



M. Sargenti, A. Beinatz, M. Nunes, S. Joliat, M. Dozio, N. Genazzi – Quartino, 25.05.2016

Ticino Day 2016

Incontro informativo - Prodotti Media Tensione

Agenda

13.00 – 13.15:	Arrivo dei clienti		
13.15 – 13.30:	Introduzione, presentazione del programma	Nicola Genazzi	IT
13.30 – 13.45:	Welcome alla sede ABB	Michele Sargenti	IT
13.45 – 14.15:	ABB e il suo portfolio MT	Andreas Beinatz	IT
14.15 – 15.15:	Celle MT, isolate ad aria o a gas	Marco Nunes	IT/FR
15.15 – 15.35:	Pausa		
15.35 – 16.10:	Relè di protezione e tecnologia dei sensori	Simon Joliat	FR
16.10 – 16.35:	Trasformatori di distribuzione e regolazione	Nicola Genazzi	IT
16.35 – 16.50:	Pausa		
16.50 – 17.20:	Automatizzazione delle reti MT	Simon Joliat	FR
17.20 – 17.40:	Discussione aperta e Feedback		
18.00 → :	Aperitivo		



Michele Sargenti – Quartino, 25.05.2016

Ticino Day 2016

Welcome alla sede ABB di Quartino

25 years of UPS business experience

Pioneering transformerless and modular trend



WELCOME TO QUARTINO / ABB Power Protection

- Former Newave
- Established in 1993, acquired by ABB in 2012
- Pioneering advanced double conversion UPS technologies: modular, transformer less
- Recognized as a premium supplier with 25 years UPS experience
- Launched first modular UPS in the market in 1998 !
- Introduced the Newave's unique Decentralised Parallel Architecture (DPA™) in 2005
- Installed base of >> 200'000 UPS
- Head quarter in Quartino (130 employees), Switzerland

Welcome SAFETY

Safety instructions

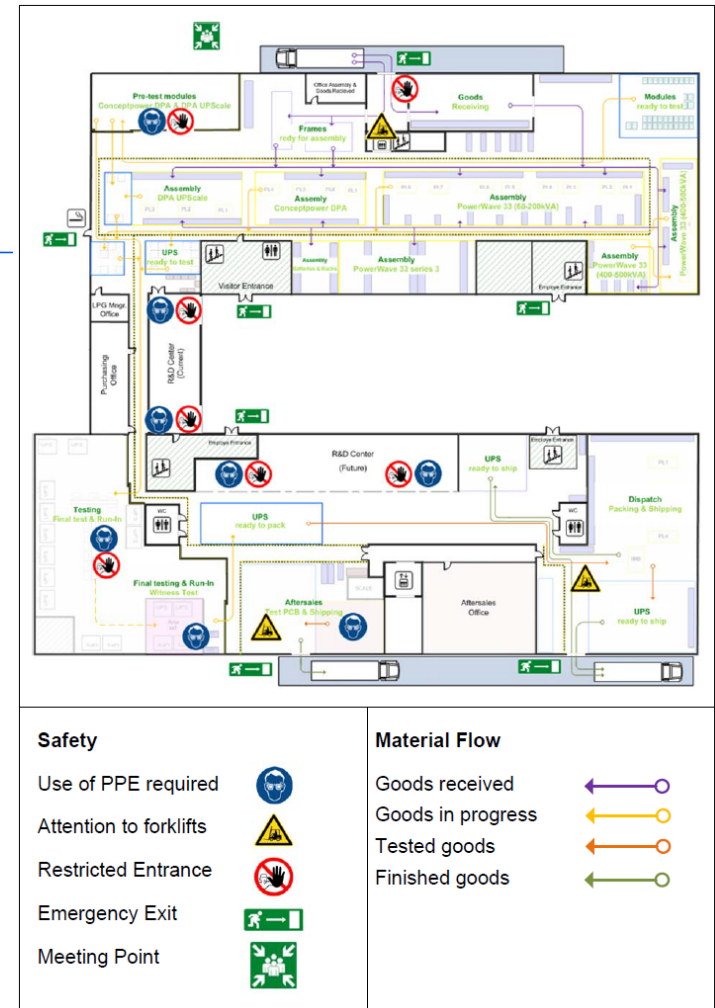
- Entry to production and testing areas is only permitted in the company of an ABB employee.
- Do not get close to opened UPS systems.
- Use the appropriate personal protective equipment (PPE).
- Do not stray from the path indicated on the factory floor.
- Pay attention to forklifts and trolleys.
- Take heed of the safety signs.
- Do not touch any product in the factory.

You need authorisation in order to:

- use ABB's equipment;
- perform welding or cutting tasks;
- perform any work-related tasks in the production departments;
- remove or assemble piers or electric lines;
- use the appropriate personal protective equipment (PPE) which has been placed at your disposal by ABB.

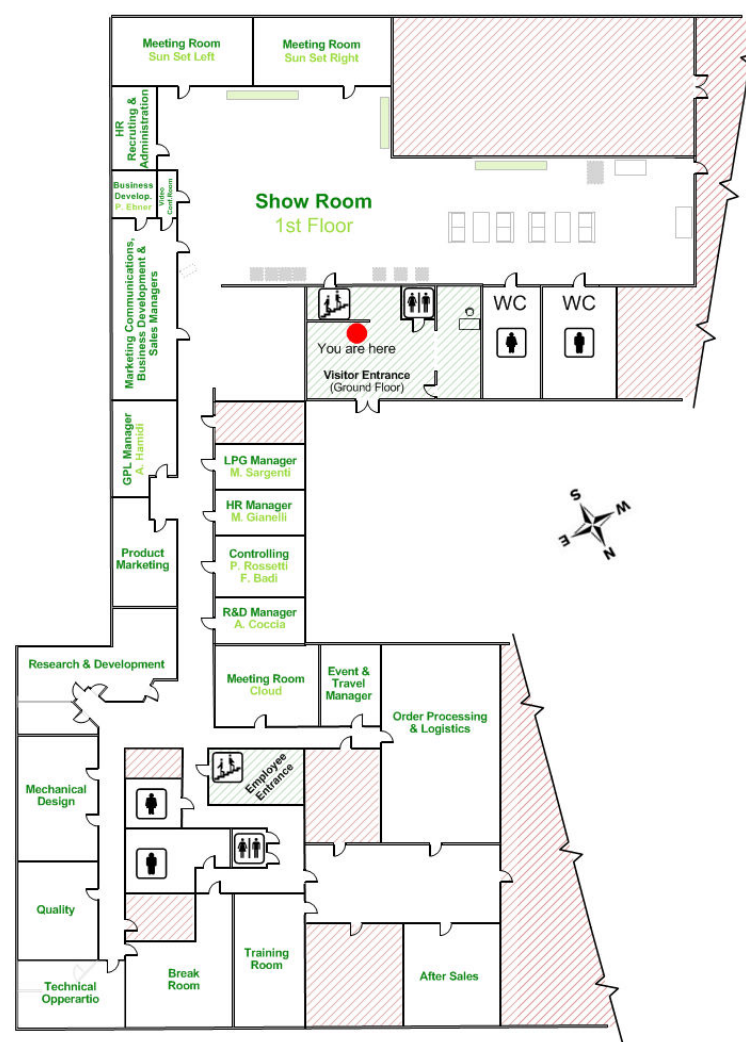
Smokers

- Smoking is restricted to the outdoor area at the back of the building as indicated on the map.



