, AF370

DOL starters protected by MCCB (magnetic only) and thermal overload relays

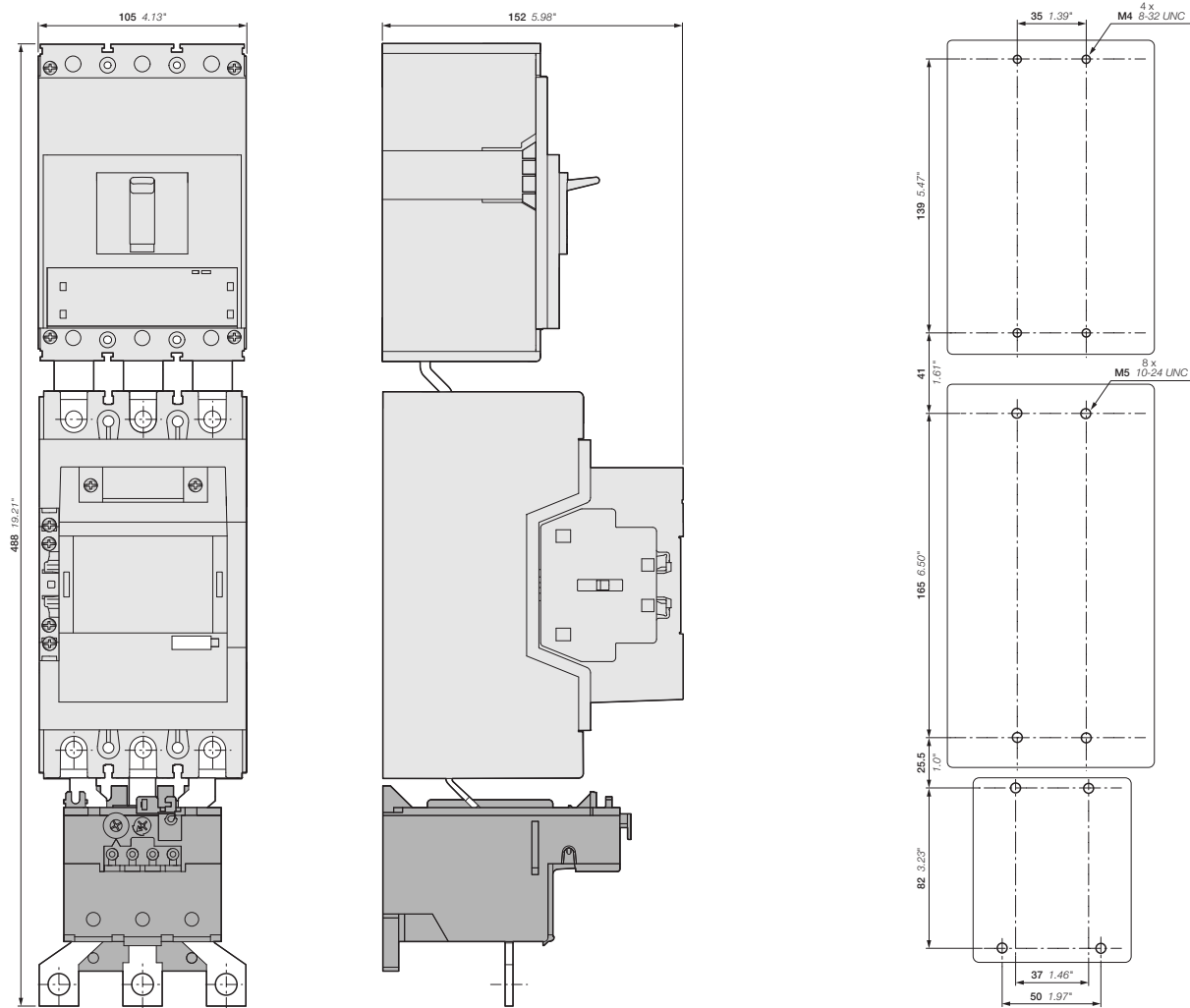
With AF contactors - Open type version in kit form



- XT2S
- + BEA140/XT2
- + AF116, AF140, AF146
- + TF140 thermal overload relay

DOL starters protected by MCCB (magnetic only) and thermal overload relays

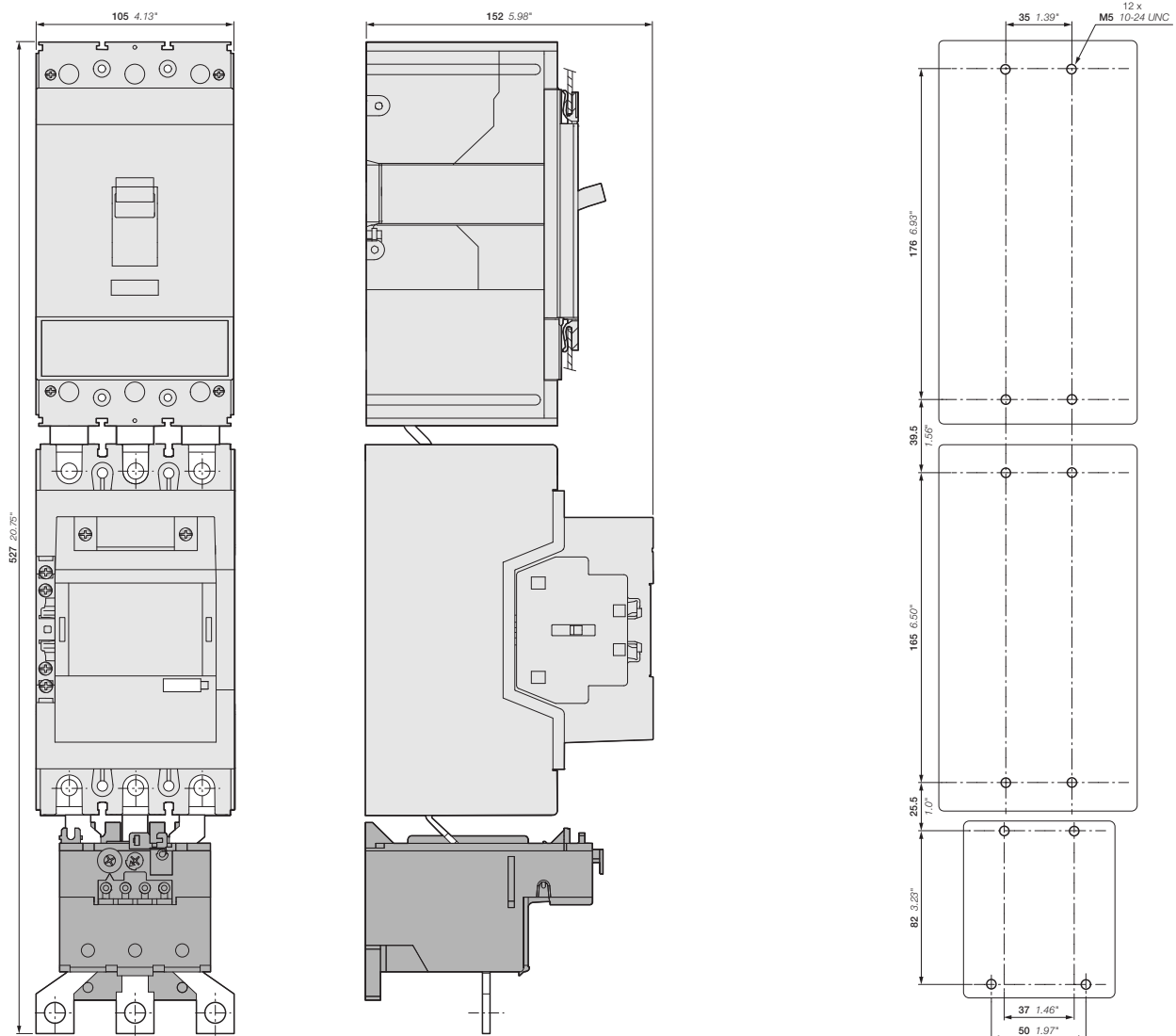
With AF contactors - Open type version in kit form



XT4S
 + BEA205/XT4
 + AF190, AF205
 + TA200DU thermal overload relay

DOL starters protected by MCCB (magnetic only) and thermal overload relays

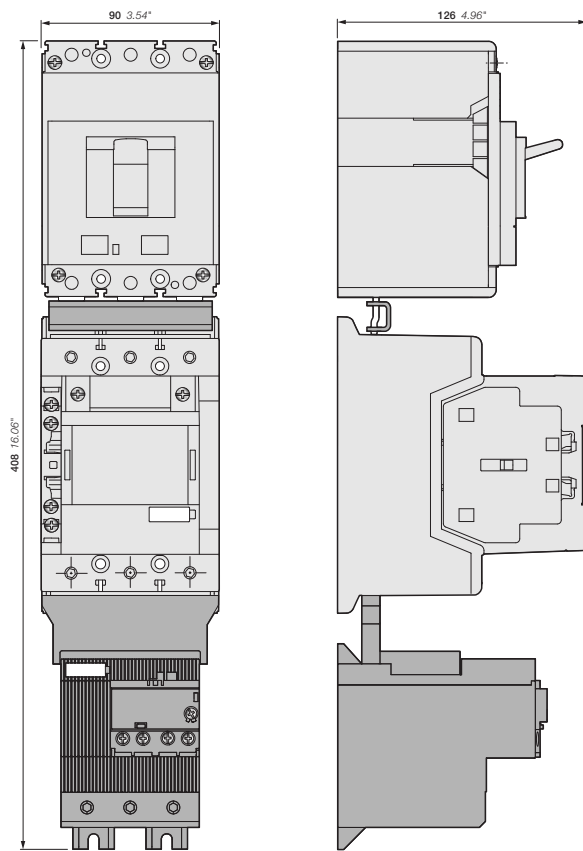
With AF contactors - Open type version in kit form



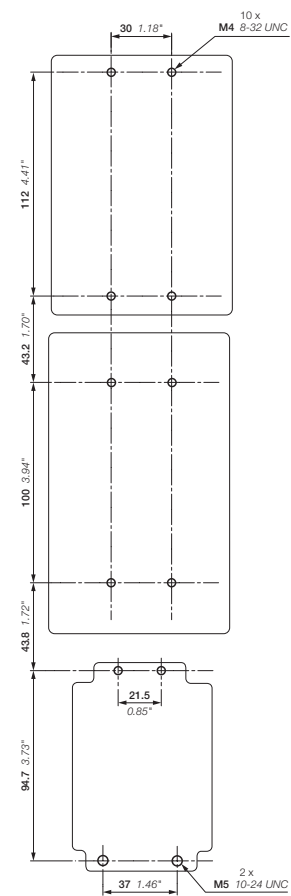
- T4S
- + BEA205/T4
- + AF190, AF205
- + TA200DU thermal overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

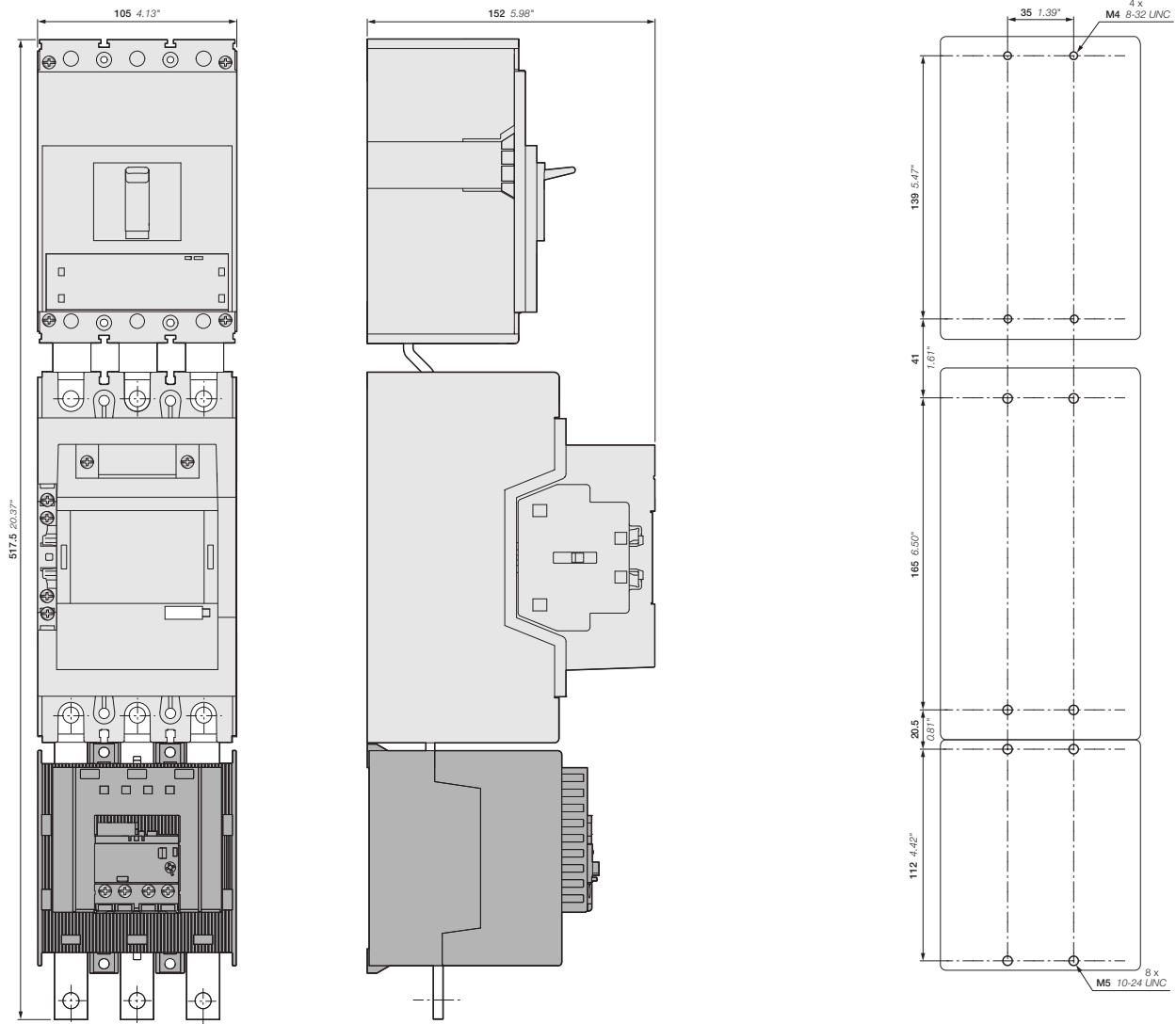


XT2S
 + BEA140/XT2
 + AF116, AF140, AF146
 + EF146 electronic overload relay



DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form

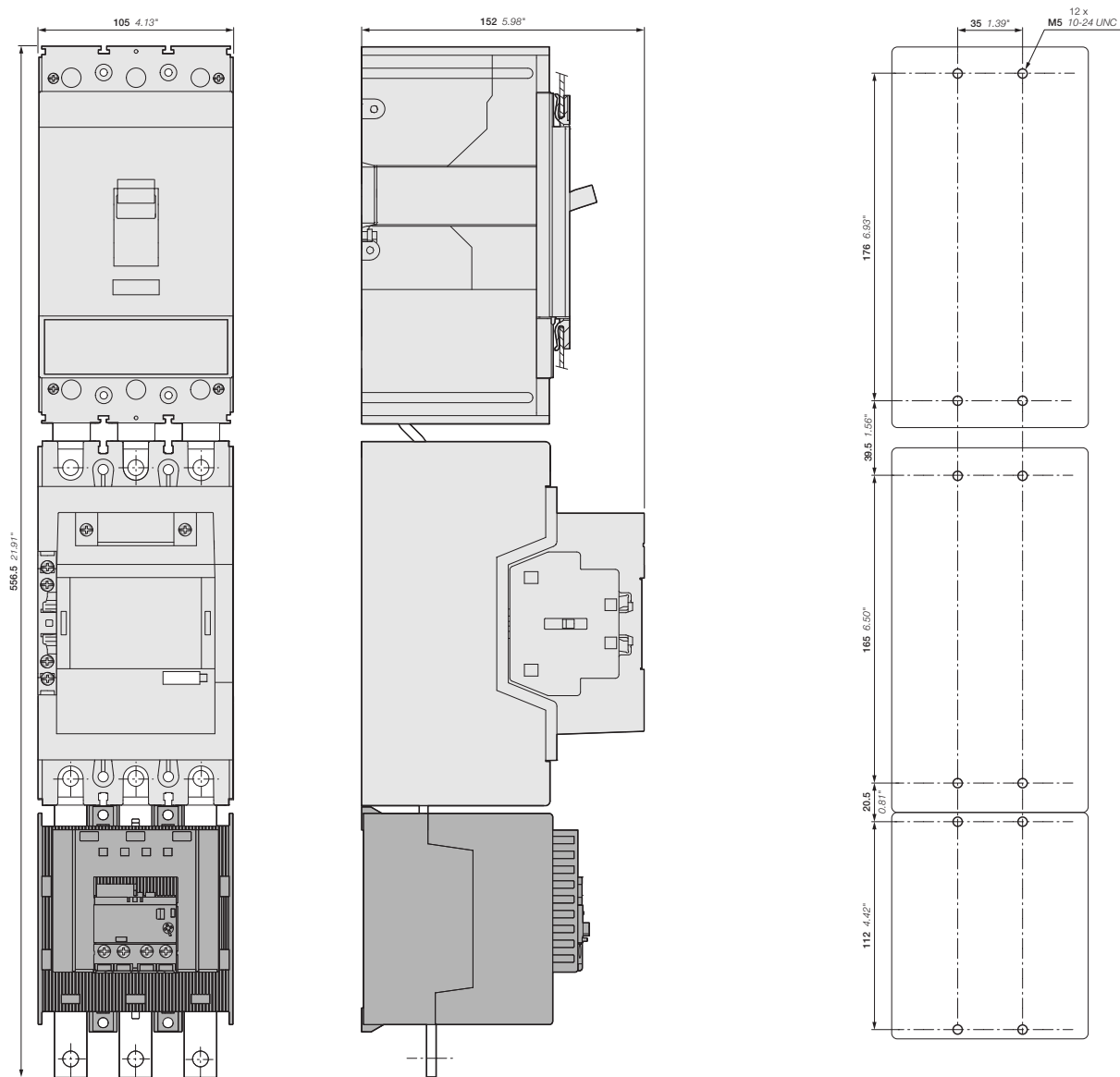


- XT4S
- + BEA205/XT4
- + AF190, AF205
- + EF205 electronic overload relay

Main dimensions mm, inches

DOL starters protected by MCCB (magnetic only) and electronic overload relays

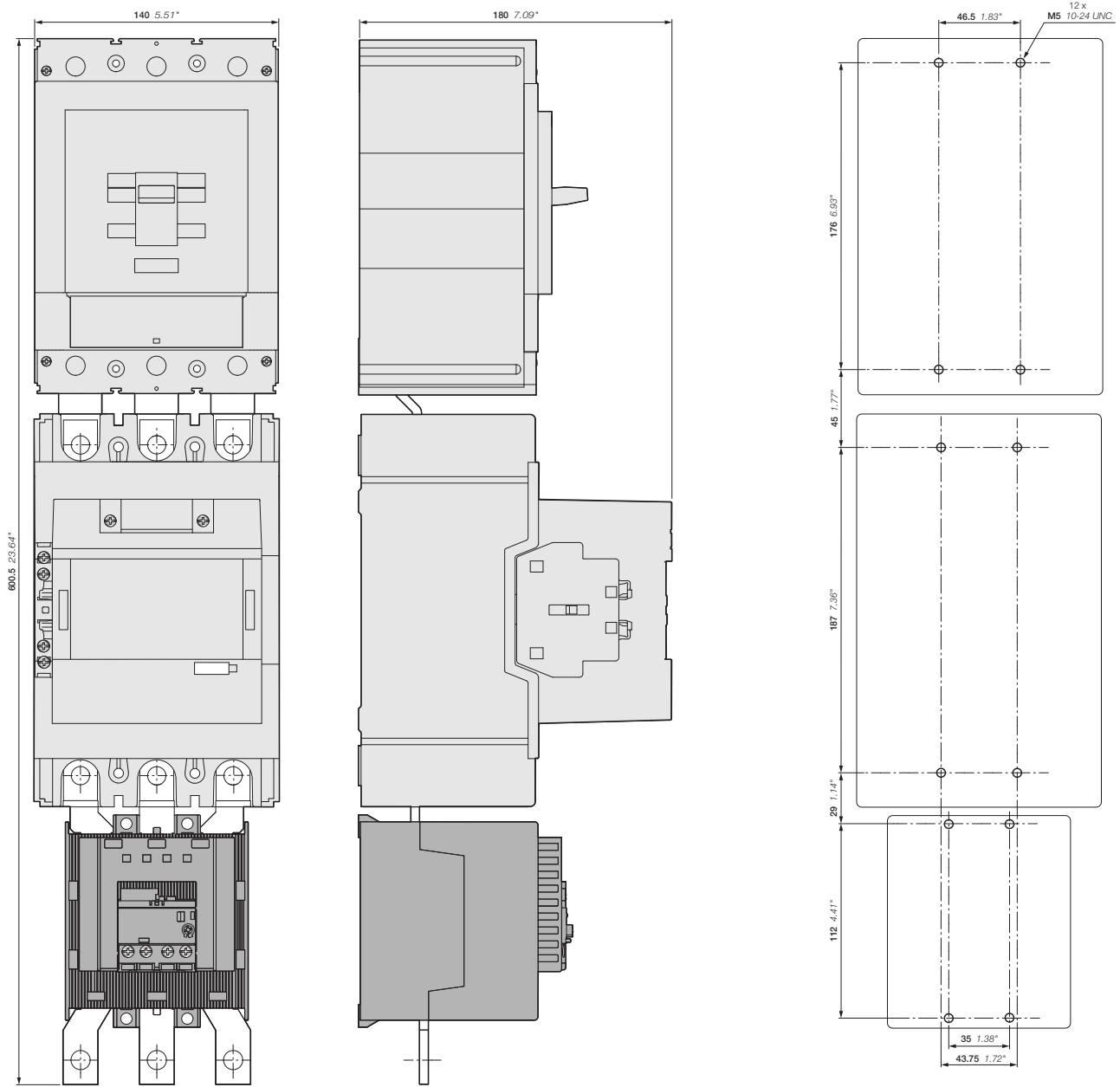
With AF contactors - Open type version in kit form



T4S
 + BEA205/T4
 + AF190, AF205
 + EF205 electronic overload relay

DOL starters protected by MCCB (magnetic only) and electronic overload relays

With AF contactors - Open type version in kit form



- T55
- + BEA370/T5
- + AF265, AF305, AF370
- + EF370 electronic overload relay

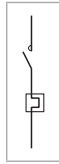
Main dimensions mm, inches

DOL and reversing starters protected by overload relays

With AF contactors - Open type version in kit form

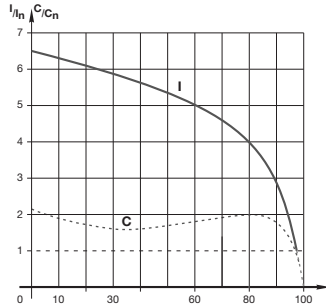


AF09-30-10 + TF42



Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque



AF140-30-11 + TF140DU

Coordination Types

The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main Technical Data

| | |
|--------------------------------------|---|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage U_e max. | 690 V - 50/60 Hz |
| Rated insulation voltage U_i | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Ambient air temperature | |
| Close to the device | $\leq 60^\circ\text{C}$ (TF42: 38 A above $\leq 50^\circ\text{C}$) |
| Degree of protection | IP20 |
| Switching frequency | Refer to "Switching frequency diagrams" page |



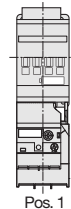
AF09-30-10 + BER16-4 + VEM4 + TF42



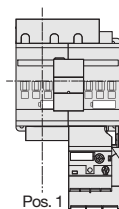
Mounting positions



AF140-30-11 + BER140-4 + VM19 + TF140DU



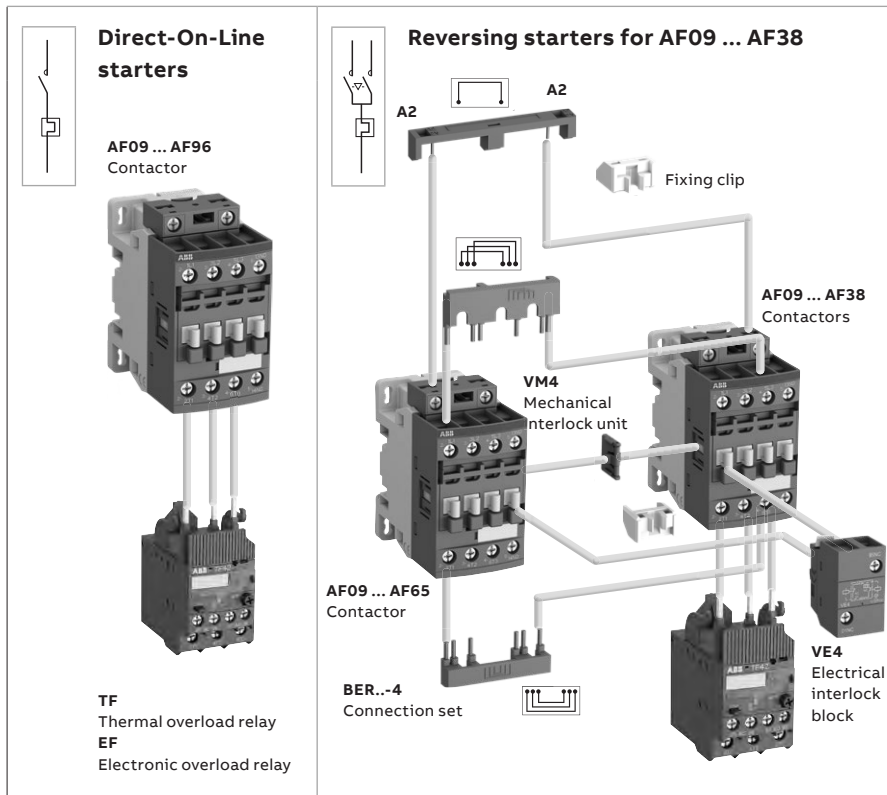
Direct-on-line



Reversing

DOL and reversing starters protected by overload relays

With AF contactors - Open type version in kit form



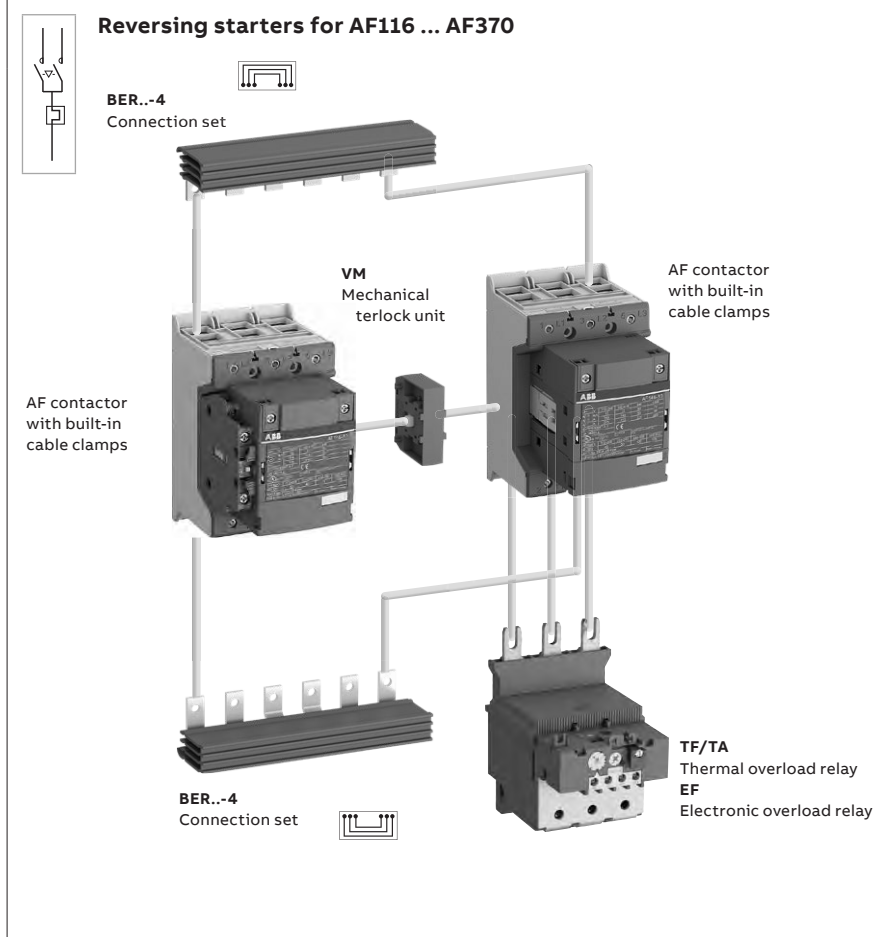
You can easily assemble a direct-on-line starter by connecting AF contactor and TF thermal overload relay or EF electronic overload relay.

You can also easily assemble reversing starter thanks to our complete range of accessories:

- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set for reversing starter in 90 mm width.
- It includes:
 - VM4 mechanical interlock unit including 2 fixing clips
 - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BER...-4 connection set: it assures a safe and simple reversing connection between both contactor main terminals.

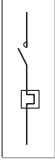
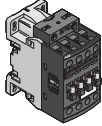
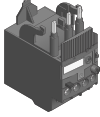
Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.

For the full coordination tables, please visit our SOC tool : <https://applications.it.abb.com/SOC/Selectivity>



Direct-on-line starters protected by thermal overload relays

With AF contactors - Open type version in kit form

| | | Contactors | | | | Thermal overload relays | | | Accessories |
|---|--------------------|---|-----------|----------------|-----------------|---|-------------|-----------------|-------------|
|  | |  | | | |  | | | |
| IEC AC-3, 400 V Rated power kW | Rated current A | Control voltage Uc min. ... Uc max. (1) | | Type | Order code | Setting ranges A | Type | Order code | |
| | | V 50/60 Hz | V DC (2) | | | | | | |
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 7.60...10.0 | TF42-10 | 1SAZ711201R1043 | |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-11 | 1SBL156001R1110 | 10.0...13.0 | TF42-13 | 1SAZ711201R1045 | |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-11 | 1SBL176001R1110 | 13.0...16.0 | TF42-16 | 1SAZ711201R1047 | |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 20.0...24.0 | TF42-24 | 1SAZ711201R1051 | |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 29.0...35.0 | TF42-35 | 1SAZ711201R1053 | |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-11 | 1SBL296001R1100 | 35.0...38.0/40.0 | TF42-38 | 1SAZ711201R1055 | |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 30.0...40.0 | TF65-40 | 1SAZ811201R1003 | |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 36.00...47.0 | TF65-47 | 1SAZ811201R1004 | |
| | | 100-250 | 100-250 | AF52-30-00-13 | 1SBL367001R1300 | | | | |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 50.0...60.0 | TF65-60 | 1SAZ811201R1006 | |
| | | 100-250 | 100-250 | AF65-30-00-13 | 1SBL387001R1300 | | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 57.0...68.0 | TF96-68 | 1SAZ911201R1003 | |
| | | 100-250 | 100-250 | AF80-30-00-13 | 1SBL397001R1300 | | | | |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 75.0...87.0 | TF96-87 | 1SAZ911201R1005 | |
| | | 100-250 | 100-250 | AF96-30-00-13 | 1SBL407001R1300 | | | | |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 80...110 | TF140DU-110 | 1SAZ431201R1002 | |
| | | 100-250 | 100-250 | AF116-30-11-13 | 1SFL427001R1311 | | | | |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 100...135 | TF140DU-135 | 1SAZ431201R1003 | |
| | | 100-250 | 100-250 | AF140-30-11-13 | 1SFL447001R1311 | | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 130...175 | TA200DU-175 | 1SAZ411201R1005 | |
| | | 100-250 | 100-250 | AF190-30-11-13 | 1SFL487002R1311 | | | | |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 150...200 | TA200DU-200 | 1SAZ411201R1006 | |
| | | 100-250 | 100-250 | AF205-30-11-13 | 1SFL527002R1311 | | | | |


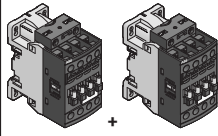
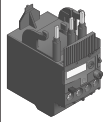
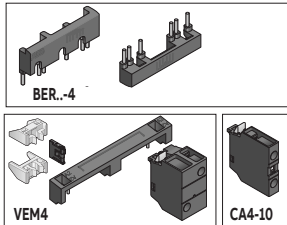
(1) For other control voltages, see "Voltage code table".

Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".

(2) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by thermal overload relays

With AF contactors - Open type version in kit form

| | |  Contactors  | | | | Thermal overload relays  | | | Accessories  | | |
|--------------------|-------------------|---|---|-----------|----------------|--|-------------------|-------------|--|----------------------------|------------------------------------|
| IEC AC-3, 400 V | Rated power kW | Rated current A | Control voltage Uc min. ... Uc max. (1) | | Type | Order code | Setting ranges | Type | Order code | Type | Order code |
| | | | V 50/60 Hz | V DC | | | | | | | |
| 4 | 8.5 | | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 7.60...10.0 | TF42-10 | 1SAZ711201R1043 | + BER16-4 VEM4 | 1SBN081311R1000 1SBN030111R1000 |
| | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | |
| 5.5 | 11.5 | | 24...60 | 20...60 | AF12Z-30-10-11 | 1SBL156001R1110 | 10.0...13.0 | TF42-13 | 1SAZ711201R1045 | | |
| | | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | | | |
| 7.5 | 15.5 | | 24...60 | 20...60 | AF16Z-30-10-11 | 1SBL176001R1110 | 13.0...16.0 | TF42-16 | 1SAZ711201R1047 | | |
| | | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | | | |
| 11 | 22 | | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 20.0...24.0 | TF42-24 | 1SAZ711201R1051 | + BER38-4 VEM4 | 1SBN082311R1000 1SBN030111R1000 |
| | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | |
| 15 | 29 | | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 29.0...35.0 | TF42-35 | 1SAZ711201R1053 | + 2x CA4-10 | 1SBN010110R1010 |
| | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | |
| 18.5 | 35 | | 24...60 | 20...60 | AF38Z-30-00-11 | 1SBL296001R1100 | 35.0...38.0/40.0 | TF42-38 | 1SAZ711201R1055 | | |
| | | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | | | |
| 18.5 | 35 | | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 30.0...40.0 | TF65-40 | 1SAZ811201R1003 | + BER65-4 VM96-4 | 1SBN083411R1000 1SBN033405T1000 |
| | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | | |
| 22 | 41 | | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 36.00...47.0 | TF65-47 | 1SAZ811201R1004 | + 2x CA4-10 + 2x CA4-01 | 1SBN010110R1010 1SBN010110R1001 |
| | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | | | |
| 30 | 55 | | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 50.0...60.0 | TF65-60 | 1SAZ811201R1006 | | |
| | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | | | |
| 37 | 66 | | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 57.0...68.0 | TF96-68 | 1SAZ911201R1003 | + BER96-4 VM96-4 | 1SBN083911R1000 1SBN033405T1000 |
| | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | | | |
| 45 | 80 | | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 75.0...87.0 | TF96-87 | 1SAZ911201R1005 | + 2x CA4-10 + 2x CA4-01 | 1SBN010110R1010 1SBN010110R1001 |
| | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | | | |
| 55 | 97 | | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 80...110 | TF140DU-110 | 1SAZ431201R1002 | + BER140-4 VM19 | 1SFN084111R1000 1SFN030300R1000 |
| | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | | | | |
| 75 | 132 | | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 100...135 | TF140DU-135 | 1SAZ431201R1003 | | |
| | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | | | | |
| 90 | 160 | | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 130...175 | TA200DU-175 | 1SAZ411201R1005 | + BER205-4 VM19 | 1SFN084811R1000 1SFN030300R1000 |
| | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | | | | |
| 110 | 195 | | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 150...200 | TA200DU-200 | 1SAZ411201R1006 | | |
| | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | | | | |

(1) For other control voltages, see "Voltage code table".
 Note : for rated power above 110 kW, refer to "Starters protected by electronic overload relays".
 (2) AF ... -11 not suitable for direct control by PLC-output.

Direct-on-line starters protected by electronic overload relays

With AF contactors - Open type version in kit form


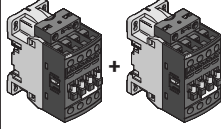
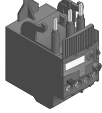
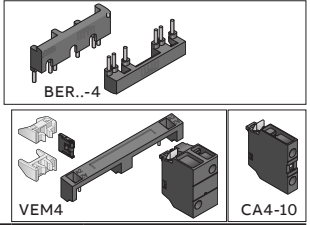
| IEC AC-3, 400 V Rated power kW | | Control voltage | | Type | Order code | Electronic overload relays | | Accessories |
|---|------|----------------------------|-----------|----------------|-----------------|----------------------------|-----------|-----------------|
| | | Uc min. ... Uc max. (1) | | | | Setting ranges | Type | |
| Rated current A | | V 50/60 Hz | V DC | | | A | | |
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-11 | 1SBL156001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-11 | 1SBL176001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 9.00...30.0 | EF45-30 | 1SAX211001R1101 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 9.00...30.0 | EF45-30 | 1SAX211001R1101 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-11 | 1SBL296001R1100 | 15.0...45.0 | EF45-45 | 1SAX211001R1102 |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100-250 | 100-250 | AF52-30-00-13 | 1SBL367001R1300 | | | |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 |
| | | 100-250 | 100-250 | AF65-30-00-13 | 1SBL387001R1300 | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 |
| | | 100-250 | 100-250 | AF80-30-00-13 | 1SBL397001R1300 | | | |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 |
| | | 100-250 | 100-250 | AF96-30-00-13 | 1SBL407001R1300 | | | |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 |
| | | 100-250 | 100-250 | AF116-30-11-13 | 1SFL427001R1311 | | | |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 |
| | | 100-250 | 100-250 | AF140-30-11-13 | 1SFL447001R1311 | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 |
| | | 100-250 | 100-250 | AF190-30-11-13 | 1SFL487002R1311 | | | |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 |
| | | 100-250 | 100-250 | AF205-30-11-13 | 1SFL527002R1311 | | | |
| 132 | 230 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF265-30-11-13 | 1SFL547002R1311 | | | |
| 160 | 280 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF305-30-11-13 | 1SFL587002R1311 | | | |
| 200 | 350 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 |
| | | 100-250 | 100-250 | AF370-30-11-13 | 1SFL607002R1311 | | | |

(1) For other control voltages, see "Voltage code table".

(2) AF ... -11 not suitable for direct control by PLC-output.

