

Metal Enclosed Capacitor Bank: ABBACUS E-Series

Enhancing power quality and energy efficiency of your electrical network



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ABBACUS E-Series MECB

The impact of poor power quality is high for distribution utilities. The integration of renewables leads to additional challenges. In the industrial sector, continually evolving manufacturing techniques and sophisticated equipment also lead to an increase in harmonics and associated effects on upstream equipment.

Power factor is the measurement of how effectively AC electrical power is being used. When the power factor is high and close to unity, high system efficiency can be achieved. Therefore, an improvement in power factor or a reduction in harmonics can lead to enhanced power quality, and energy efficiency, contribute to industrial productivity and lower carbon emissions, thus creating stronger, smarter and greener power networks.

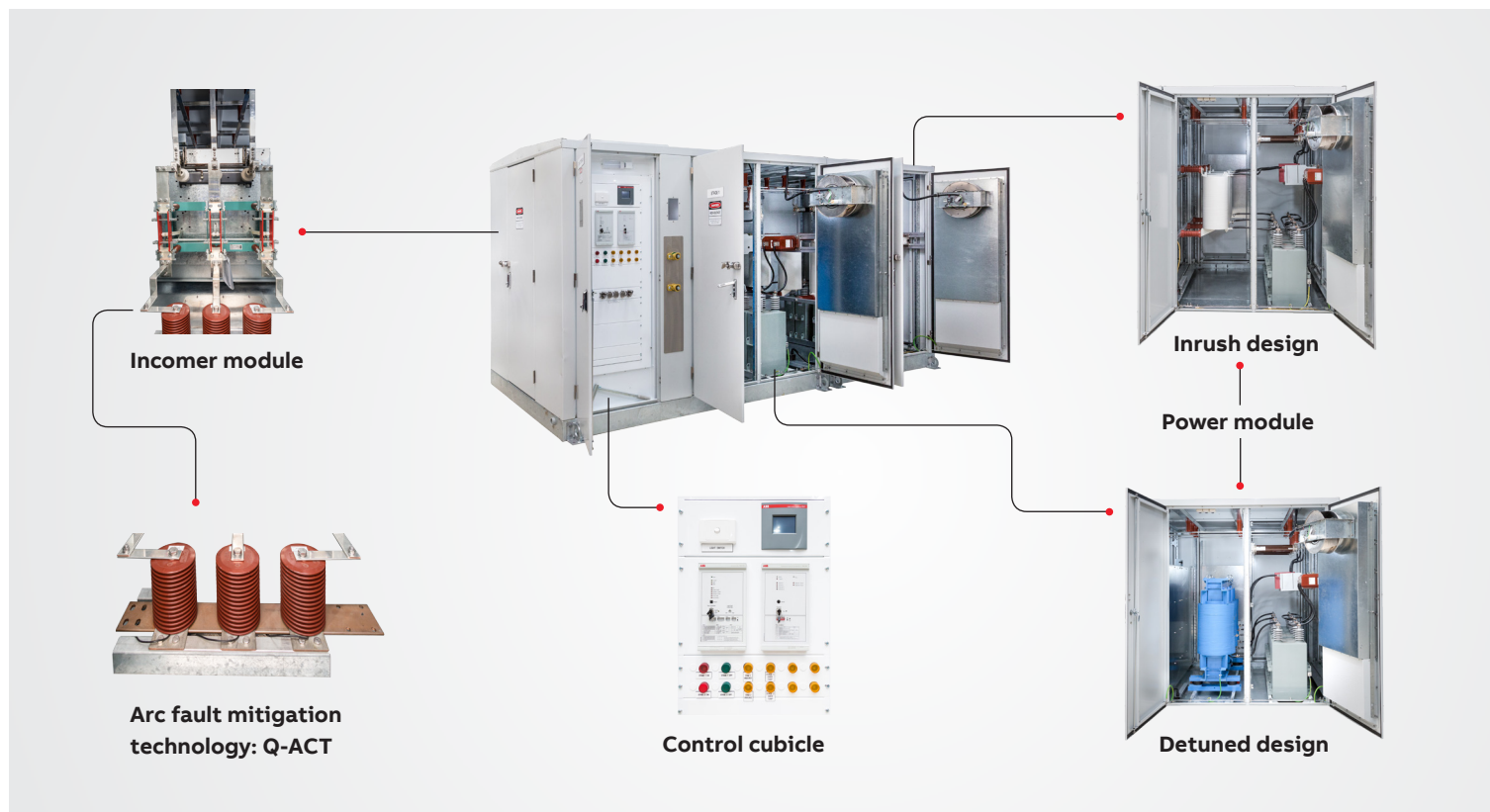
ABB is a pioneer in power quality solutions and offers a wide product portfolio that helps enhance the power quality of electrical networks in high, medium and low voltage systems. ABB's ABBACUS range of metal enclosed capacitor banks (MECB) are a 'one stop' solution for maintaining power quality in medium