Welcome

UPS facility - Quartino



Welcome

UPS facility - Quartino

Shop Floor Layout & Material Flow

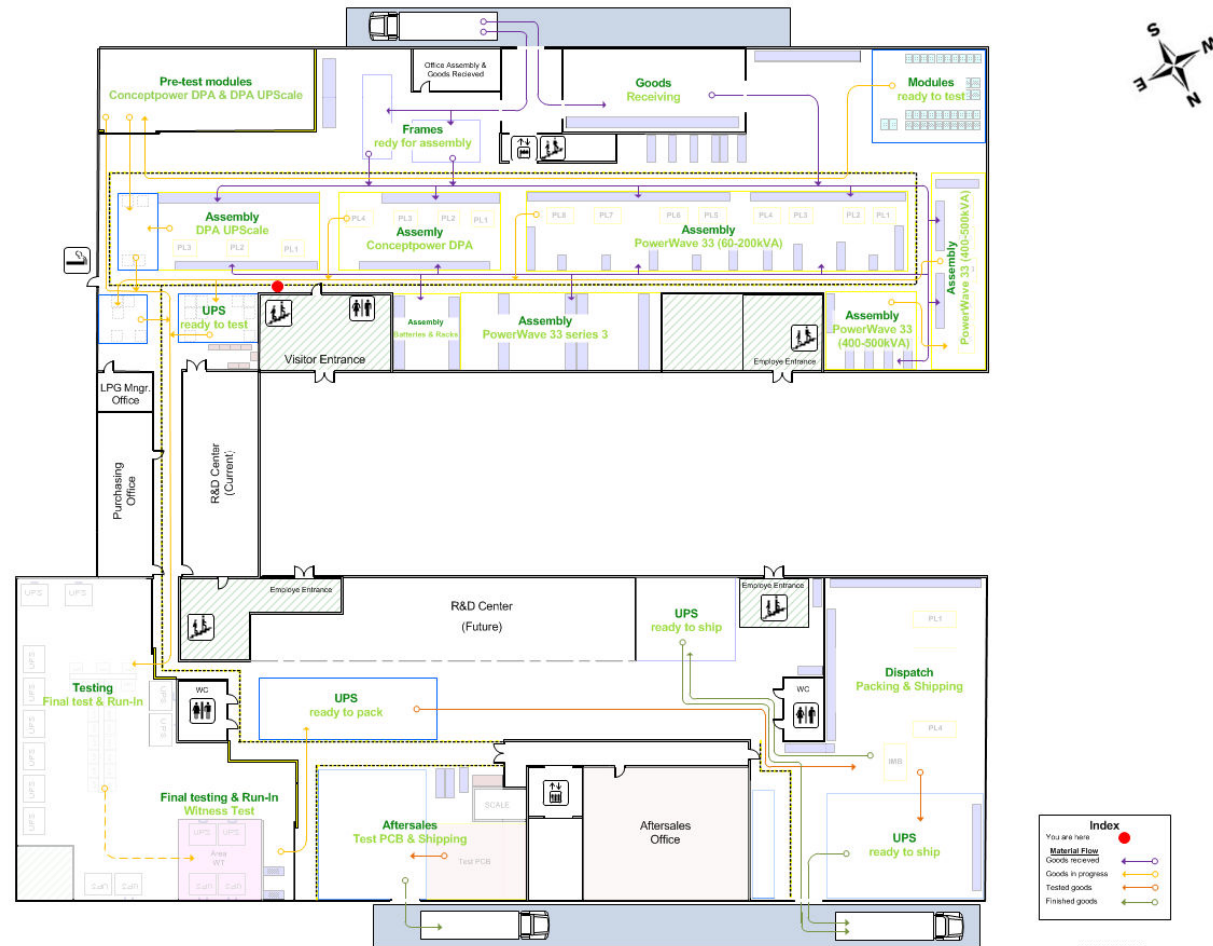


ABB: Gruppo - Division

Numeri e fatti

150
nationalities



+135,000 employees

500 In Ticino (130 ABB PP e 370 Trasfor)
Trasfor)

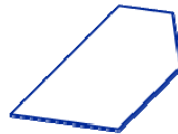
Present In

+100

countries



+300
production plants



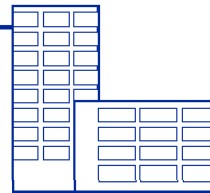
\$ 35.5
billion

In revenue
(2015)

180 Mio In Ticino (70 ABB PP e 90
Trasfor)

Formed In

1988



merger of Swiss (BBC, 1891) and Swedish
(ASEA, 1883) engineering companies

Old division



**Discrete
Automation
and Motion**

\$8.4 billion
**27,500
employees**

New division



**Power
Conversion**

- Wind turbine converters and solar inverters
- Synchronizing products
- Static excitation systems
- Converters for energy storage & grid stabilization
- High power rectifiers
- Traction converters
- EV chargers and systems
- DC wayide power solutions
- Power Protection
- Service

Division Discrete Automation and Motion



Drives and Controls

- Low voltage AC drives from 0.12 to 5'600 kW
- Medium voltage AC drives from 250kW to 100MW
- DC Drives from 9 kW to 18 MW
- Wind turbine drives
- Solar inverters
- PLCs, HMIs, and wireless sensors and actuators
- Software tools
- Energy saving tools
- Service



Power Conversion

- Wind turbine converters and solar inverters
- Synchronizing products
- Static excitation systems
- Converters for energy storage & grid stabilization
- High power rectifiers
- Traction converters
- EV chargers and systems
- DC wayside power solutions
- **Power Protection**
- Service



Motors and Generators

- Low voltage motors from 0.25 to 1'000 kW
- High voltage motors and generators up to 70 MW
- High speed motors
- Traction motors
- Wind power generators
- Diesel generators
- Gas and steam turbine generators
- Hydro generators, tidal waves, etc.
- Service