Reversing starters protected by electronic overload relays

With AF contactors - Open type version in kit form

| | | Contactors | | | Electronic overload relays | | | Accessories | | |
|---|-----------------|---|-----------|----------------|---|-------------|------------|---|----------------------------|------------------------------------|
|  | |  | | |  | | |  | | |
| IEC | Control voltage | | Type | Order code | Setting ranges | Type | Order code | Type | Order code | |
| | AC-3, 400 V | Rated power kW | | | | | | | | Rated current A |
| | | V 50/60 Hz | V DC | | | | | | | |
| 4 | 8.5 | 24...60 | 20...60 | AF09Z-30-10-11 | 1SBL136001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | BER16-4 + VEM4 | 1SBN081311R1000 1SBN030111R1000 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | | | | | |
| 5.5 | 11.5 | 24...60 | 20...60 | AF12Z-30-10-11 | 1SBL156001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | | |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | | | | | |
| 7.5 | 15.5 | 24...60 | 20...60 | AF16Z-30-10-11 | 1SBL176001R1110 | 5.70...18.9 | EF19-18.9 | 1SAX111001R1105 | | |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | | | | | |
| 11 | 22 | 24...60 | 20...60 | AF26Z-30-00-11 | 1SBL236001R1100 | 9.00...30.0 | EF45-30 | 1SAX211001R1101 | BER38-4 + VEM4 | 1SBN082311R1000 1SBN030111R1000 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | | | | | |
| 15 | 29 | 24...60 | 20...60 | AF30Z-30-00-11 | 1SBL276001R1100 | 9.00...30.0 | EF45-30 | 1SAX211001R1101 | + 2x CA4-10 | 1SBN010110R1010 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF38Z-30-00-11 | 1SBL296001R1100 | 15.0...45.0 | EF45-45 | 1SAX211001R1102 | | |
| | | 100...250 | 100...250 | AF38-30-00-13 | 1SBL297001R1300 | | | | | |
| 18.5 | 35 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | BER65-4 + VM96-4 | 1SBN083411R1000 1SBN033405T1000 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | | | | | |
| 22 | 41 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | + 2x CA4-10 + 2x CA4-01 | 1SBN010110R1010 1SBN010110R1001 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | | | | | |
| 30 | 55 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | 25.0...70.0 | EF65-70 | 1SAX331001R1101 | | |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | | | | | |
| 37 | 66 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 | BER96-4 + VM96-4 | 1SBN083911R1000 1SBN033405T1000 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | | | | | |
| 45 | 80 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | 36...100 | EF96-100 | 1SAX341001R1101 | + 2x CA4-10 + 2x CA4-01 | 1SBN010110R1010 1SBN010110R1001 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | | | | | |
| 55 | 97 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 | BER140-4 + VM19 | 1SBN084111R1000 1SBN030300R1000 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | | | | | |
| 75 | 132 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | 54...150 | EF146-150 | 1SAX351001R1101 | | |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | | | | | |
| 90 | 160 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 | BER205-4 + VM19 | 1SBN084811R1000 1SBN030300R1000 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | | | | | |
| 110 | 195 | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | 63...110 | EF205-110 | 1SAX531001R1101 | | |
| | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | | | | | |
| 132 | 230 | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | BER370-4 + VM19 | 1SBN085411R1000 1SBN030300R1000 |
| | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | | | | | |
| 160 | 280 | 24...60 | 20...60 | AF305-30-11-11 | 1SFL587002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | | |
| | | 100...250 | 100...250 | AF305-30-11-13 | 1SFL587002R1311 | | | | | |
| 200 | 350 | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | 115...380 | EF370-380 | 1SAX611001R1101 | | |
| | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | | | | | |

(1) For other control voltages, see "Voltage code table".
 (2) AF ... -11 not suitable for direct control by PLC-output.

DOL and reversing starters protected by overload relays

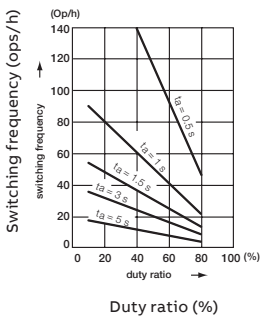
With AF contactors - Open type version in kit form
Switching frequency diagrams

General

Overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency.

Thermal overload relay

Intermittent periodic duty



Example:

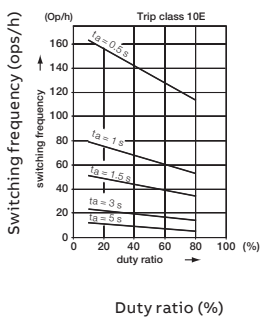
Starting time of the motor: 1 second - Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour.

ta: motor starting time

Electronic overload relay

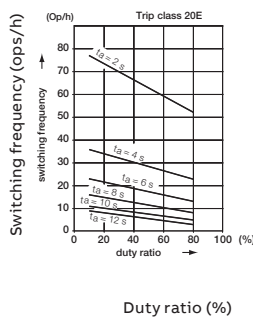
Intermittent periodic duty

Trip class 10E



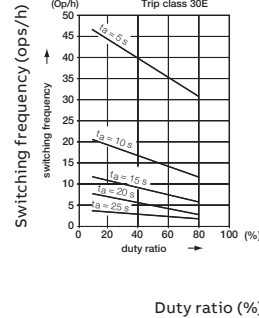
ta: motor starting time

Trip class 20E



Duty ratio (%)

Trip class 30E



Duty ratio (%)

Exemple for trip class 10E:

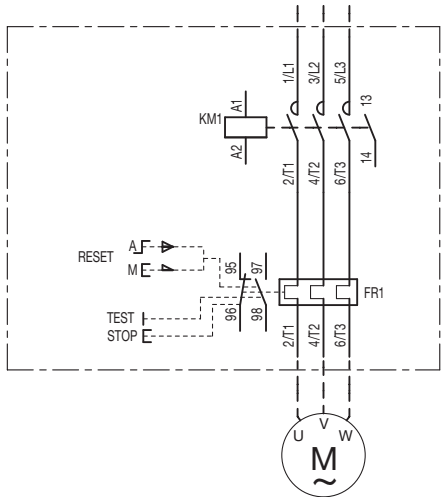
Starting time of the motor: 1 second. Duty ratio: 60 % means a permitted switching frequency of max. 60 operating cycles per hour, for a motor breaking current not exceeding 6 x In.

DOL and reversing starters protected by overload relays

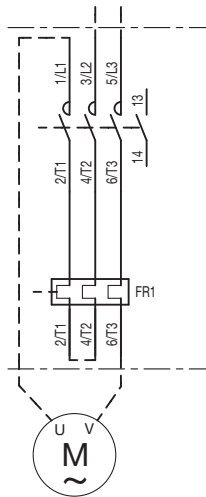
With AF contactors - Open type version in kit form
Wiring diagrams

Direct-on-line starters

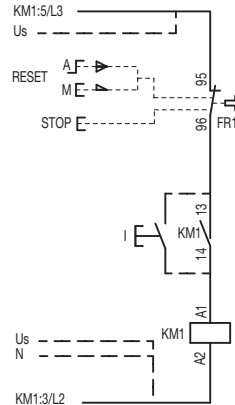
Power circuit



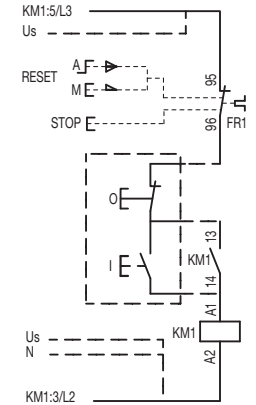
1-phase



AC or DC local control



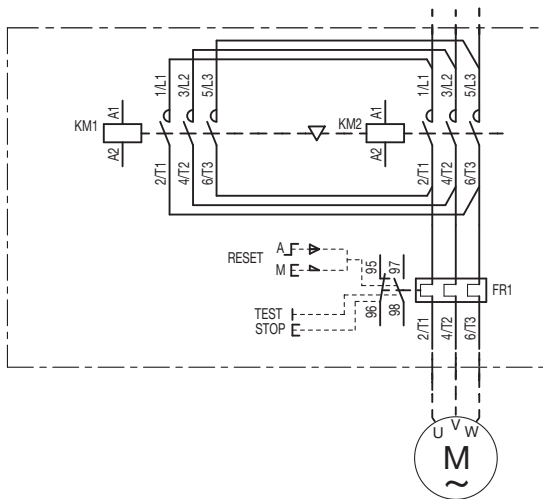
AC or DC remote control



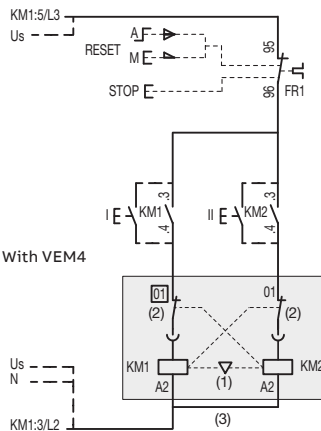
Note: coil Uc 12-20 V DC : A1+, A2-

Reversing starters

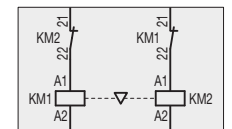
Power circuit



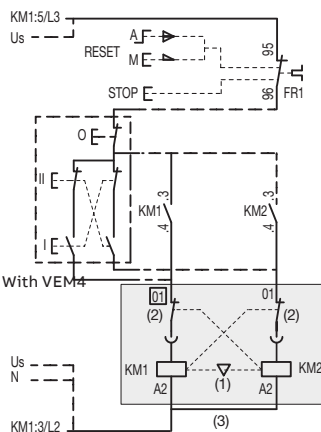
AC or DC local control



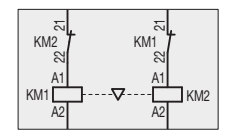
With VM



AC or DC remote control



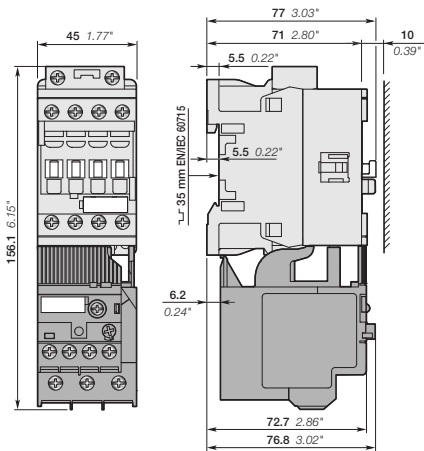
With VM



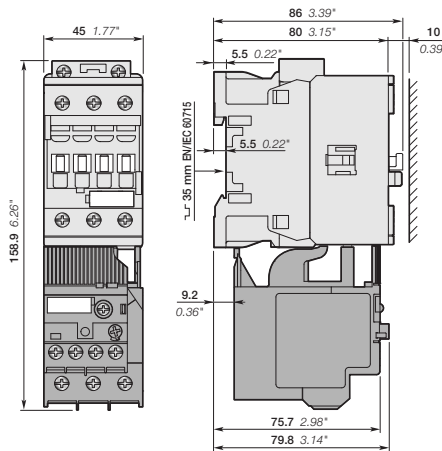
Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
(Except for coil Uc 12-20 V DC : use VM4 with CA4).
- coil Uc 12-20 V DC : A1+, A2-

DOL starters protected by thermal overload relays

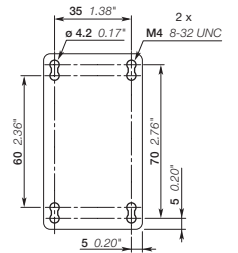
With AF contactors - open type version in kit form



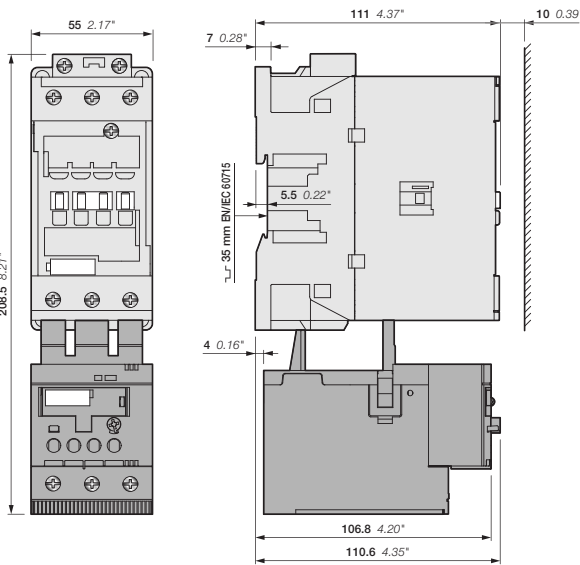
AF09, AF12, AF16 + TF42 thermal overload relay



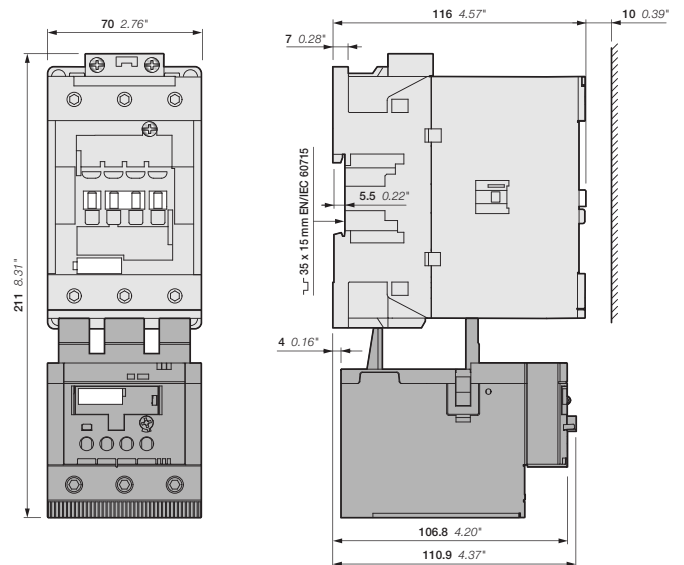
AF26, AF30, AF38 + TF42 thermal overload relay



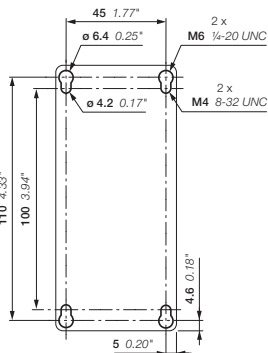
Note: contactor lateral distance to grounded component 2 mm 0.08" min.



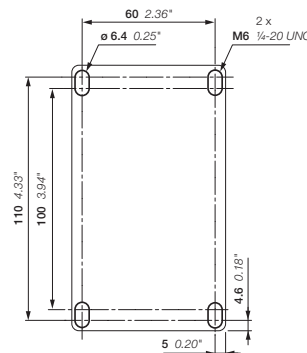
AF40, AF52, AF65 + TF65 thermal overload relay



AF80, AF96 + TF96 thermal overload relay



AF40, AF52, AF65 + TF65 thermal overload relay

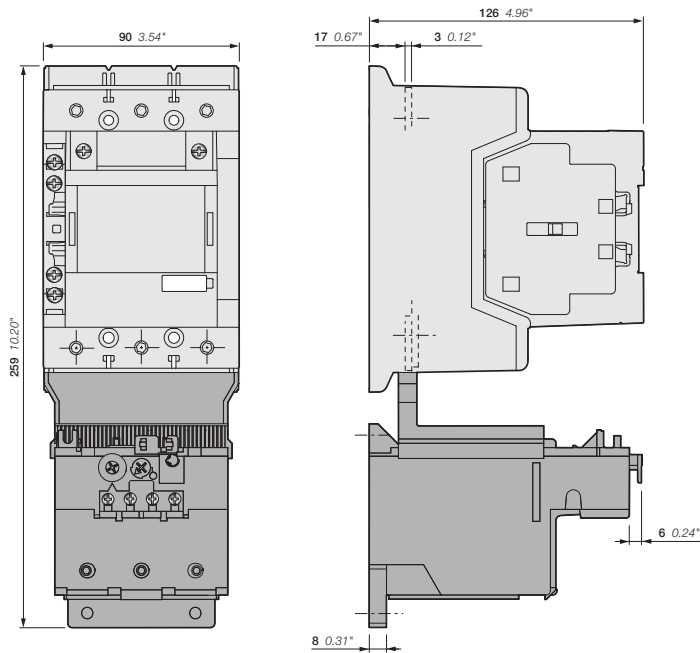


AF80, AF96 + TF96 thermal overload relay

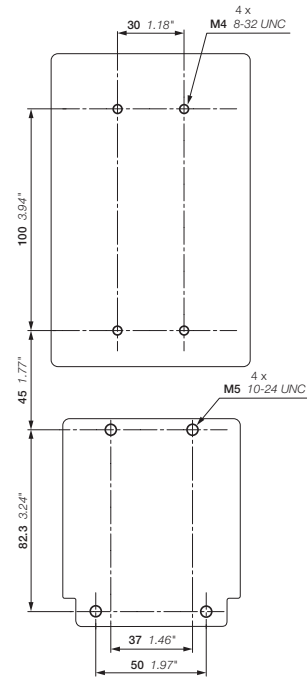
Main dimensions mm, inches

DOL starters protected by thermal overload relays

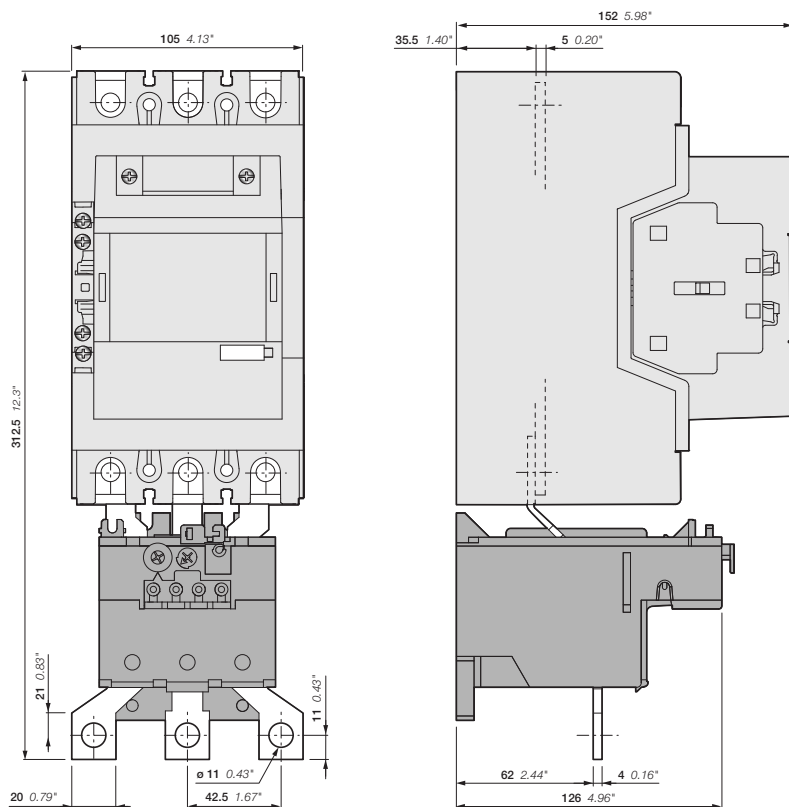
With AF contactors - open type version in kit form



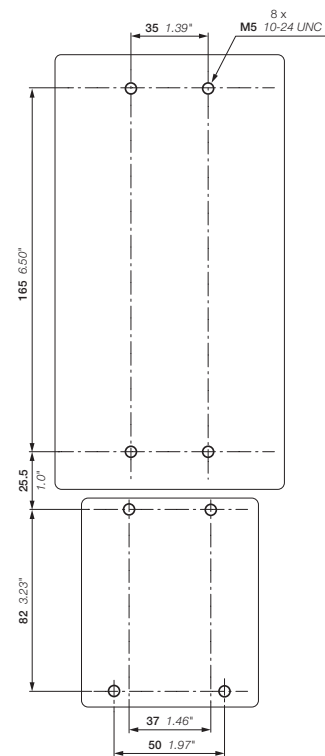
AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF116, AF140-30-11(B)
+ TF140 thermal overload relay



AF190, AF205-30-11
+ TA200DU thermal overload relay

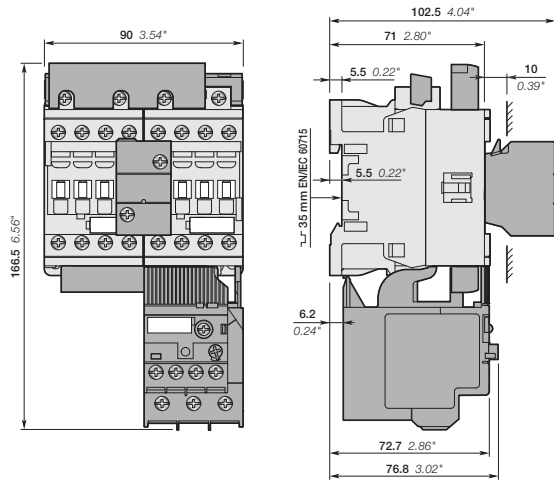


AF190, AF205
+ TA200DU thermal overload relay

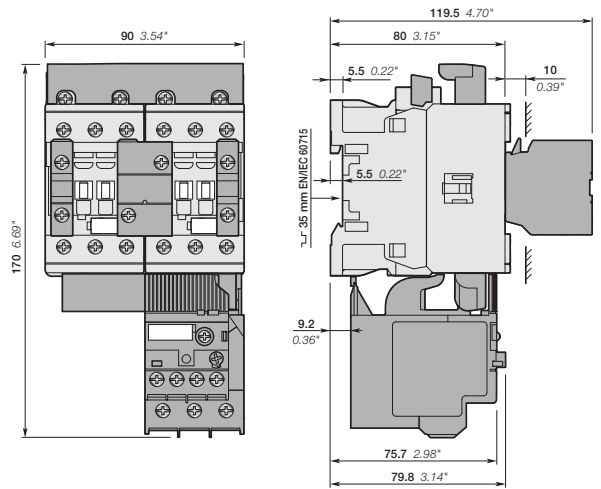
Main dimensions mm, inches

Reversing starters protected by thermal overload relays

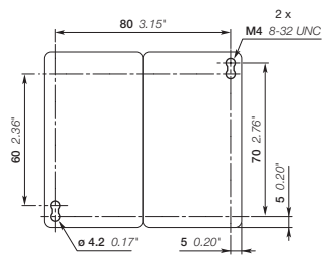
With AF contactors - open type version in kit form



AF09, AF12, AF16
+ BER16-4, VEM4
+ TF42 thermal overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ TF42 thermal overload relay

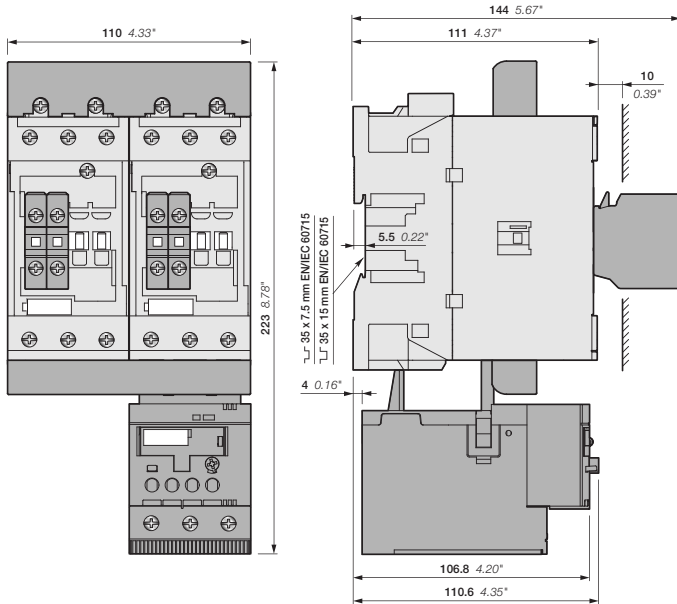


AF09, AF12, AF16, AF26, AF30, AF38

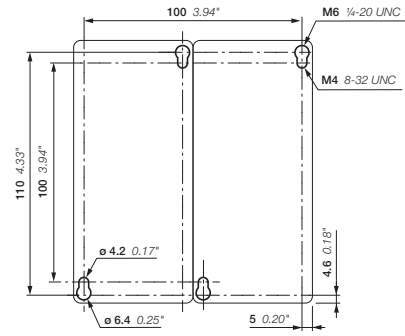
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

Reversing starters protected by thermal overload relays

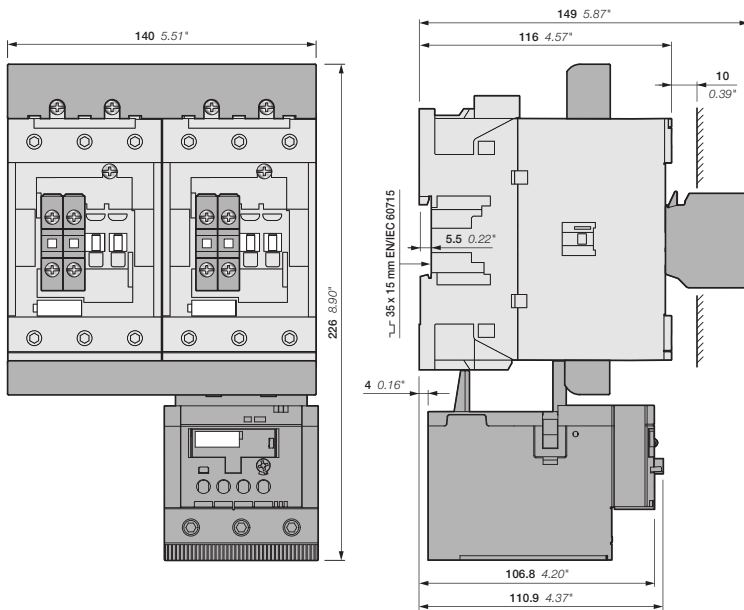
With AF contactors - open type version in kit form



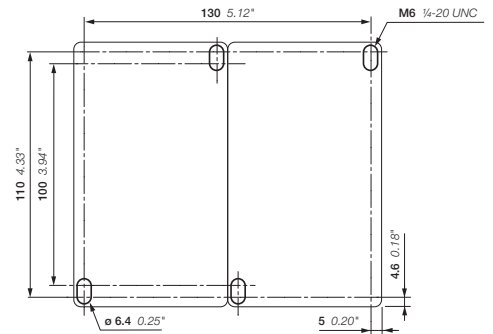
AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



AF40, AF52, AF65
+ BER65-4, VM96-4
+ TF65 thermal overload relay



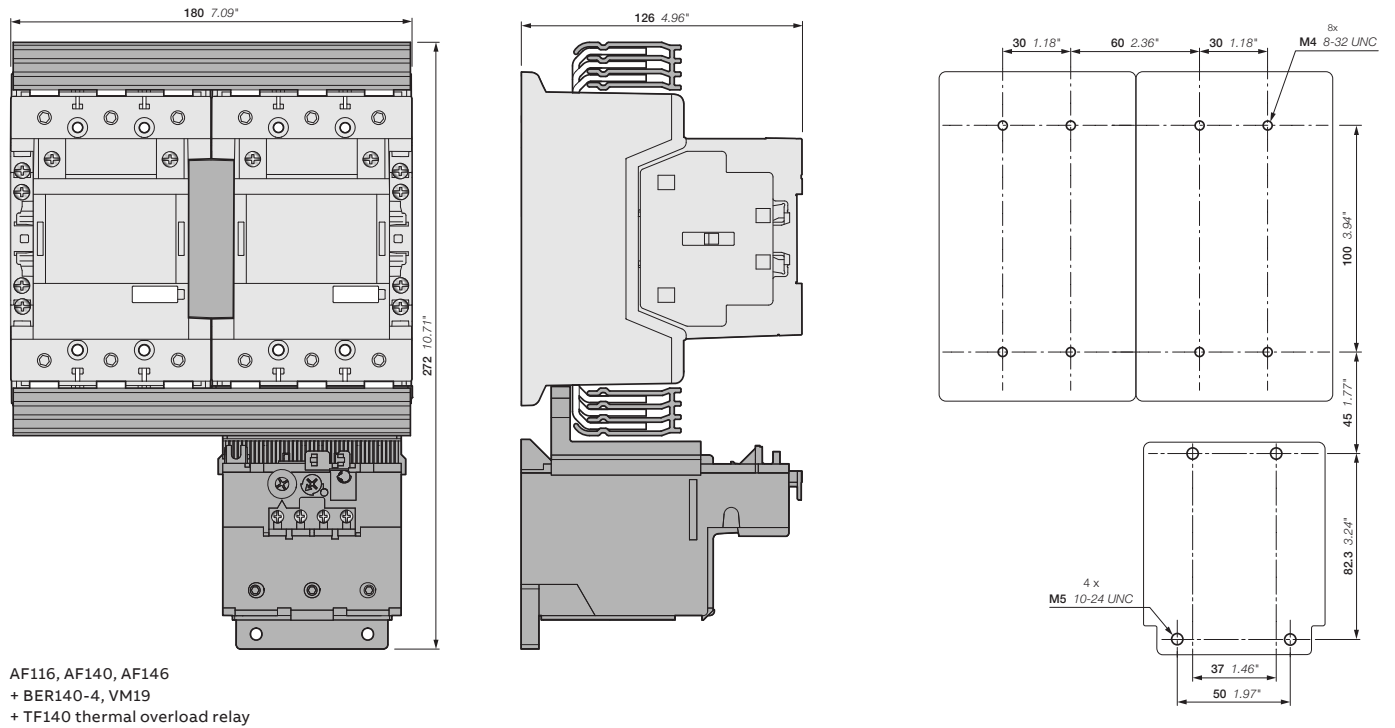
AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay



AF80, AF96
+ BER96-4, VM96-4
+ TF96 thermal overload relay

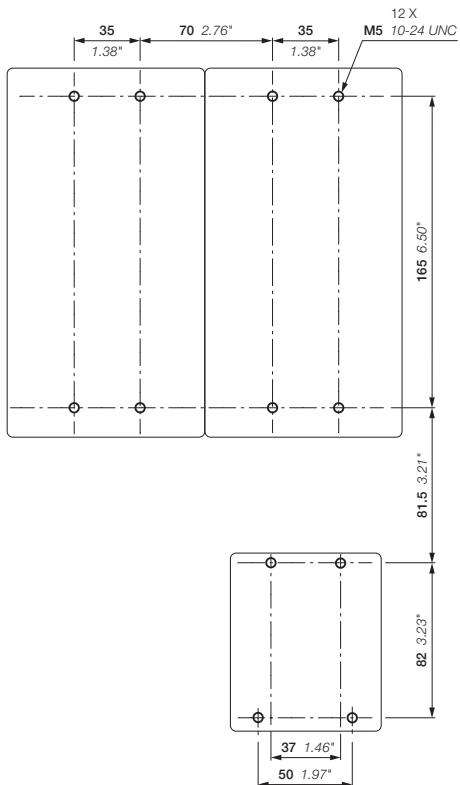
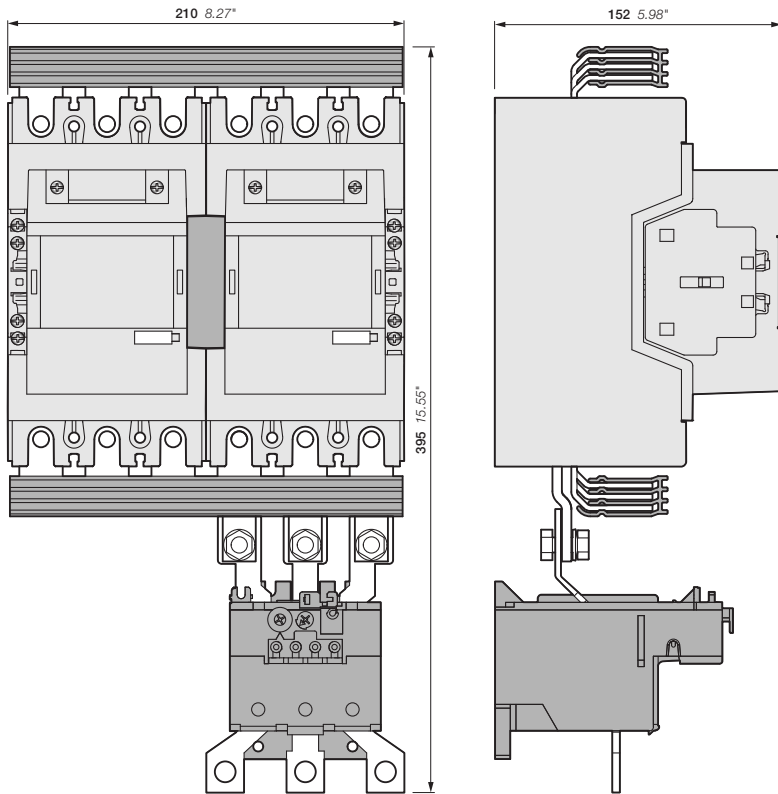
Reversing starters protected by thermal overload relays

With AF contactors - open type version in kit form



Reversing starters protected by thermal overload relays

With AF contactors - open type version in kit form

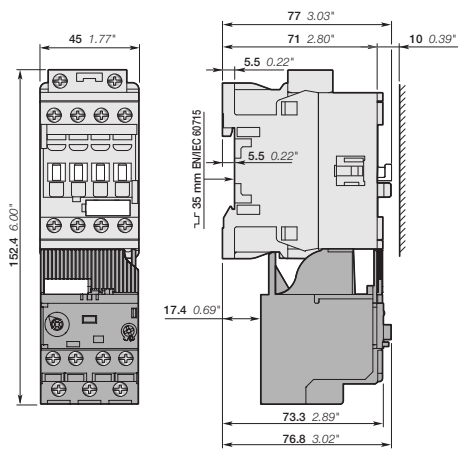


AF190, AF205
 + BER205-4, VM19
 + TA200DU thermal overload relay

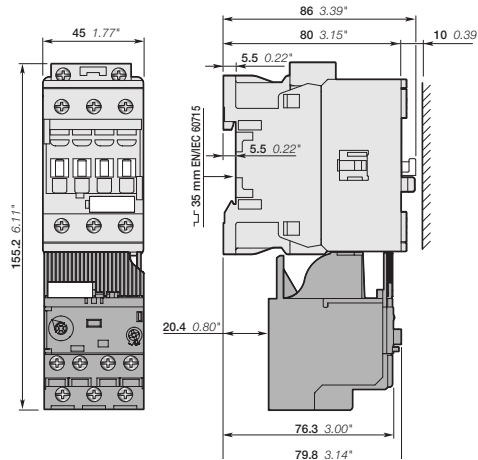
Main dimensions mm, inches

DOL starters protected by electronic overload relays

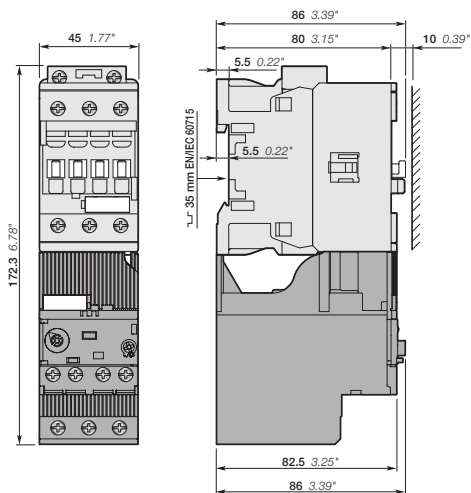
With AF contactors - open type version in kit form



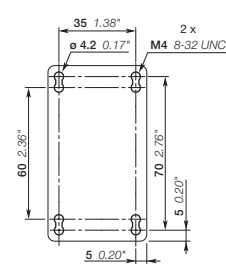
AF09, AF12, AF16
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF19 electronic overload relay



AF26, AF30, AF38
+ EF45 electronic overload relay

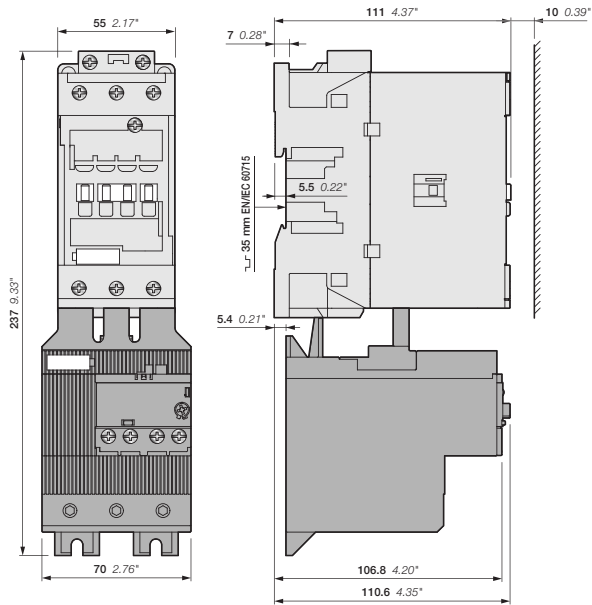


AF09, AF12, AF16, AF26, AF30, AF38
+ EF electronic overload relay

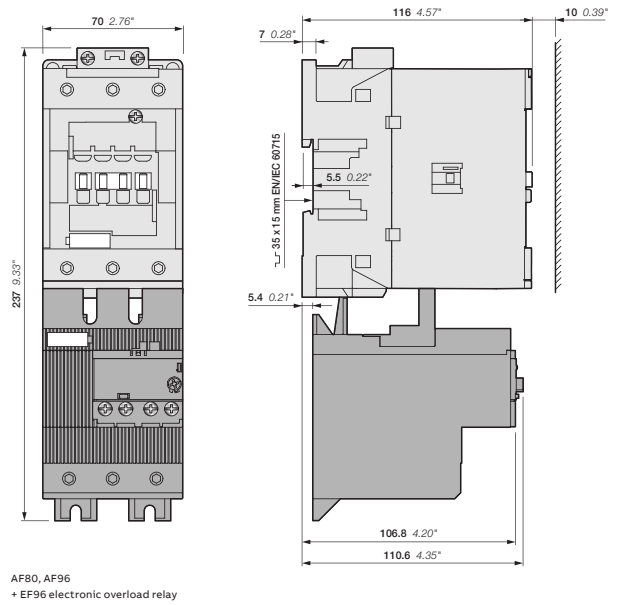
Note: contactor lateral distance to grounded component 2 mm 0.08" min.