Power quality is a major concern for transmission and distribution utilities, industries such as mining, petrochemical and manufacturing, as well as infrastructure sectors. It affects reliability of the electrical network, plant productivity and performance of electrical equipment connected to the network and leads to higher operating costs.

voltage networks and comprise of premium range of primary and secondary components, including world-class, highly reliable capacitors from ABB. The ABBACUS E-Series MECB improves power quality by compensating reactive power, improving power factor or passively mitigating harmonics. It consists of a compact modular enclosure that combines primary components with secondary control and protection equipment. The system can be either configured as fixed or switched, with the switched bank consisting of single or multiple steps, automatically controlled to improve power factor.

ABBACUS E-Series MECB is available in a range of models and is suitable for voltages up to 38 kV. It is fully assembled and factory tested in an ISO 9001 and ISO 14001 environment.

The design of the ABBACUS E-Series MECB provides a solution suitable for electrical distribution utilities, integrators of renewable power e.g. wind or solar farm integrators and large industrial power users including mining, pulp and paper, chemical, petrochemical, plastics, cement and heavy industries.



Components of ABBACUS E-Series MECB

Incomer module

The incoming section consists of:

- Incoming cable termination busbars
- Isolator/earth switch
- Surge arresters
- Circuit breakers
- Protection voltage transformers
- Line current transformers
- Control voltage transformers
- Live line indication

Power module

The elements of a power module are:

- Capacitors
- Inrush, detuning or filter reactors
- HRC fuses
- Contactors
- Pressure switches
- Earthing stick
- Safety interlocks
- Lights
- Anti condensation heaters
- Cooling fans
- Thermostats

Control cubicle

The control cubicle consists of:

- Power factor controller with Modbus communication
- Safety interlock keys
- Over current/earth fault protection relay

- Unbalance protection relay
- Unbalance/overload protection relay
- Under/overvoltage protection relay
- Local/remote and manual/automatic switching

Arc fault mitigation technology Q-ACT

ABB's ABBACUS E-Series MECB is also available with the latest innovation in arc fault mitigation technology.

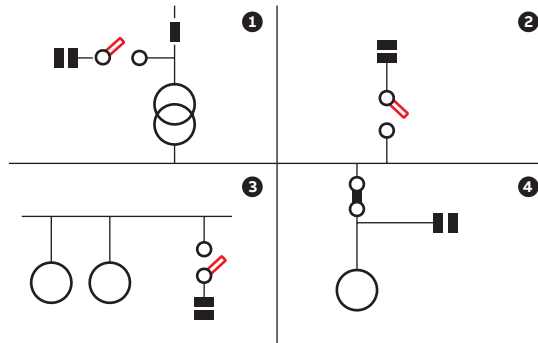
The type tested protection system utilises advanced sensing and tripping relays in conjunction with a sophisticated fibre optic network to detect and extinguish an arc before any damage can occur.