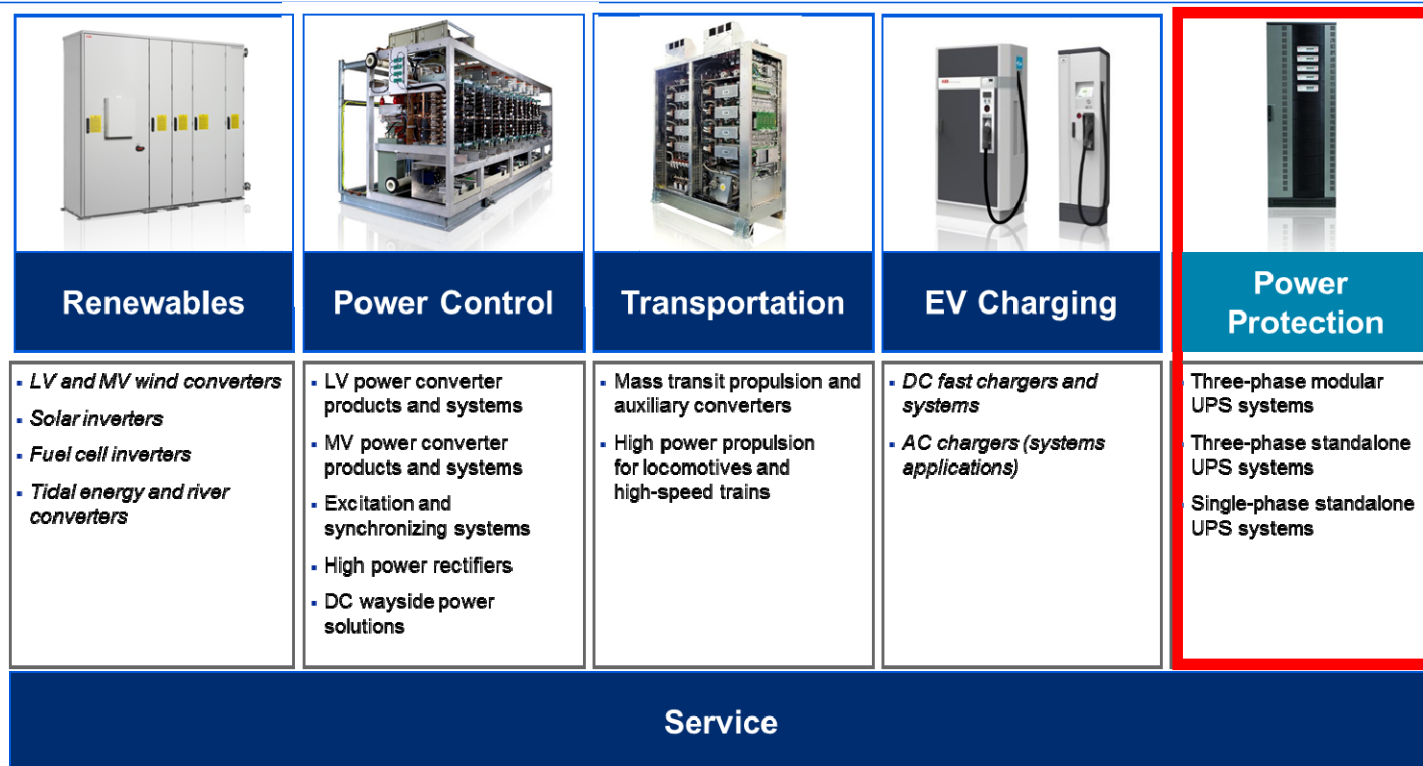
Robotics

- Industrial robots
- Robot controllers and software
- Industrial software products
- Application equipment and accessories
- Robot automation systems for automotive, foundry, packaging, metal, solar, wood, plastics, etc. industries
- Service

Number 1 or 2 in all markets where we operate

Business Unit Power Conversion

UPS as a new product group



Power Protection – main offering

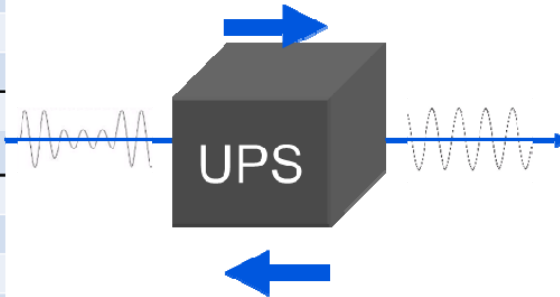
	Commercial			Industrial		
	Double Conversion Standalone UPS	Double Conversion Modular UPS	Static Switch and Power Distribution	Double Conversion Industrial UPS & Chargers	Single Conversion UPS	Power Conditioning
Product	PowerValue PowerScale PowerWave 33	DPA Upscale Conceptpower DPA	Superswitch Cyberex ZF PDUs, FaultGuard RPP, BCMS	Cyberwave RBE II IDM	PCS100 UPS-I PCS100 MV UPS	PCS100 AVC PCS100 RPC PCS100 SFC
Major Market Segments	- Computer Rooms - Data Centers - General Industry	- Computer Rooms - Data Center - General Industry	- Data Center - General Industry	- Process Automation - Oil & Gas - Power Generation	- Data Center - General Industry - Process Automation - Water Processing - Food & Beverage	- General Industry - Process Automation - Water Processing - Food & Beverage
Pictures						
Power Range	1 kVA to 500 kW Parallel to 5 MW	10 kW to 500 kW Parallel to 3 MW	Up to 4000A STS, 600 kW PDM	Up to 150kVA	150 kVA to 3 MVA (parallel)	125 kVA – 20 MVA (parallel)
Compliance	IEC	IEC	UL - IEC	UL - IEC	IEC - UL	IEC - UL
	UPS (CH - Quartino)		Power Solutions (US - Richmond)		Power Conditioning (NZ - Napier)	

[Watch the power protection portfolio video here](#)

Power Protection

Funzioni principali dell'UPS

	Tipo di disturbo	Esempio	Durata
1	Marcanza rete		> 10 ms
2	Abb. di tensione		< 16 ms
3	Inn. di tensione		< 16 ms
4	Sottotensione		Continua
5	Sovratensione		Continua
6	Transienti		Intermittente
7	Disturbi		< 4 ms
8	Var. di frequenza		Intermittente
9	Picchi di tensione		Periodici
10	Dist. armoniche		Continua



1. Eliminare tutti i disturbi presenti nella rete nei confronti del carico
2. Eliminare i disturbi del carico nei confronti della rete (armoniche, PF)
3. Aumentare la disponibilità di approvvigionamento di energia protetta nei confronti del carico

Power Protection

La mancanza di energia al carico critico provoca danni ingenti

Costi orari di inoperatività

Business Operation	Average Cost/hour of downtime
Communications: Converged Services	\$ 10'000'000
Financial: Brokerage Operation	\$ 6'450'000
Financial: Credit Card/Sales Authorization	\$ 2'600'000
Energy	\$ 2'800'000
Telecom	\$ 2'000'000
Manufacturing	\$ 1'600'000
Retail	\$ 1'100'000
Health Care	\$ 636'000
Media: Pay Per View	\$ 150'000
Retail: Merchandise Sales	\$ 140'000
Transportation: Airline Ticketing	\$ 89'500
Media: Event Ticket Sales	\$ 69'000
Source: Gartner, Dataquest, Contingency Planning Research, MetaGroup and others	



Risks

Product Families

Dual Conversion UPS's – overview & highlights



Single-phase standalone systems

- 1 – 80 kVA
- Best-in-class compactness
- Outstanding cost-effectiveness



Three-phase standalone systems



Three-phase modular systems

- 10 kVA – 3 MVA
- DPA with intelligent power modules
- Easy to replace safe-swap modules
- Low TCO
- Simple installation and service
- Optimal scalability of the UPS systems

Applicazioni

**Small power applications
10 – 200 kW**



DPA UPScale
10 or 20kW modules
Up to 10 modules in //

**Medium power applications
200 kW – 1 MW**



Conceptpower DPA
24, 32, 40, 100kW modules
Parallel syst. up to 30 modules

**Large power applications
> 1 MW**



Conceptpower DPA 500
100kW modules
Parallel systems up to 30 modules

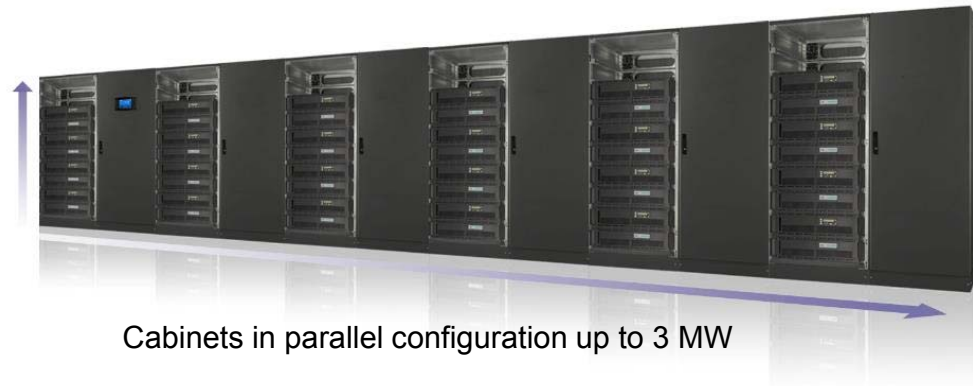
Conceptpower DPA 500

High power modular UPS

All True Modular system benefits *available in MW range*

- *The UPS for large data centers and other high power applications*
- Scalable power in 100 kW steps

One to five
modules in one
single cabinet



Decentralized Parallel Architecture (DPA™)

- Secures the highest level of availability through having true redundancy across modules.