DOL starters protected by electronic overload relays

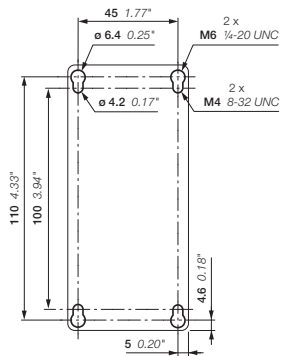
With AF contactors - open type version in kit form



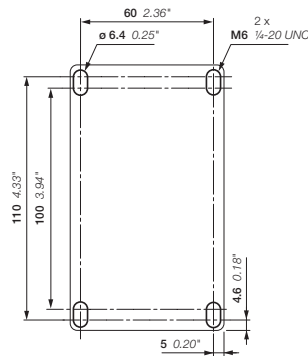
AF40, AF52, AF65
• EF65 electronic overload relay



AF80, AF96
• EF96 electronic overload relay



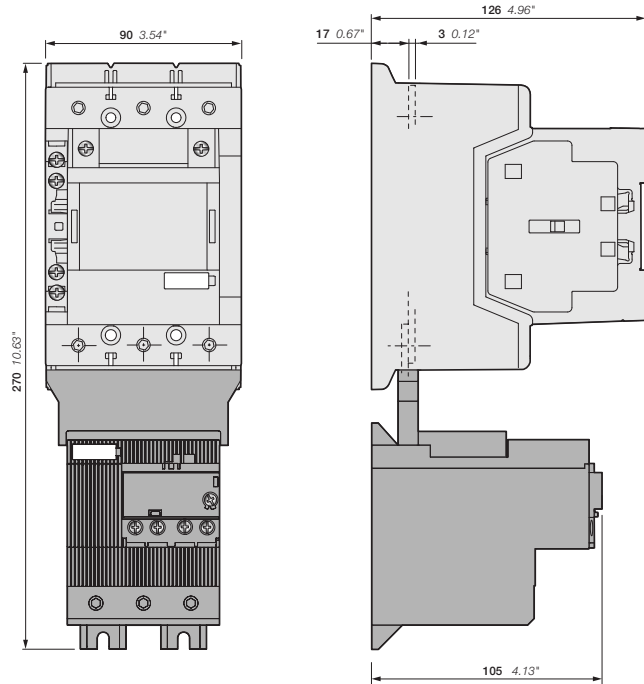
AF40, AF52, AF65
• EF65 electronic overload relay



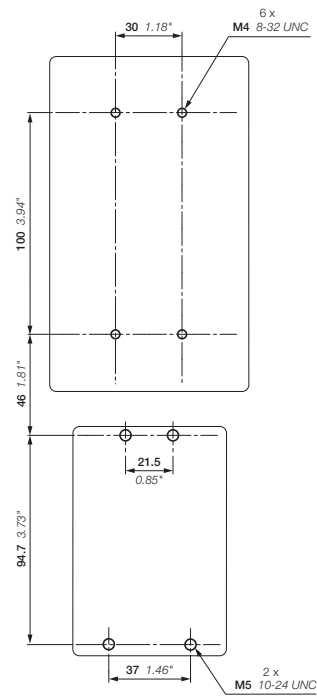
AF80, AF96
• EF96 electronic overload relay

DOL starters protected by electronic overload relays

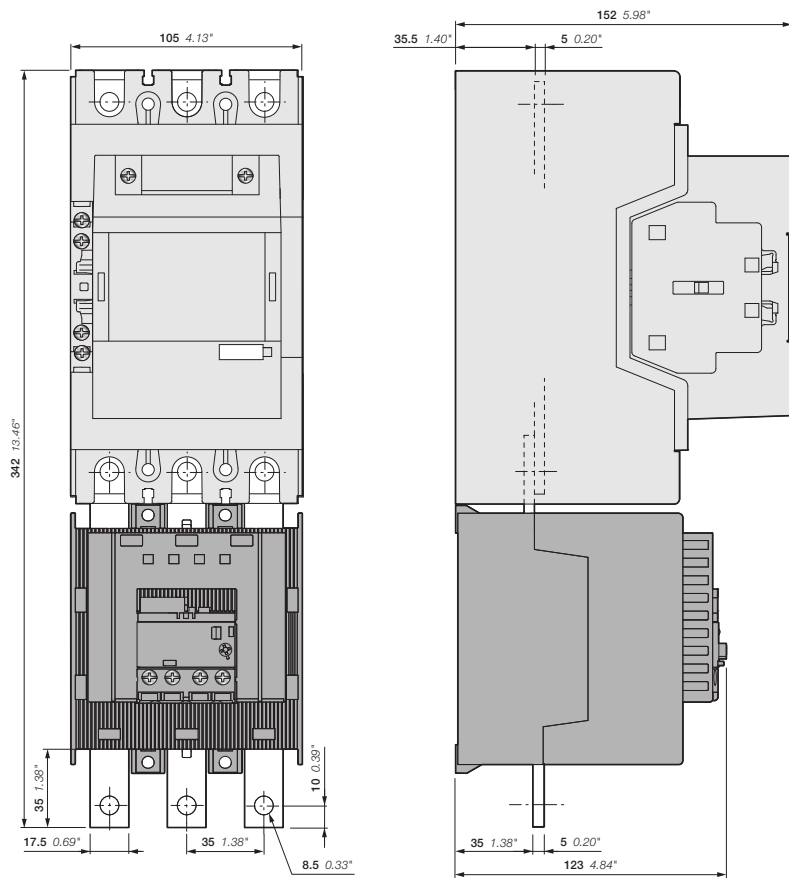
With AF contactors - open type version in kit form



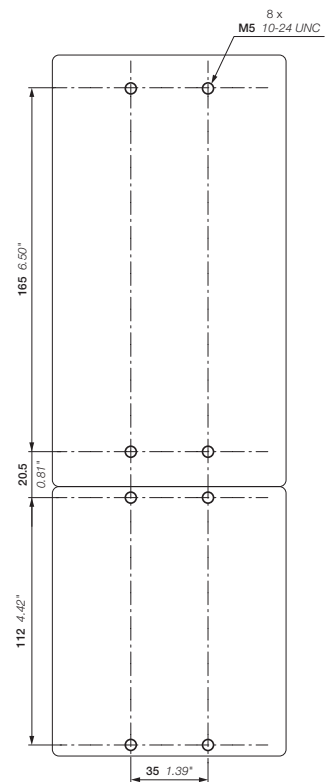
AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



AF116, AF140, AF146-30-11(B)
+ EF146 electronic overload relay



AF190, AF205-30-11
+ EF205 electronic overload relay

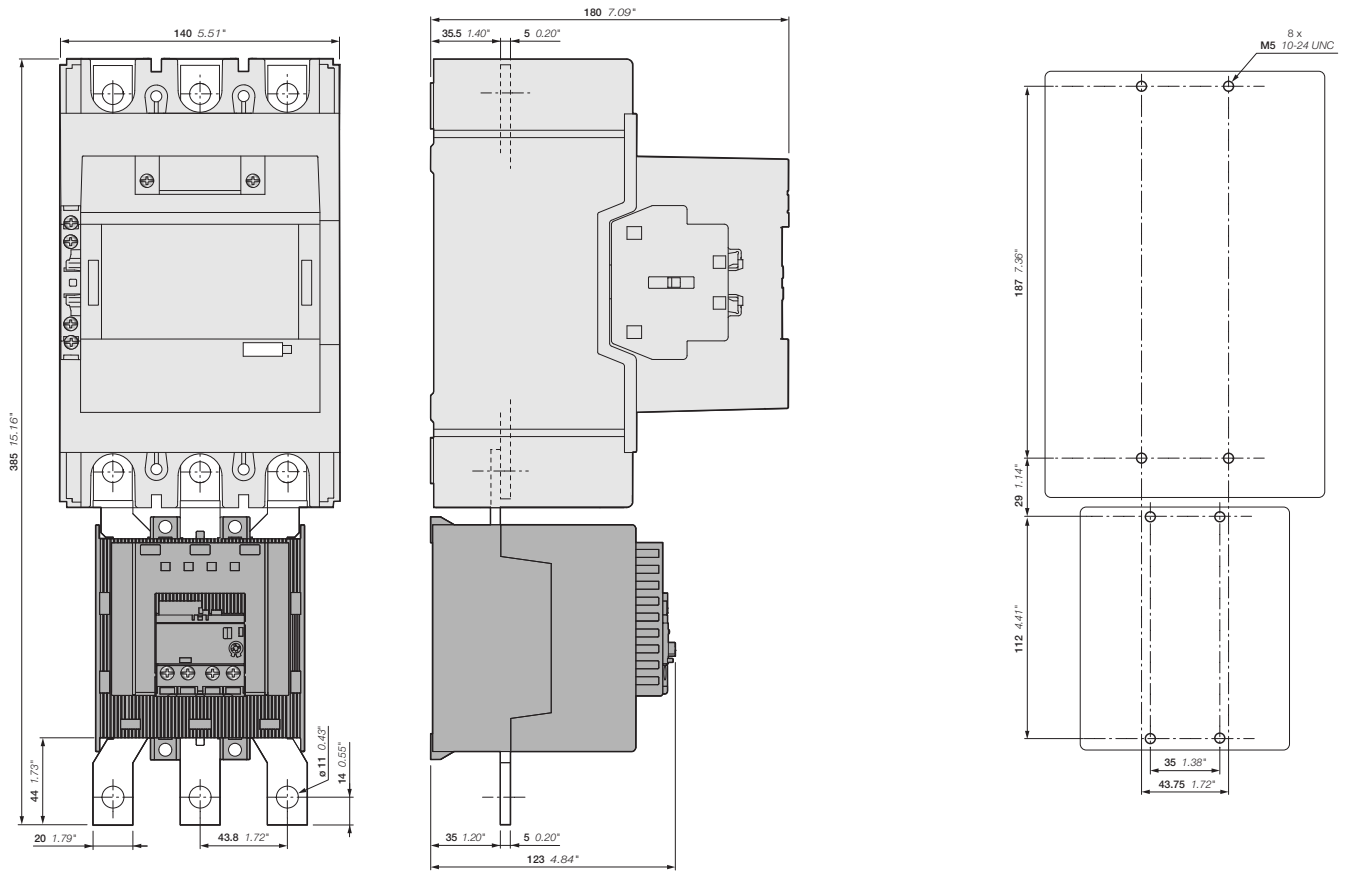


AF190, AF205
+ EF205 electronic overload relay

Main dimensions mm, inches

DOL starters protected by electronic overload relays

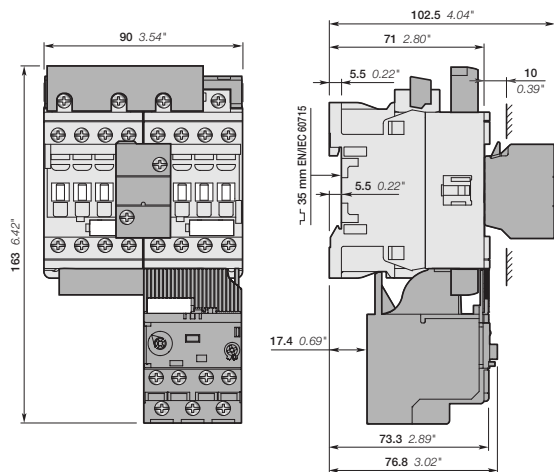
With AF contactors - open type version in kit form



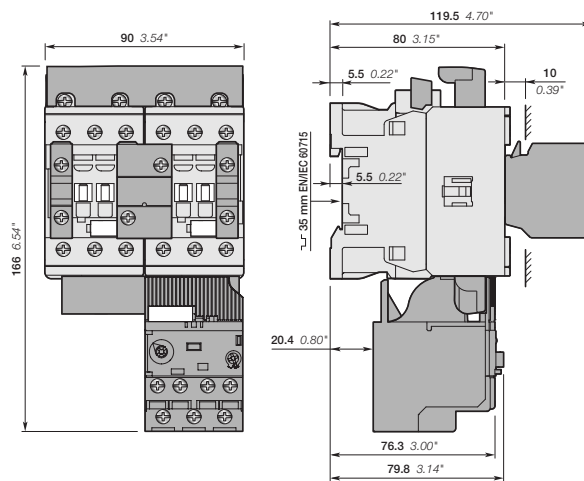
AF265, AF305, AF370-30-11
+ EF370 electronic overload relay

Reversing starters protected by electronic overload relays

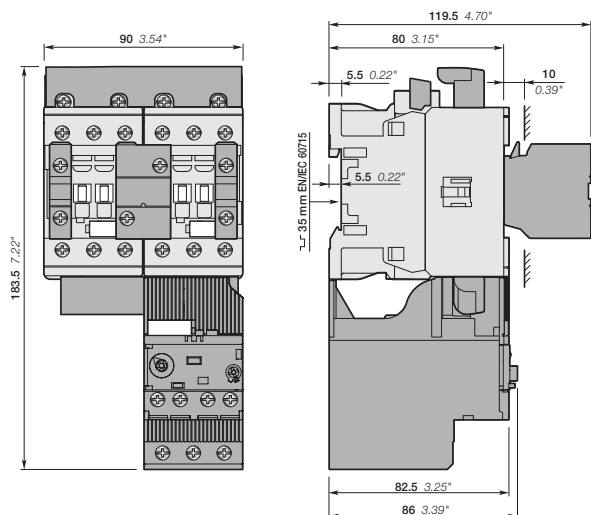
With AF contactors - open type version in kit form



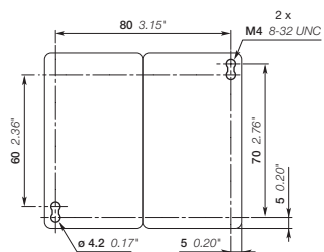
AF09, AF12, AF16
+ BER16-4, VEM4
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF19 electronic overload relay



AF26, AF30, AF38
+ BER38-4, VEM4, CA4-10
+ EF45 electronic overload relay

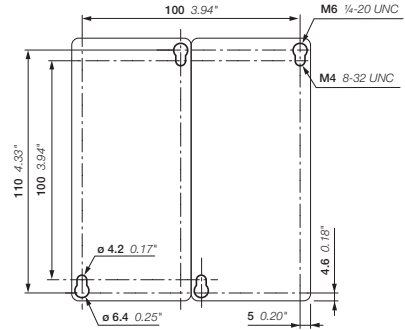
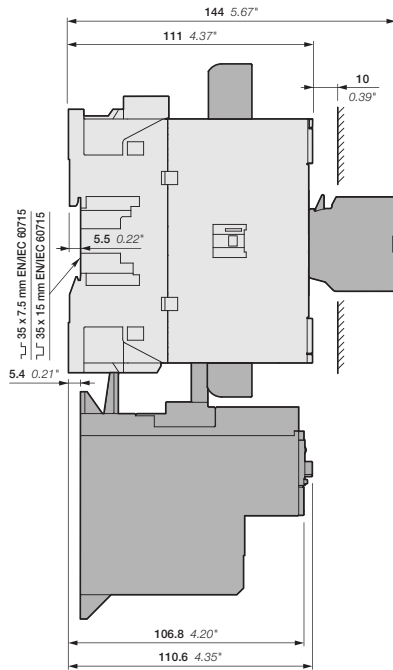
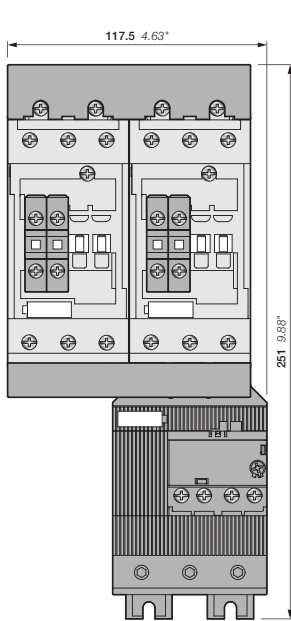


AF09, AF12, AF16, AF26, AF30, AF38

Note: contactor lateral distance to grounded component 2 mm 0.08" min.

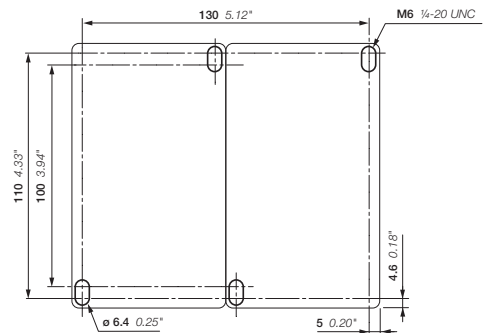
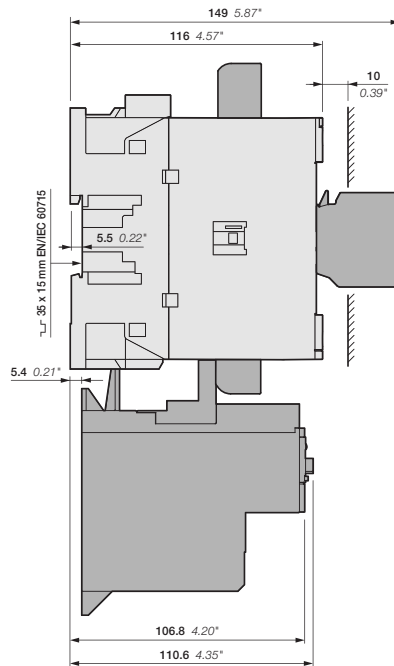
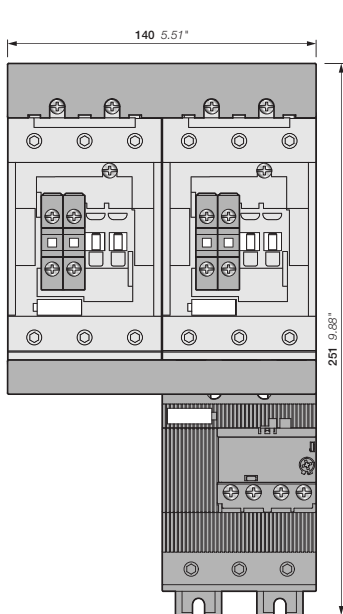
Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form



AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay

AF40, AF52, AF65
+ BER65-4, VM96-4
+ EF65 electronic overload relay



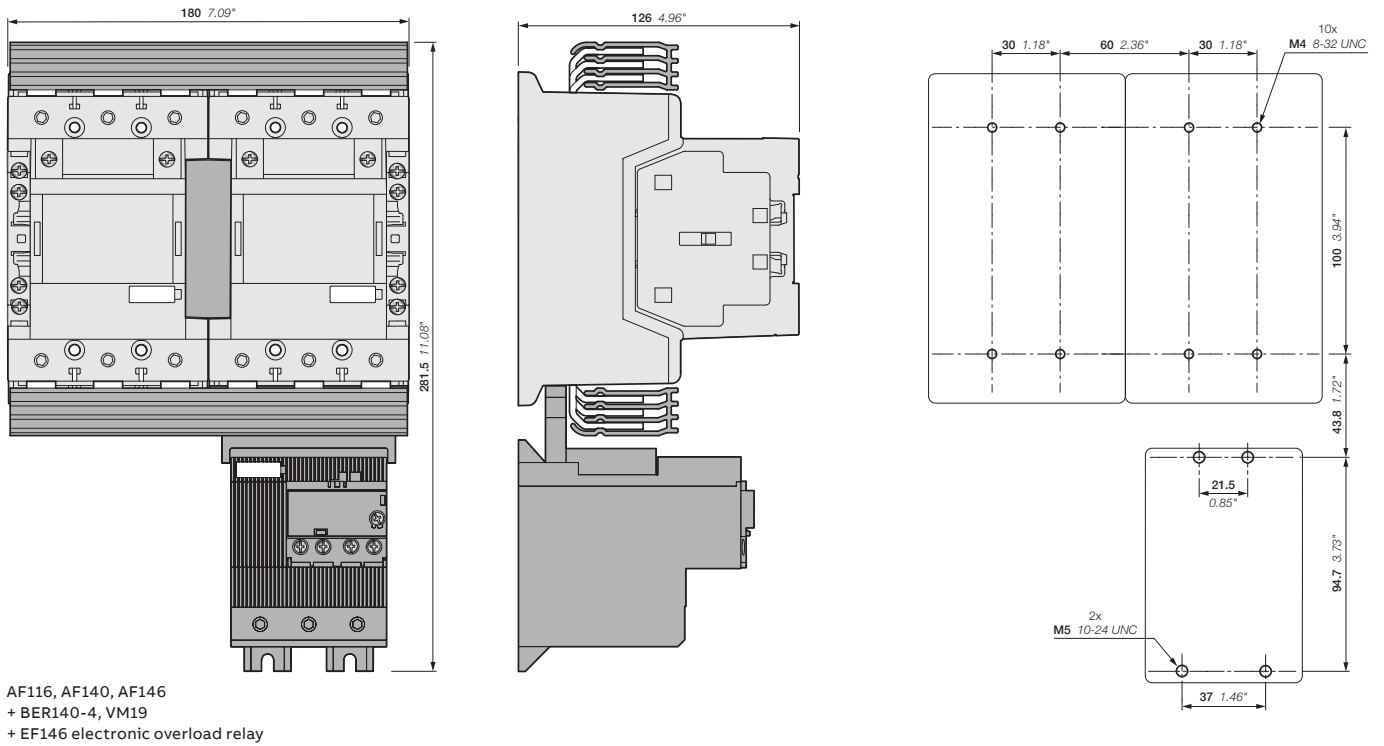
AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

AF80, AF96
+ BER96-4, VM96-4
+ EF96 electronic overload relay

Main dimensions mm, inches

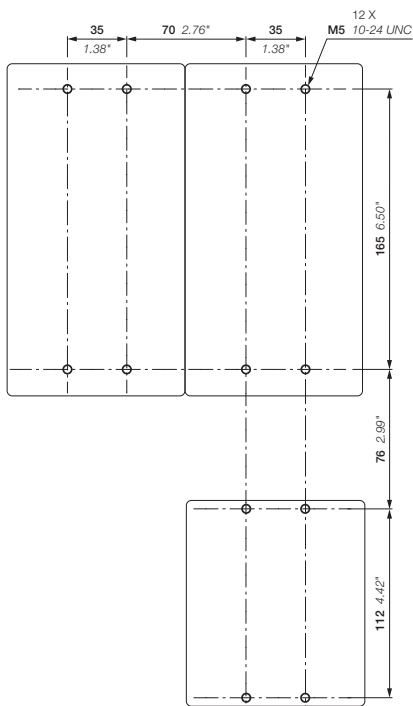
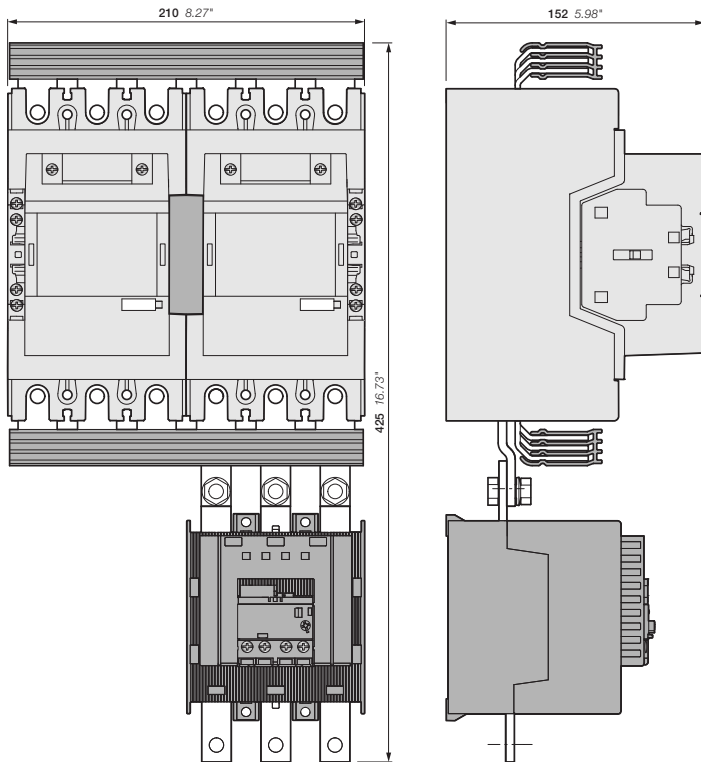
Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form



Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form

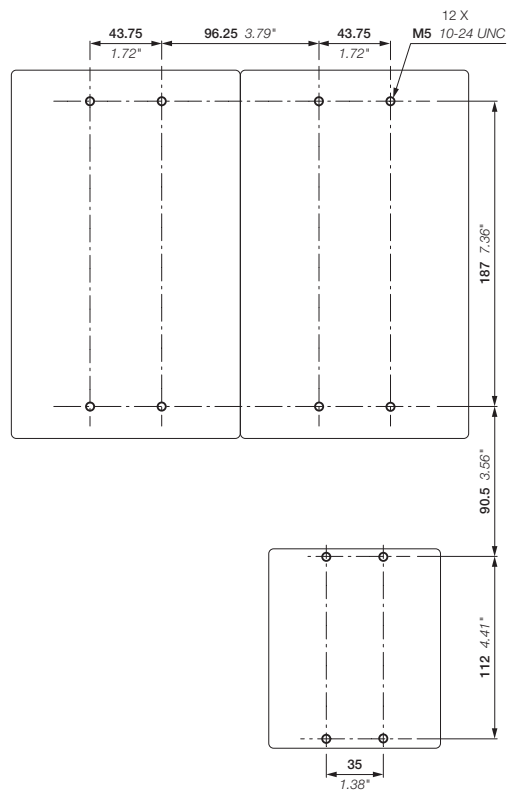
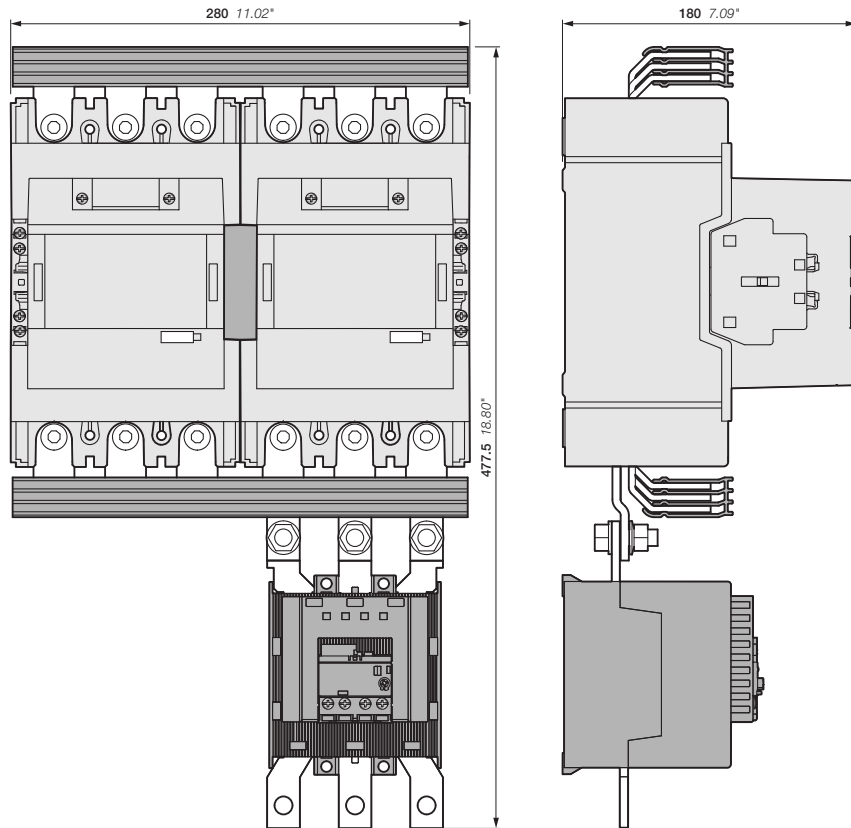


AF190, AF205
 + BER205-4, VM19
 + EF205 electronic overload relay

Main dimensions mm, inches

Reversing starters protected by electronic overload relays

With AF contactors - open type version in kit form

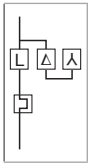


- AF265, AF305, AF370
- + BER370-4, VM19
- + EF370 electronic overload relay

Main dimensions mm, inches

Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form



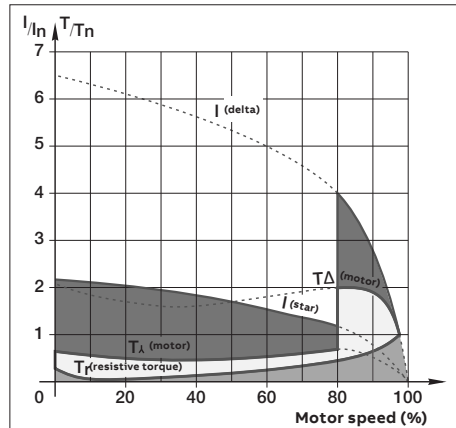
AF16-30-10 + AF16-30-10 + AF09-30-10 + BEY16-4 + VEM4 + TF42



AF140-30-11 + AF140-30-11 + AF140-30-11 + BEY140-4 + VM19 + EF146

Application

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.



I = current
T = torque
In = nominal current
Tn = nominal torque

When starting:

- Inrush current is reduced to a third of direct starting current
 - Motor torque is reduced to a third or even less of direct starting torque.
- Transient current is generated when switching from star to delta connection. During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs. This starting mode is therefore ideal for machines having low starting torque such as pumps, centrifugal compressors, wood-working machines...

Precaution

- Motor nominal voltage in delta connection must be equal to that of the mains. Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
- In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

Sequence

Starting is a three-stage process:

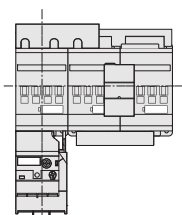
- 1st stage:** "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.
- 2nd stage:** "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.
- 3rd stage:** "Delta" connection - Thanks to AF contactors, a transition time (or dwelling time) of 50 ms is already integrated between the opening of the "star" contactor and closing of the "delta" contactor.

Conclusion: An on-delay timer without dwelling time (e.g.: CT-ERS.21S or TEF4-ON) is enough to countdown the programmed starting time (6 to 10 s) during "Star connection". The use of a star-delta timer including a dwelling time is not permitted.

Main Technical Data

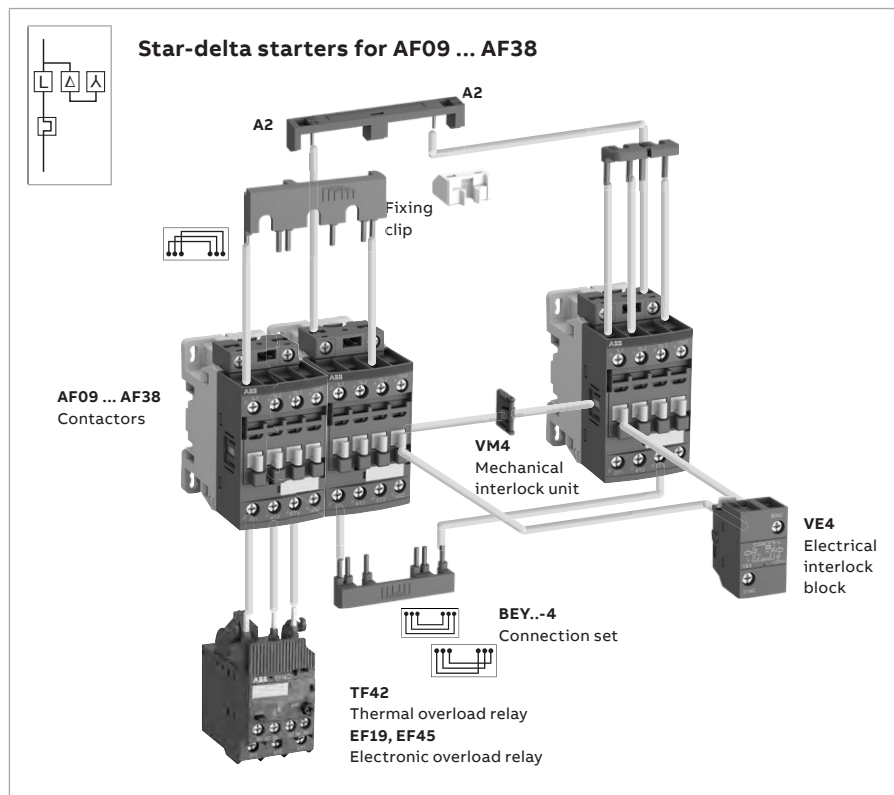
| | |
|-----------------------------------|--|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage Ue max. | 690 V - 50/60 Hz |
| Rated insulation voltage Ui | |
| acc. to IEC 60947-4-1 | 690 V |
| acc. to UL / CSA | 600 V |
| Ambient air temperature | |
| Close to the device | ≤ 60 °C (TF42: 38 A above ≤ 50 °C) |
| Degree of protection | IP20 |
| Switching frequency | Refer to "Switching frequency diagrams" page |

Mounting positions



Star-delta starters protected by overload relays

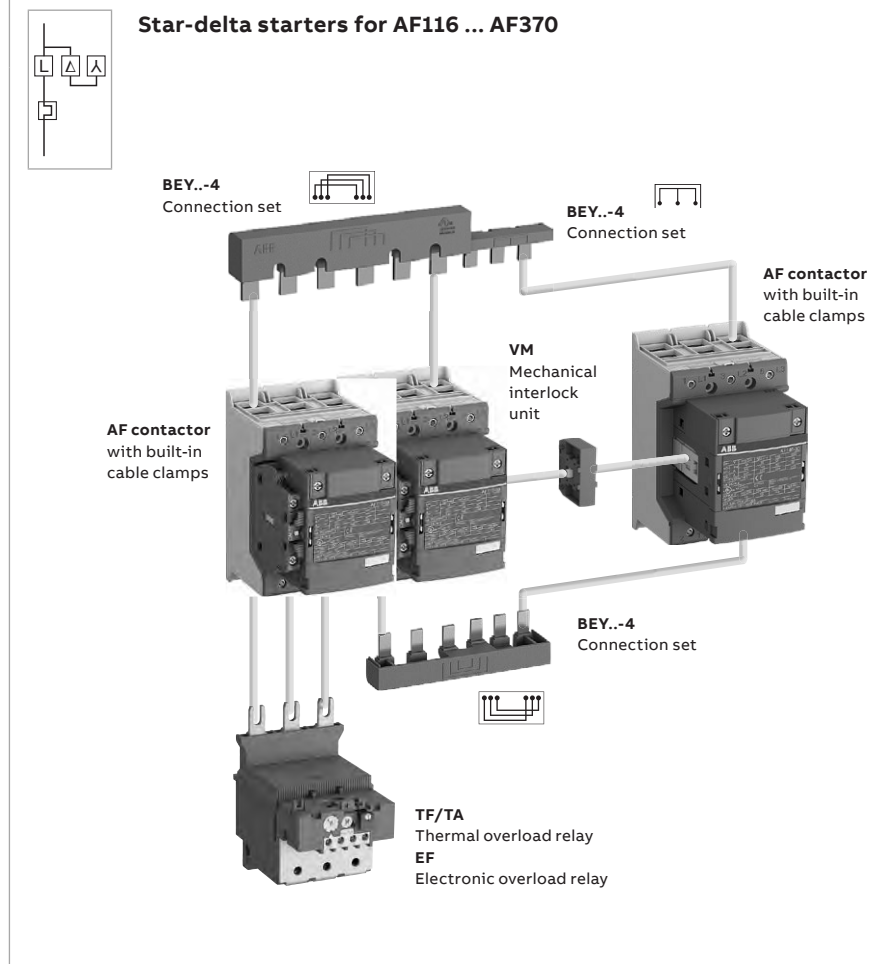
With AF contactors - Open type version in kit form



You can easily assemble star-delta starter thanks to our complete range of accessories:

- For AF09 ... AF38, use VEM4 mechanical and electrical interlock set without increasing starter width. It includes:
 - VM4 mechanical interlock unit and 2 fixing clips
 - VE4 electrical interlock block with A2-A2 connection.
- For AF40 ... AF370, use VM mechanical interlock unit and additional auxiliary contact blocks for electrical interlocking.
- BEY..-4 connection set: it assures a safe and simple connection between both contactor main terminals.

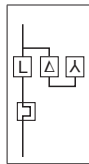
Select now easily and quickly your starter in the following pages at 400 V, up to 200 kW.



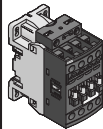
For the full coordination tables: www.abb.com/lowvoltage then go to the right menu: "Support", select: "Online Product Selection Tools" then select "Coordination Tables for motor protection"

Star-delta starters protected by thermal overload relays

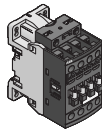
With AF contactors - Open type version in kit form



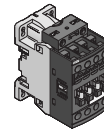
Line contactor KM1



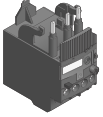
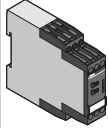
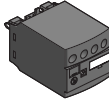
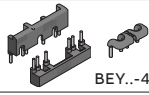
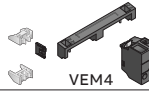

Delta contactor KM3



Star contactor KM2

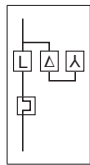


| IEC AC-3 Rated power 400 V kW | Rated current 400 V A | Control voltage Uc min. ... Uc max. (1) | | Line contactor KM1 | | Delta contactor KM3 | | Star contactor KM2 | |
|--|--------------------------------|---|-----------|--------------------|-----------------|---------------------|-----------------|--------------------|-----------------|
| | | V 50/60 Hz | V DC | Type | Order code | Type | Order code | Type | Order code |
| 7.5 | 15.5 | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 11 | 22 | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | AF12Z-30-10-21 | 1SBL156001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | AF12-30-10-13 | 1SBL157001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 15 | 29 | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | AF16Z-30-10-21 | 1SBL176001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | AF16-30-10-13 | 1SBL177001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 18.5 | 35 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 22 | 41 | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 25 | 47 | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | AF30Z-30-00-21 | 1SBL276001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | AF30-30-00-13 | 1SBL277001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 37 | 66 | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 45 | 80 | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | AF52-30-00-11 | 1SBL367001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | AF52-30-00-13 | 1SBL367001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 55 | 97 | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | AF65-30-00-11 | 1SBL387001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | AF65-30-00-13 | 1SBL387001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 75 | 132 | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | AF80-30-00-11 | 1SBL397001R1100 | AF52-30-00-11 (4) | 1SBL367001R1100 |
| | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | AF80-30-00-13 | 1SBL397001R1300 | AF52-30-00-13 | 1SBL367001R1300 |
| 90 | 160 | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | AF96-30-00-11 | 1SBL407001R1100 | AF65-30-00-11 | 1SBL387001R1100 |
| | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | AF96-30-00-13 | 1SBL407001R1300 | AF65-30-00-13 | 1SBL387001R1300 |
| 110 | 195 | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 (4) | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 132 | 230 | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | AF140-30-11-11 | 1SFL447001R1111 | AF116-30-11-11 | 1SFL427001R1111 |
| | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | AF140-30-11-13 | 1SFL447001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 160 | 280 | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | AF190-30-11-11 | 1SFL487002R1111 | AF140-30-11-11 | 1SFL447001R1111 |
| | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | AF190-30-11-13 | 1SFL487002R1311 | AF140-30-11-13 | 1SFL447001R1311 |

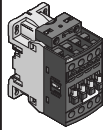
| Thermal overload relays (2) | | | Electronic timers (3) | | Accessories | | Auxiliary contact blocks | |
|--|-------------|-----------------|---|------------------------------------|--|------------------------------------|--|--|
|  | | |   CT-ERS TEF4-ON U _c = 24...240 V 50/60 Hz or DC | | Connection sets  BEY..-4 Mechanical and electrical interlock sets  VEM4 | |  CA4 | |
| Setting ranges | Type | Order code | Type | Order code | Type | Order code | Type | Order code |
| A | | | | | | | | |
| 7.60...10.0 | TF42-10 | 1SAZ721201R1043 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 10.0...13.0 | TF42-13 | 1SAZ721201R1045 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 16.0...20.0 | TF42-20 | 1SAZ721201R1049 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 20.0...24.0 | TF42-24 | 1SAZ721201R1051 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 20.0...24.0 | TF42-24 | 1SAZ721201R1051 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 24.0...29.0 | TF42-29 | 1SAZ721201R1052 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 30.0...40.0 | TF65-40 | 1SAZ811201R1003 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 36.0...47.0 | TF65-47 | 1SAZ811201R1004 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 50.0...60.0 | TF65-60 | 1SAZ811201R1006 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 65.0...78.0 | TF96-78 | 1SAZ911201R1004 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY96-4 + VM96-4 | 1SBN083913R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 84.0...96.0 | TF96-96 | 1SAZ911201R1006 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY96-4 + VM96-4 | 1SBN083913R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 100...135 | TF140DU-135 | 1SAZ431201R1003 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4 + VM19 | 1SFN084413R1000 1SFN030300R1000 | - | - |
| 100...135 | TF140DU-135 | 1SAZ431201R1003 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4 + VM19 | 1SFN084413R1000 1SFN030300R1000 | - | - |
| 130...175 | TA200DU-175 | 1SAZ421201R1005 | CT-ERS.21S | 1SVR730100R0300 | BEY190-4 + VM140/190 | 1SFN084813R1000 1SFN034403R1000 | - | - |

Star-delta starters protected by electronic overload relays

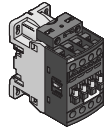
With AF contactors - Open type version in kit form



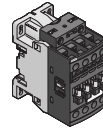
Line contactor KM1



Delta contactor KM3



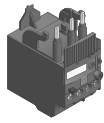
Star contactor KM2



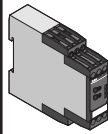
| IEC AC-3 | Rated power 400 V kW | Rated current 400 V A | Control voltage Uc min. ... Uc max. (1) | | Type | Order code | Type | Order code | Type | Order code |
|-------------|----------------------------|-----------------------------|---|-----------|----------------|-----------------|----------------|-----------------|--------------------|-----------------|
| | | | V 50/60 Hz | V DC | | | | | | |
| 7.5 | 15.5 | | 24...60 | 20...60 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | | 100...250 | 100...250 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 11 | 22 | | 24...60 | 20...60 | AF12Z-30-10-21 | 1SBL156001R2110 | AF12Z-30-10-21 | 1SBL156001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | | 100...250 | 100...250 | AF12-30-10-13 | 1SBL157001R1310 | AF12-30-10-13 | 1SBL157001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 15 | 29 | | 24...60 | 20...60 | AF16Z-30-10-21 | 1SBL176001R2110 | AF16Z-30-10-21 | 1SBL176001R2110 | AF09Z-30-10-21 | 1SBL136001R2110 |
| | | | 100...250 | 100...250 | AF16-30-10-13 | 1SBL177001R1310 | AF16-30-10-13 | 1SBL177001R1310 | AF09-30-10-13 | 1SBL137001R1310 |
| 18.5 | 35 | | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 22 | 41 | | 24...60 | 20...60 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | | 100...250 | 100...250 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 25 | 47 | | 24...60 | 20...60 | AF30Z-30-00-21 | 1SBL276001R2100 | AF30Z-30-00-21 | 1SBL276001R2100 | AF26Z-30-00-21 | 1SBL236001R2100 |
| | | | 100...250 | 100...250 | AF30-30-00-13 | 1SBL277001R1300 | AF30-30-00-13 | 1SBL277001R1300 | AF26-30-00-13 | 1SBL237001R1300 |
| 37 | 66 | | 24...60 | 20...60 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | | 100...250 | 100...250 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 45 | 80 | | 24...60 | 20...60 | AF52-30-00-11 | 1SBL367001R1100 | AF52-30-00-11 | 1SBL367001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | | 100...250 | 100...250 | AF52-30-00-13 | 1SBL367001R1300 | AF52-30-00-13 | 1SBL367001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 55 | 97 | | 24...60 | 20...60 | AF65-30-00-11 | 1SBL387001R1100 | AF65-30-00-11 | 1SBL387001R1100 | AF40-30-00-11 | 1SBL347001R1100 |
| | | | 100...250 | 100...250 | AF65-30-00-13 | 1SBL387001R1300 | AF65-30-00-13 | 1SBL387001R1300 | AF40-30-00-13 | 1SBL347001R1300 |
| 75 | 132 | | 24...60 | 20...60 | AF80-30-00-11 | 1SBL397001R1100 | AF80-30-00-11 | 1SBL397001R1100 | AF52-30-00-11 | 1SBL367001R1100 |
| | | | 100...250 | 100...250 | AF80-30-00-13 | 1SBL397001R1300 | AF80-30-00-13 | 1SBL397001R1300 | AF52-30-00-13 | 1SBL367001R1300 |
| 90 | 160 | | 24...60 | 20...60 | AF96-30-00-11 | 1SBL407001R1100 | AF96-30-00-11 | 1SBL407001R1100 | AF65-30-00-11 | 1SBL387001R1100 |
| | | | 100...250 | 100...250 | AF96-30-00-13 | 1SBL407001R1300 | AF96-30-00-13 | 1SBL407001R1300 | AF65-30-00-13 | 1SBL387001R1300 |
| 110 | 195 | | 24...60 | 20...60 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 | 1SFL427001R1111 | AF116-30-11-11 (4) | 1SFL427001R1111 |
| | | | 100...250 | 100...250 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 132 | 230 | | 24...60 | 20...60 | AF140-30-11-11 | 1SFL447001R1111 | AF140-30-11-11 | 1SFL447001R1111 | AF116-30-11-11 | 1SFL427001R1111 |
| | | | 100...250 | 100...250 | AF140-30-11-13 | 1SFL447001R1311 | AF140-30-11-13 | 1SFL447001R1311 | AF116-30-11-13 | 1SFL427001R1311 |
| 160 | 280 | | 24...60 | 20...60 | AF190-30-11-11 | 1SFL487002R1111 | AF190-30-11-11 | 1SFL487002R1111 | AF140-30-11-11 | 1SFL447001R1111 |
| | | | 100...250 | 100...250 | AF190-30-11-13 | 1SFL487002R1311 | AF190-30-11-13 | 1SFL487002R1311 | AF140-30-11-13 | 1SFL447001R1311 |
| 200 | 350 | | 24...60 | 20...60 | AF205-30-11-11 | 1SFL527002R1111 | AF205-30-11-11 | 1SFL527002R1111 | AF190-30-11-11 | 1SFL487002R1111 |
| | | | 100...250 | 100...250 | AF205-30-11-13 | 1SFL527002R1311 | AF205-30-11-13 | 1SFL527002R1311 | AF190-30-11-13 | 1SFL487002R1311 |
| 250 | 430 | | 24...60 | 20...60 | AF265-30-11-11 | 1SFL547002R1111 | AF265-30-11-11 | 1SFL547002R1111 | AF265-30-11-11 | 1SFL527002R1111 |
| | | | 100...250 | 100...250 | AF265-30-11-13 | 1SFL547002R1311 | AF265-30-11-13 | 1SFL547002R1311 | AF205-30-11-13 | 1SFL527002R1311 |
| 315 | 540 | | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | AF370-30-11-11 | 1SFL607002R1111 | AF265-30-11-11 | 1SFL547002R1111 |
| | | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | AF370-30-11-13 | 1SFL607002R1311 | AF265-30-11-13 | 1SFL547002R1311 |
| 355 | 610 | | 24...60 | 20...60 | AF370-30-11-11 | 1SFL607002R1111 | AF370-30-11-11 | 1SFL607002R1111 | AF305-30-11-11 | 1SFL587002R1111 |
| | | | 100...250 | 100...250 | AF370-30-11-13 | 1SFL607002R1311 | AF370-30-11-13 | 1SFL607002R1311 | AF305-30-11-13 | 1SFL587002R1311 |

(1) AF09 ... AF370: ambient temperature ≤ 60 °C.
 (2) The setting current value is: nominal motor current x 0.58. Overload relay type given for 400 V - AC-3.
 For other voltage, select overload relay type according to required nominal motor current x 0.58.
 (3) On-delay timer without dwelling-time (e.g.: side-mounted CT-ERS.21S or front-mounted TEF4-ON) is enough to countdown the programmed starting time during "Star connection". In case of use of front-mounted TEF4-ON on-delay timer, mount on KM1 contactor AF26 ... AF96 a side-mounted CAL4-11 auxiliary contact block instead of CA4-10 auxiliary contact block.
 (4) AF80 can also be used, but no connection set and mechanical interlock is available for this combination.