Using ABB's Ultra-Fast Earthing Switch (UFES) device, arc extinction occurs in less than four milliseconds leaving the metal enclosed capacitor bank and its components completely undamaged and operational after an arc fault.

DS1 capacitor switch

In operations where sensitive loads are present, ABB's DS1 capacitor switch can be included to allow for transient free switching. Utilising diode based switching technology, the DS1 can perform bank opening and closing operations without any transient current or voltage, and completely eliminates any possibility of restrike.

ABBACUS E-Series MECB offers flexibility to meet the varying requirements of utility and industrial users due to its unique modular design. The design allows compensation to be connected at different points in the network and offers different configurations for reactive power compensation and harmonic mitigation:



- A - Central compensation on MV side.
- B - Central compensation on MV/LV side.
- C - Group compensation.
- D - Individual compensation.

Central compensation

When the main purpose is to reduce reactive power purchased, due to power supplier's tariffs, central compensation is preferable.

Group compensation

Group compensation can be applied when a concentrated group of loads needs to be or can be compensated. This compensation type reduces load on the upstream cables/transformers thereby decreasing energy losses.

Individual compensation

With this compensation type, individual loads (e.g. motors) are compensated. The special advantage with individual compensation is that existing switching and protective devices for the machine to be compensated can also be utilised for switching and protection of the capacitors. In addition, the upstream cables or transformers are offloaded maximally, resulting in maximum reduction in network losses.



Technical data

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1 Higher ratings
available on request

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2 Lower ratings
available on request

General	
Voltage	up to 38 kV
Maximum output	up to 30 Mvar ¹
Frequency	50 or 60 Hz
Location	Indoor or outdoor
Ambient temperature	–10/+50°C ^{1, 2}
Altitude	<1000 m above sea level ¹
Humidity	Maximum 90% RH non condensing
Insulation level	Up to 200 kV BIL
Short circuit current	Up to 50 kA for 1 second ¹
Bank configuration	Fixed, switched single or multistep
Interlocking	Mechanical or solenoid
Arc fault mitigation (optional)	ABB Q-ACT
Busbar	Hard drawn copper (tinned or silver plated)
Standards	IEC, IEEE / ANSI, CSA or equivalent
	ASCE 7-10 120mph Wind rating
	IEEE 693-2005 High seismic level
	MSK-64 X rating for seismic intensity
Enclosure	
Material	'AA' grade corrosion resistant Aluminium, Zinc-coated steel, stainless steel
Base frame	Hot dipped galvanized steel
Protection	Up to IP65 / NEMA 4x indoor/outdoor
Door locking	Front: three point lockable handle or side and rear: blind ¼ turn locks
Installation	Base fixing
Handling	Fork and crane lifting via base or lifting eye bolts
Cable entry	Bottom or optional side wall
Capacitors	
Type	Single, three or split-phase
Fusing	Internal or unfused
Discharge resistor	Built-in
Losses	<0.15 W / kvar including resistors
Dielectric	Polypropylene film
Impregnant	Faradol non-PCB
Container	Stainless steel
Bushings	Grey porcelain one, two or three
Inrush reactors	
Type	Single phase, air core
Detuning / filter reactors	
Type	Single or three phase, iron or air core
Contactors and switches	
Type	Vacuum (transient free solutions available)
Phase	Single or three
Current rating	1250 A ¹
Isolator & earth switch	
Type	Air insulated
Phase	Three
Current rating	1250 A ¹
Fuses	
Rated current	Up to 315 A ¹
Short time current	63 kA (max)
Power factor controller	
Microprocessor-based system for single or three phase system Insensitive to harmonics	
Control voltage	100 VAC to 240 VAC
Power Factor	Setting 0.7 inductive to 0.7 capacitive

For more information please contact
your local ABB representative or visit

abb.com/powerquality

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