A wide-angle, nighttime aerial photograph of a city and a large body of water. The city is illuminated with warm yellow and orange lights, reflecting on the water's surface. The surrounding landscape is dark, with some distant hills visible under a deep blue twilight sky. The foreground shows dark, silhouetted trees and foliage.

Andreas Beinath – Quartino, 25.05.2016

Ticino Day 2016

ABB e il suo portfolio MT

Gruppo ABB

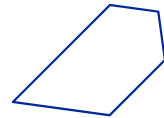
Fatti e cifre

Gruppo ABB

150
nationalities



+135,000 employees



\$ 35.5
billion
in revenue
(2015)

Present in



+100
countries

+300
production plants



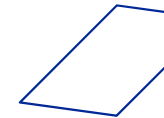
Formed in
1988
merger of Swiss (BBC, 1891) and Swedish
(ASEA, 1883) engineering companies

ABB Svizzera

>120
nationalities



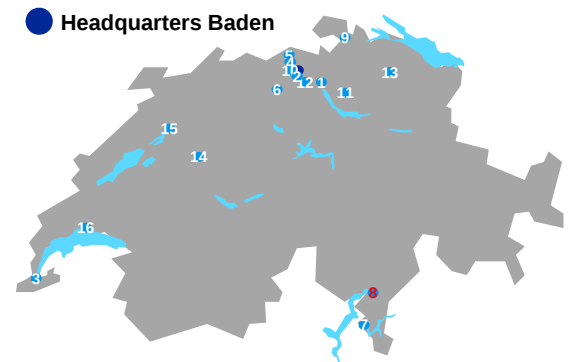
+6,350 employees



\$ 3.2
billion
in revenue
(2015)

Production/Engineering

- 1 Zürich Oerlikon/Altstetten
- 2 Baden/Dättwil
- 3 Geneva
- 4 Kleindöttingen
- 5 Klingnau
- 6 Lenzburg
- 7 Molinazzo di Monteggio
- 8 **Quartino**
- 9 Schaffhausen
- 10 Turgi
- 11 Uster
- 12 Wettingen
- 13 Zuzwil



Gruppo ABB

Energia e automazione in quattro divisioni

Quattro divisioni per una migliore copertura delle esigenze del cliente

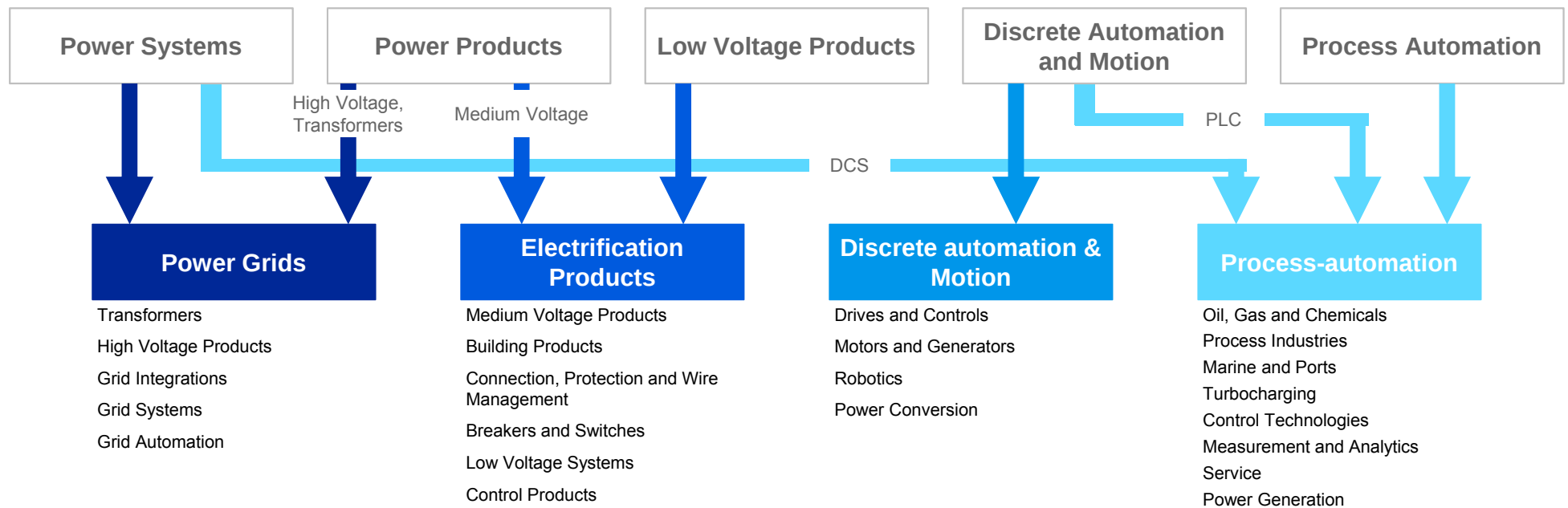
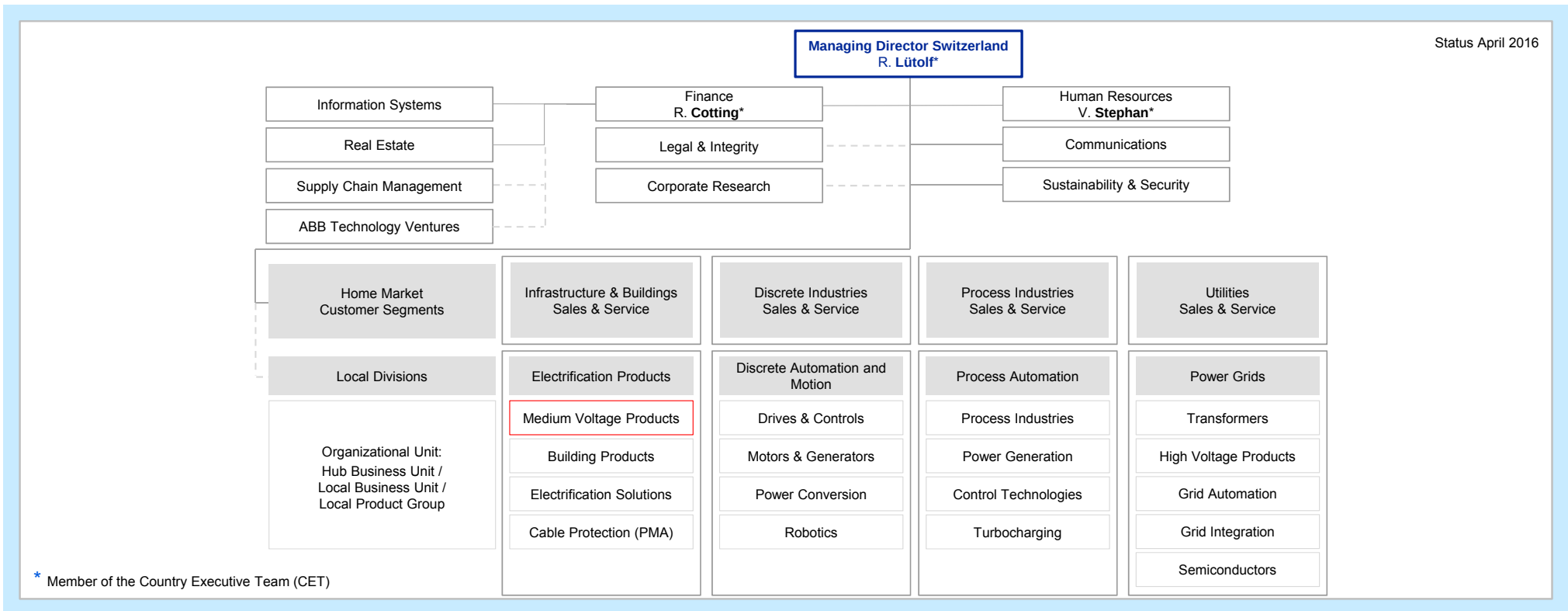