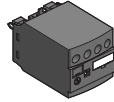
Electronic overload relays (2)



Electronic timers (3)



CT-ERS

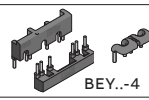


TEF4-ON

Uc = 24...240 V
50/60 Hz or DC

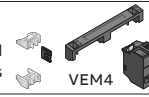
Accessories

Connection sets



BEY.-4

Mechanical and electrical interlock sets



VEM4

Auxiliary contact blocks



CA4

| Setting ranges | Type | Order code | Type | Order code | Type | Order code | Type | Order code |
|----------------|-----------|-----------------|--------------------------|------------------------------------|-------------------------|------------------------------------|--|--|
| A | | | | | | | | |
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 5.70...18.9 | EF19-18.9 | 1SAX121001R1105 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY16-4 + VEM4 | 1SBN081313R2000 1SBN030111R1000 | - | - |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 9.00...30.0 | EF45-30 | 1SAX221001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY38-4 + VEM4 | 1SBN082713R2000 1SBN030111R1000 | KM1 : 1 x CA4-10 KM2 : 1 x CA4-10 | 1SBN010110R1010 1SBN010110R1010 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 25...70 | EF65-70 | 1SAX331001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY65-4 + VM96-4 | 1SBN083413R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 36...100 | EF96-100 | 1SAX341001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY96-4 + VM96-4 | 1SBN083913R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 36...100 | EF96-100 | 1SAX341001R1101 | CT-ERS.21S or TEF4-ON | 1SVR730100R0300 1SBN020112R1000 | BEY96-4 + VM96-4 | 1SBN083913R2000 1SBN033405T1000 | KM1 : 1 x CA4-10 (3) KM2 : 1 x CA4-10 1 x CA4-01 KM3 : 1 x CA4-01 | 1SBN010110R1010 1SBN010110R1010 1SBN010110R1001 1SBN010110R1001 |
| 54...150 | EF146-150 | 1SAX351001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4 + VM19 | 1SBN084413R1000 1SBN030300R1000 | - | - |
| 54...150 | EF146-150 | 1SAX351001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY140-4 + VM19 | 1SBN084413R1000 1SBN030300R1000 | - | - |
| 63...210 | EF205-210 | 1SAX531001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY190-4 + VM140/190 | 1SBN084813R1000 1SBN034403R1000 | - | - |
| 63...210 | EF205-210 | 1SAX531001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY205-4 + VM19 | 1SBN085213R1000 1SBN030300R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY265-4 + VM205/265 | 1SBN085413R1000 1SBN035203R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY370-4 + VM19 | 1SBN085813R1000 1SBN030300R1000 | - | - |
| 115...380 | EF370-380 | 1SAX611001R1101 | CT-ERS.21S | 1SVR730100R0300 | BEY370-4 + VM19 | 1SBN085813R1000 1SBN030300R1000 | - | - |

Star-delta starters protected by overload relays

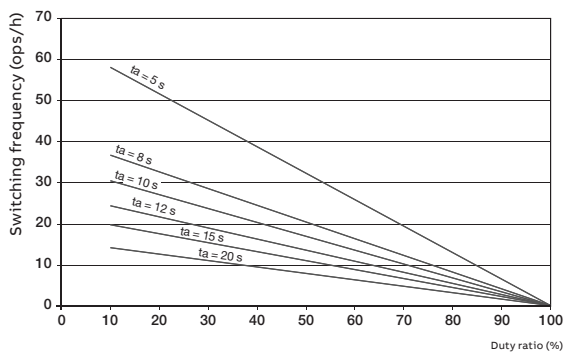
With AF contactors - Open type version in kit form
Switching frequency diagrams

General

Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay.

Thermal overload relay

Intermittent periodic duty



ta: motor starting time

Example:

Starting time of the motor: 7 second (use 8s curve) - Duty ratio: 63 % means a permitted switching frequency of max. 15 operating cycles per hour.

This corresponds to a 4 minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.

Electronic overload relay : please consult us

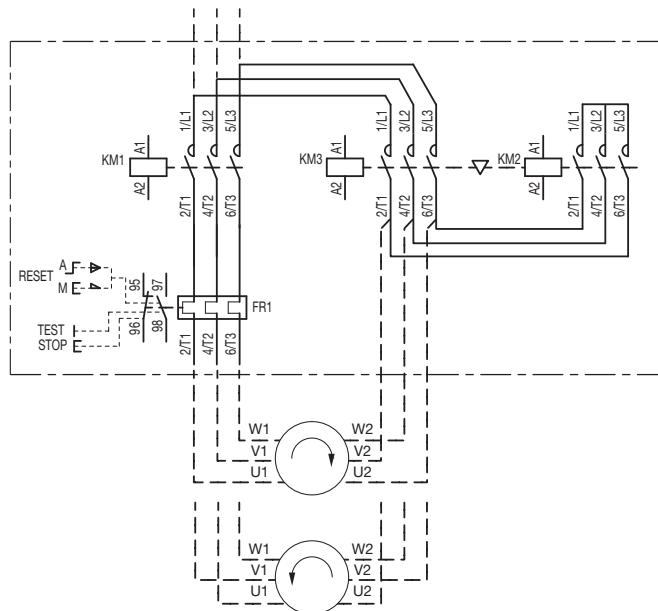
Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

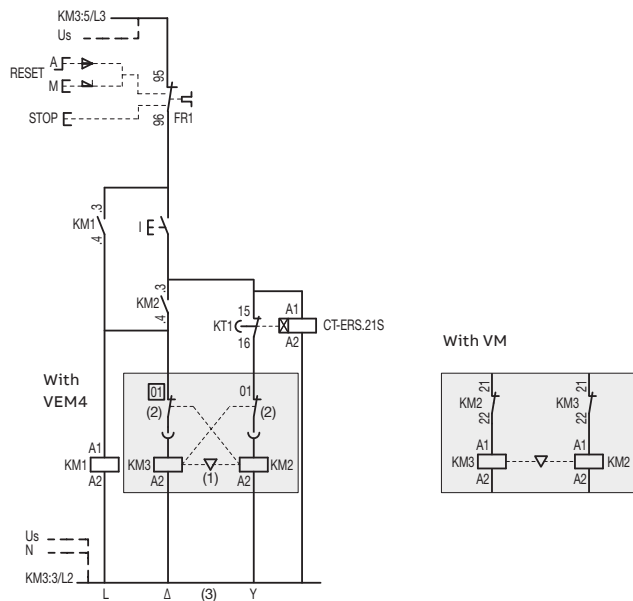
Wiring diagrams with CT-ERS.21S timer

Star-delta starters

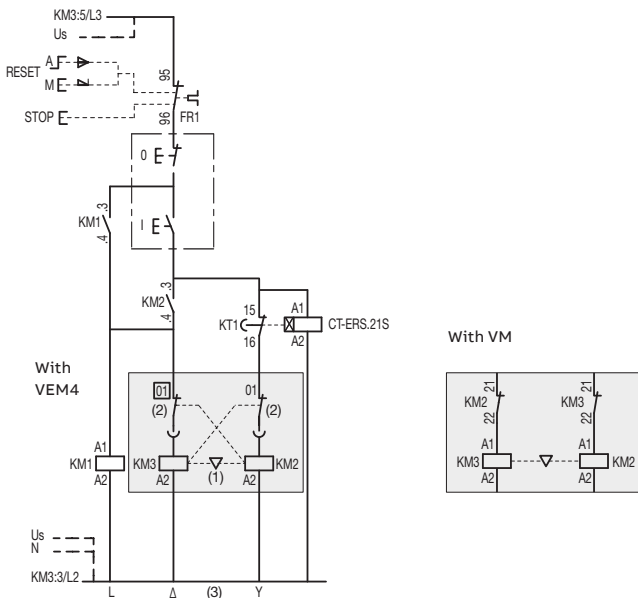
Power circuit



AC or DC local control with CT-ERS.21S timer



AC or DC remote control with CT-ERS.21S timer



Note: - VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection
 (Except for coil Uc 12-20 V DC : use VM4 with CA4).
 - coil Uc 12-20 V DC : A1+, A2-

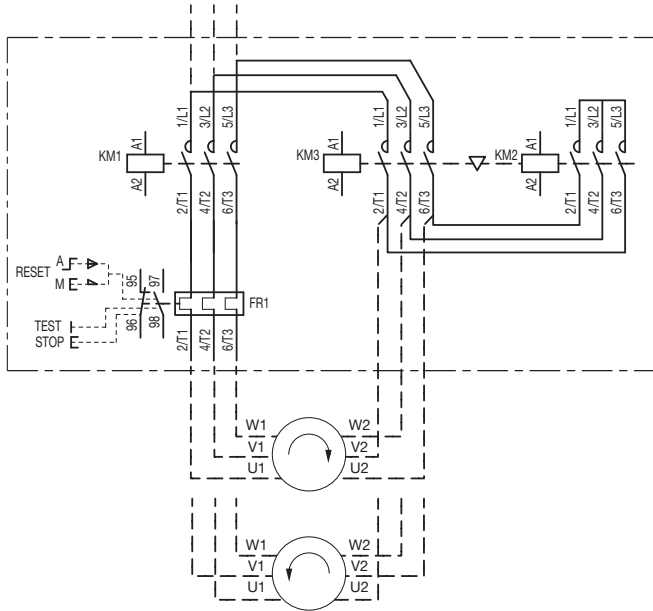
Star-delta starters protected by overload relays

With AF contactors - Open type version in kit form

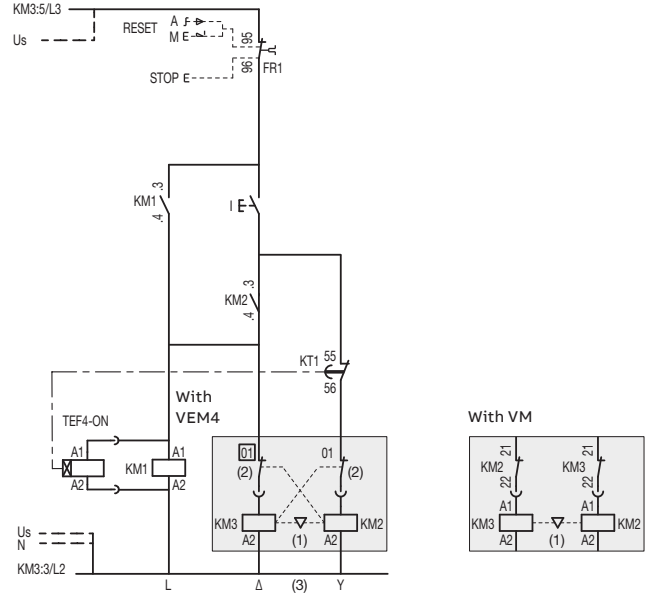
Wiring diagrams with TEF4-ON timer

Star-delta starters

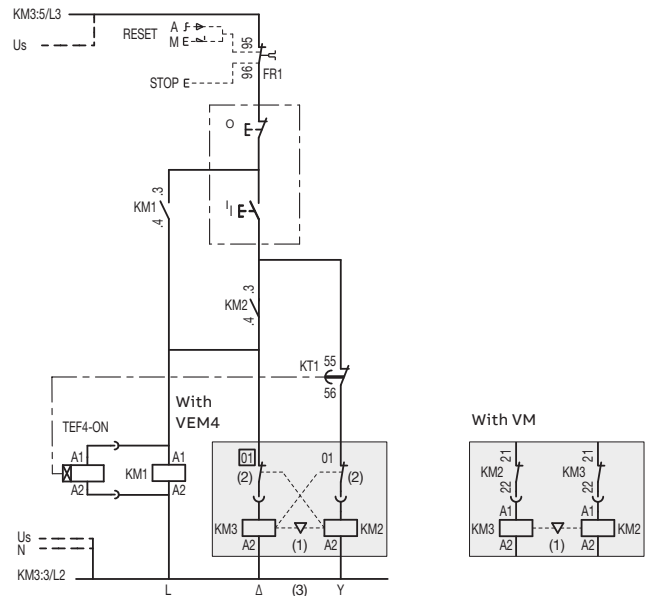
Power circuit



AC or DC local control with TEF4-ON timer
 Uc = 24...240 V 50/60 Hz or DC



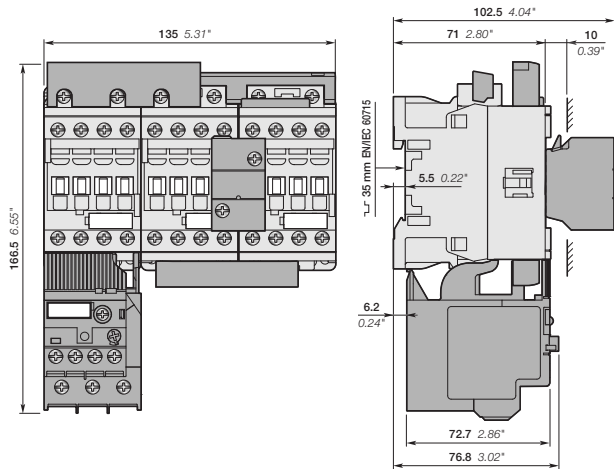
AC or DC remote control with TEF4-ON timer
 Uc = 24...240 V 50/60 Hz or DC



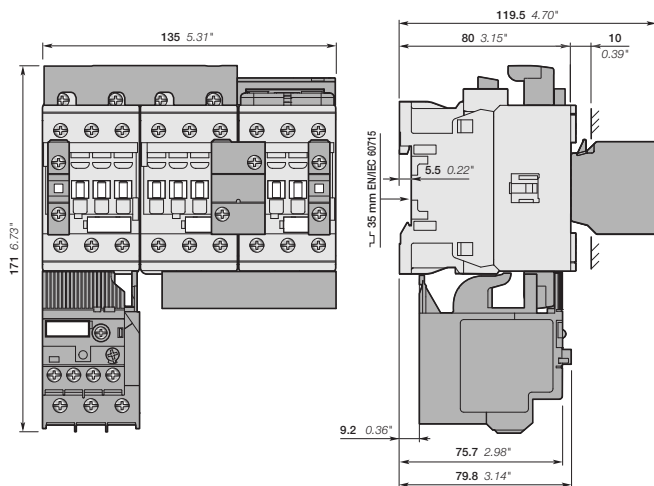
Note: VEM4 = VM4 (1) + VE4 (2) with A2-A2 (3) connection

Star-delta starters protected by thermal overload relays

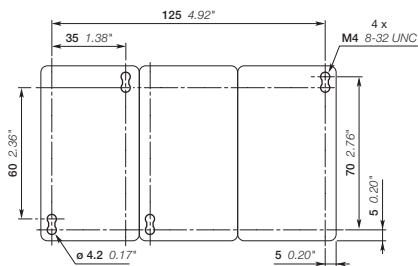
With AF contactors - Open type version in kit form



AF09, AF12, AF16
 + BEY16-4, VEM4
 + TF42 thermal overload relay



AF26, AF30, AF38
 + BEY38-4, VEM4, CA4-10
 + TF42 thermal overload relay

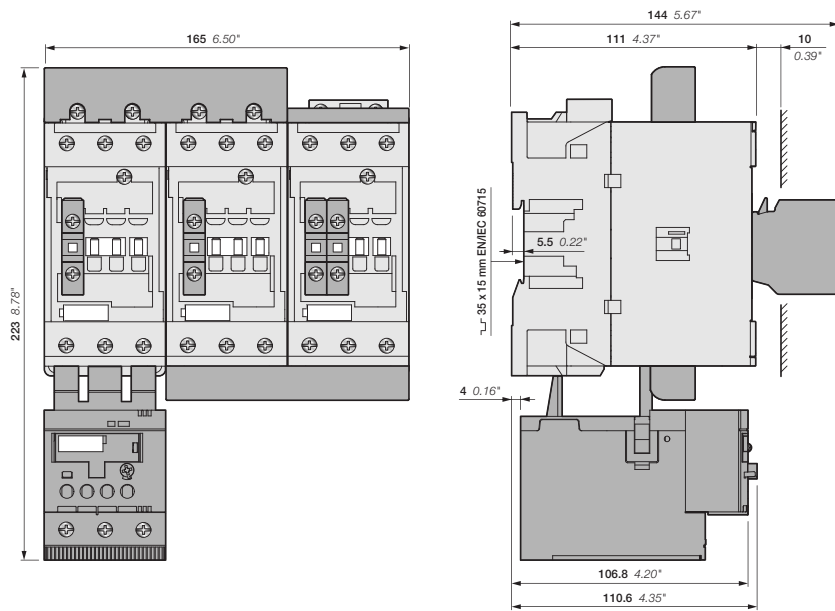


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

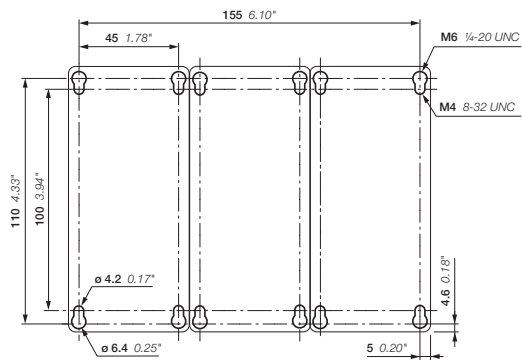
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



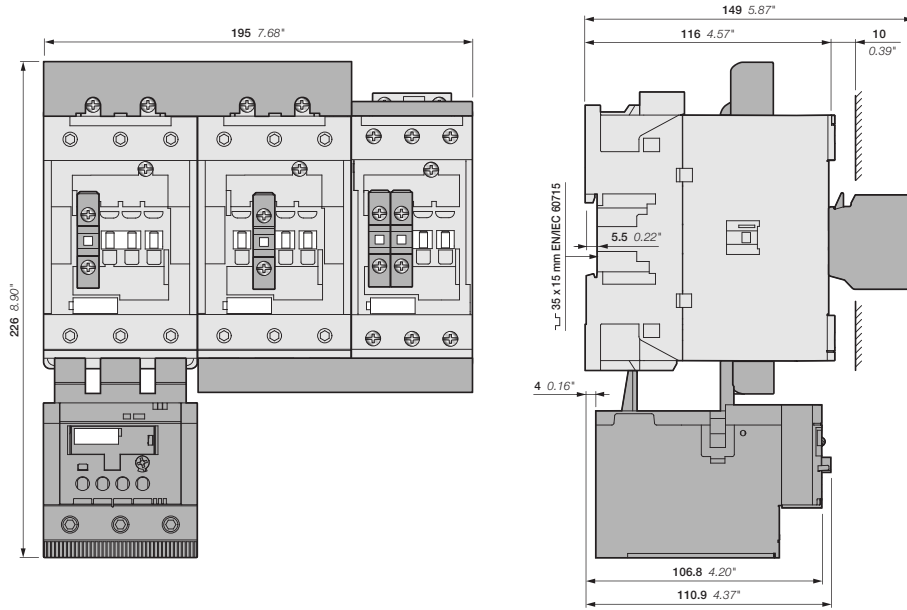
AF40, AF52, AF65
 + BEY65-4, VM96-4, CA4-10, CA4-01
 + TF65 thermal overload relay



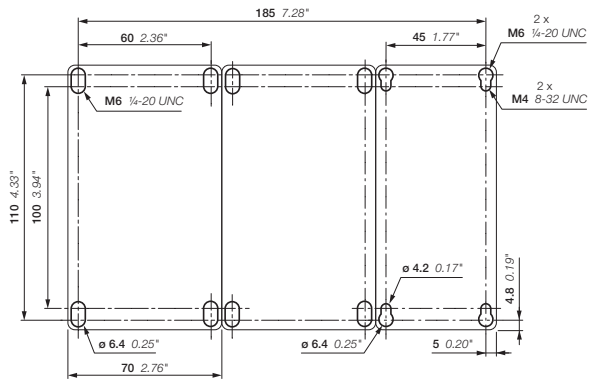
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



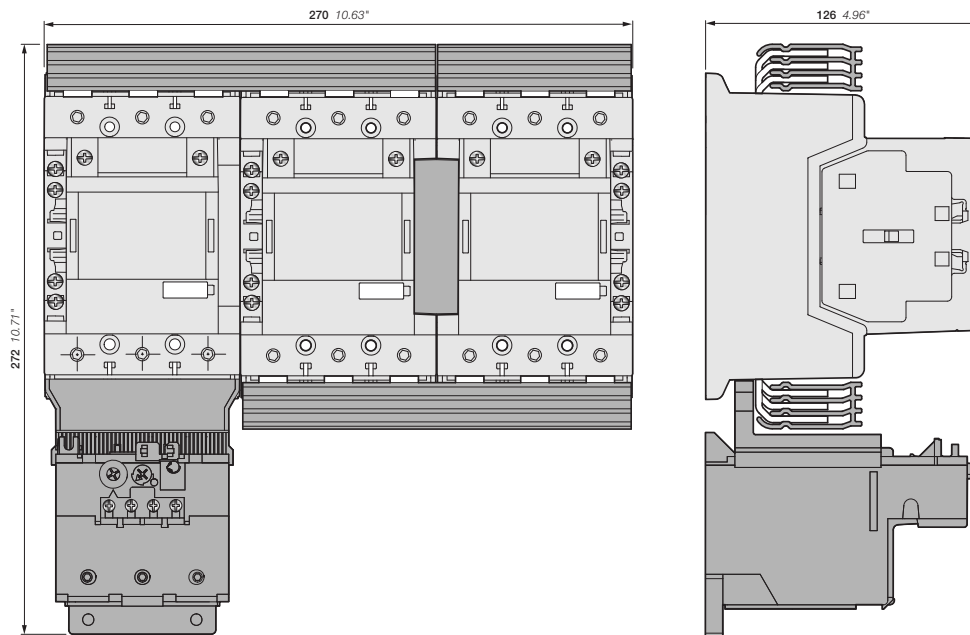
- Line, Delta: AF80, AF96
- + Star: AF52, AF65
- + BEY96-4, VM96-4, CA4-10, CA4-01
- + TF96 thermal overload relay



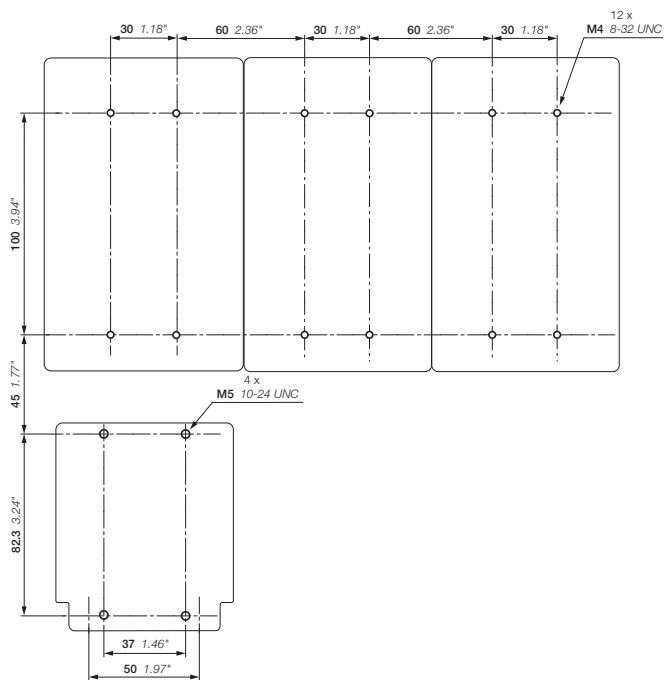
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



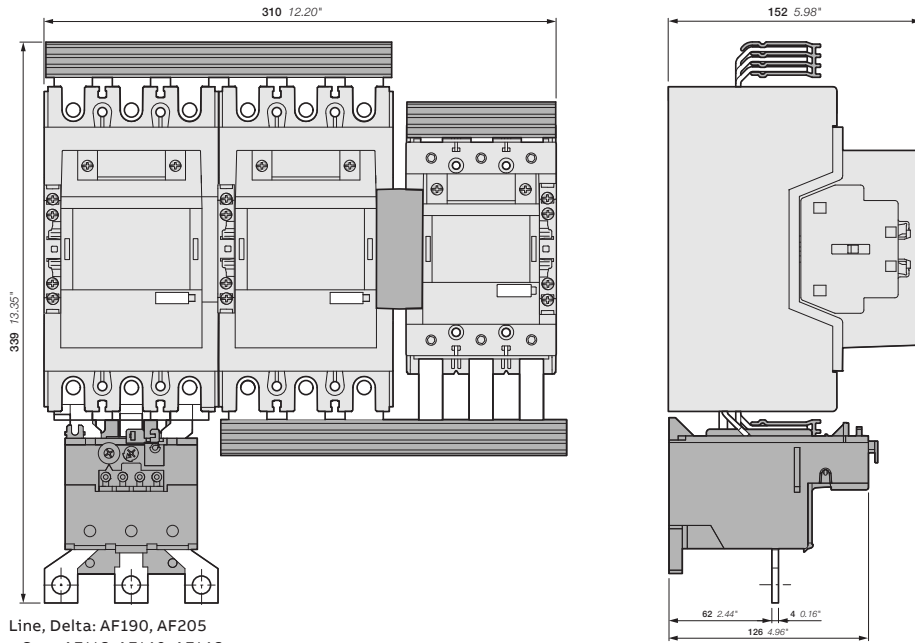
AF116, AF140, AF146
 + BEY140-4, VM19
 + TF140 thermal overload relay



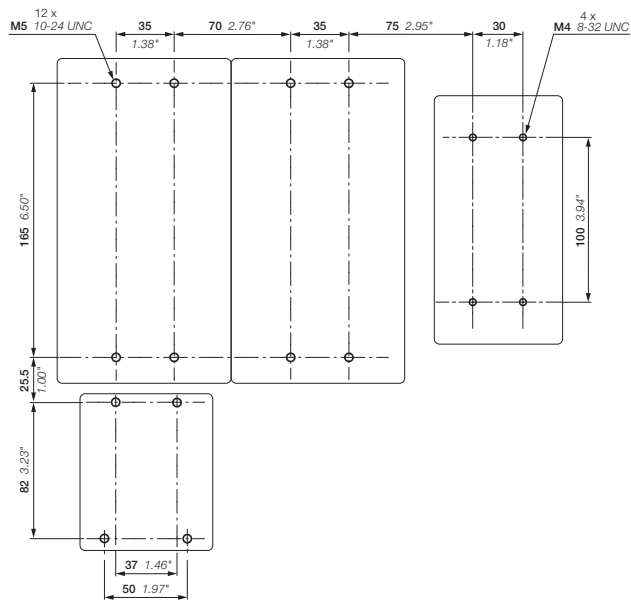
Main dimensions mm, inches

Star-delta starters protected by thermal overload relays

With AF contactors - Open type version in kit form



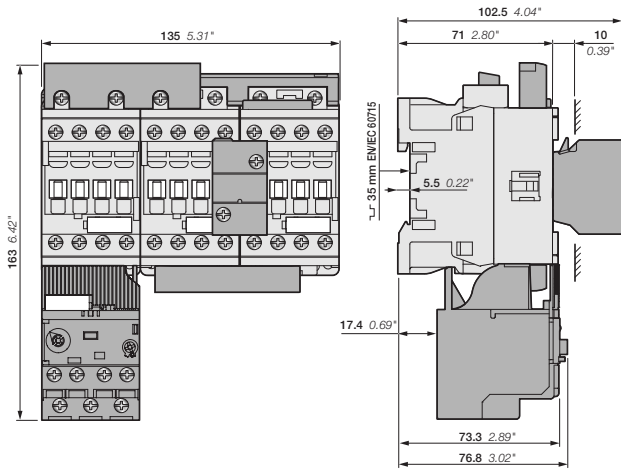
Line, Delta: AF190, AF205
 + Star: AF116, AF140, AF146
 + BEY190-4, VM140/190
 + TA200 thermal overload relay



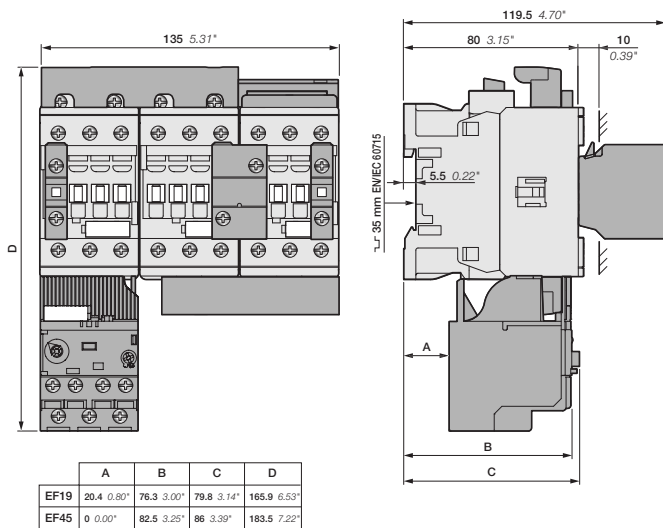
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

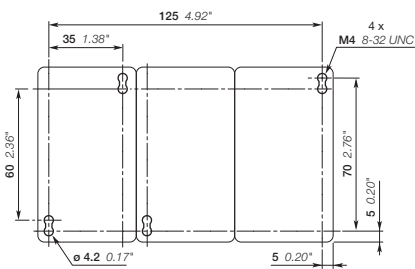
With AF contactors - Open type version in kit form



AF09, AF12, AF16
 + BEY16-4, VEM4
 + EF19 electronic overload relay



AF26, AF30, AF38
 + BEY38-4, VEM4, CA4-10
 + EF19/EF45 electronic overload relay

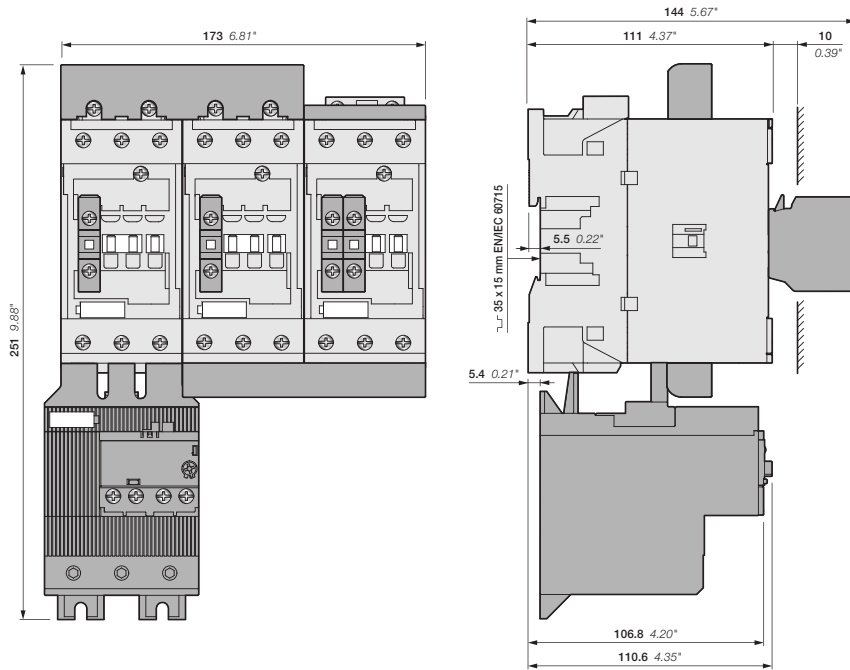


Note: contactor lateral distance to grounded component 2 mm 0.08" min.

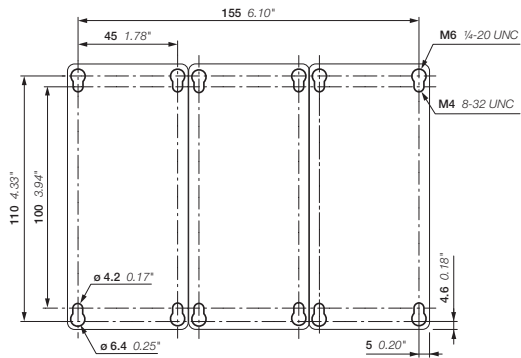
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



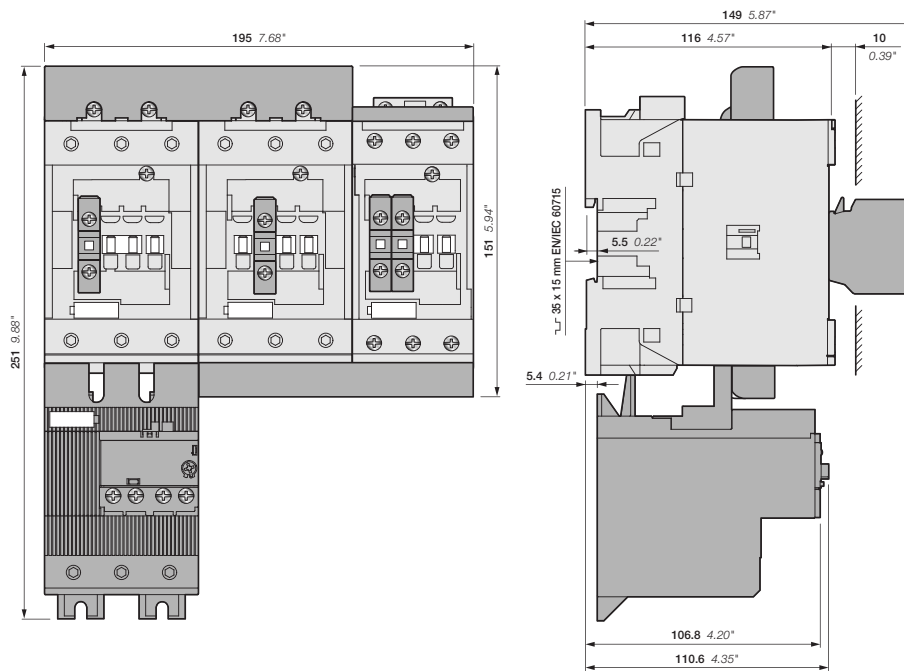
AF40, AF52, AF65
 + BEY65-4, VM96-4, CA4-10, CA4-01
 + EF65 electronic overload relay



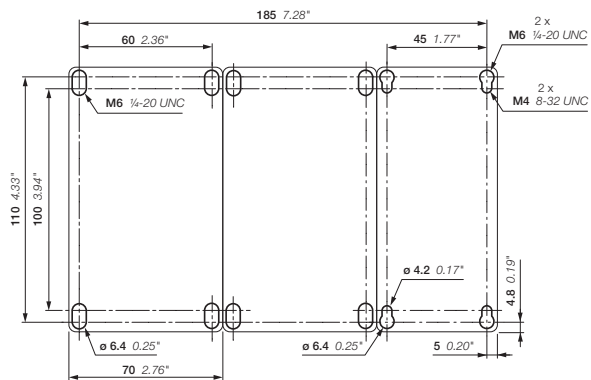
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



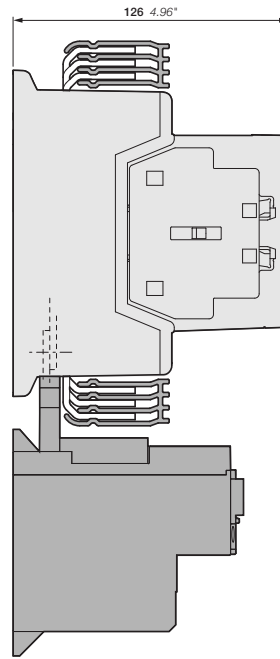
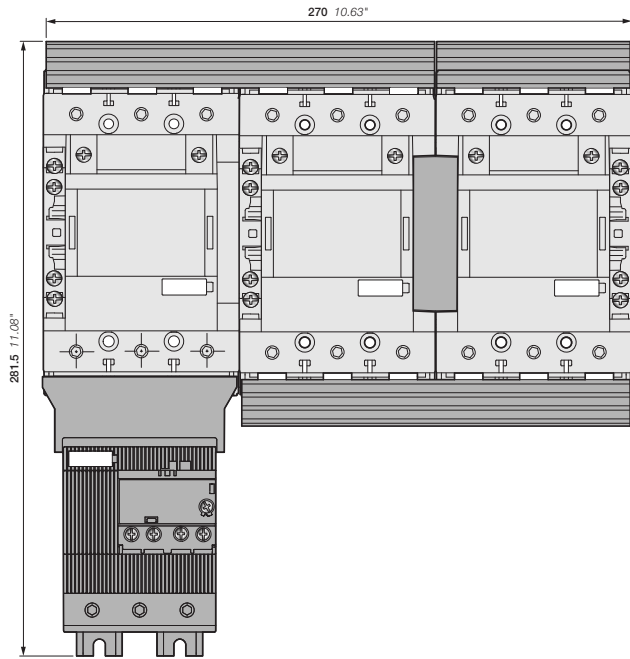
Line, Delta: AF80, AF96
 + Star: AF52, AF65
 + BEY96-4, VM96-4, CA4-10, CA4-01
 + EF96 electronic overload relay



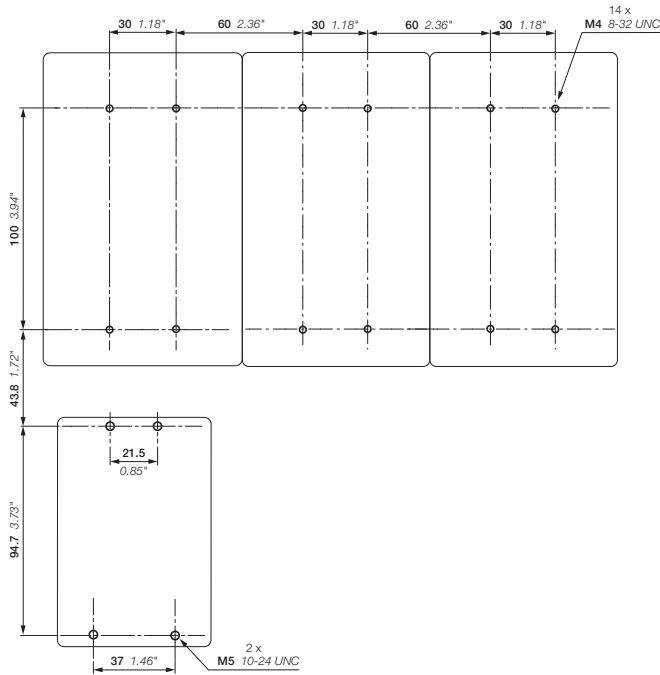
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



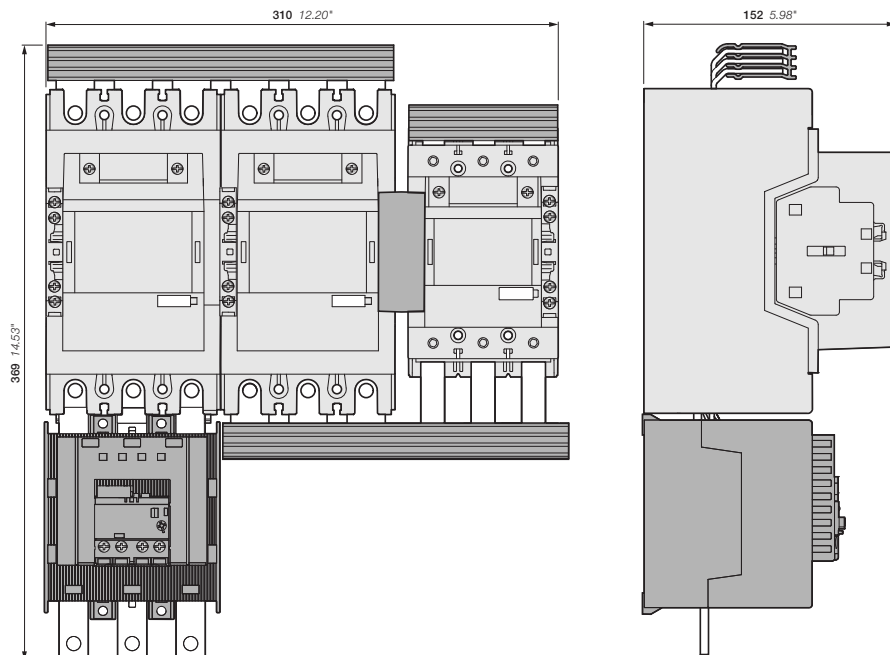
AF116, AF140, AF146
 + BEY140-4, VM19
 + EF146 electronic overload relay



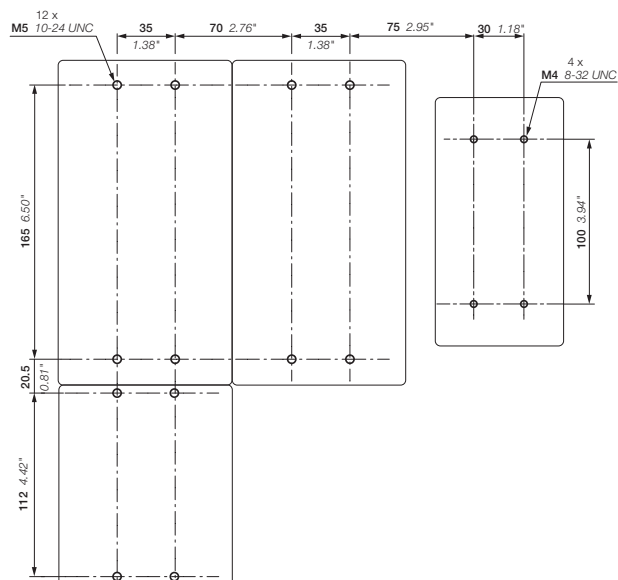
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



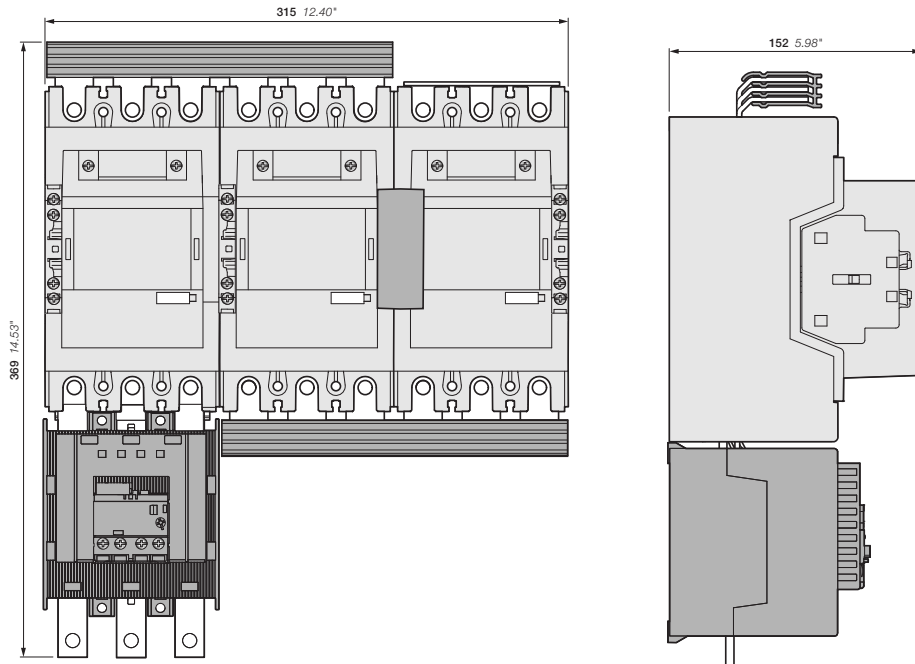
- Line, Delta: AF190, AF205
- + Star: AF116, AF140, AF146
- + BEY190-4, VM140/190
- + EF205 electronic overload relay



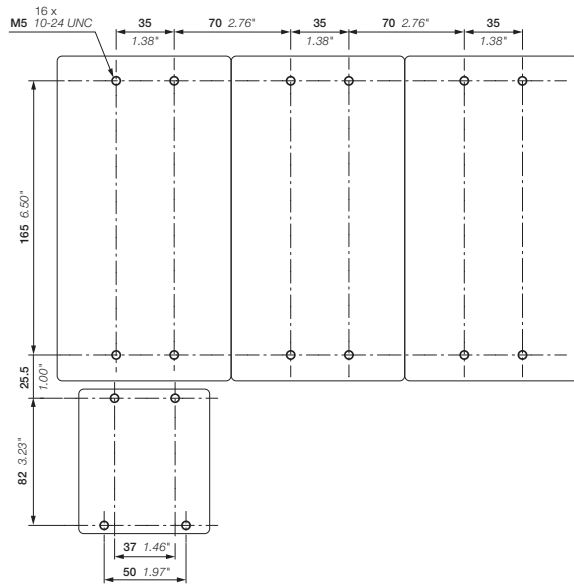
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



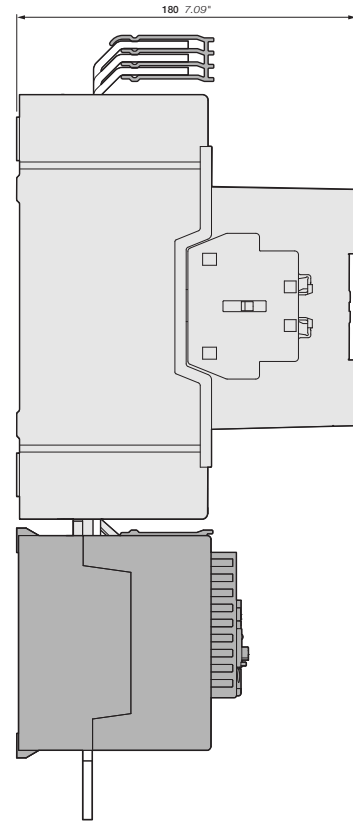
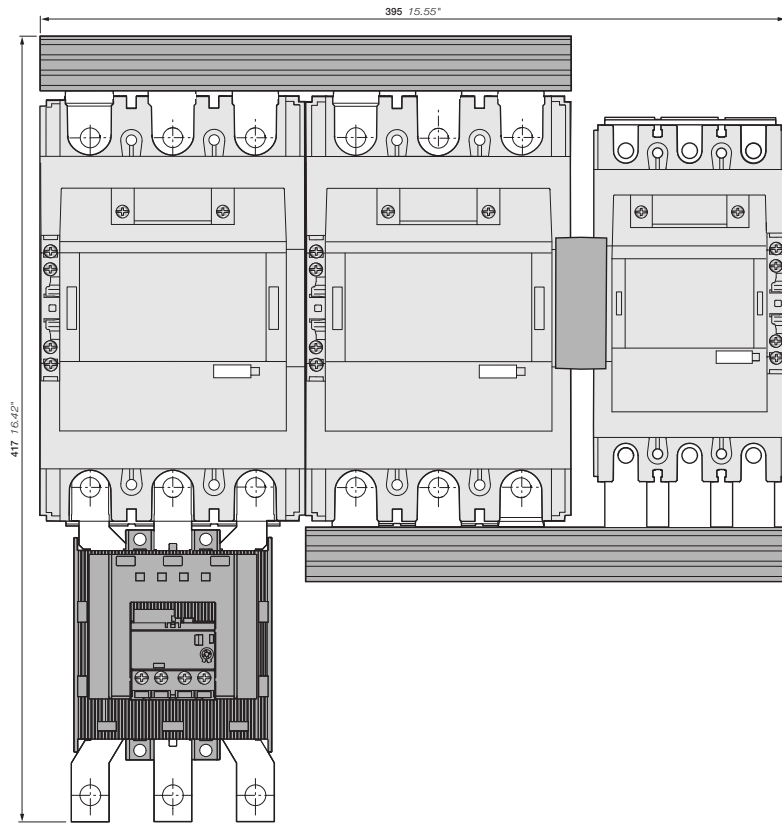
AF190, AF205
 + BEY205-4, VM19
 + EF205 electronic overload relay



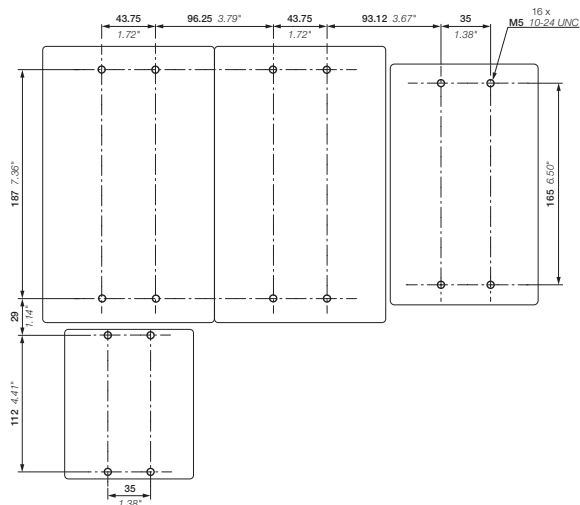
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



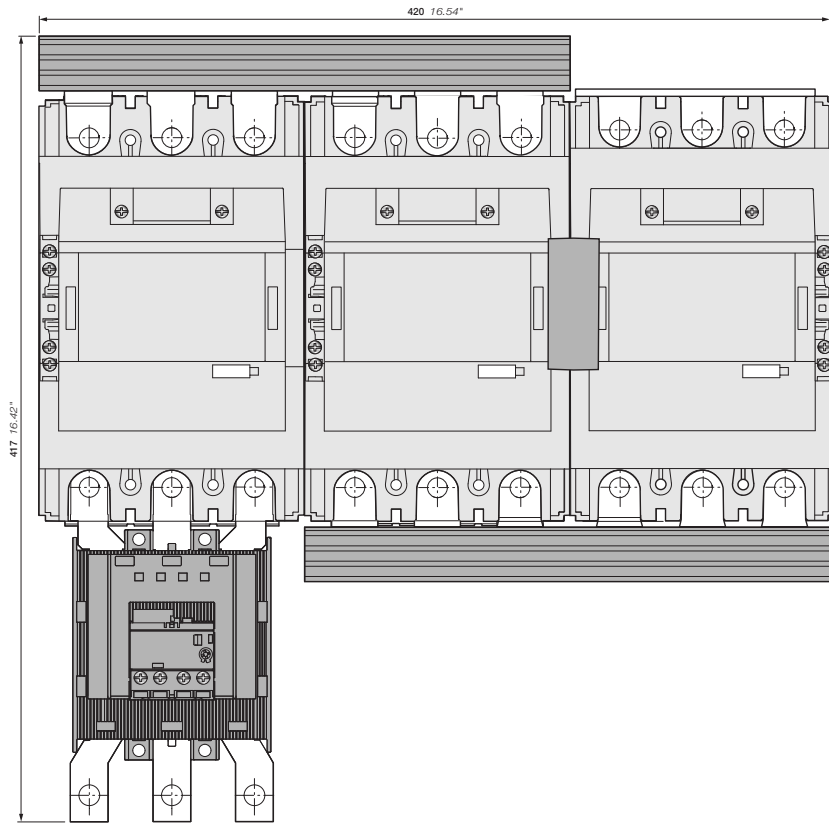
- Line, Delta: AF265, AF305, AF370
- + Star: AF190, AF205
- + BEY265-4, VM205/265
- + EF370 electronic overload relay



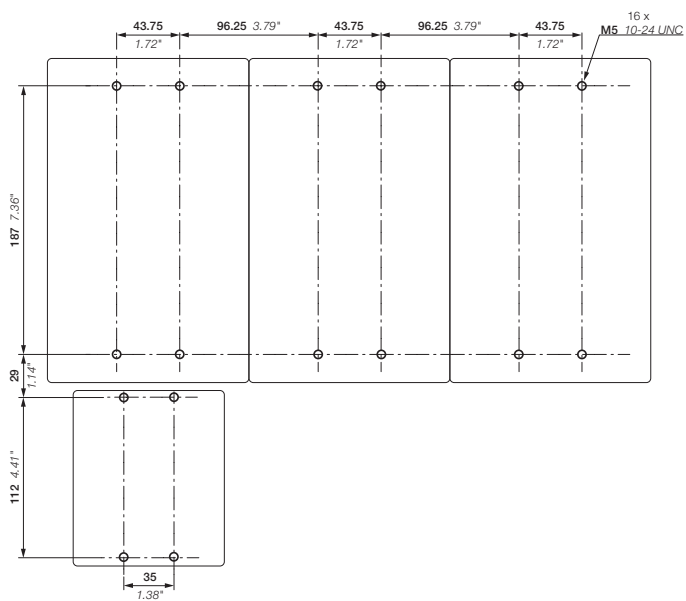
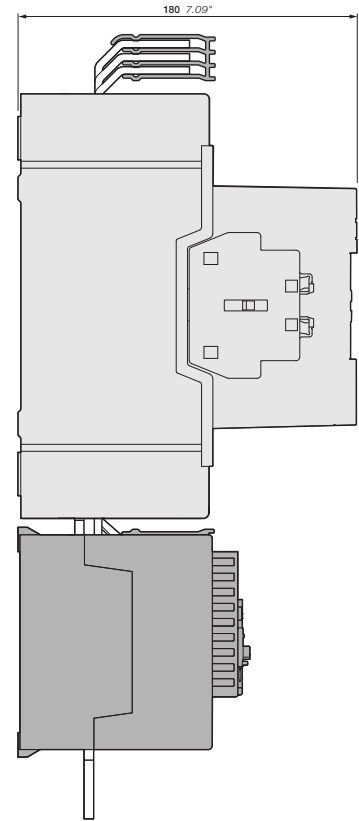
Main dimensions mm, inches

Star-delta starters protected by electronic overload relays

With AF contactors - Open type version in kit form



AF265, AF305, AF370
 + BEY370-4, VM19
 + EF370 electronic overload relay



Main dimensions mm, inches



Customer made motor starting solution with AS contactors with screw terminals

Starters protected by manual motor starters

- 12/82** Overview
- 12/84** Direct-on-line starters
- 12/88** Reversing starters
- 12/92** Dimensions

Starters protected by thermal overload relays

- 12/94** Direct-on-line and reversing starters
- 12/98** Star-delta starters
- 12/102** Dimensions

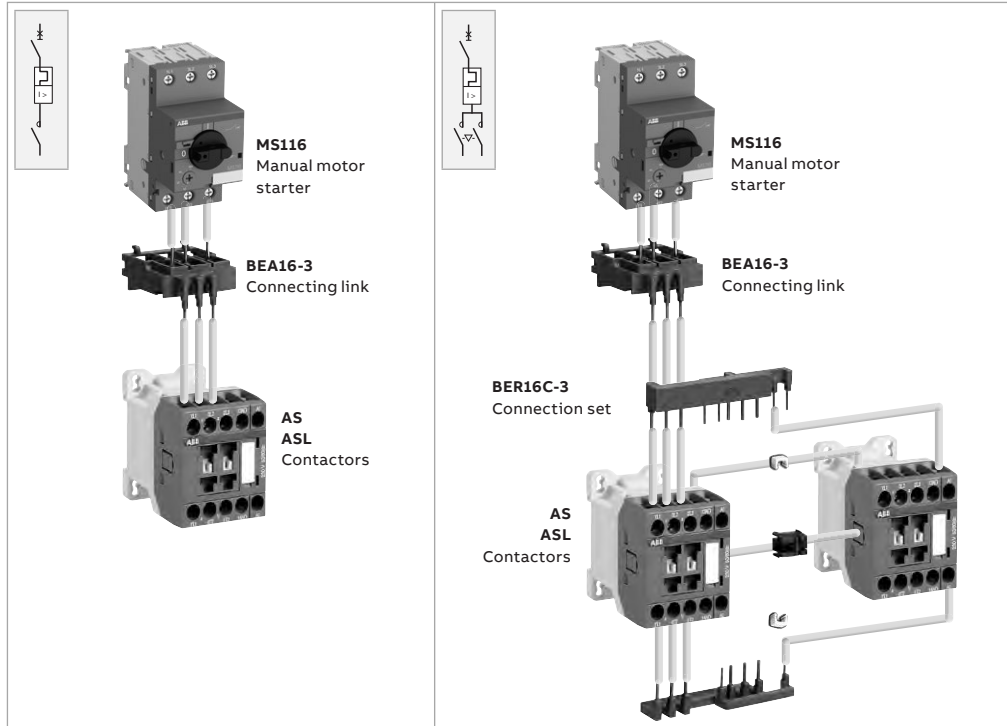
Motor starting solutions

Open type version, in kit form

Starters protected by manual motor starters

Direct-on-line starters

Reversing starters

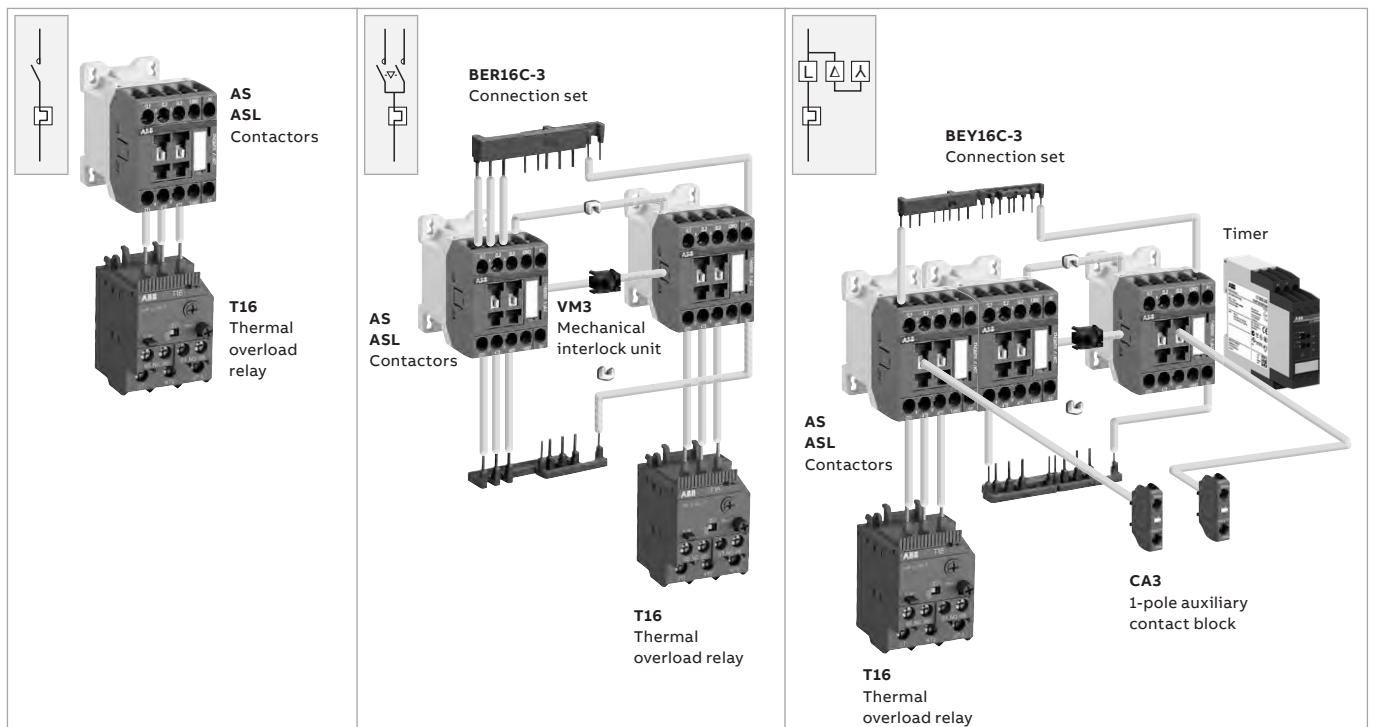


Starters protected by thermal overload relays

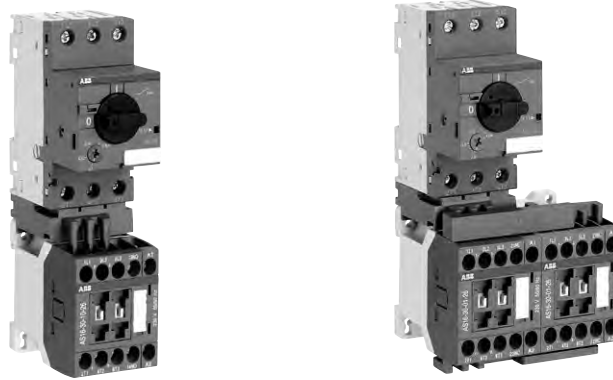
Direct-on-line starters

Reversing starters

Star-delta starters



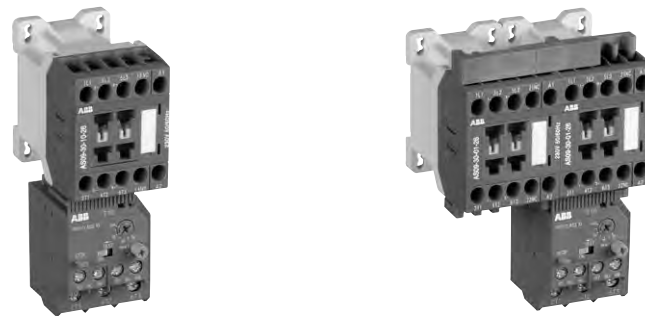
Starters protected
by manual motor starters



Switching of 3-phase cage motors

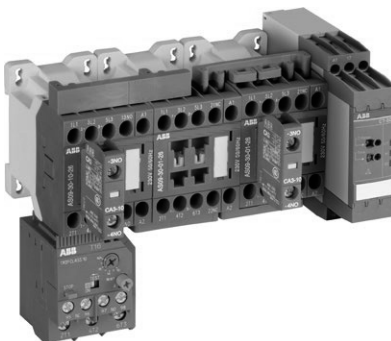
| | | Direct-on-line starters | Reversing starters |
|--------------------------------------|-------------|-------------------------|--------------------|
| Rated power - AC-3, 400 V | | 0.06...7.5 kW | 0.06...7.5 kW |
| Short-circuit current I _q | | 16 kA - 50 kA | 16 kA - 50 kA |
| Coordination type | | Type 1 & type 2 | Type 1 & type 2 |
| Manual motor starters | | MS116 | MS116 |
| Contactors | AC operated | AS09 ... AS16 | AS09 ... AS16 |
| | DC operated | ASL09 ... ASL16 | ASL09 ... ASL16 |

Starters protected
by thermal overload relays



Switching of 3-phase cage motors

| | | Direct-on-line starters | Reversing starters |
|---------------------------|-------------|-------------------------|--------------------|
| Rated power - AC-3, 400 V | | 4...7.5 kW | 4...7.5 kW |
| Contactors | AC operated | AS09 ... AS16 | AS09 ... AS16 |
| | DC operated | ASL09 ... ASL16 | ASL09 ... ASL16 |
| Thermal overload relays | | T16 | T16 |

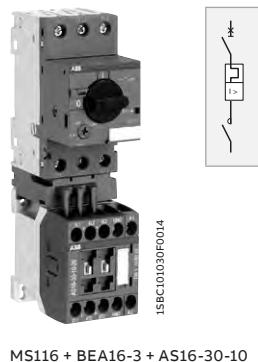


Switching of 3-phase cage motors

| | | Star-delta starters |
|---------------------------|-------------|---------------------|
| Rated power - AC-3, 400 V | | 7.5...11 kW |
| Contactors | AC operated | AS09 ... AS16 |
| | DC operated | ASL09 ... ASL16 |
| Thermal overload relays | | T16 |

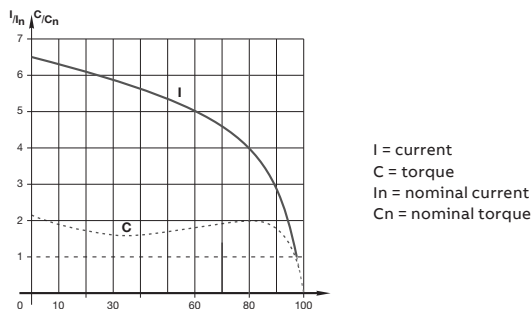
Direct-on-line starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



Application

Full voltage direct-on-line starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

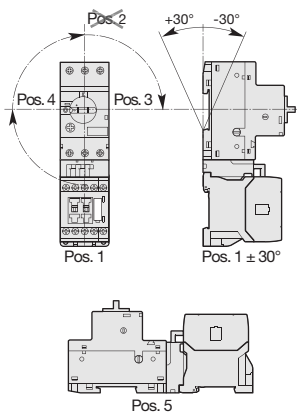
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

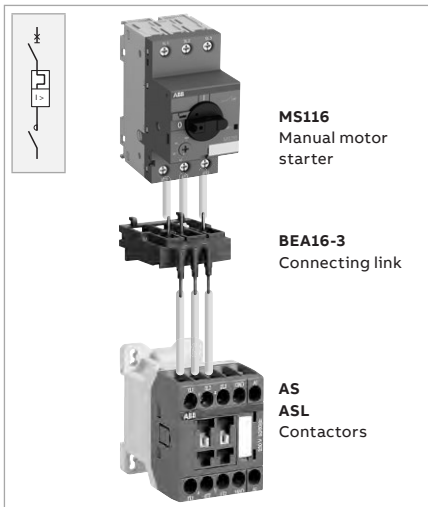
| | |
|---|--|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage U_e max. | 690 V - 50/60 Hz |
| Rated insulation voltage U_i according to IEC 60947-4-1 | 690 V |
| Switching frequency | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature close to the device | ≤ 55 °C |
| Degree of protection | IP20 |

Mounting positions



Direct-on-line starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



MS116
Manual motor starter

BEA16-3
Connecting link

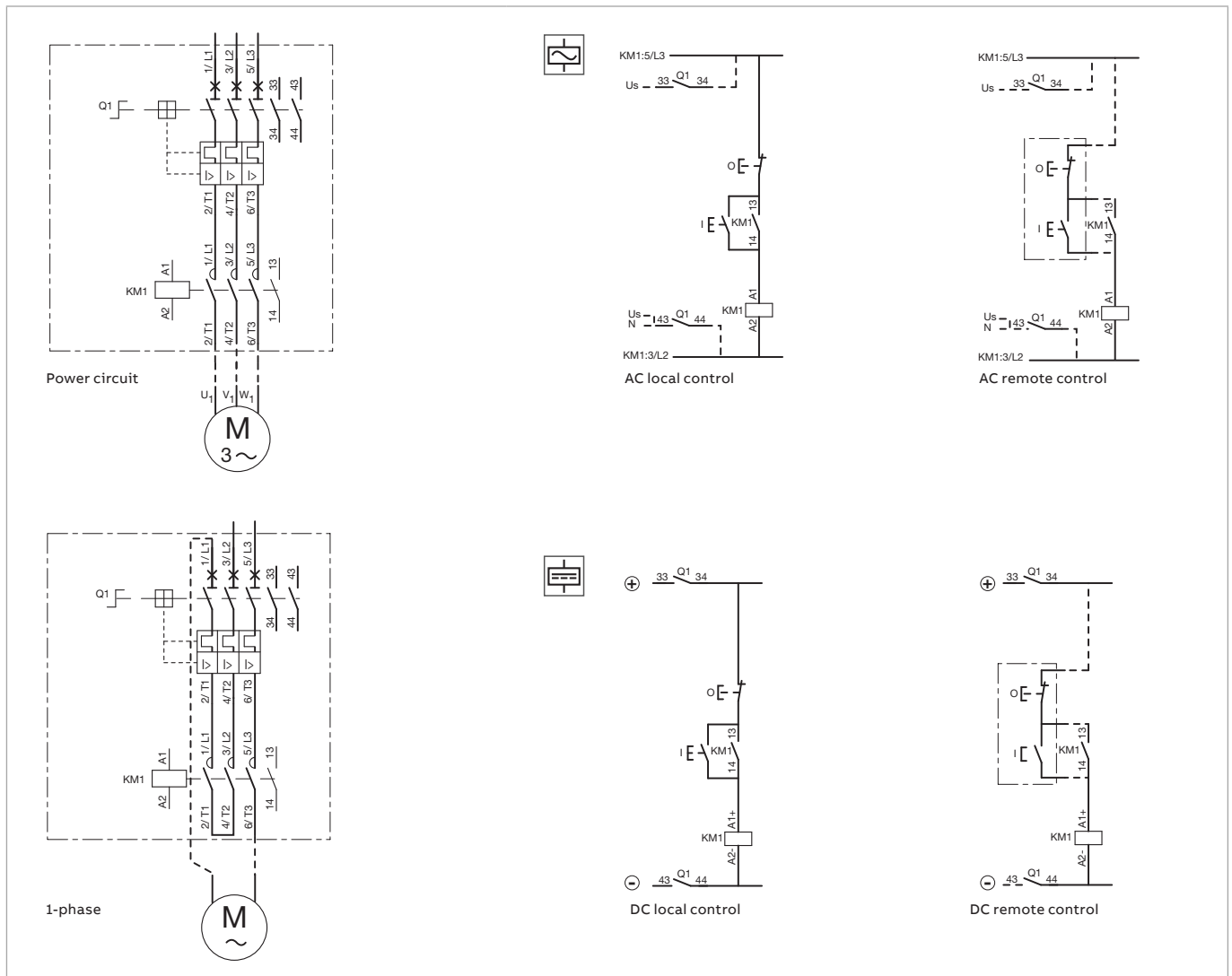
AS
ASL
Contactors

You can easily assemble a direct-on-line starter by using the BEA16-3 connecting link 3-pole insulated. It is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, I_q = 16 kA or I_q = 50 kA up to 7.5 kW.

For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.


Wiring diagrams



DOL starters protected by MS116 manual motor starters

With AS contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

|  | Manual motor starters | | | | | Contactors | | | | Allowed setting current A | |
|---|-----------------------|-------------------------------|------|------------|---------------|--|--|---------|------|------------------------------|------------|
| | IEC | | Type | Order code | Setting range | Rated instantaneous short-circuit current setting I _i | Rated control circuit voltage U _c (1) | | Type | | Order code |
| | AC-3, 400 V | Rated operational power kW | | | | | Rated operational current A | V 50 Hz | | | |

Coordination type 1

Coordination type 2

| I _q = 16 kA | | I _q = 50 kA | | | | | | | | | |
|------------------------|------|------------------------|-----------------|-------------|-------|-----|-----|---------------|-----------------|------|--|
| 0.06 | 0.2 | MS116-0.25 | 1SAM250000R1002 | 0.16...0.25 | 3.13 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 0.25 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.09 | 0.3 | MS116-0.4 | 1SAM250000R1003 | 0.25...0.40 | 5 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 0.4 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.12 | 0.44 | MS116-0.63 | 1SAM250000R1004 | 0.40...0.63 | 7.88 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 0.63 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.18 | 0.6 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 1 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.25 | 0.85 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 1 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.37 | 1.1 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 1.6 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.55 | 1.5 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 1.6 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 0.75 | 1.9 | MS116-2.5 | 1SAM250000R1007 | 1.60...2.50 | 31.25 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 2.5 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 1.1 | 2.7 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 4 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 1.5 | 3.6 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 4 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 2.2 | 4.9 | MS116-6.3 | 1SAM250000R1009 | 4.00...6.30 | 78.75 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 6.3 | |
| | | | | | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | |
| 3 | 6.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | 24 | AS12-30-10-20 | 1SBL111001R2010 | 10 | |
| | | | | | | 230 | 230 | AS12-30-10-26 | 1SBL111001R2610 | | |
| 4 | 8.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | 24 | AS12-30-10-20 | 1SBL111001R2010 | 10 | |
| | | | | | | 230 | 230 | AS12-30-10-26 | 1SBL111001R2610 | | |
| 5.5 | 11.5 | MS116-12 | 1SAM250000R1012 | 8.00...12.0 | 180 | 24 | 24 | AS12-30-10-20 | 1SBL111001R2010 | 12 | |
| | | | | | | 230 | 230 | AS12-30-10-26 | 1SBL111001R2610 | | |
| 7.5 | 15.5 | MS116-16 | 1SAM250000R1011 | 10.0...16.0 | 240 | 24 | 24 | AS16-30-10-20 | 1SBL121001R2010 | 15.5 | |
| | | | | | | 230 | 230 | AS16-30-10-26 | 1SBL121001R2610 | | |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.




Main accessories

| | Type | Order code |
|--|---------|-----------------|
| Connecting link for manual motor starter | BEA16-3 | 1SBN081006T1000 |

DOL starters protected by MS116 manual motor starters

With ASL contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

|  | Manual motor starters | | | | | Contactors | | | | |
|---|-----------------------|----------------------------|-----------------------------|------------|---------------|--|--|------|------------|-------------------------|
| | IEC | | Type | Order code | Setting range | Rated instantaneous short-circuit current setting I _i | Rated control circuit voltage U _c (1) | Type | Order code | Allowed setting current |
| | AC-3, 400 V | Rated operational power kW | Rated operational current A | | A | | VDC | | | A |

Coordination type 1

Coordination type 2

| I _q = 16 kA | | I _q = 50 kA | | | | | | | | |
|------------------------|------|------------------------|-----------------|-------------|-------|----|----------------|-----------------|------|--|
| 0.06 | 0.2 | MS116-0.25 | 1SAM250000R1002 | 0.16...0.25 | 3.13 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 0.25 | |
| 0.09 | 0.3 | MS116-0.4 | 1SAM250000R1003 | 0.25...0.40 | 5 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 0.4 | |
| 0.12 | 0.44 | MS116-0.63 | 1SAM250000R1004 | 0.40...0.63 | 7.88 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 0.63 | |
| 0.18 | 0.6 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 1 | |
| 0.25 | 0.85 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 1 | |
| 0.37 | 1.1 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 1.6 | |
| 0.55 | 1.5 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 1.6 | |
| 0.75 | 1.9 | MS116-2.5 | 1SAM250000R1007 | 1.60...2.50 | 31.25 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 2.5 | |
| 1.1 | 2.7 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 4 | |
| 1.5 | 3.6 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 4 | |
| 2.2 | 4.9 | MS116-6.3 | 1SAM250000R1009 | 4.00...6.30 | 78.75 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | 6.3 | |
| 3 | 6.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | ASL12-30-10-81 | 1SBL113001R8110 | 10 | |
| 4 | 8.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | ASL12-30-10-81 | 1SBL113001R8110 | 10 | |
| 5.5 | 11.5 | MS116-12 | 1SAM250000R1012 | 8.00...12.0 | 180 | 24 | ASL12-30-10-81 | 1SBL113001R8110 | 12 | |
| 7.5 | 15.5 | MS116-16 | 1SAM250000R1011 | 10.0...16.0 | 240 | 24 | ASL16-30-10-81 | 1SBL123001R8110 | 15.5 | |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.