ABB Svizzera

Organizzazione

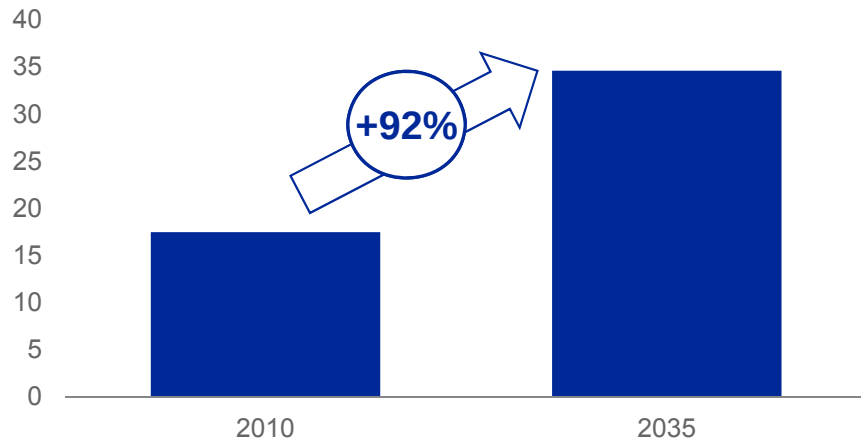


Il consumo di energia intelligente

Le tendenze globali e le sfide

Rise in electricity demand by 2035 (under current policies)¹

In thousand Terawatt-hours (TWh)



Electricity demand is calculated as the total gross electricity generated less own use in the production of electricity and transmission, and distribution losses.

Rising power demand

Climate change

Change of power supply systems

→ European Energy Targets 2030*

→ Swiss «Energy Strategy 2050»**

*Targets by 2030:

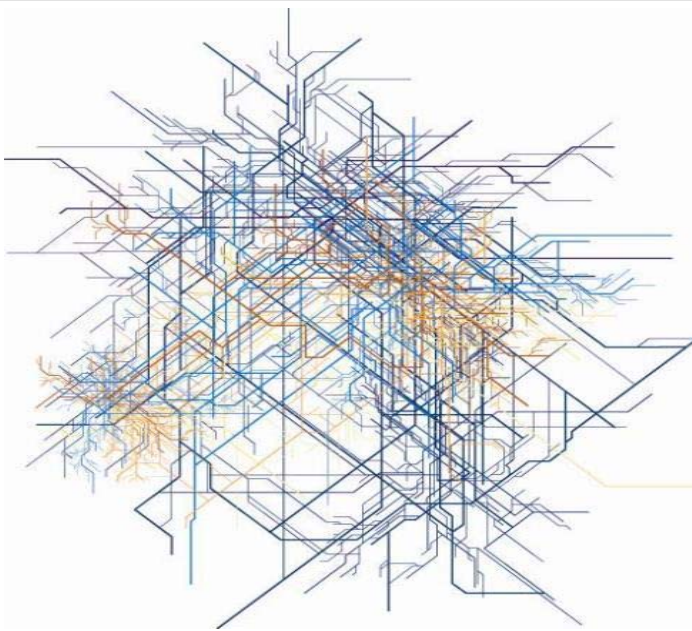
- 27% increase in energy efficiency
- 27% of energy from renewables
- 40% less greenhouse gas emissions than in 1990

**Swiss Energy Strategy:

- Withdraw from nuclear energy on a step-by-step basis
- Increasing the portion of renewable energy
- Energy efficiency
- Reduction of CO₂ (especially building heating, traffic)

Smart Grid di domani

Il cambiamento della rete



Cosa cambia nella rete

The power landscape is changing fundamentally through...

- stronger integration of renewables and small, decentralized power sources
- rising power grid load
- accelerating e-mobility

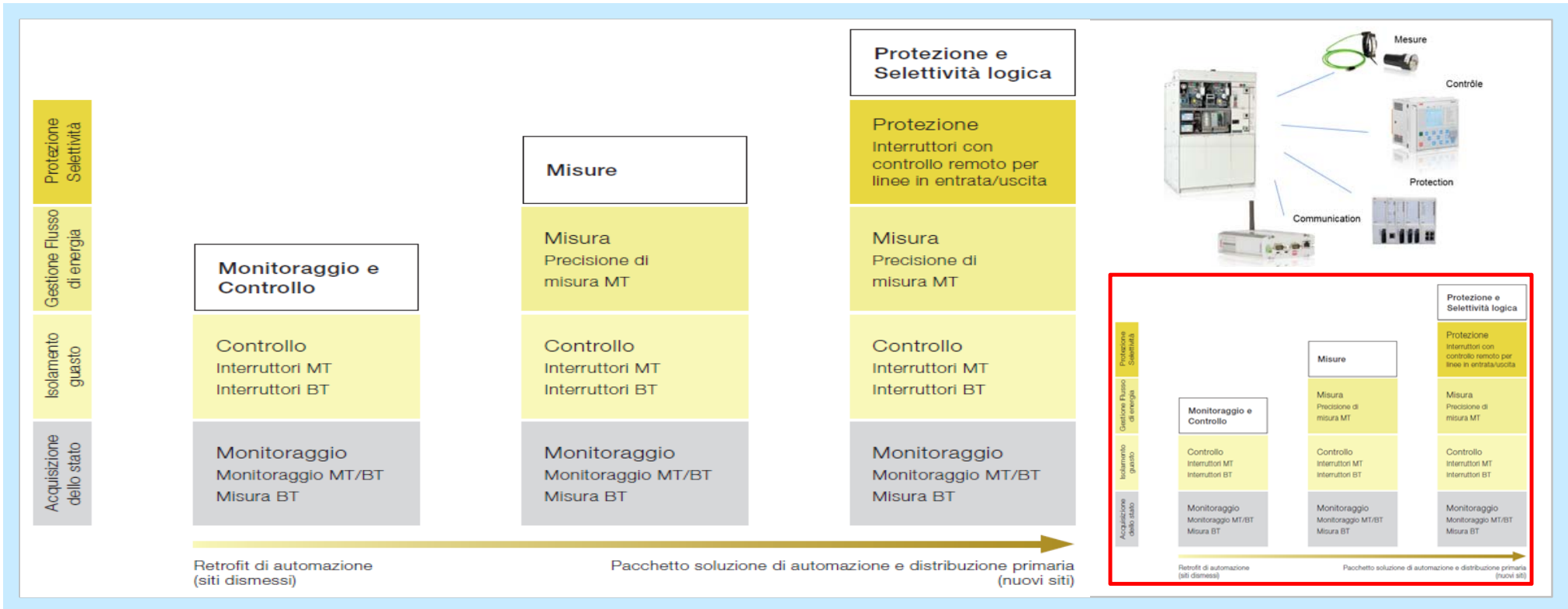
With grid requirements quickly increasing, we need...