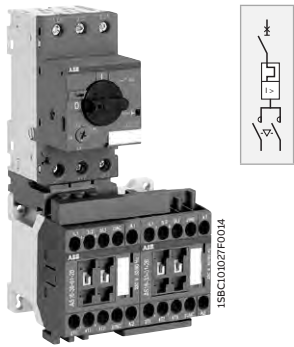


Main accessories

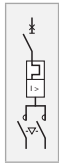
| | Type | Order code |
|--|---------|-----------------|
| Connecting link for manual motor starter | BEA16-3 | 1SBN081006T1000 |

Reversing starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form

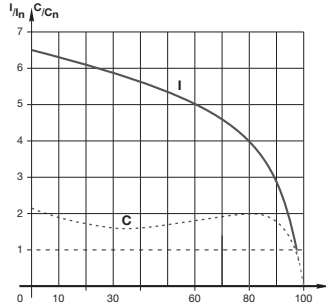


MS116 + BEA16-3 + VM3 + BER16C-3 + AS16-30-01



Application

Full voltage reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque

Coordination types

The contactor and the manual motor starter control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:

Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

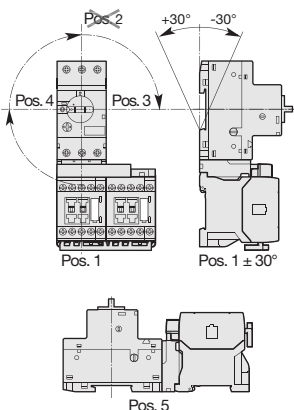
Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

| | |
|---|--|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage U_e max. | 690 V - 50/60 Hz |
| Rated insulation voltage U_i according to IEC 60947-4-1 | 690 V |
| Switching frequency | ≤ 15 starts/hour - 80 % max. load factor - with max. 1.5 s starting time ≤ 30 starts/hour - 50 % max. load factor - with max. 1.5 s starting time |
| Ambient air temperature close to the device | ≤ 55 °C |
| Degree of protection | IP20 |

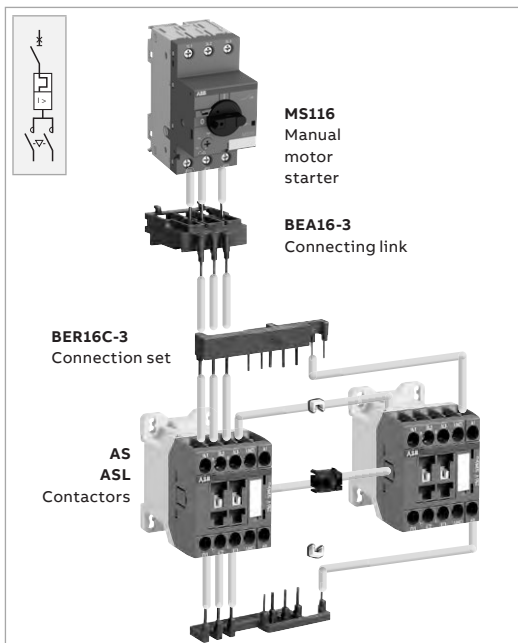
Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

Mounting positions



Reversing starters protected by manual motor starters

With AS, ASL contactors - open type version in kit form



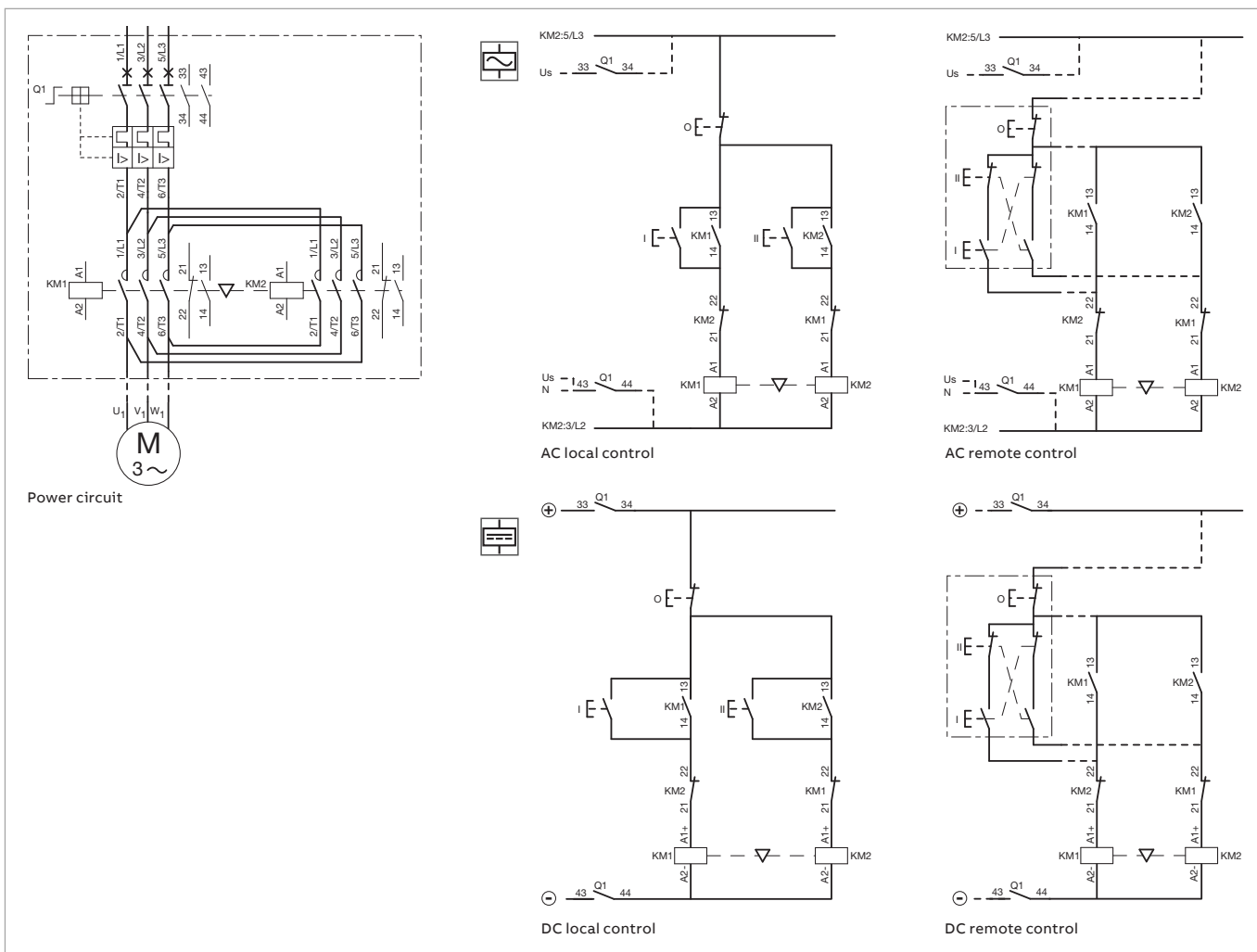
You can easily assemble reversing starter thanks to our complete range of accessories:

- BEA16-3 connecting link 3-pole insulated: it is used to electrically and mechanically connect MS116 manual motor starter and AS or ASL contactors.
- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter width.
- BER16C-3 connection set: it assures a safe and simple connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages for coordination type 1 or 2 at 400 V, 50 / 60 Hz, I_q = 16 kA or I_q = 50 kA up to 7.5 kW.

For complete coordination tables with MS116 or MS132, please contact your ABB local sales organization.


Wiring diagrams



Reversing starters protected by MS116 manual motor starters

With AS contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 kA or 50 kA, 400 V, 50/60 Hz

|  | Manual motor starters | | | | | Contactors | | | | | |
|---|-----------------------|-------------------------|------|------------|---------------|---|---|---------|------|------------|-------------------------|
| | IEC | | Type | Order code | Setting range | Rated instantaneous short-circuit current setting I_i | Rated control circuit voltage U_c (1) | | Type | Order code | Allowed setting current |
| | AC-3, 400 V | Rated operational power | | | | | Rated operational current | V 50 Hz | | | |
| | kW | A | | | A | | | | | | A |

Coordination type 1

Coordination type 2

$I_q = 16 \text{ kA}$

$I_q = 50 \text{ kA}$

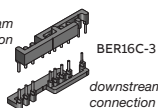
| | | | | | | | | | | |
|------|------|------------|-----------------|-------------|-------|-----|-----|---------------|-----------------|------|
| 0.06 | 0.2 | MS116-0.25 | 1SAM250000R1002 | 0.16...0.25 | 3.13 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 0.25 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.09 | 0.3 | MS116-0.4 | 1SAM250000R1003 | 0.25...0.40 | 5 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 0.4 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.12 | 0.44 | MS116-0.63 | 1SAM250000R1004 | 0.40...0.63 | 7.88 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 0.63 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.18 | 0.6 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 1 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.25 | 0.85 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 1 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.37 | 1.1 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 1.6 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.55 | 1.5 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 1.6 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 0.75 | 1.9 | MS116-2.5 | 1SAM250000R1007 | 1.60...2.50 | 31.25 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 2.5 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 1.1 | 2.7 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 4 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 1.5 | 3.6 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 4 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 2.2 | 4.9 | MS116-6.3 | 1SAM250000R1009 | 4.00...6.30 | 78.75 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 6.3 |
| | | | | | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | |
| 3 | 6.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | 24 | AS12-30-01-20 | 1SBL111001R2001 | 10 |
| | | | | | | 230 | 230 | AS12-30-01-26 | 1SBL111001R2601 | |
| 4 | 8.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | 24 | AS12-30-01-20 | 1SBL111001R2001 | 10 |
| | | | | | | 230 | 230 | AS12-30-01-26 | 1SBL111001R2601 | |
| 5.5 | 11.5 | MS116-12 | 1SAM250000R1012 | 8.00...12.0 | 180 | 24 | 24 | AS12-30-01-20 | 1SBL111001R2001 | 12 |
| | | | | | | 230 | 230 | AS12-30-01-26 | 1SBL111001R2601 | |
| 7.5 | 15.5 | MS116-16 | 1SAM250000R1011 | 10.0...16.0 | 240 | 24 | 24 | AS16-30-01-20 | 1SBL121001R2001 | 15.5 |
| | | | | | | 230 | 230 | AS16-30-01-26 | 1SBL121001R2601 | |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



upstream connection



downstream connection




Main accessories

| | Type | Order code |
|--|----------|-----------------|
| Connecting link for manual motor starter | BEA16-3 | 1SBN081006T1000 |
| Connection set for reversing starter | BER16C-3 | 1SBN081012R1000 |
| Mechanical interlock unit | VM3 | 1SBN031005T1000 |

Reversing starters protected by MS116 manual motor starters

With ASL contactors - open type version in kit form

Coordination type 1 or type 2, AC-3, 16 or 50 kA, 400 V, 50/60 Hz

|  | IEC | | Manual motor starters | | | | Contactors | | | |
|---|----------------------------|-----------------------------|-----------------------|------------|---------------|---|---|------|------------|-------------------------|
| | AC-3, 400 V | | Type | Order code | Setting range | Rated instantaneous short-circuit current setting I_i | Rated control circuit voltage U_c (1) | Type | Order code | Allowed setting current |
| | Rated operational power kW | Rated operational current A | | | A | | V DC | | | A |

Coordination type 1

Coordination type 2

$I_q = 16 \text{ kA}$
 $I_q = 50 \text{ kA}$

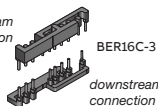
| | | | | | | | | | |
|------|------|------------|-----------------|-------------|-------|----|----------------|-----------------|------|
| 0.06 | 0.2 | MS116-0.25 | 1SAM250000R1002 | 0.16...0.25 | 3.13 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 0.25 |
| 0.09 | 0.3 | MS116-0.4 | 1SAM250000R1003 | 0.25...0.40 | 5 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 0.4 |
| 0.12 | 0.44 | MS116-0.63 | 1SAM250000R1004 | 0.40...0.63 | 7.88 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 0.63 |
| 0.18 | 0.6 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 1 |
| 0.25 | 0.85 | MS116-1.0 | 1SAM250000R1005 | 0.63...1.00 | 12.5 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 1 |
| 0.37 | 1.1 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 1.6 |
| 0.55 | 1.5 | MS116-1.6 | 1SAM250000R1006 | 1.00...1.60 | 20 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 1.6 |
| 0.75 | 1.9 | MS116-2.5 | 1SAM250000R1007 | 1.60...2.50 | 31.25 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 2.5 |
| 1.1 | 2.7 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 4 |
| 1.5 | 3.6 | MS116-4.0 | 1SAM250000R1008 | 2.50...4.00 | 50 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 4 |
| 2.2 | 4.9 | MS116-6.3 | 1SAM250000R1009 | 4.00...6.30 | 78.75 | 24 | ASL09-30-01-81 | 1SBL103001R8101 | 6.3 |
| 3 | 6.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | ASL12-30-01-81 | 1SBL113001R8101 | 10 |
| 4 | 8.5 | MS116-10 | 1SAM250000R1010 | 6.30...10.0 | 150 | 24 | ASL12-30-01-81 | 1SBL113001R8101 | 10 |
| 5.5 | 11.5 | MS116-12 | 1SAM250000R1012 | 8.00...12.0 | 180 | 24 | ASL12-30-01-81 | 1SBL113001R8101 | 12 |
| 7.5 | 15.5 | MS116-16 | 1SAM250000R1011 | 10.0...16.0 | 240 | 24 | ASL16-30-01-81 | 1SBL123001R8101 | 15.5 |

Note: for multiple packaging, please contact your ABB local sales organization.

(1) Other control voltages see voltage code table.



upstream connection



downstream connection



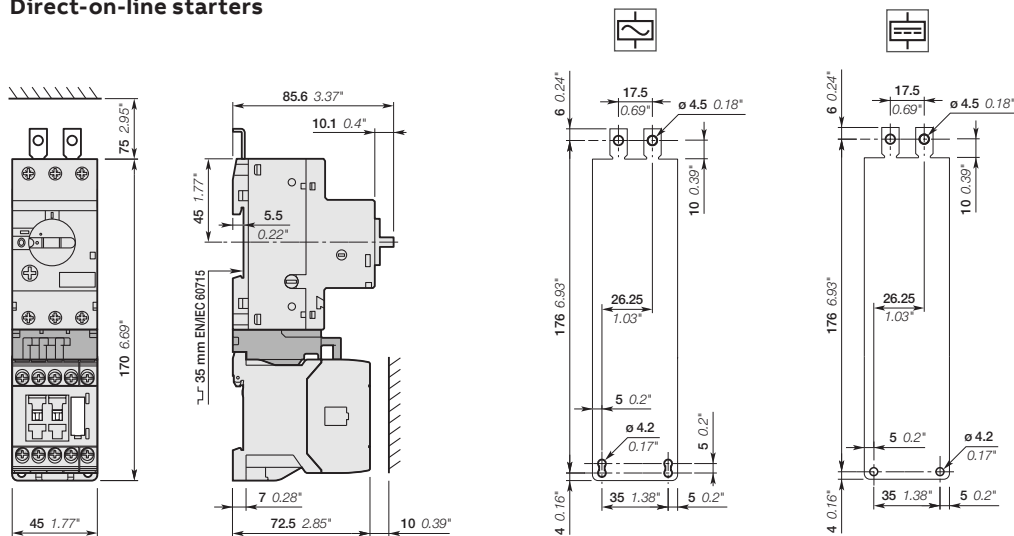
Main accessories

| | Type | Order code |
|--|----------|-----------------|
| Connecting link for manual motor starter | BEA16-3 | 1SBN081006T1000 |
| Connection set for reversing starter | BER16C-3 | 1SBN081012R1000 |
| Mechanical interlock unit | VM3 | 1SBN031005T1000 |

DOL starters protected by MS116 manual motor starters

With AS, ASL contactors - open type version in kit form

Direct-on-line starters

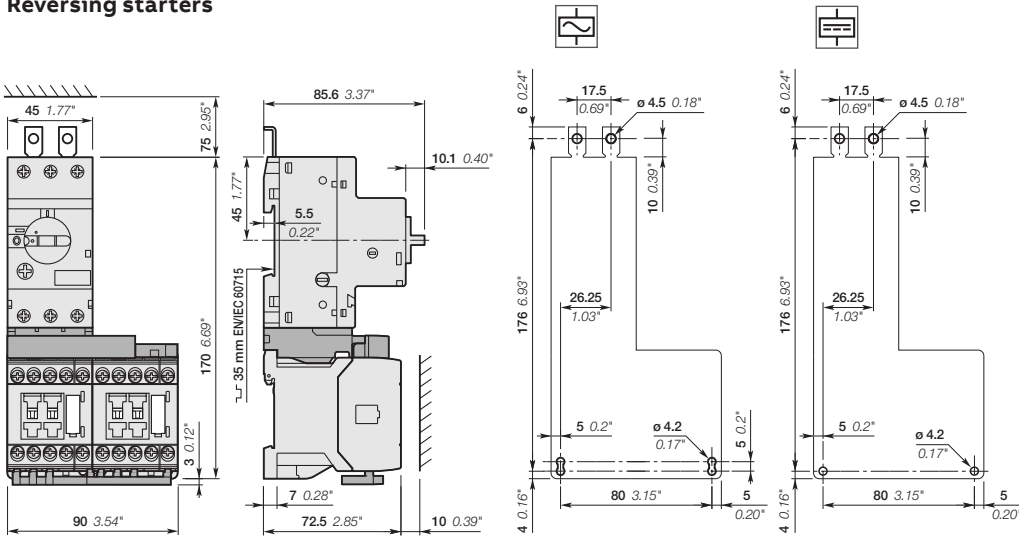


MS116
 + BEA16-3
 + AS09, ASL09, AS12, ASL12, AS16, ASL16

Reversing starters protected by MS116 manual motor starters

With AS, ASL contactors - open type version in kit form

Reversing starters



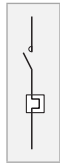
- MS116
- + BEA16-3 + BER16C-3 + VM3
- + AS09, ASL09, AS12, ASL12, AS16, ASL16

DOL & reversing starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

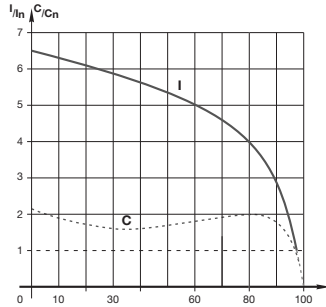


AS09-30-10 + T16



Application

Full voltage direct-on-line and reversing starting for controlling three-phase asynchronous motors is a simple and economic solution characterised by a high starting torque (1.9 to 2.1 times full-speed torque) and a starting current 5.5 to 7 times nominal current.



I = current
C = torque
In = nominal current
Cn = nominal torque



AS09-30-01 + BER16C + VM3 + T16



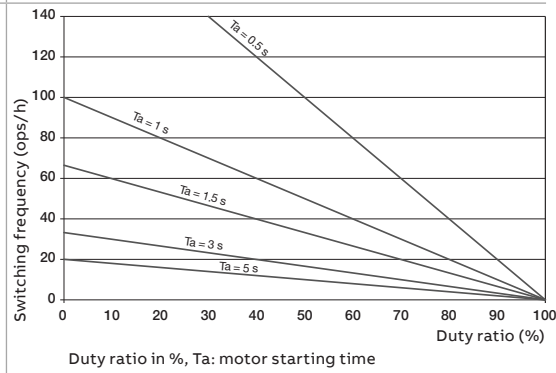
Coordination types

The contactor, the short-circuit protection device and the thermal overload relay control and protect motors against overload and short-circuits according to coordination types 1 and 2 (IEC 60947-4-1 / EN 60947-4-1) defining the anticipated level of service continuity as follow:
Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.

Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable.

Main technical data

| | |
|---|---|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage U_e max. | 690 V - 50/60 Hz |
| Rated insulation voltage U_i according to IEC 60947-4-1 | 690 V |
| Air temperature close to the device | ≤ 60 °C |
| Degree of protection | IP20 |
| Switching frequency | Thermal overload relays cannot be operated at any arbitrary switching frequency in order to avoid tripping. Applications involving up to 15 operations per hour are acceptable. Higher switching frequencies are permitted if the duty ratio and the motor starting time are allowed for and if the motor's making current does not appreciably exceed 6 times the rated operating current. Please refer to the adjacent diagram for guideline values for the permitted switching frequency. Example: Starting time of the motor: 1 second Duty ratio: 40 % means a permitted switching frequency of max. 60 operating cycles per hour. |

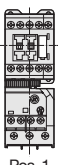


Note: Minimum switchover delay of 50 ms must be introduced between respective opening and closing of AC operated reversing contactors

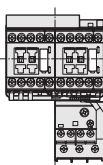
Mounting positions

Direct-on-line

Reversing



Pos. 1



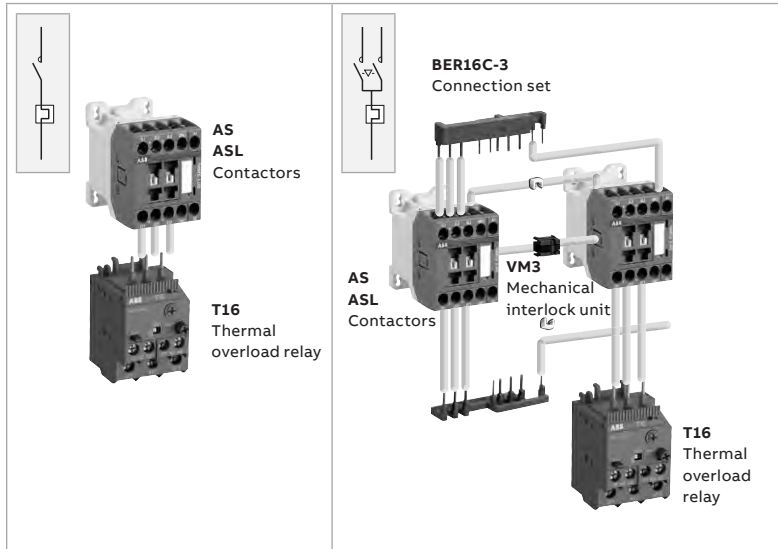
Pos. 1

DOL & reversing starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Direct-on-line starters

Reversing starters



You can easily assemble a direct-on-line starter by connecting AS or ASL contactors and T16 thermal overload relay.

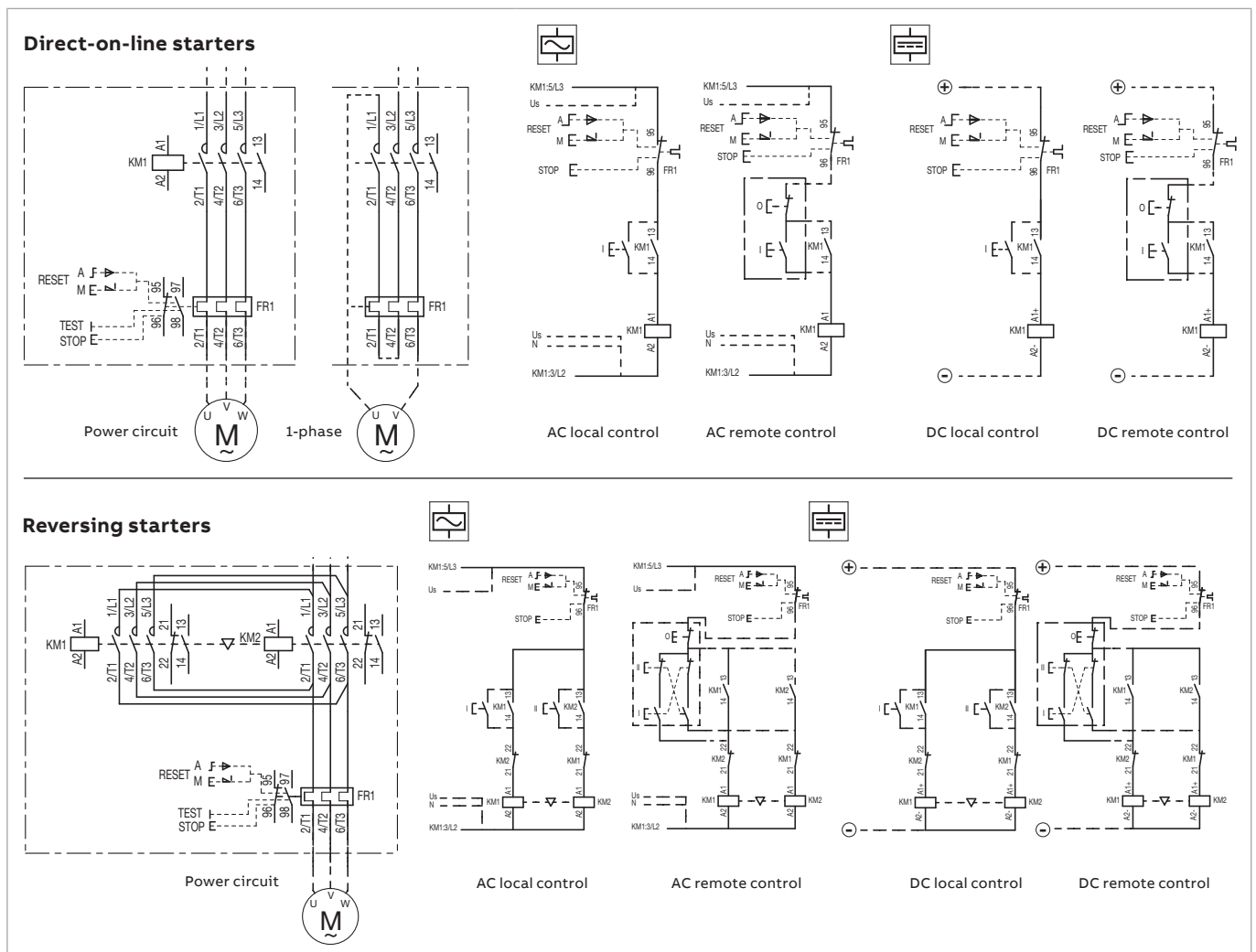
You can easily assemble reversing starter thanks to our complete range of accessories:

- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BER16C-3 connection set: it assures a safe and simple reversing connection between both contactor main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of both contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 7.5 kW.

For complete coordination tables, please contact your ABB local sales organization.

Wiring diagrams



DOL starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

| IEC | | Contactors | | | | Thermal overload relays | | | Accessories |
|----------------------------|-----------|--|---------|---------------|-----------------|-------------------------|-----------------|-----------------|-------------|
| AC-3, 400 V | | Rated control circuit voltage U _c (1) | | Type | Order code | Setting ranges | Type | Order code | |
| Rated operational power kW | current A | V 50 Hz | V 60 Hz | | | A ... A | | | |
| | | 4 | 8.5 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | 7.60...10.0 | T16-10 |
| | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | | | | |
| 5.5 | 11.5 | 24 | 24 | AS12-30-10-20 | 1SBL111001R2010 | 10.0...13.0 | T16-13 | 1SAZ711201R1045 | - |
| | | 230 | 230 | AS12-30-10-26 | 1SBL111001R2610 | | | | |
| 7.5 | 15.5 | 24 | 24 | AS16-30-10-20 | 1SBL121001R2010 | 13.0...16.0 | T16-16 | 1SAZ711201R1047 | - |
| | | 230 | 230 | AS16-30-10-26 | 1SBL121001R2610 | | | | |

Contactors - DC operated

| IEC | | Rated control circuit voltage U _c (1) | | Type | Order code | Setting ranges | Type | Order code | |
|----------------------------|-----------|--|-----|----------------|-----------------|----------------|-----------------|-----------------|--------|
| Rated operational power kW | current A | DC | | | | A ... A | | | |
| | | 4 | 8.5 | 24 | | ASL09-30-10-81 | 1SBL103001R8110 | 7.60...10.0 | T16-10 |
| 5.5 | 11.5 | 24 | | ASL12-30-10-81 | 1SBL113001R8110 | 10.0...13.0 | T16-13 | 1SAZ711201R1045 | - |
| 7.5 | 15.5 | 24 | | ASL16-30-10-81 | 1SBL123001R8110 | 13.0...16.0 | T16-16 | 1SAZ711201R1047 | - |

Note: for multiple packaging, please contact your ABB local sales organization.
(1) Other control voltages see voltage code table.

see table below for all setting ranges

| Setting ranges | Type | Order code |
|----------------|----------|-----------------|
| A ... A | | |
| 0.10...0.13 | T16-0.13 | 1SAZ711201R1005 |
| 0.13...0.17 | T16-0.17 | 1SAZ711201R1008 |
| 0.17...0.23 | T16-0.23 | 1SAZ711201R1009 |
| 0.23...0.31 | T16-0.31 | 1SAZ711201R1013 |
| 0.31...0.41 | T16-0.41 | 1SAZ711201R1014 |
| 0.41...0.55 | T16-0.55 | 1SAZ711201R1017 |
| 0.55...0.74 | T16-0.74 | 1SAZ711201R1021 |
| 0.74...1.00 | T16-1.0 | 1SAZ711201R1023 |
| 1.00...1.30 | T16-1.3 | 1SAZ711201R1025 |
| 1.30...1.70 | T16-1.7 | 1SAZ711201R1028 |
| 1.70...2.30 | T16-2.3 | 1SAZ711201R1031 |
| 2.30...3.10 | T16-3.1 | 1SAZ711201R1033 |
| 3.10...4.20 | T16-4.2 | 1SAZ711201R1035 |
| 4.20...5.70 | T16-5.7 | 1SAZ711201R1038 |
| 5.70...7.60 | T16-7.6 | 1SAZ711201R1040 |
| 7.60...10.0 | T16-10 | 1SAZ711201R1043 |
| 10.0...13.0 | T16-13 | 1SAZ711201R1045 |
| 13.0...16.0 | T16-16 | 1SAZ711201R1047 |

Reversing starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

| IEC | | Rated control circuit voltage U _c (1) | | Type | Order code | Setting ranges | Type | Order code | Type | Order code |
|----------|-----------|--|---------|---------------|-----------------|----------------|-----------------|-----------------|----------------------------|---|
| power kW | current A | V 50 Hz | V 60 Hz | | | A ... A | | | | |
| | | 4 | 8.5 | 24 | 24 | AS09-30-01-20 | 1SBL101001R2001 | 7.60...10.0 | T16-10 | 1SAZ711201R1043 |
| | | 230 | 230 | AS09-30-01-26 | 1SBL101001R2601 | | | | | |
| 5.5 | 11.5 | 24 | 24 | AS12-30-01-20 | 1SBL111001R2001 | 10.0...13.0 | T16-13 | 1SAZ711201R1045 | BER16C-3 + VM3 + 2x CA3-10 | 1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010 |
| | | 230 | 230 | AS12-30-01-26 | 1SBL111001R2601 | | | | | |
| 7.5 | 15.5 | 24 | 24 | AS16-30-01-20 | 1SBL121001R2001 | 13.0...16.0 | T16-16 | 1SAZ711201R1047 | BER16C-3 + VM3 + 2x CA3-10 | 1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010 |
| | | 230 | 230 | AS16-30-01-26 | 1SBL121001R2601 | | | | | |

Contactors - DC operated

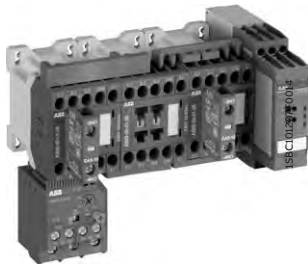
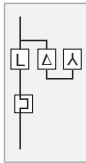
| IEC | | Rated control circuit voltage U _c (1) | | Type | Order code | Setting ranges | Type | Order code | Type | Order code |
|----------|-----------|--|-----|----------------|-----------------|----------------|-----------------|-----------------|----------------------------|---|
| power kW | current A | DC | | | | A ... A | | | | |
| | | 4 | 8.5 | 24 | | ASL09-30-10-81 | 1SBL103001R8110 | 7.60...10.0 | T16-10 | 1SAZ711201R1043 |
| 5.5 | 11.5 | 24 | | ASL12-30-10-81 | 1SBL113001R8110 | 10.0...13.0 | T16-13 | 1SAZ711201R1045 | BER16C-3 + VM3 + 2x CA3-10 | 1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010 |
| 7.5 | 15.5 | 24 | | ASL16-30-10-81 | 1SBL123001R8110 | 13.0...16.0 | T16-16 | 1SAZ711201R1047 | BER16C-3 + VM3 + 2x CA3-10 | 1SBN081012R1000 + 1SBN031005T1000 + 1SBN011010T1010 |

Note: for multiple packaging, please contact your ABB local sales organization. see table below for all setting ranges
 (1) Other control voltages see voltage code table.

| Setting ranges | Type | Order code |
|----------------|----------|-----------------|
| A ... A | | |
| 0.10...0.13 | T16-0.13 | 1SAZ711201R1005 |
| 0.13...0.17 | T16-0.17 | 1SAZ711201R1008 |
| 0.17...0.23 | T16-0.23 | 1SAZ711201R1009 |
| 0.23...0.31 | T16-0.31 | 1SAZ711201R1013 |
| 0.31...0.41 | T16-0.41 | 1SAZ711201R1014 |
| 0.41...0.55 | T16-0.55 | 1SAZ711201R1017 |
| 0.55...0.74 | T16-0.74 | 1SAZ711201R1021 |
| 0.74...1.00 | T16-1.0 | 1SAZ711201R1023 |
| 1.00...1.30 | T16-1.3 | 1SAZ711201R1025 |
| 1.30...1.70 | T16-1.7 | 1SAZ711201R1028 |
| 1.70...2.30 | T16-2.3 | 1SAZ711201R1031 |
| 2.30...3.10 | T16-3.1 | 1SAZ711201R1033 |
| 3.10...4.20 | T16-4.2 | 1SAZ711201R1035 |
| 4.20...5.70 | T16-5.7 | 1SAZ711201R1038 |
| 5.70...7.60 | T16-7.6 | 1SAZ711201R1040 |
| 7.60...10.0 | T16-10 | 1SAZ711201R1043 |
| 10.0...13.0 | T16-13 | 1SAZ711201R1045 |
| 13.0...16.0 | T16-16 | 1SAZ711201R1047 |

Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form



AS09-30-10 + AS09-30-01
 + AS09-30-01 + BEY16C-3 + VM3
 + CT-SDS + CA3-10 + T16

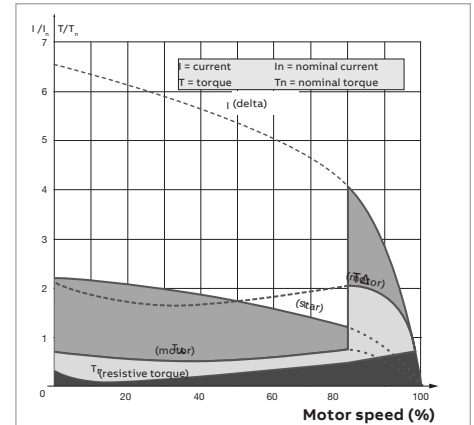
Application

Star-delta starting is the most common method to reduce the starting current of a motor. This system can be used on all the squirrel cage motors, which are normally used in delta connection. In this type of starting, it is recommended to choose motors having high starting torque i.e. much higher than the resistive torque in order to reach sufficient high speed when the motor is connected in star.

When starting:

- Inrush current is reduced to a third of direct starting current
- Motor torque is reduced to a third or even less of direct starting torque.

Transient current is generated when switching from star to delta connection. During the initial starting phase ("star" connection), the resistive torque of the driven load must remain, irrespective of speed, less than the "star" motor torque until "star-delta" switching occurs. This starting mode is therefore ideal for machines having low starting torque such as pumps, centrifugal compressors, wood-working machines...



Precaution

- Motor nominal voltage in delta connection must be equal to that of the mains.
 Example: a motor for 400 V star-delta starting must be designed for 400 V in "delta" connection. Its usual designation is "400 V / 690 V motor". The motor must be constructed with 6 terminal windings
- In order to prevent a high current peak, at least 85 % of nominal speed must be reached before switching from star to delta

Sequence

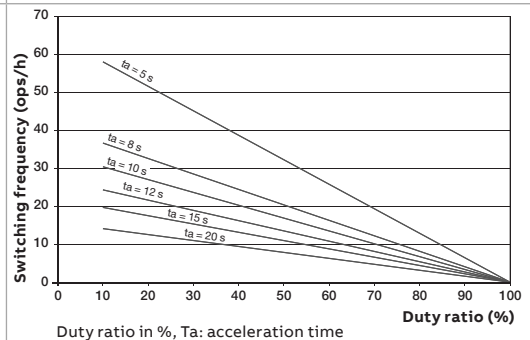
Starting is a three-stage process:

- 1st stage: "Star" connection - Press the "On" button on the control circuit to close the KM2 "Star" contactor. The KM1 "line" contactor then closes and the motor starts. Countdown of programmed starting time (6 to 10 s) then begins.
- 2nd stage: "Star" to "Delta" switching - when programmed starting time is over, the KM2 "Star" contactor opens.
- 3rd stage: "Delta" connection - A transition time (or dwelling time) of 50 ms is fixed between opening of the "star" contactor and closing of the "delta" contactor by the use of CT-SDS timer. This prevent short-circuit between "star" and "delta".

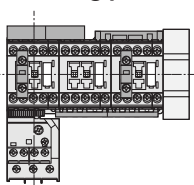
Main technical data

| | |
|--|------------------------------|
| Standards | IEC 60947-4-1 / EN 60947-4-1 |
| Rated operational voltage U _e max. | 690 V - 50/60 Hz |
| Rated insulation voltage U _i according to IEC 60947-4-1 | 690 V |
| Air temperature close to the device | ≤ 60 °C |
| Degree of protection | IP20 |

Switching frequency
 Switching frequency/hour, according to acceleration time and load factor. Respect of the following conditions enables utilization of the starter without excessive overheating of the connections or nuisance tripping of the thermal overload relay.
 Example:
 - Switching frequency = 15 starts/hr
 - Motor starting time "Ta" = 7 s (use 8 s curve)
 - Maximum load factor = 63 %
 This corresponds to a 4-minute operating cycle (15 starts/hr) with 7 seconds acceleration, 2.5 minutes operation and 1.5 minutes rest.