- a balancing of load and generation and energy storage
- real-time analysis of electrical grid data and immediate trouble-shooting
- demand management

Smart ABB technologies facilitate a secure and efficient change of the power landscape

Smart Grid di domani

Il cambiamento della rete e cosa offre ABB



Portafoglio per la rete di distribuzione in Svizzera

Gamme completa per una rete di distribuzione a l'avanguardia

Principale portafoglio dei prodotti di vendita per la rete di distribuzione

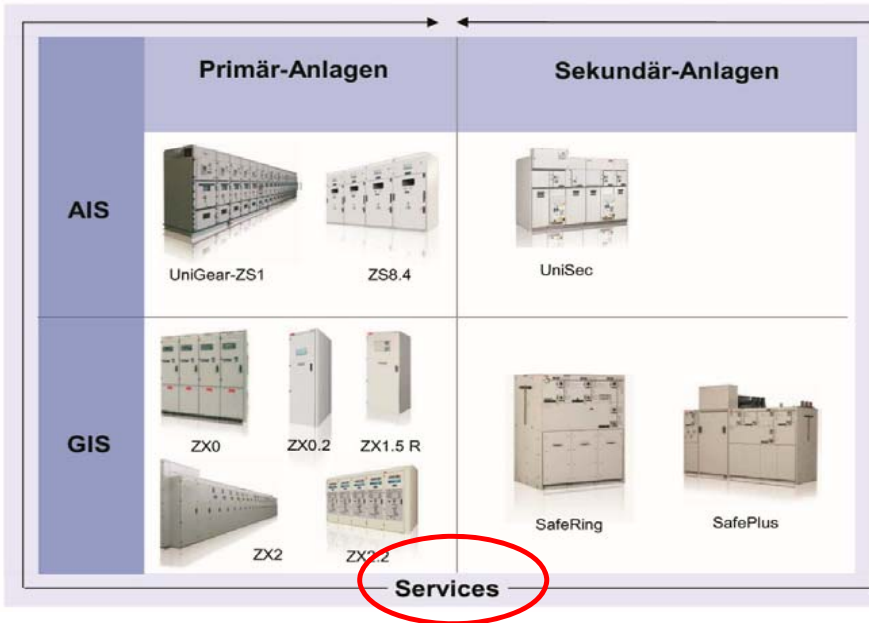
								
Distribution automation	Apparatus	Primary switchgear	Secondary switchgear	Modular systems	Service	Distribution Transformer	DRY Transformer	Surge Arrester
❖ Relion® relay family ❖ Station automation ❖ SPACOM portfolio ❖ Ultra low end portfolio	❖ Indoor apparatus ❖ Current limiters ❖ Ultrafast eart. switch ❖ Vacuum interruptors ❖ Sensors ❖ Inst. transformers ❖ Outdoor portfolio	❖ Air insulated PSWG ❖ Gas insulated PSWG ❖ Railway portfolio	❖ Air insulated SSWG ❖ Ring main units	❖ Metal housing ❖ Concrete housing ❖ GRP housing ❖ eHouses ❖ Product packaging	❖ Product life cycle serv. ❖ Life extension ❖ Replacement and retrofit ❖ Asset management ❖ Spare parts	❖ Liquid filled transformers ❖ Amorphous solutions ❖ Low loss & high efficient	❖ Vacuum Cast Coil ❖ RESIBLOC ❖ Open wound ❖ Amorphous solutions (ECO-DRY) ❖ Low loss & high efficient	❖ Cable protection ❖ Other medium-voltage equipment ❖ Rotating machines ❖ Generators ❖ Switchgear ❖ Transformers

Migliorare la sicurezza, l'affidabilità, l'efficienza e la qualità

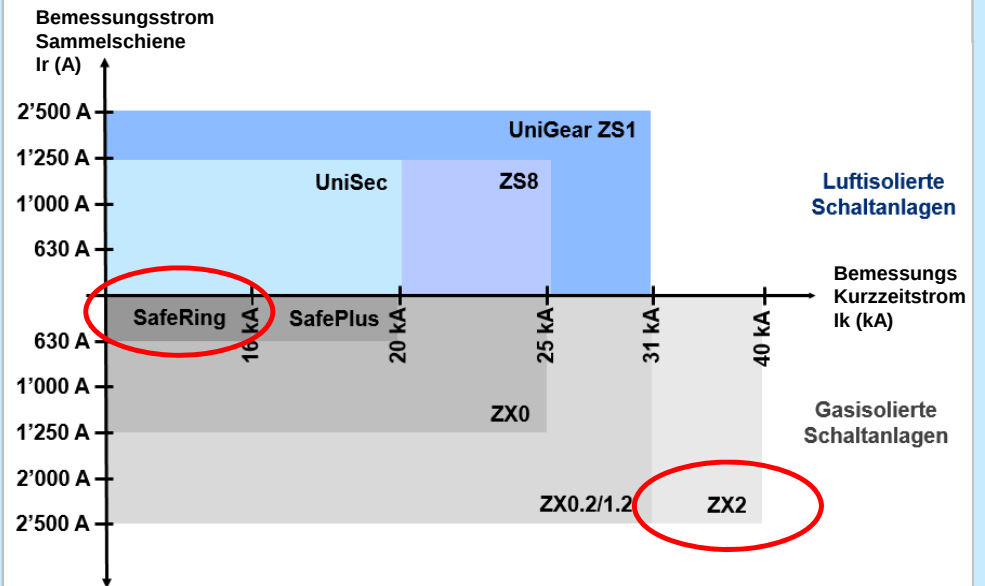
Portafoglio

Celle di media tensione

Le celle di media tensione



Classe di potenza: Ur = 24kV



Portafoglio

Innovazione nelle celle di media tensione

ZX2 AirPlus

Prima referenza in Svizzera:

- Cliente: ewz / Sottostazione «UW Oerlikon»
- 50 celle installate
- 24kV / 25kA / 2000A



SafeAir / SafeRing AirPlus

Lancio della «**SafeRing AirPlus**» in Svizzera:

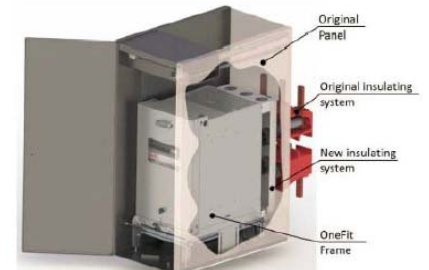
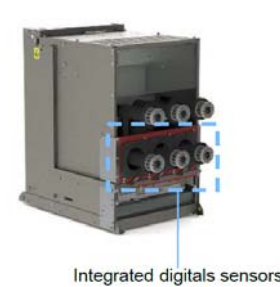
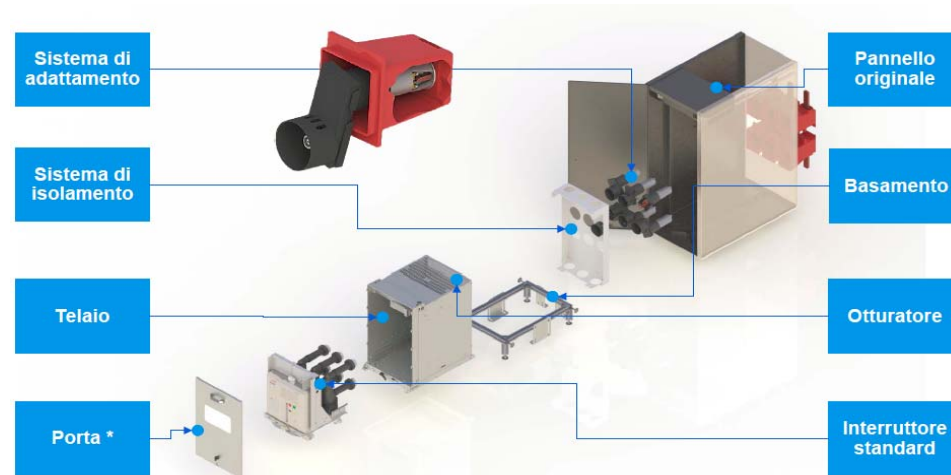
- Powertage a Zurigo
- Dal 31.Maggio al 02.Giugno 2016
- SafeAir:
 - 12kV / 20kA / 630A
- SafeRing AirPlus:
 - - 24kV / 16kA / 630A



Portafoglio

Innovazione nel Service MT con il OneFIT 12-24kV / <50kA

OneFit è la soluzione di retrofitting che permette di collegare facilmente un nuovo interruttore standard ABB ad un'ampia gamma di pannelli esistenti grazie ad un sistema integrato di adattamento ad innesto sicuro.