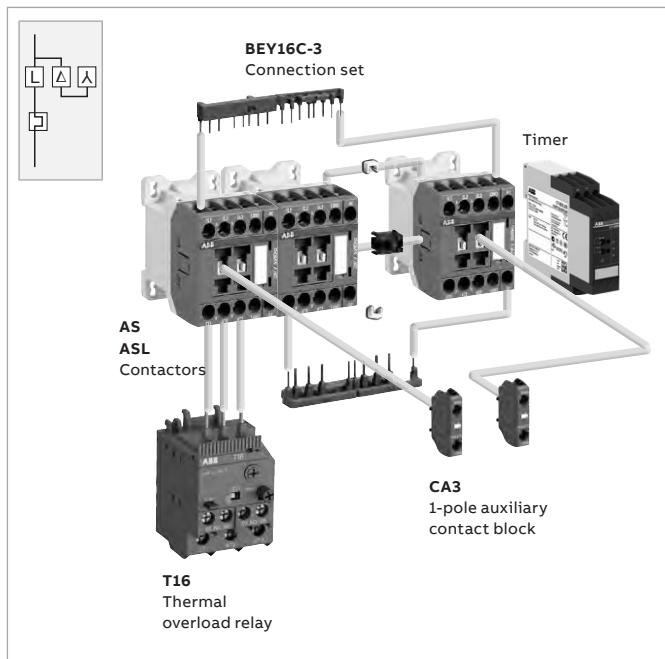
Mounting positions



Pos. 1

Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form



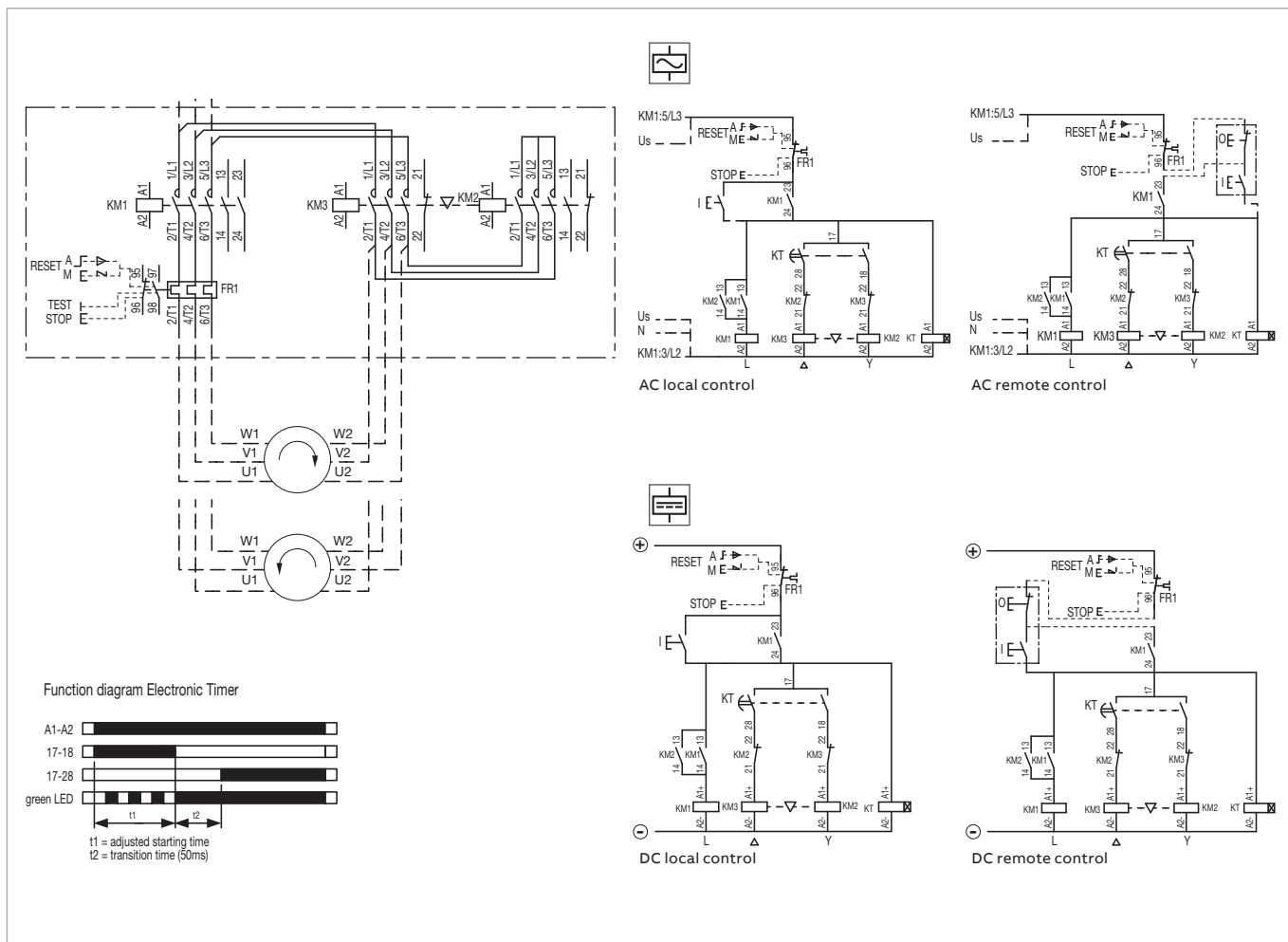
You can easily assemble a star-delta starter thanks to our complete range of accessories:

- VM3 mechanical interlock unit: just clip it between the 2 contactors without increasing starter length.
- BEY16C-3 connection set: it assures a safe and simple connection between contactors main terminals and an electrical interlocking between coil and N.C. built-in auxiliary contact terminals of star and delta contactors.

Select now easily and quickly your starter in the following pages at 400 V, up to 11 kW.

For complete coordination tables, please contact your ABB local sales organization.

Wiring diagrams



Star-delta starters protected by thermal overload relays

With AS, ASL contactors - open type version in kit form

Contactors - AC operated

| IEC AC-3, 400 V Rated operational power kW | | Rated control circuit voltage U _c (1) V 50 Hz V 60 Hz | | Line contactor KM1 | | Delta contactor KM3 | | Star contactor KM2 | |
|--|------|--|-----|--------------------|-----------------|---------------------|-----------------|--------------------|-----------------|
| | | | | Type | Order code | Type | Order code | Type | Order code |
| 7.5 | 15.5 | 24 | 24 | AS09-30-10-20 | 1SBL101001R2010 | AS09-30-01-20 | 1SBL101001R2001 | AS09-30-01-20 | 1SBL101001R2001 |
| | | 230 | 230 | AS09-30-10-26 | 1SBL101001R2610 | AS09-30-01-26 | 1SBL101001R2601 | AS09-30-01-26 | 1SBL101001R2601 |
| 11 | 22 | 24 | 24 | AS12-30-10-20 | 1SBL111001R2010 | AS12-30-01-20 | 1SBL111001R2001 | AS09-30-01-20 | 1SBL101001R2001 |
| | | 230 | 230 | AS12-30-10-26 | 1SBL111001R2610 | AS12-30-01-26 | 1SBL111001R2601 | AS09-30-01-26 | 1SBL101001R2601 |

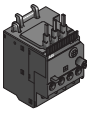
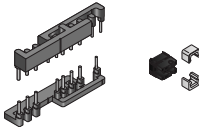

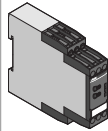
Contactors - DC operated

| IEC AC-3, 400 V Rated operational power kW | | Rated control circuit voltage U _c (1) DC | | Type | Order code | Type | Order code | Type | Order code |
|--|----|---|----------------|-----------------|----------------|-----------------|----------------|-----------------|----------------|
| | | | | 7.5 | 15.5 | 24 | ASL09-30-10-81 | 1SBL103001R8110 | ASL09-30-01-81 |
| 11 | 22 | 24 | ASL12-30-10-81 | 1SBL113001R8110 | ASL12-30-01-81 | 1SBL113001R8101 | ASL09-30-01-81 | 1SBL103001R8101 | |

Note: for multiple packaging, please contact your ABB local sales organization.
 (1) Other control voltages see voltage code table.

Star-delta starters protected by thermal overload relays

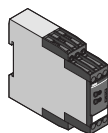
With AS, ASL contactors - open type version in kit form

| | | Thermal overload relays  The setting current value is: nominal motor current x 0.58 | | Connection sets Mechanical interlock unit  | | Auxiliary contact block  | | Electronic timer  | |
|----------------|--------|---|----------------|---|------------------------------------|---|-----------|--|--|
| Setting ranges | Type | Order code | Type | Order code | Type | Order code | Type | Order code | |
| A ... A | | | | | | | | | |
| 7.60...10.0 | T16-10 | 1SAZ711201R1043 | BEY16C-3 + VM3 | 1SBN081018R2000 + 1SBN031005T1000 | KM1: 1 x CA3-10 KM2: 1 x CA3-10 | 1SBN011010T1010 1SBN011010T1010 | CT-SDS... | see "Ordering Details" | |
| 10.0...13.0 | T16-13 | 1SAZ711201R1045 | BEY16C-3 + VM3 | 1SBN081018R2000 + 1SBN031005T1000 | KM1: 1 x CA3-10 KM2: 1 x CA3-10 | 1SBN011010T1010 1SBN011010T1010 | CT-SDS... | see "Ordering Details" | |

| Setting ranges | Type | Order code | Type | Order code | Type | Order code | Type | Order code |
|----------------|--------|-----------------|----------------|-----------------------------------|------------------------------------|------------------------------------|-----------|------------------------|
| A ... A | | | | | | | | |
| 7.60...10.0 | T16-10 | 1SAZ711201R1043 | BEY16C-3 + VM3 | 1SBN081018R2000 + 1SBN031005T1000 | KM1: 1 x CA3-10 KM2: 1 x CA3-10 | 1SBN011010T1010 1SBN011010T1010 | CT-SDS... | see "Ordering Details" |
| 10.0...13.0 | T16-13 | 1SAZ711201R1045 | BEY16C-3 + VM3 | 1SBN081018R2000 + 1SBN031005T1000 | KM1: 1 x CA3-10 KM2: 1 x CA3-10 | 1SBN011010T1010 1SBN011010T1010 | CT-SDS... | see "Ordering Details" |

see table below for all setting ranges

| Setting ranges | Type | Order code |
|----------------|----------|-----------------|
| A ... A | | |
| 0.10...0.13 | T16-0.13 | 1SAZ711201R1005 |
| 0.13...0.17 | T16-0.17 | 1SAZ711201R1008 |
| 0.17...0.23 | T16-0.23 | 1SAZ711201R1009 |
| 0.23...0.31 | T16-0.31 | 1SAZ711201R1013 |
| 0.31...0.41 | T16-0.41 | 1SAZ711201R1014 |
| 0.41...0.55 | T16-0.55 | 1SAZ711201R1017 |
| 0.55...0.74 | T16-0.74 | 1SAZ711201R1021 |
| 0.74...1.00 | T16-1.0 | 1SAZ711201R1023 |
| 1.00...1.30 | T16-1.3 | 1SAZ711201R1025 |
| 1.30...1.70 | T16-1.7 | 1SAZ711201R1028 |
| 1.70...2.30 | T16-2.3 | 1SAZ711201R1031 |
| 2.30...3.10 | T16-3.1 | 1SAZ711201R1033 |
| 3.10...4.20 | T16-4.2 | 1SAZ711201R1035 |
| 4.20...5.70 | T16-5.7 | 1SAZ711201R1038 |
| 5.70...7.60 | T16-7.6 | 1SAZ711201R1040 |
| 7.60...10.0 | T16-10 | 1SAZ711201R1043 |
| 10.0...13.0 | T16-13 | 1SAZ711201R1045 |
| 13.0...16.0 | T16-16 | 1SAZ711201R1047 |



CT-SDS...

Ordering details - Main accessories

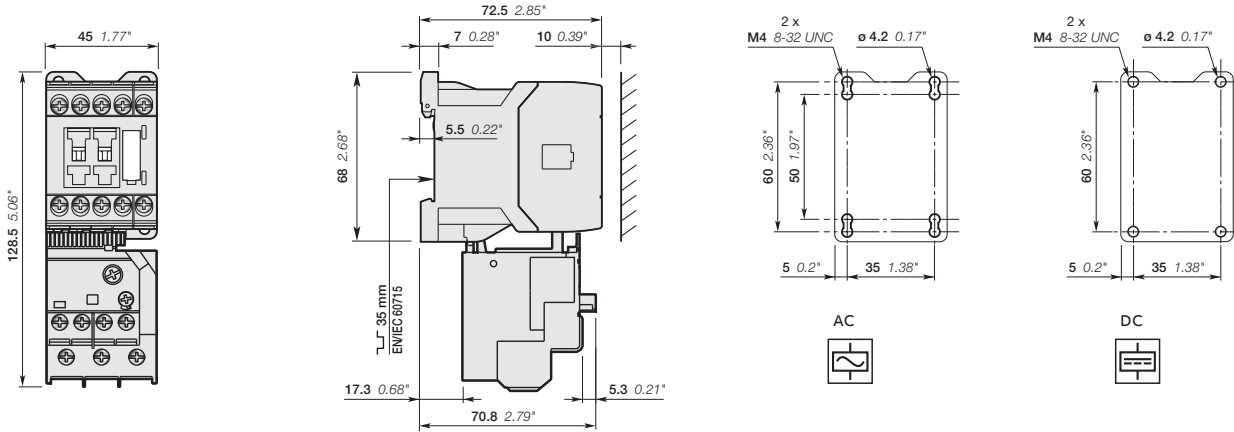
| | Type | Order code | Pkg qty | Weight (1 pce) kg |
|-------------------|---------------------------|------------|-----------------|-------------------|
| Electronic timer* | 28-48 V DC 24-240 V AC | CT-SDS.22S | 1SVR730210R3300 | 1 0.114 |
| | 380-440 V AC | CT-SDS.23S | 1SVR730211R2300 | 1 0.118 |

* 7 time ranges (0.05 s - 10 min), 50 ms transition time, 2 n/o contacts, 3 LEDs

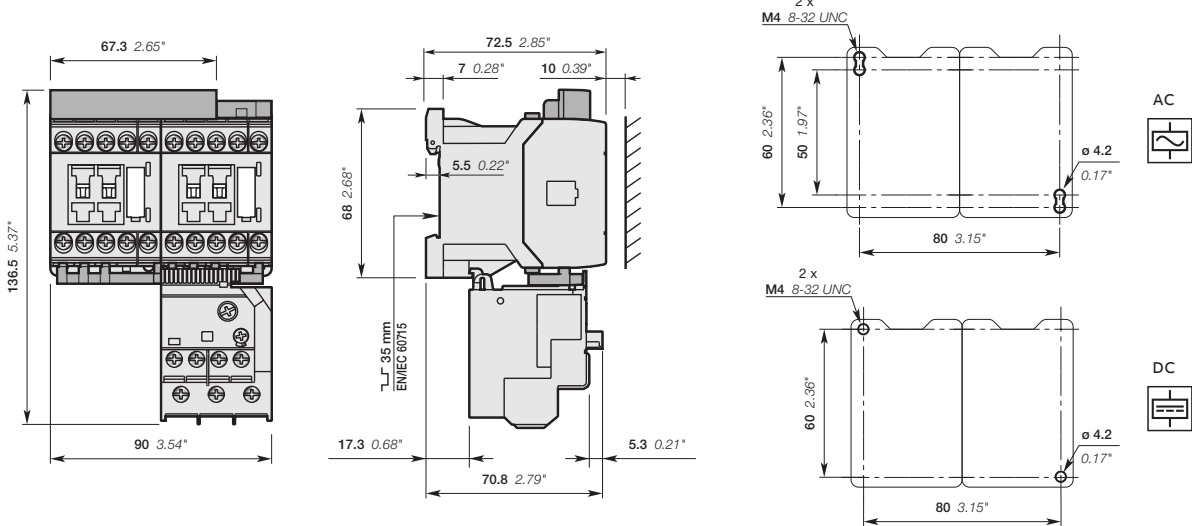
Protected by thermal overload relays

With AS, ASL contactors - open type in kit form

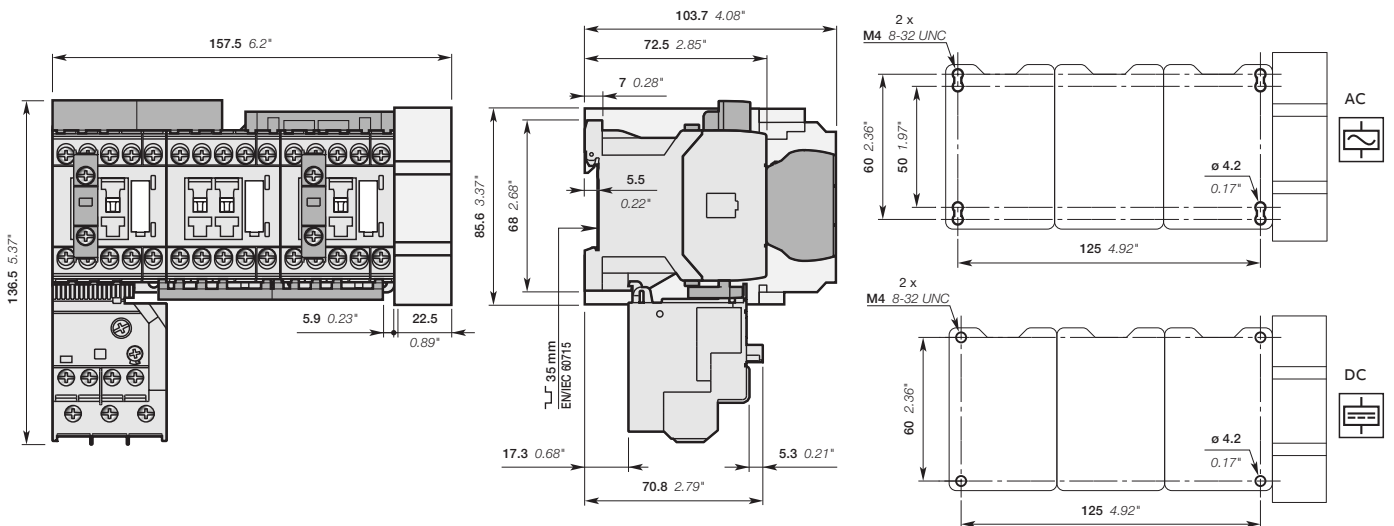
Direct-on-line starters



Reversing starters



Star-delta starters



Main dimensions mm, inches

Notes

A large rectangular area filled with a grid of small, evenly spaced dotted lines, intended for handwritten notes.



—

For direct product details information, use product type or order code, ex:

or www.abb.com/productdetails/AF09-30-10-13
www.abb.com/productdetails/1SBL137001R1310

Certifications and approvals

General technical data

13/2 Certifications and approvals

General technical data

- 13/8** Coordination with short-circuit protection devices
- 13/10** Standards, specifications and certifying organizations
- 13/12** Terms and technical definitions
- 13/14** Standards and utilization categories
- 13/16** North American standards and utilization categories
- 13/17** Degrees of protection
- 13/18** Climatic withstand of devices

Certifications and approvals

Designed according to the appropriate specifications, the devices in this catalogue have been built and tested. They can be used in most countries without any further certifications.

Some countries, however, require certification according to their own national standards. In other cases, the Marine for example, approvals ratifying that particular specifications have been met are necessary.

The table below shows the approvals and certifications for different devices.















The following documents may be obtained on request:


- Certificates of conformity
- Certificates of certification or approval.

The use of certified devices does not exonerate the equipment supplier from complying with the legal specifications of the country concerned.
















Explanation of symbols:

■ **Standard design approved**, the company labels bear the certification mark when this is required.














| Mark | Certifications | | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|---|---|---|---|--|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3-pole contactors with screw terminals | | | | | | | | | | | | | | |
| 4 to 7.5 kW | | | | | | | | | | | | | | |
| AC operated AS09, AS12, AS16 | | | ■ E312527 | ■ | | | | | | | | | | |
| DC operated ASL09, ASL12, ASL16 | | | ■ E312527 | ■ | | | | | | | | | | |
| 4 to 45 kW | | | | | | | | | | | | | | |
| AC / DC operated AF09, AF12, AF16, AF26, AF30, AF38 | | | ■ E312527 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| AC / DC operated AF40, AF52, AF65, AF80, AF96 | | | ■ E312527 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| 55 to 200 kW | | | | | | | | | | | | | | |
| AC / DC operated (2) AF116, AF140, AF146t | | | ■ E36588 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| AC / DC operated (2) AF190, AF205, AF265, AF305, AF370 | | | ■ E36588 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| 200 to 560 kW | | | | | | | | | | | | | | |
| AC / DC operated AF400, AF460, AF580, AF750 | | | ■ E36588 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| AC / DC operated AF1250 | | | ■ E73397 | ■ | ■ | | | | ■ | ■ | | | ■ | |
| AC / DC operated AF1350, AF1650 | | | ■ E36588 | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | | ■ | ■ |
| AC / DC operated AF2050 | | | ■ E73397 | ■ | ■ | | | | ■ | ■ | | | ■ | |
| AC / DC operated AF2650, AF2850 | | | ■ E73397 | ■ | ■ | | | | ■ | ■ | | | ■ | (1) |
| (1) For 2650 only. | | | | | | | | | | | | | | |
| 4-pole contactors with screw terminals | | | | | | | | | | | | | | |
| 25 to 125 A, AC-1 | | | | | | | | | | | | | | |
| AC / DC operated AF09, AF16, AF26, AF38 | | | ■ E319322 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ |
| AC / DC operated AF40, AF52, AF80 | | | ■ E312527 | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | ■ |
| 160 to 525 A, AC-1 | | | | | | | | | | | | | | |
| AC / DC operated AF116, AF140, AF190, AF205, AF265, AF305, AF370 | | | ■ E73397 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | ■ |
| 800 to 1000 A AC-1 | | | | | | | | | | | | | | |
| AC operated EK550 | | | ■ E36588 | ■ | ■ | | | | | | | | | |
| AC operated EK1000 | | | | ■ | ■ | | | | | | | | | |
| DC operated EK550 | | | ■ E36588 | ■ | ■ | | | | | | | | | |
| DC operated EK1000 | | | | ■ | ■ | | | | | | | | | |

(1) AF116 ... AF265 only. KC only applicable to devices up to 300 A. (2) Marine approvals for AF116 ... AF370 with built-in PLC interface: only DNV is available. All AF contactors are  (RCM) marked.

Certifications and approvals














| Mark | Certifications | | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|---|--|---|---|--|--|---|---|--|--|--|--|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  KC Korea |  BV France |  DNV-GL |  LR Gr. Britain |  RINA Italy |  ABS USA |  RMRS Russia |  CCS China shipping |  ClassNK Japan |
| DC switching contactors | | | | | | | | | | | | | | |
| AC operated GA75 | ■ | ■ | | ■ | | | | | | | | | | |
| DC operated GAE75 | ■ | ■ | | ■ | | | | | | | | | | |
| AC / DC operated GAF185 ... GAF300 | | | ■ | ■ | | | | | | | | | | |
| AC / DC operated GAF460, GAF750, GAF1250, GAF1650, GAF2050 | | | ■ | ■ | | | | | | | | | | |
| Capacitor switching contactors | | | | | | | | | | | | | | |
| AC operated UA16 | | ■ | | ■ | ■ | | | | | | | | | |
| AC operated UA26 ... UA75 | ■ | ■ | | ■ | ■ | | | | | | | | | |
| AC operated UA95, UA110 | | | ■ | ■ | ■ | | | | | | | | | |
| AC operated UA16..RA | | ■ | | ■ | ■ | | | | | | | | | |
| AC operated UA26..RA ... UA75..RA | ■ | ■ | | ■ | ■ | | | | | | | | | |
| AC operated UA95..RA, UA110..RA | | | ■ | ■ | ■ | | | | | | | | | |
| Contactor relays with screw terminals | | | | | | | | | | | | | | |
| AC operated 4-pole, 8-pole - NS.. | | | ■ | ■ | | | | | | | | | | |
| DC operated 4-pole, 8-pole - NSL.. | | | ■ | ■ | | | | | | | | | | |
| AC / DC operated 4-pole, 8-pole - NF.. | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| All GAF and NF contactors are  (RCM) marked. | | | | | | | | | | | | | | |
| 3-pole contactors with spring terminals | | | | | | | | | | | | | | |
| 4 to 7.5 KW | | | | | | | | | | | | | | |
| AC operated AS09..S, AS12..S, AS16..S | | | ■ | ■ | | | | | | | | | | |
| DC operated ASL09..S, ASL12..S, ASL16..S | | | ■ | ■ | | | | | | | | | | |
| 4 to 11 KW | | | | | | | | | | | | | | |
| AC / DC operated AF09..S AF12..S, AF16..S | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| AF26..S | | | | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Contactor relays with spring terminals | | | | | | | | | | | | | | |
| AC operated 4-pole, 8-pole - NS.. | | | ■ | ■ | | | | | | | | | | |
| DC operated 4-pole, 8-pole - NSL.. | | | ■ | ■ | | | | | | | | | | |
| AC / DC operated 4-pole, 8-pole - NFS.. | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

Certifications and approvals

| Mark | Certifications | | | | | Approvals: ship classification societies | | | | | | | |
|--|---|---|---|--|---|--|---|---|---|--|--|--|--|
| |  CSA Canada |  UL USA |  cUL _{us} North America |  CCC China |  GOST or EAC Russia |  BV France |  DNV-GL |  Lloyd's Register LR Gr.Britain |  RINA Italy |  ABS USA |  RMRS Russia |  CCS China shipping |  ClassNK Japan |
| Accessories for AS09 ... AS16 contactors | | | | | | | | | | | | | |
| Auxiliary contacts | | | | | | | | | | | | | |
| CA3 | | | ■ | ■ | ■ | | | | | | | | |
| CA3..S | | | E252354 ■ | ■ | | | | | | | | | |
| Mechanical interlock unit | | | | | | | | | | | | | |
| VM3 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Connecting links | | | | | | | | | | | | | |
| BEA16-3 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEA16-3U | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BER16C-3 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEY16C-3 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Electronic timer | | | | | | | | | | | | | |
| TEF3 | | | ■ E252354 | | ■ | | | | | | | | |
| Surge suppressors | | | | | | | | | | | | | |
| RT5, RC5-1, RV5 | | | ■ E312527 | | ■ | | | | | | | | |
| Accessories for AF09 ... AF2650 and EK contactors and NF contactor relays | | | | | | | | | | | | | |
| Auxiliary contacts | | | | | | | | | | | | | |
| CA4, CC4 | | | ■ E252354 | ■ | ■ | ■ (CA4) | ■ (CA4) | ■ | ■ | ■ | ■ | | □ |
| CAT4 | | | ■ E252354 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | □ |
| CAL4 | | | ■ E252354 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | □ |
| CAL19 | | | ■ E76003 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | □ |
| CAL18 | | | ■ E76003 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | □ |
| CAL16 | | | ■ E76003 | ■ | ■ | | | | | | | | |
| CE5...D0.1 | | | ■ E319322 | ■ | ■ | | | | | | | | |
| CE5...D2 | | | ■ E319322 | ■ | ■ | | | | | | | | |
| CE5...W0.1 | | | ■ E319322 | ■ | ■ | | | | | | | | |
| CE5...W2 | | | ■ E319322 | | ■ | | | | | | | | |
| CEL18 | | | ■ E76003 | | ■ | | | | | | | | |
| CA4..S, CAL4..S, CAT4..S | | | ■ E252354 | ■ | ■ | ■ | ■ | | ■ | ■ | | | |
| Electronic timer | | | | | | | | | | | | | |
| TEF4, TEF45 | | | ■ E252354 | | ■ | | | | | | | | |
| Mechanical / electrical interlock unit | | | | | | | | | | | | | |
| VEM4 | | | ■ E312527 | ■ | ■ | | | | | | | | |
| Mechanical interlock units | | | | | | | | | | | | | |
| VM4, VM96-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| VM19 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| VM140/190 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| VM205/265 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| VM 750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| VM1650H | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Interface relay | | | | | | | | | | | | | |
| RA4 | | | ■ E252354 | | ■ | | | | | | | | |
















□ Marine approvals not needed for this accessory.

Certifications and approvals

| Mark | Certifications | | | | | Approvals: ship classification societies | | | | | | | |
|---|---|---|---|--|---|--|--|---|---|--|--|--|--|
| |  CSA Canada |  UL USA |  cUL ^{us} North America |  CCC China |  GOST or EAC Russia |  BV France |  DNV-GL |  Lloyd's Register LR Gr.Britain |  RINA Italy |  ABS USA |  RMRS Russia |  CCS China shipping |  ClassNK Japan |
| Latching unit | | | | | | | | | | | | | |
| WB75-A | | ■ E252354 | | | ■ | | | | | | | | |
| WA4 | | | ■ E312527 | | | | | | | | | | |
| Connecting links with manual motor starters | | | | | | | | | | | | | |
| BEA16-4, BEA26-4, BEA38-4, BEA65-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Connection sets for reversing contactors | | | | | | | | | | | | | |
| BER16-4, BER38-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BER65-4, BER96-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BER140-4, BER205-4, BER370-4 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEM460-30, BEM750-30 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Connection sets for star-delta starters | | | | | | | | | | | | | |
| BEY16-4, BEY38-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEY65-4, BEY96-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEY190-4, BEY205-4, BEY265-4, BEY370-4 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BED460, BED580, BED750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Phase to phase connections | | | | | | | | | | | | | |
| BEP140-30, BEP205-30, BEP370-30 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEP140-40, BEP205-40, BEP370-40 | | | | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BES460, BES750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Connection bars between contactors and MCCB | | | | | | | | | | | | | |
| BEA140/XT2, BEA140/XT3 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| BEA205/XT4 | | | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| BEA370/T5 | | | ■ E36588 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| Terminal connecting strips and shorting bars | | | | | | | | | | | | | |
| LY16-4, LY38-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LY110, LY185, LY300, LY460, LY750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LP185, LP300, LP460, LP750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LH38-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LF16-4, LF38-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LG16-4 | | | ■ E312527 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LK96-4F | | | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| Additional coil terminal blocks | | | | | | | | | | | | | |
| LD38-4 | | | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| Additional terminal blocks | | | | | | | | | | | | | |
| LDC4 | | | ■ E312527 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| Protective covers | | | | | | | | | | | | | |
| BX4, BX4-CA | | | ■ E252354 | | | □ | □ | □ | □ | □ | □ | □ | □ |
| Terminal shrouds | | | | | | | | | | | | | |
| LT65-30 ... LT96-30 | | | - | | | □ | □ | □ | □ | □ | □ | □ | □ |
| LT52-40 ... LT80-40 | | | - | | | □ | □ | □ | □ | □ | □ | □ | □ |
| LT140 ... LT750 | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| LT140-40 ... LT370-40 | | | ■ E73397 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
| Terminal enlargement | | | | | | | | | | | | | |
| LW | | | ■ E36588 | | ■ | □ | □ | □ | □ | □ | □ | □ | □ |
















(1) In progress. □ Marine approvals not needed for this accessory.


Certifications and approvals

| Mark | Certifications | | | | | | | Approvals: ship classification societies | | | | | | | |
|--|---|---|--|--|---|--|--|---|---|--|--|---|--|--|--|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  ATEX |  IEC Ex |  KC Korea |  BV France |  DNV-GL |  LR Gr.Britain |  RINA Italy |  ABS USA |  RMRS Russia |  ClassNK Japan |
| Terminal extension | | | | | | | | | | | | | | | |
| LX | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| Connection socket | | | | | | | | | | | | | | | |
| LL | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| Connection modules | | | | | | | | | | | | | | | |
| LD146-30, LD146-40 | | | ■ E36588 | | ■ | □ | | | □ | □ | □ | □ | □ | □ | □ |
| Function marker | | | | | | | | | | | | | | | |
| BA4 | | | ■ E252354 | | | □ | | | □ | □ | □ | □ | □ | □ | □ |
| Fixing clip | | | | | | | | | | | | | | | |
| BB4 | | | ■ E312527 | | | □ | | | □ | □ | □ | □ | □ | □ | □ |
| Manual motor starters | | | | | | | | | | | | | | | |
| MS116 | | | ■ E137861 | ■ | ■ | | | ■ | ■ | ■ | | | ■ | ■ | |
| MS132 | | | ■ E137861 E345003 | ■ | ■ | | ■ (1) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| MS165 | | | ■ E137861 E345003 | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| MS132-K | | | ■ | ■ | ■ | | ■ | ■ | | ■ | | | ■ | | |
| Manual motor starters magnetic only | | | | | | | | | | | | | | | |
| MO132 | | | ■ E137861 E345003 | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| MO165 | | | ■ E137861 E345003 | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Circuit breaker for transformer protection | | | | | | | | | | | | | | | |
| MS132-T | | | ■ E137861 | ■ | ■ | | | ■ | | | | | | | ■ |
| MS132-KT | | | ■ E137864 | ■ | | | | | | | | | | | |
| Mini contactors | | | | | | | | | | | | | | | |
| 3-pole contactors | | | | | | | | | | | | | | | |
| AC operated B6, B7 | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated BC6, BC7, B7D | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated B6S, B7S | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| 3-pole reversing contactors | | | | | | | | | | | | | | | |
| AC operated VB6, VB7 | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated VBC6, VBC7 | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| AC operated VB6A, VB7A | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| DC operated VBC6A, VBC7A | | | ■ E191658 | ■ | ■ | | | ■ | ■ | ■ | ■ | | | ■ | |
| 3-pole interface contactors | | | | | | | | | | | | | | | |
| DC operated BC6, BC7 | | | ■ E191658 | ■ | ■ | | | | ■ | ■ | ■ | | | ■ | |
| 3-pole contactor - large coil voltage range | | | | | | | | | | | | | | | |
| DC operated TBC7 | | | | ■ | ■ | | | ■ | | | | | | | |

(1) Valid for production date week 47, 2018. □ Marine approvals not needed for this accessory.

Certifications and approvals

| Mark | Certifications | | | | | | | Approvals: ship classification societies | | | | | | | |
|---|--|--|---|---|--|--|--|--|--|--|--|--|---|---|---|
| |  CSA Canada |  UL USA |  cULus North America |  CCC China |  GOST or EAC Russia |  ATEX |  IEC Ex |  KC Korea |  BV France |  DNV-GL |  LR Gr. Britain |  RINa Italy |  ABS USA |  RMRS Russia |  ClassNK Japan |
| 4-pole contactors | | | | | | | | | | | | | | | |
| AC operated | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | | ■ | |
| B6, B7 | | | E191658 | | | | | | | | | | | | |
| DC operated | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | | | | ■ | |
| BC6, B7D | | | E191658 | | | | | | | | | | | | |
| 4-pole contactor - large coil voltage range | | | | | | | | | | | | | | | |
| DC operated | | | | ■ | ■ | | ■ | | | | | | | | |
| TBC7 | | | | | | | | | | | | | | | |
| Contactors relays | | | | | | | | | | | | | | | |
| AC operated | | | ■ | ■ | ■ | | | | | | | | | ■ | |
| K6 | | | E48139 | | | | | | | | | | | | |
| DC operated | | | ■ | ■ | ■ | | | | | | | | | ■ | |
| KC6 | | | E48139 | | | | | | | | | | | | |
| Interface contactor relays | | | | | | | | | | | | | | | |
| DC operated | | | ■ | ■ | ■ | | | | | | | | | ■ | |
| KC6 | | | E48139 | | | | | | | | | | | | |
| DC operated | | | ■ | ■ | ■ | | | | | | | | | ■ | |
| K6S | | | E48139 | | | | | | | | | | | | |
| Contactors relays - large coil voltage range | | | | | | | | | | | | | | | |
| DC operated | | | | | ■ | | | | | | | | | | |
| TKC6 | | | | | | | | | | | | | | | |
| Thermal overload relays | | | | | | | | | | | | | | | |
| T16 | | | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TF42 | | | ■ | ■ | ■ | | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TF65 | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TF96 | | | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TF140DU | | | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TF140DU-V1000 | | | ■ | ■ | ■ | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TA200DU | | | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| TA200DU-V1000 | | | ■ | ■ | ■ | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | E48139 | | | | | | | (4) | | | | | |
| | | | E48139 | | | | | | | (4) | | | | | |
| Electronic overload relays | | | | | | | | | | | | | | | |
| 0.10...45 A | | | | | | | | | | | | | | | |
| E16DU | | | ■ | ■ | ■ | | | | | | | | | ■ | |
| EF19 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF45 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | E48139 | | | | | | | | | | | (1) | |
| 20...150 A | | | | | | | | | | | | | | | |
| EF65 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF96 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF146 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | E48139 | | | | | | | | | | | (1) | |
| 63...380 A | | | | | | | | | | | | | | | |
| EF205 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF370 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | E48139 | | | | | | | | | | | (1) | |
| 150...1250 A | | | | | | | | | | | | | | | |
| EF460 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF750 | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| EF1250 | | | ■ | ■ | ■ | | | | | | | | | | |
| | | | E76003 | | | | | | | | | | | | |
| Electronic compact starter | | | | | | | | | | | | | | | |
| HF range | | | ■ | ■ | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | | | E191658 | | | | | | | | | | | | |

(1) IECEx is valid for product produced from week15, 2017. (2) EF65-56 has no RINa approval and ATEX certification is valid for EF65-56 produced from week 47, 2015. (3) ATEX is valid for products produced from week 26, 2015. All electronic overload relays are  (RCM) marked : EF produced from week 47, 2015; E produced from week 14, 2016. (4) 2 separate certificate available: 1 for DNV and 1 for GL.

Coordination with short-circuit protection devices

Definition

The coordination of control and protection devices in compliance with IEC 60947-4-1, EN 60947-4-1 and UL 60947-4-1 between the branch circuit protective device and the motor starter standards defines for the contactors and starters the type rating and characteristics of the short-circuit protection devices SCPD which allow selective protection against overloads and ensure protection against short circuits.

Basic functions

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices MUST be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

Applicable standards

IEC 60947-4-1 (EN 60947-4-1) and UL 60947-4-1 between the branch circuit protective device and the motor starter precisely defines the different points to be considered in order to carry out correct coordination. Complete coordination for a combination includes the following points:

- selectivity test between the overload relay and the short protection device SCPD.
- short-circuit condition tests:
 - at prospective "r" currents - These currents depend on the rated operational current of the starter (I_e AC-3) and are given by the standard (Table 13).
For example:
 - r = 1kA for I_e AC-3 < 16 A
 - r = 3 kA for 16 A < I_e AC-3 < 63 A
 - r = 5 kA for 63 A < I_e AC-3 < 125 A etc.
 - at the rated conditional short-circuit current "I_q" - This is the maximum prospective current that the combination can withstand, for example 50 kA.

Types of coordination

IEC 60947-4-1 (EN 60947-4-1) UL 60947-4-1 between the branch circuit protective device and the motor starter defines two types of coordination according to the expected level of service continuity. Acceptable extreme damage for the switchgear is divided into two types.

- Type 1: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will not be able to then operate without being repaired or having parts replaced.
- Type 2: In short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts light welding is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

Motor efficiency class and design type

IEC coordination tables are displayed for IE1, IE2 and IE3 motor efficiency classes in regards with N/H or NE/HE motor design use.

Asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H.

Asynchronous IE3/IE4 motors may be of the design NE or HE, having extended / locked rotor apparent power and current than design N and H motors.

- International Efficiency (IE) classes for single speed electric motors
IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:
 - IE4 = Super premium efficiency
 - IE3 = Premium efficiency
 - IE2 = High efficiency
 - IE1 = Standard efficiency
- Motor design N/H and NE/HE
IEC 60034-12:2016 standard defines motor design categories as below:
 - **Design N**
Normal starting torque with normal locked rotor current
 - **Design H**
High starting torque with normal locked rotor current
 - **Design NE**
Normal starting torque with higher locked rotor current
 - **Design HE**
High starting torque with higher locked rotor current.

Coordination with short-circuit protection devices

A complete data base of coordination tables, according to **IEC 60947-4-1 (EN 60947-4-1)** or **UL 508 / UL 60947-4-1**, is available on the ABB Website: see below.

Selection

Simple or multiple selections all from the same screen.

Quick Start Guide

Languages

IEC or UL selection

Motor efficiency class and design type

Short-circuit protection devices

- Air circuit breakers
- Fuses "gG" or "aM"
- Moulded case circuit breakers
- Manual motor starters

Overload relay

- Embedded: manual motor starter / soft starter
- TOL : thermal overload relay
- EOL : electronic overload relay
- UMC : universal motor controller

Coordination type acc. to IEC or UL selection

- IEC type 1 or type 2
- UL CMC type A to type F and UL component rating

Starter type

- Direct-on-line normal start
- Direct-on-line heavy duty
- Star-delta normal start
- Star-delta heavy duty
- Soft starter normal start

Results

- Search results displayed at the bottom of the selection page
- Only the most appropriate solutions to your application, will be displayed at the bottom of the page. "Enable Smart Current Search" function featured for the short-circuit current where "near to" selected values also are included in the result.
- Indication of the status (Active, Legacy) of the selected tables
- Possible to print the page to a pdf file or from your printer
- "Clear selection" function to deselect all selected.

| Fuses, 400 Vac, 100 kA, DOL-NS, Coordination type : IEC Type 2, Overload relay : TOL, Motor efficiency class IE1/IE2/IE3 N/H | | | | | | | | | | | | |
|--|-------------------------|------------------|---------------------|------------|---------------|--------|----------|-------------|-------------------|------------------------------|----|--------------|
| Motor | | Fuses | | | | Rating | | Contactor | | Overload relay | | Status Table |
| Motor Rated Power [kW] | Rated Current (FLA) [A] | Switch-Fuse Type | Fuse Characteristic | Rating [A] | Type and Size | Type | Type | Trip Class | Current range [A] | Max allowed load current [A] | | |
| 0.25 | 0.85 | OS32GD03P | gG | 2 | OFAF000AM2 | AF09 | TF42-1.0 | 0.74 - 1.00 | 1.00 | Active | >> | |

| Fuses, 400 Vac, 100 kA, DOL-NS, Coordination type : IEC Type 2, Overload relay : TOL, Motor efficiency class IE1/IE2/IE3 N/H | | | | | | | | | | | | |
|--|-------------------------|------------------|---------------------|------------|---------------|--------|-----------|-------------|-------------------|------------------------------|----|--------------|
| Motor | | Fuses | | | | Rating | | Contactor | | Overload relay | | Status Table |
| Motor Rated Power [kW] | Rated Current (FLA) [A] | Switch-Fuse Type | Fuse Characteristic | Rating [A] | Type and Size | Type | Type | Trip Class | Current range [A] | Max allowed load current [A] | | |
| 0.12 | 0.44 | OS32GD03P | gG | 2 | OFAF000H2 | AF09 | TF42-0.55 | 0.42 - 0.55 | 0.55 | Active | >> | |



Access

To find the coordination tables for motor protection, please see:
<http://applications.it.abb.com/SOC/Page/Selection.aspx>

Standards, specifications and certifying organizations

Definitions

ABB low voltage devices are developed and manufactured in accordance with the applicable regulations as stated in the international IEC standards, the European EN standards and the national ones such as NF, DIN, GB and BS. For devices installed in ships, an approval issued by independent classification societies is demanded by the maritime insurance companies.

CB scheme

Certification Body certificates (CB certificates) are available to prove the complete conformity to standards

The IEC CB (Certification Body) scheme is multilateral agreement between the National Certification Bodies to allow international certification of electrical and electronic products so that a single certification allows worldwide market access.

The CB Scheme was established by the International Electrotechnical Committee for conformity testing to standards for electrical equipment (IECEE).

Certified products

In some cases, products are validated and tested according to a standard by a certification body and the manufacturer is regularly visited by this body in order to check the respect of the design and the materials used. This process creates a certified product. This is the case of UL (Underwriters Laboratories) and CSA (Canadian Standard Association) for instance (see below).

Specifications

International Specifications

The International Electrotechnical Commission, IEC, which is part of the International Standards Organization, ISO, publishes IEC publications which act as a basis for the world market.

European Specifications and National Specifications

The European committee for electrotechnical standardization (CENELEC), which groups together European countries, publishes EN standards.

These European standards may differ very little from IEC international standards and have similar numbering.

The same applies for national standards which use, without exception, the same numbering and reproduce the texts of these unified standards in their entirety. Contradicting national standards are withdrawn.

European Directives

The guarantee of the free movement of goods within the European Community means that any regulatory differences between member states have been eliminated. The European directives set up common rules that are included in the legislation of each state while contradictory regulations are cancelled.

Three directives are essential:

- **Low Voltage Directive** 2006/95/EC (until April 2016, 19th) and 2014/35/EC (from April 2016, 20th) concerns electrical equipment from 0 to 1000 V AC and from 0 to 1500 V DC.

This specifies that compliance with the requirements that it sets out is acquired if the equipment conforms to the standards harmonized on an European level. EN 60947-1 and EN 60947-4-1 for contactors.

- **Machinery Directive** 2006/42/EC for safety specifications of machines and equipment on complete machines.

- **Electromagnetic Compatibility Directive** 2004/108/EC (until April 2016, 19th) and 2014/30/EC (from April 2016, 20th) which concerns all devices able to create electromagnetic disturbance.

CE Marking:

CE marking indicates that the marked equipment conforms to the relevant EU directive.

CE marking is part of an administrative procedure and guarantees free movement of the product within the European Community.

Standards in Canada and the USA

Canadian and American specifications are more or less equivalent but differ greatly from IEC standards.

UL Underwriters Laboratories USA

CSA Canadian Standard Association Canada

UL (USA) specifications make the following distinction between devices:



Listed Product

A product that has been produced under UL's listing and follow-up service program in accordance with the terms of UL's service agreement and that bears the UL listing mark as the manufacturer's declaration that the product complies with UL's requirements.



Recognized Component

A part or subassembly covered under UL's recognition service and intended for factory installation in listed (or other) products. Recognized components are incomplete in certain construction features or restricted in performance capabilities and not intended for separate installation in the field, rather they are intended for use as components of incomplete equipment submitted for investigation by UL. Final acceptance of the component in the complete equipment is dependent upon its installation and use in accordance with all applicable use conditions and ratings noted in the component report issued by UL, in the guide information and in the individual client's Recognized Component information page.

The combined UL signs for the USA and Canada are recognized by the authorities of both countries.

China Compulsory Certification (CCC): The CCC mark is a compulsory certification mark in the field of safety for products sold on the Chinese market.

GOST / EAC: Russia (please consult your local ABB sales office)

C-Tick: The C-Tick mark certifies compliance with the Australian EMC requirements. The mark is also recognized in New Zealand

ANCE: Mexico

Marine Approvals

The following specifications must be respected when these devices are used on ships:

BV Bureau Veritas France

DNV Det Norske Veritas Norway

GL Germanischer Lloyd Germany

Standards, specifications and certifying organizations

| | |
|-------------|--|
| LRS | Lloyd's Register of Shipping Great Britain |
| ABS | America Bureau of Shipping |
| RMRS | Russian Maritime Register of Shipping RMRS |
| RRR | Russian River Register |
| MRS | Maritime Register of Shipping Russia |
| PRS | Polski Rejestr Statkow Poland |
| RINA | Registro Italiano Navale Italy |

Specifications (cont.)

International Standards

IEC 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules

IEC 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters

IEC 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices

IEC 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests

IEC 60947-6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment

IEC 60204-1 Electrical equipment of industrial machines – Part 1: General requirements

IEC 60715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations

European Standards

EN 50 005 Low-voltage switchgear and controlgear for industrial use – Terminal marking and distinctive number: General rules

(Annex L of IEC 60947-1).

EN 50 011 Low-voltage switchgear and controlgear for industrial use – Terminal marking, distinctive number and distinctive letter for particular contactor relays (Annex M of IEC 60947-5-1)

EN 60947-1 Low-voltage switchgear and controlgear – Part 1: General rules.

EN 60947-4-1 Low-voltage switchgear and controlgear – Part 4: Contactors and motor starters – Section 1: Electromechanical contactors and motor starters.

EN 60947-5-1 Low-voltage switchgear and controlgear – Part 5: Control circuit devices and switching elements – Section 1: Electromechanical control circuit devices.

EN 60947-5-4 Low-voltage switchgear and controlgear – Part 5-4: Control circuit devices and switching elements. Method of assessing the performance of low-energy contacts. Special tests.

EN 60947-6-1 Low-voltage switchgear and controlgear – Part 6: Multiple function equipment – Section 1: Automatic transfer switching equipment.

EN 60204-1 Electrical equipment of industrial machines – Part 1: General requirements.

EN 60 715 Dimensions of low-voltage switchgear and controlgear. Standardized mounting on rails for mechanical support of electrical devices in switchgear and controlgear installations.

National Standards

European countries national standards reproduce the corresponding EN... standards. Codification is built by addition of a prefix to EN numbering.

For instance:

- France **NF** EN...
- Germany **DIN** EN...
- Great Britain **BS** EN...
- Italy **CEI** EN...
- Sweden **SS** EN...

Terms and technical definitions

Circuits

- auxiliary circuit: All the conductive parts of a contactor designed to be inserted in a different circuit from the main circuit and the contactor control circuits.
- control circuit: All the conductive parts of a contactor (other than the main circuit and the auxiliary circuit) used to control the contactor's closing operation or opening operation or both.
- main circuit: All the conductive parts of a contactor designed to be inserted in the circuit that it controls.

Thermal overload relay tripping classes

IEC 60947-4-1 defines tripping classes 10 A, 10, 20 and 30. Types 10 A, 10, etc. correspond to the maximum tripping time for a making current at 7.2 times the setting current.

Furthermore, for each class the standard specifies the tripping time for 1.5 times the setting current and sets the non tripping condition at 1.05 times the setting current.

All these data are summarized in the table below.

Extract from IEC 60947-4-1:

| Tripping class | 10 A | 10 | 20 | 30 |
|---|-------------|--------|--------|--------|
| Max. tripping time for 1.5 times the setting current (warm state) | s 120 | 240 | 480 | 720 |
| Tripping time for 7.2 times the setting current (cold state) | s 2 - 10 | 4 - 10 | 6 - 20 | 9 - 30 |
| For 1.05 times the setting current | No tripping | | | |

Electromagnetic compatibility

AF... contactors comply with IEC 60947-1, 60947-4-1 and EN 60947-1, 60947-4-1 standards.

Definitions:

Environment A: "Mainly relates to low-voltage non public or industrial networks/locations/installations (EN 50082-2 article 4) including highly disturbing sources".

Environment B: "Mainly relates to low-voltage public networks (EN 50082-1 article 5) such as residential, commercial and light industrial locations/installations. Highly disturbing sources such as arc welders are not covered by this environment".

Notice for AF09...AF2650 contactors:

- AF09 ... AF38 contactors and NF contactor relays (produced since week 08-2013), AF40 ... AF96 contactors have been designed for environment B.
- AF09 ... AF38-...-12 contactors and NF..E-12 contactor relays (48...130 V 50/60 Hz-DC), AF116 ... AF2650 contactors: these products have been designed for environment A. Use of this product in environment B may cause unwanted electromagnetic disturbances in which case the user may be required to take adequate mitigation measures.

Note: for 48...130 V 50/60 Hz-DC in environment B, AF09Z ... AF38Z-...-22 contactor or NFZ..E-22 contactor relays can be selected.

Definitions according to SEMI F47-0706

SEMI F47-0706 defines the voltage sag immunity required for semiconductor processing, metrology and automated test equipment, and on subsystems and components which are used in the construction of semiconductor processing equipment including but not limited to:

- Power supplies
- Generators
- Robots and factory interface
- Chillers, pumps, blowers

- AC operated contactors and contactor relays...

voltage sag: an rms reduction in the AC voltage, at the power frequency, for durations from a half cycle to a few seconds.

The IEC terminology for this phenomenon is voltage dip.

voltage sag immunity: the ability of equipment to withstand momentary electrical power interruptions or sags.

Coordination of protections against short circuit

The goal here is to protect electromechanical starters and soft-starters.

Any starter is designed to:

- start motors,
- ensure continuous functioning of motors,
- disconnect motors from the supply line,
- guarantee protection of motors against overloads.

The starter is typically made up of a switching device (contactor) and an overload protection device (thermal overload relay or electronic overload relay). These two devices **MUST** be coordinated with equipment capable of providing protection against short circuit (SCPD: short circuit protective device): typically a circuit breaker with magnetic release only or a switch fuse. These are not necessarily part of the starter.

The characteristics of the starter must comply with the international standard IEC 60947-4-1 which defines the above items as follows:

contactor: a mechanical switching device having only one position of rest, operated otherwise than by hand, capable of making, carrying and breaking currents under normal circuit conditions including overload conditions.

overload release: overload relay or release which operates in the case of overload and also in case of loss of phase.

circuit-breaker: defined by IEC 60947-2 as a mechanical switching device, capable of making, carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time and breaking currents under specified abnormal circuit conditions.

IEC publication 60947-4-1 defines coordination types "1" and "2":

- Type "1" coordination requires that, in the event of a short-circuit, the contactor or starter does not endanger persons or installations and will not then be able to operate without being repaired or parts being replaced.
- Type "2" coordination requires that, in short-circuit conditions, the contactor or starter does not endanger persons or installations and will be able to operate afterwards. The risk of contacts being light welded is acceptable. In this case, the manufacturer must stipulate the measures to be taken with respect to maintenance of the equipment.

IEC coordination tables are displayed for IE1, IE2 and IE3 motor efficiency classes in regards with N/H or NE/HE motor design use.

International Efficiency (IE) classes for single speed electric motors

IEC 60034-30-1:2014 standard defines four International Efficiency (IE) classes for single speed three-phase cage rotor induction motors designed for operation on sinusoidal voltage:

- IE4 = Super premium efficiency
- IE3 = Premium efficiency
- IE2 = High efficiency
- IE1 = Standard efficiency

Terms and technical definitions

Motor design N/H and NE/HE

IEC 60034-12:2016 standard defines motor design categories as below:

- **Design N**
Normal starting torque with normal locked rotor current
- **Design H**
High starting torque with normal locked rotor current
- **Design NE**
Normal starting torque with higher locked rotor current
- **Design HE**
High starting torque with higher locked rotor current.

Asynchronous IE1/IE2/IE3/IE4 motors may be of the design N or H. Asynchronous IE3/IE4 motors may be of the design NE or HE, having extended/locked rotor apparent power and current than design N and H motors.

IEC 60947-4-1 Ed.4 introduces now a new AC-3e utilization category for AC circuit switching and keeps the use and definition of existing AC-3 utilization category unchanged.

- AC-3: Refer to the asynchronous motor of designs N and H according to IEC 60034-12:2016
- AC-3e: Refer to the asynchronous motor of designs NE and HE, according to IEC 60034-12:2016, with extended / higher locked rotor apparent power and current than design N and H respectively, to achieve a higher efficiency class according to IEC 60034-30-1.
AC-3e category is defined for the use and the selection of MS116, MS132, MS165 manual motor starters, 3-pole AF09... AF96 contactors and B mini-contactors: please see their respective data pages.

Rated operational current I_e .

Current rated by the manufacturer. It is mainly based on the rated operational voltage U_e , the rated frequency, the utilization category, the rated duty and the type of protective enclosure, if necessary.

Conventional free air thermal current I_{th}

Current that the contactor can withstand in free air for a duty time of 8 hours without the temperature rise of its various parts exceeding the maximum values given by the standard.

Operating cycle or cycle

Includes one making operation and one breaking operation.

Cycle time

This is the sum of the current flow time and the no-current time for given cycle.

Electrical durability

Number of on-load operating cycles that the contactor is able to carry out. It depends on the operational current, the operational voltage and the utilization category.

Mechanical durability

Number of no-current operating cycles that a contactor is able to carry out.

Assessed failure rate

Defined according to IEC 60947-5-4. This rate is given in standard industrial environments for the contactor relays and for the built-in auxiliary contact of contactors.

Load factor

Ratio of the on-load operating time to the total cycle time x 100.

Switching frequency

Number of switching cycles per hour.

Plugging

Stopping or fast reversal in rotation direction of a motor by two supply leads being interchanged while the motor is running.

Inching

Energization of a motor's circuit repeatedly or for short periods with the aim of obtaining small movements of the driven mechanism.

Coil operating limits

Expressed in multiples of the nominal control circuit voltage U_c for the upper and lower limits.

Mounting position

Comply with the manufacturer's instructions. Restrictions are to be taken into account for certain mounting positions.

Rated breaking or making capacity

Root mean square (r.m.s.) value of the current that the contactor is able to break or make at a given voltage according to the conditions specified by standards and for a given utilization category.

Intermittent duty

Duty during which the contactor is successively closed or open for periods which are too short to enable the contactor to achieve thermal balance.

Ambient temperature

Air temperature close to the contactor.

Time

- Time constant: Ratio of the inductance to the resistance ($L/R = \text{mH}/\Omega = \text{ms}$).
- Short-time withstand current: Current that the contactor is able to withstand in closed position for a short time interval and in specified conditions.
- Closing time: Time interval between the coil energization and the instant the contacts touch on all the poles.
- Opening time: Time interval between the coil de-energization and the instant the contacts separate on all the poles.

Rated control voltage U_c

Control voltage value for which the control circuit is sized.

Terms and technical definitions

Rated operational voltage U_e

Voltage to which the contactor's utilization characteristics refer. In three-phase it is the phase-to-phase voltage.

Rated insulation voltage U_i

Reference voltage for dielectric tests and creepage distances.

Rated impulse withstand voltage U_{imp}

Peak value of an impulse voltage, having a specified form and polarity, which does not cause breakdown in specific test conditions.

Shock withstand

Requirement for vehicles, crane drives, installations on board ships and plug-in equipment. For the acceptable "g" values, the contacts must not change position and the thermal overload relays must not trip.

Resistance to vibrations

Requirements for vehicles, boats and other means of transport. For the specified vibration amplitude and frequency values the device must remain able to operate.

Mirror contacts



Definitions of mirror contact acc. to IEC 60947-4-1, Annex F 2.1. Normally closed auxiliary contact (N.C.) which cannot be in the closed position simultaneously with the normally open (N.O.) main contact.

Mechanically linked contact



Definitions of mechanically linked elements acc. to IEC 60947-5-1, Annex L. Combination of "n" Make auxiliary contact element(s) and "m" Break auxiliary contact element(s) are designed in such a way that they cannot be in the closed position simultaneously.

One control circuit device may have more than one group of mechanically linked contact elements.

Standards and utilization categories

Utilization categories:

A contactor's duty is characterised by the utilization category together with the rated operational voltage and current indicated.

Utilization categories for contactors according to IEC 60947-4-1:

| | | |
|----------------------|--|---|
| Alternating current: | AC-1 | Non-inductive or slightly inductive loads, resistance furnaces. |
| | AC-2 | Slip-ring motors: starting, switching off. |
| | AC-3 | Cage motors: starting, switching off running motors. |
| | AC-3e | Cage motors with higher locked rotor current: starting, switching off running motors. |
| | AC-4 | Cage motors: starting, plugging, inching. |
| | AC-5a | Discharge lamp switching. |
| | AC-5b | Incandescent lamp switching. |
| | AC-6a | Transformer switching. |
| | AC-6b | Capacitor bank switching. |
| | AC-8a | Hermetic refrigeration compressor motor control with manual resetting of overload releases. |
| AC-8b | Hermetic refrigeration compressor motor control with automatic resetting of overload releases. | |
| Direct current: | DC-1 | Non inductive or slightly inductive loads, resistance furnaces. |
| | DC-3 | Shunt motors: starting, plugging, inching, dynamic breaking of DC motors. |
| | DC-5 | Series motors: starting, plugging, inching, dynamic breaking of DC motors. |
| | DC-6 | Incandescent lamp switching. |

Utilization categories for contactor relays according to IEC 60947-5-1:

| | | |
|----------------------|-------|--|
| Alternating current: | AC-12 | Control of resistive loads and static loads with opto-coupler isolation. |
| | AC-13 | Control of static loads with transformer isolation. |
| | AC-14 | Control of weak electromagnetic loads (≤ 72 VA). |
| | AC-15 | Control of electromagnetic loads (> 72 VA). |
| Direct current: | DC-12 | Control of resistive loads and static loads with opto-coupler isolation. |
| | DC-13 | Control of DC electromagnets. |
| | DC-14 | Control of DC electromagnets having economy resistors. |

In fact some applications, and the specific criteria characterizing the various loads controlled by contactors, may modify the utilization characteristics of the contactors. The main applications concerned are:

Capacitor bank switching

Account must be taken of high peaks when the current is made and of harmonic currents during continuous duty. For this application, IEC publication 60947-4-1 stipulates utilization category AC-6b. The operational currents or powers acceptable for the contactors are determined by our electrical tests; IEC publication 60947-4-1 gives the calculating formula for determining the operational current (Table 9).

Transformer switching

Account must be taken of the peaks due to magnetization phenomena when the current is made.

For this application, IEC publication 60947-4-1 stipulates utilization category AC-6a. The operational currents or powers acceptable for the contactors are determined using the values obtained for AC-3 or AC-4 category tests and the calculating formula given in IEC 60947-4-1 (Table 9).

Lighting circuit switching

The current peaks occurring on energization of the circuit and the power factor depend on the type of lamps, the connection mode and whether or not there is compensation.

For this application, IEC publication 60947-4-1 stipulates two standard utilization categories:

AC-5a for discharge lamp switching.

AC-5b for incandescent lamp switching.

Slip-ring motor switching

The contactors used for short-circuiting rotor resistors can be used for rotor voltages up to 2 times the rated operational voltage.

The conditions of use of rotor contactors depend on the connection mode of the main poles. IEC 60947-4-1 stipulates AC-2 utilization category for starter contactor.

Standards and utilization categories

Utilization categories (cont.)

DC power circuit switching

Arc suppression is more difficult in direct current than in alternating current. Higher the time constant and voltage, heavier the breaking conditions: consequently several poles have to be connected in series.

AC high current circuit switching

Possibility of increasing performances by connecting poles in parallel.

Circuit switching during temporary and intermittent duty

In these cases higher operational currents are acceptable.

Influence of the length of the conductors used in the contactor control circuit

According to the operational voltages, the cross-sectional areas, the coil consumption and the control layout, difficulties due to line resistances and capacitances may appear during contactor closing and opening orders.

Making and breaking conditions for utilization categories

| Utilization category | Durability test conditions | | | | | | Occasional operation | | | | | |
|----------------------|----------------------------|------|-------------------------------|---------------------|------|-------------------------------|--|-------------------------------|-------|---------------------|-------------------------------|--|
| | Making conditions | | | Breaking conditions | | | Making and breaking capacities - 50 operating cycles | | | | | |
| | I/le | U/Ur | Cos. ϕ or L/R (ms) | I/le | U/Ur | Cos. ϕ or L/R (ms) | Making conditions | | | Breaking conditions | | |
| | | | | | | Ic/le | Ur/Ur | Cos. ϕ or L/R (ms) | Ic/le | Ur/Ur | Cos. ϕ or L/R (ms) | |

Contactors for AC circuit switching

| | | | | | | | | | | | | | |
|------|-------------------------------|-----|---|------|-----|------|------|-----|------|------|-----|------|------|
| AC-1 | | 1 | 1 | 0.95 | 1 | 1 | 0.95 | 1.5 | 1.05 | 0.8 | 1.5 | 1.05 | 0.8 |
| AC-2 | | 2.5 | 1 | 0.65 | 2.5 | 1 | 0.65 | 4 | 1.05 | 0.65 | 4 | 1.05 | 0.65 |
| AC-3 | $I_e \leq 17 \text{ A}$ | 6 | 1 | 0.65 | 1 | 0.17 | 0.65 | 10 | 1.05 | 0.45 | 8 | 1.05 | 0.45 |
| | $17 < I_e \leq 100 \text{ A}$ | 6 | 1 | 0.35 | 1 | 0.17 | 0.35 | 10 | 1.05 | 0.45 | 8 | 1.05 | 0.45 |
| | $I_e > 100 \text{ A}$ | 6 | 1 | 0.35 | 1 | 0.17 | 0.35 | 10 | 1.05 | 0.35 | 8 | 1.05 | 0.35 |
| AC-4 | $I_e \leq 17 \text{ A}$ | 6 | 1 | 0.65 | 6 | 1 | 0.65 | 12 | 1.05 | 0.45 | 10 | 1.05 | 0.45 |
| | $17 < I_e \leq 100 \text{ A}$ | 6 | 1 | 0.35 | 6 | 1 | 0.35 | 12 | 1.05 | 0.45 | 10 | 1.05 | 0.45 |
| | $I_e > 100 \text{ A}$ | 6 | 1 | 0.35 | 6 | 1 | 0.35 | 12 | 1.05 | 0.35 | 10 | 1.05 | 0.35 |

Contactors for DC circuit switching

| | | | | | | | | | | | | | |
|------|--|-----|---|-----|-----|---|-----|-----|------|-----|-----|------|-----|
| DC-1 | | 1 | 1 | 1 | 1 | 1 | 1 | 1.5 | 1.05 | 1 | 1.5 | 1.05 | 1 |
| DC-3 | | 2.5 | 1 | 2 | 2.5 | 1 | 2 | 4 | 1.05 | 2.5 | 4 | 1.05 | 2.5 |
| DC-5 | | 2.5 | 1 | 7.5 | 2.5 | 1 | 7.5 | 4 | 1.05 | 15 | 4 | 1.05 | 15 |

Contactor relays for AC circuit switching

| | | | | | | | | | | | | | |
|-------|--------------------------|----|---|-----|---|---|-----|----|-----|-----|----|-----|-----|
| AC-14 | ($\leq 72 \text{ VA}$) | - | - | - | - | - | - | 6 | 1.1 | 0.7 | 6 | 1.1 | 0.7 |
| AC-15 | (> 72 VA) | 10 | 1 | 0.7 | 1 | 1 | 0.4 | 10 | 1.1 | 0.3 | 10 | 1.1 | 0.3 |

Contactor relays for DC circuit switching

| Utilization category | Standard operation | | | | | | Occasional operation | | | | | |
|----------------------|--------------------|------|--------|---------------------|------|--------|--|-------|--------|---------------------|-------|--------|
| | Making conditions | | | Breaking conditions | | | Making and breaking capacities - 50 operating cycles | | | | | |
| | I/le | U/Ur | T0.95 | I/le | U/Ur | T0.95 | Making conditions | | | Breaking conditions | | |
| | | | | | | Ic/le | Ur/Ur | T0.95 | Ic/le | Ur/Ur | T0.95 | |
| DC-13 | 1 | 1 | 6 P(1) | 1 | 1 | 6 P(1) | 1.1 | 1.1 | 6 P(1) | 1.1 | 1.1 | 6 P(1) |
| DC-14 | - | - | - | - | - | - | 10 | 1.1 | 15 ms | 10 | 1.1 | 15 ms |

(1) The value "6 x P" is the result of an empirical relation which is estimated to represent most DC magnetic loads up to the highest limit of P = 50 W (6 x P = 300 ms). It is accepted that loads having drawn energy above 50 W are made up of weaker loads in parallel. As a consequence, the 300 ms value must form the highest limit whatever the value of the power drawn.

Key:

U (I) = applied voltage (current)

Ur = recovery voltage

L/R = test circuit time constant

Ue (Ie) = rated operational voltage (current)

Ic = making and breaking current expressed in DC or in AC like the r.m.s. value of the symmetrical components

T0.95 = time required to reach 95 % of the current in steady-state conditions, expressed in milliseconds

North American standards and utilization categories

Depending on the utilization category or intended rating for a contactor, North American standards require two main tests: an endurance test to simulate conventional device making and breaking capacity over its lifetime, and an overload test to simulate periodic conditions demanding higher making and breaking capacity than is conventional for the application. The test setups differ in regards to current, power factor, and number of electrical operating cycles.

The tables below provide a comparison of the types of load testing for contactors rated up to 100 A.

AC load testing for contactors rated up to 100 A

| Harmonized test | | | Rating designation | Endurance (conventional) test | | | Overload (conditional) test | | | Required load marking |
|-----------------|----|-----|--------------------|-------------------------------|--------------|------------------|-----------------------------|--------------|------------------|-----------------------|
| IEC | UL | CSA | | Multiple of current | Power factor | Number of cycles | Multiple of current | Power factor | Number of cycles | |

General use, non-inductive or slighting inductive loads, resistance furnaces and heaters

| | | | | | | | | | | |
|---|---|---|-------------------------------|---|-----|--------|-----|-----|----|--------------|
| ■ | ■ | ■ | AC-1: general use | 1 | 0.8 | 6000 | 1.5 | 0.8 | 50 | - |
| | ■ | ■ | AC resistance | 1 | 1 | 6000 | 1.5 | 1 | 50 | "Resistive" |
| | | ■ | AC resistance air heating | 1 | 1 | 100000 | 1.5 | 1 | 50 | "Resistance" |
| | | ■ | AC electrical heating control | 1 | 1 | 250000 | 1.5 | 1 | 50 | - |

Motor loads

| | | | | | | | | | | |
|---|---|---|--------------------------------------|---|-------------|--------|----------------------------------|-------------|----------------------------|-----------------|
| ■ | ■ | ■ | AC-2: slip-ring motors | 2 | 0.65 | 6000 | 4 | 0.65 | 50 | - |
| ■ | | | AC-3: squirrel cage motors | 2 | 0.45 | 6000 | 10 for make 8 for make break | 0.45 | 50 make + 50 make break | - |
| | ■ | ■ | AC motor (across-the-line switching) | 2 | 0.40 – 0.50 | 1000 | LRA (~6) | 0.40 – 0.50 | 50 | - |
| | | ■ | Elevator control, AC motor | 2 | 0.50 | 500000 | n/a | n/a | n/a | "Elevator duty" |
| ■ | ■ | ■ | AC-4: plugging, inching, jogging | 6 | 0.45 | 6000 | 12 for make 10 for make break | 0.45 | 50 make + 50 make break | - |

Lamps and lighting loads

| | | | | | | | | | | |
|---|---|---|---------------------------------|---|------|------|-----|------|----|------------|
| ■ | ■ | ■ | AC-5a: electric discharge lamps | 2 | 0.45 | 6000 | 3 | 0.45 | 50 | "Ballast" |
| ■ | ■ | ■ | AC-5b: incandescent lamps | 1 | Lamp | 6000 | 1.5 | Lamp | 50 | "Tungsten" |

Transformers and capacitors

| | | | | | | | | | | |
|---|---|---|-----------------------------|--|-----------|------|-----|-----------|----|---|
| ■ | | | AC-6a: transformers | The manufacturer shall verify the AC-6a rating by testing with a transformer, or may derive the rating from the values for AC-3. | | | | | | |
| ■ | | | AC-6b: capacitors | Capacitive ratings may be derived by capacitor switching tests or assigned on the basis of established practice and experience. | | | | | | |
| | ■ | ■ | Capacitive switching (kVar) | 1 | Capacitor | 6000 | 1.5 | Capacitor | 50 | - |

Hermetic refrigerant compressor motors

| | | | | | | | | | | |
|---|---|---|---|---|------|-------|---|------|----|-------------------------------------|
| ■ | ■ | ■ | AC-8a: hermetic refrigerant compressor | 1 | 0.8 | 30000 | 6 | 0.45 | 50 | "Hermetic refrigeration compressor" |
| ■ | ■ | ■ | AC-8b: hermetic refrigerant compressor (recycle rating) | 6 | 0.45 | 6000 | 6 | 0.45 | 50 | - |

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

DC load testing for contactors rated up to 100 A

| Harmonized test | | | Rating designation | Endurance test | | | Overload test | | | Required load marking |
|-----------------|----|-----|--------------------|---------------------|--------|------------------|---------------------|--------|------------------|-----------------------|
| IEC | UL | CSA | | Multiple of current | L/R ms | Number of cycles | Multiple of current | L/R ms | Number of cycles | |

General use, non-inductive or slighting inductive loads, resistance furnaces and heaters

| | | | | | | | | | | |
|---|---|---|---------------------------|---|---|--------|-----|---|----|--------------|
| ■ | ■ | ■ | DC-1: general use | 1 | 1 | 6000 | 1.5 | 1 | 50 | - |
| | ■ | ■ | DC resistance | 1 | 1 | 6000 | 1.5 | 1 | 50 | "Resistive" |
| | | ■ | DC resistance air heating | 1 | 1 | 100000 | 1.5 | 1 | 50 | "Resistance" |

Motor loads

| | | | | | | | | | | |
|---|---|---|--------------------------------------|-----|-----|--------|----------------|-----|----|-----------------|
| ■ | | | DC-3: shunt motors | 2.5 | 2 | 6000 | 4 | 2.5 | 50 | - |
| | ■ | ■ | DC motor (across-the-line switching) | 2 | n/a | 1000 | 10 | n/a | 50 | - |
| | | ■ | Elevator control, DC motor | 2 | n/a | 500000 | Not applicable | | | "Elevator duty" |
| ■ | | | DC-5: series motors | 2.5 | 7.5 | 6000 | 4 | 15 | 50 | - |

Lamps and lighting loads

| | | | | | | | | | | |
|---|---|---|--------------------------|---|------|------|-----|------|----|------------|
| ■ | ■ | ■ | DC-6: incandescent lamps | 1 | Lamp | 6000 | 1.5 | Lamp | 50 | "Tungsten" |
|---|---|---|--------------------------|---|------|------|-----|------|----|------------|

Note: the information above is an overview of UL 60947-4-1 tables 1, 7, 10, 5.4.1DV.1.1, 8.2.4.1DV.1.1, and 8.2.4.2DV.1.1 and is intended for comparison purposes only.

Degrees of protection

General

In an installation, the degree of protection required for electrical equipment depends on the environmental characteristics. The degree of protection, ensured by the enclosure of equipment or by the cubicle containing the equipment is expressed by the IP code which gives the level of protection against access to hazardous parts, the ingress of foreign bodies and/or the ingress of water, in compliance with IEC 60529, IEC 60947-1.

Besides the IP symbol, the complete code has two figures followed (optionally) by two additional letters. A short description of the elements used in IP coding is given below.

| IP... code | Figures or letters | Specifications for installation protection | Protection of persons |
|---|--------------------|--|--|
| First figure | | Against ingress of foreign bodies | Against access to hazardous parts with: |
| | 0 | No protection | No protection |
| | 1 | Diameter > 50 mm | Back of hand |
| | 2 | Diameter > 12.5 mm | Finger |
| | 3 | Diameter > 2.5 mm | Tool |
| | 4 | Diameter > 1 mm | Wire |
| | 5 | Limited protection against dust | Wire |
| | 6 | Total protection against dust | Wire |
| Second figure | | Against entrance of water having a harmful effect | |
| | 0 | No protection | |
| | 1 | Vertical dripping | |
| | 2 | Dripping at a vertical angle of < 15° | |
| | 3 | Rain at a vertical angle of < 60° | |
| | 4 | Splashing | |
| | 5 | Low pressure water jet | |
| | 6 | Powerful water jets | |
| | 7 | Temporary immersion | |
| | 8 | Permanent immersion | |
| Additional letter (optional) for use with: | | Against ingress of foreign bodies | Against access to hazardous parts with: |
| First figure 0 | A | Stopped by a barrier with a 50 mm Ø sphere | Back of hand |
| First figure 0 or 1 | B | Entrance of test finger limited to 80 mm | Finger |
| First figure 1 or 2 | C | Wire with 2.5 mm Ø and length of 100 mm | Tool |
| First figure 2 or 3 | D | Wire with 1 mm Ø and length of 100 mm | Wire |
| Additional letter (optional) | | Specific additional information | |
| | H | High voltage apparatus | - |
| | M | Moving parts which are moving during water test | |
| | S | Moving parts which are stationary during water test | |
| | W | Specified atmospheric conditions | |

Note: The type of enclosure or cubicle in which the equipment must be installed prevails with respect to the degree of protection.

Climatic withstand of devices

The life time of devices are mainly influenced by series of climatic factors which cause their corrosion.

In practice, besides climatic conditions, there are other factors which may damage equipment such as fungi, insects (termites), dust, work site dirt and aggressive environment (salty or sulphurous atmosphere, etc.) which can often only be identified at the place of installation.

Climatic stress, definitions and test conditions are dealt with in national publications such as the DIN 50 series and UTE 63-100 publication which are attached to international publications such as IEC 60068.

The test conditions are:

| Description | Symbolization | Time of one cycle | Cycle phase time | Temperature in test chamber | Relative humidity |
|-----------------------------------|---------------------------|-------------------|--|-----------------------------|-------------------|
| Humidity and variable temperature | IEC 60068-2-30 Test Db | 24 hours | 12 hours including rise in temperature | 40 °C | 95 % |
| | | | 12 hours including cooling (open device) | 25 °C | 95 % |

ABB contactors have been used for many years in the most countries, with hot and humid climates for example: Brazil, Indonesia, India or on ships. Experience has shown that ABB devices can be used in most countries throughout the world.

The climate of the country in which the apparatus is installed is not the determining choice factor.

Account must be taken of:

- the immediate environment of the devices (sheltered, ventilated, temperature),
- the aggressivity of the immediate atmosphere at the place of installation,
- the length and frequency of non operating periods.

In the case of frequent condensation (i.e. the formation of condensation caused by rapid changes in temperature), heating resistors must be installed in cubicles (100 to 250 W per m³ of enclosure).

The table below gives the cases where heating is necessary.

| Environment | | Operating conditions | Climate | Internal heating of enclosure | |
|---------------------------|-------------------------------------|----------------------|------------------------|-------------------------------|---------|
| Inside premises | No running water no condensation | Continuous or not | All climates | Without | |
| | With running water | Continuous | All climates | Without | |
| Frequent or long stops | | Temperate | Without | | |
| | | Tropical | With | | |
| Outside, sheltered | No running water no condensation | Continuous or not | Temperate | Without | |
| | | | Tropical | With | |
| Outside or by the seaside | With running water | Continuous | All climates | Without | |
| | | | Frequent or long stops | Temperate | Without |
| | | | | Tropical | With |

The entrance of dust, insects, dirt, etc. in devices may be prevented if the appropriate degree of protection according to IEC 60529 is chosen (See "Degree of protection" table).

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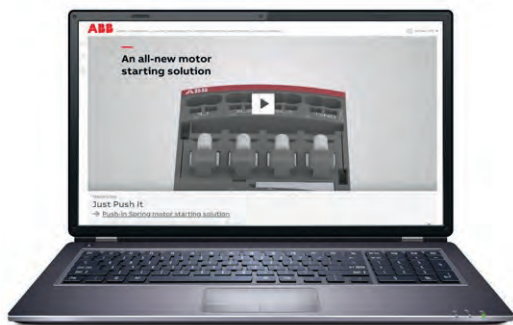
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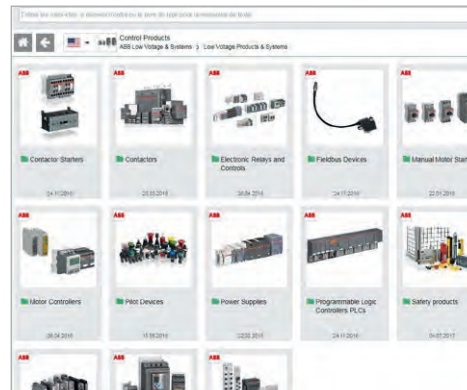
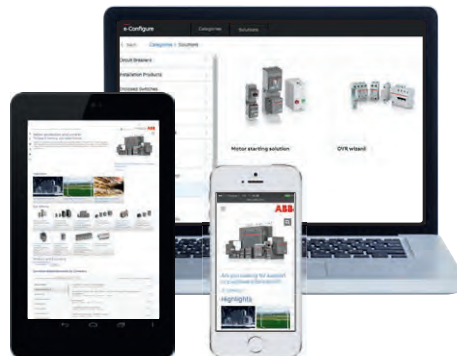
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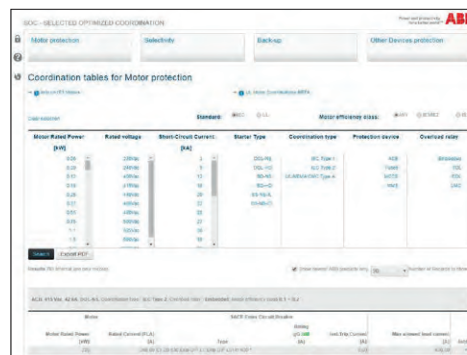
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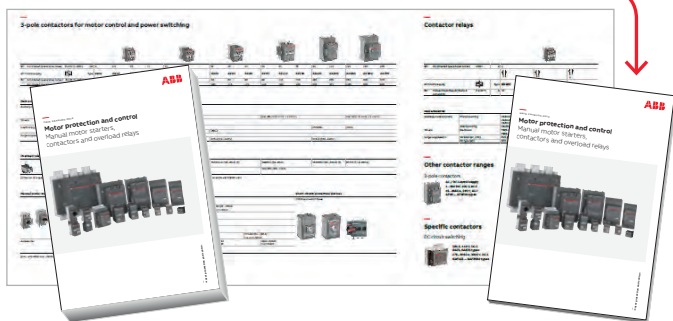
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