Important notices

Per ulteriori informazioni visitate il nostro nuovo sito dei i prodotti e soluzioni per la rete di distribuzione Svizzera:

- <http://new.abb.com/ch/fr/distributiongrid-fr>

The screenshot shows the ABB Distribution Grid website for Switzerland in French. The header includes the ABB logo with the tagline "Power and productivity for a better world™", the location "SWITZERLAND - FRENCH", and a navigation menu. The main heading is "Bienvenue sur le portail du réseau de distribution". Below this, a section titled "Produits et solutions pour les réseaux électriques et industries en Suisse" describes ABB's offerings for energy transmission and distribution, emphasizing reliability and environmental protection. A large image shows a power grid with wind turbines and substations. Below the text, there are six product categories: "Stations transformatrices" (transformer stations), "Cellules MT" (medium voltage cells), "Distribution Automation", "Appareillages moyenne-tension" (medium voltage equipment), "Service & Retrofits", and "Portfolio" (overview of solutions and products for the distribution network).



Marco Nunes – Quartino, 25.05.2016

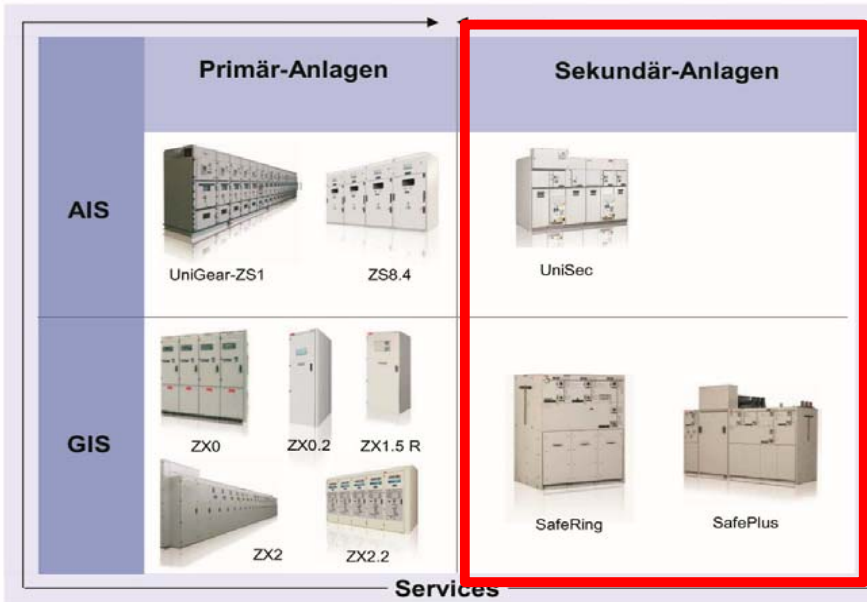
Ticino Day 2016

Celle MT, isolate ad aria o a gas

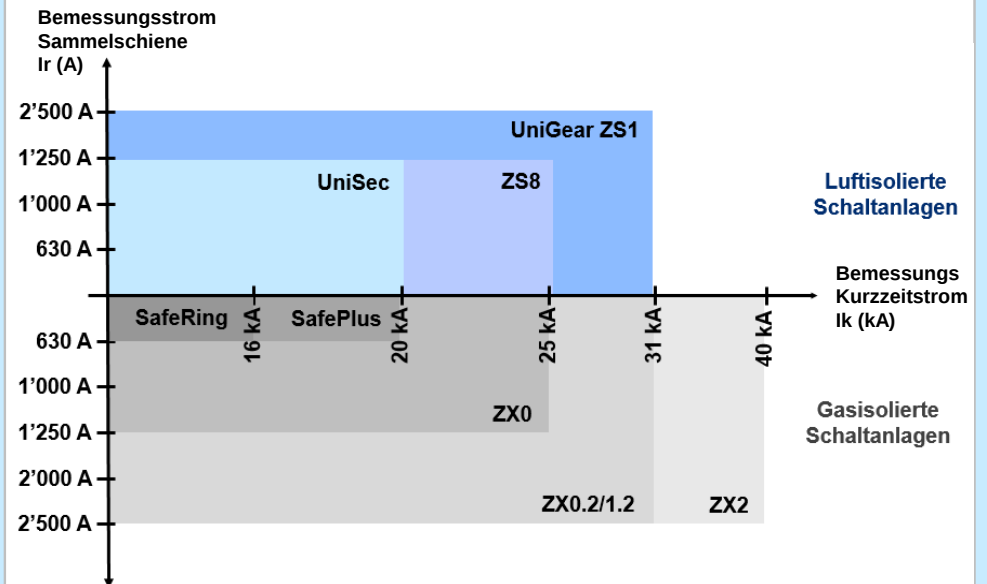
Celle MT

Marco Nunes

Le nostre celle di MT



Classi di potenza aUr = 24 kV



Celle MT

Unisec : presentazione

UniSec è il nuovo quadro ABB di media tensione per interno, di distribuzione secondaria, isolato in aria. È un quadro classificato LSC2A-PM per pannelli con interruttore di manovra-sezionatore e/o con interruttore rimovibile. E' classificato LSC2B-PM fino a 17,5 kV e LSC2B-PI fino a 24 kV per pannelli con interruttore estraibile, in riferimento alla continuità di servizio in conformità alle Norme IEC 62271-200.



Celle MT

Unisec : presentazione

Caratteristiche elettriche dei quadri

Tensione nominale	kV	12	17,5	24
Tensione di prova (50-60 Hz per 1 min)	kV	28	38	50
Tensione di tenuta ad impulso	kV	75	95	125
Frequenza nominale	Hz	50-60	50-60	50-60
Corrente nominale sbarre principali	A	630/800/1250	630/800/1250	630/1250
Corrente nominale delle apparecchiature:				
– VD4/R-Sec - HD4/R-Sec - HD4/RE-Sec interruttore estraibile	A	630/800	630/800	630
– VD4/R-Sec - HD4/R-Sec interruttore estraibile	A	630	630	630
– apparecchio multifunzione HySec	A	630	630	630
– interruttore di manovra-sezionatore in gas GSec	A	630/800	630/800	630
– interruttore estraibile Vmax/Sec	A	630/1250	630/1250	–
– interruttore estraibile VD4/Sec	A	–	–	630/1250
– interruttore estraibile HD4/Sec	A	630/1250	630/1250	630/1250
– contattore in vuoto estraibile VSC/P	A	400	–	–
Corrente nominale ammissibile di breve durata	kA (3s)	16 ⁽⁴⁾ /20 ⁽³⁾ /25 ⁽¹⁾ ⁽²⁾	16 ⁽⁴⁾ /20 ⁽³⁾ /25 ⁽²⁾	16 ⁽⁴⁾ /20 ⁽³⁾
Corrente di cresta	kA	40 ⁽⁴⁾ /50 ⁽³⁾ /62.5	40 ⁽⁴⁾ /50 ⁽³⁾ /62.5	40 ⁽⁴⁾ /50 ⁽³⁾
Corrente di tenuta all'arco interno (fino a IAC AFLR)	kA (1s)	12,5/16 ⁽⁴⁾ /21/25 ⁽²⁾	12,5/16 ⁽⁴⁾ /21/25 ⁽²⁾	12,5/16 ⁽⁴⁾ /21

⁽¹⁾ 25 kA 2s per classe di continuità di servizio LSC2A

⁽²⁾ Per la classe di continuità di servizio LSC2B

⁽³⁾ Contattare ABB per 21 kA/52,5 kAp

⁽⁴⁾ Per HySec 16 kA(1s)/40 kAp

Celle MT

Unisec : presentazione

Elenco delle unità disponibili

Codice	Descrizione	Larghezza				
		190 mm	375 mm	500 mm	600 mm	750 mm
SDC	Unità con interruttore di manovra-sezionatore		•	•		•
SDS	Unità con interruttore di manovra-sezionatore – sezionamento		•	•		•
SDD	Unità con doppio interruttore di manovra-sezionatore					•
SDM	Unità di sezionamento con misura e interruttore di manovra-sezionatore					•
UMP	Unità misura universale					•
DRC	Unità arrivo diretta con misura e messa a terra sbarra		•	•		
DRS	Unità risalita – misura		•	•		
SFV	Interruttore di manovra-sezionatore con fusibili – misura		•	•		
SFC	Interruttore di manovra-sezionatore con fusibili		•	•		•
SFS	Interruttore di manovra-sezionatore con fusibili – sezionamento		•	•		
SBC	Unità con interruttore removibile con interruttore di manovra-sezionatore					•
SBC-W	Unità con interruttore estraibile e interruttore di manovra-sezionatore					•
SBS	Unità con interruttore removibile con interruttore di manovra-sezionatore – sezionamento					•
SBS-W	Unità con interruttore estraibile e interruttore di manovra-sezionatore – sezionamento					•
SBM	Unità di sezionamento con misura, interruttore e doppio interruttore di manovra-sezionatore					•
SBR	Unità interruttore invertita					•
HBC	Unità con interruttore e sezionatore integrato			•		
RLC/RLC	Risalita con cavo laterale, sinistro e destro	•				
WBC	Unità con interruttore estraibile				• (*)	• (*)
WBS	Unità con interruttore estraibile – sezionamento				• (*)	• (*)
BME	Unità misura sbarre e messa a terra				• (*)	

□ 12-17,5 kV
□ 24 kV

Celle MT

Unisec: portfolio

Portfolio

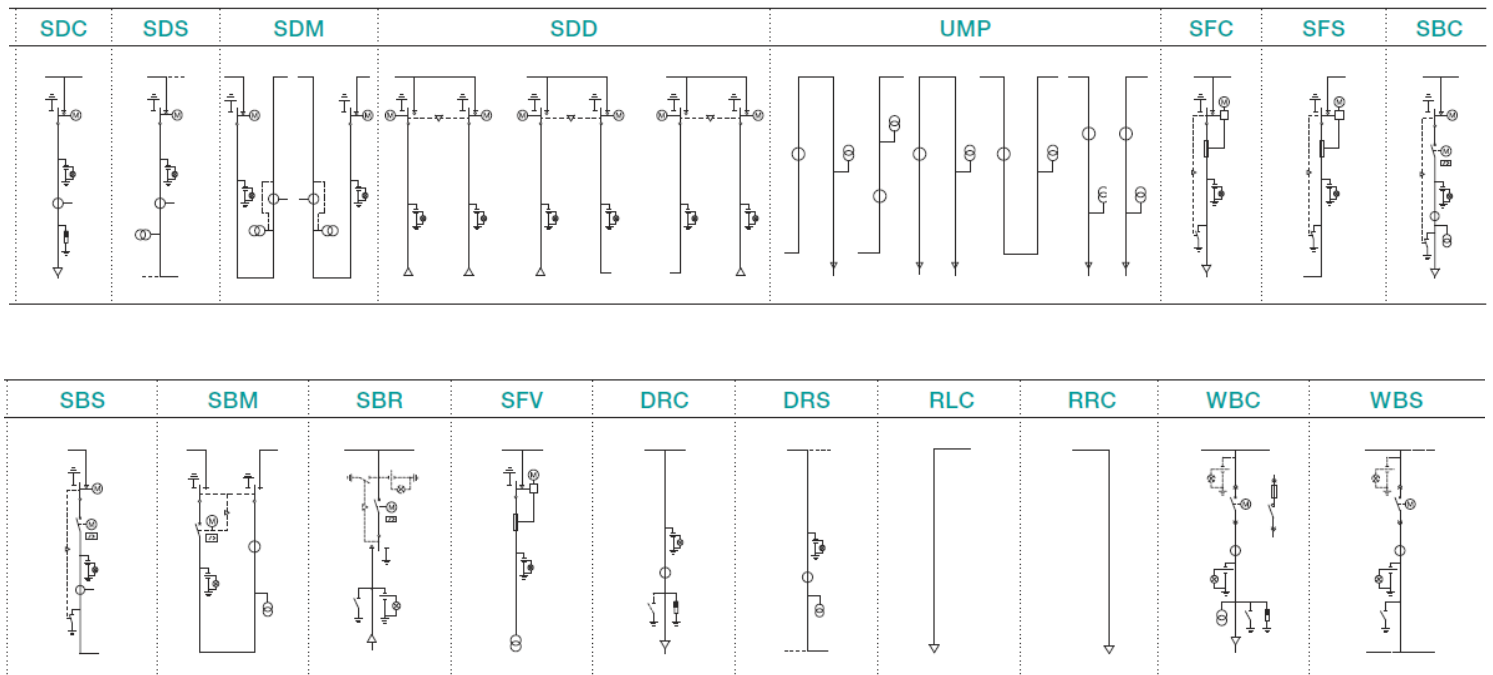
- 18 tipi di funzioni
- Design compatto

Applicazioni:

- ST accessibile interni
- Industria
- Ospedali

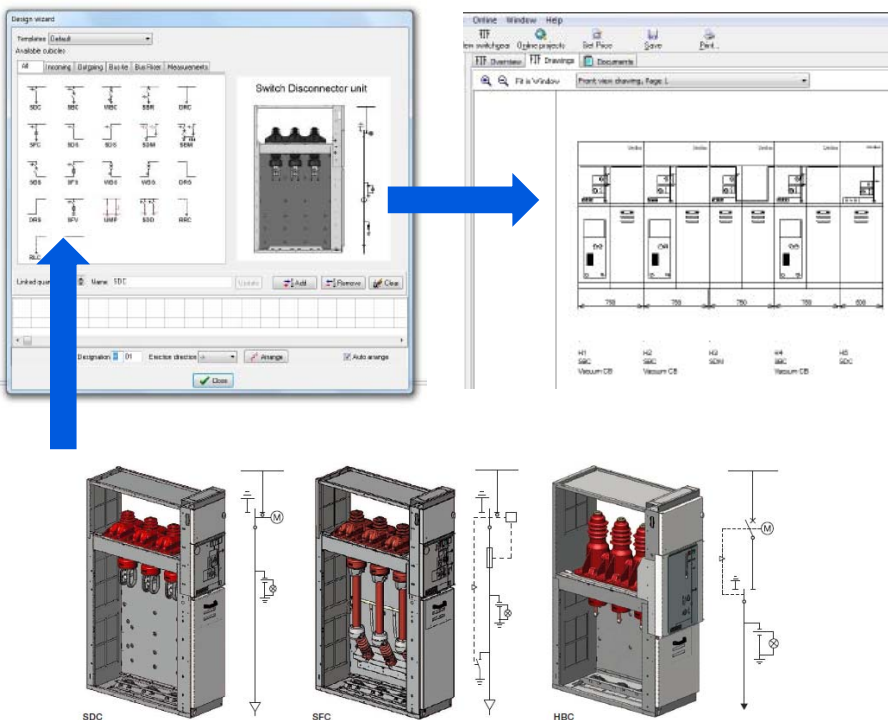
Vantaggi:

- Fino a 1250A / 24kV
- Interruttore estraibile
- Quantità minima di SF6
- Design modulare e compatto per diverse applicazioni



Celle MT

Unisec : Unisec Pro







Quadro SDC-SDC-SFC a 3 vie

Indicato per il Monitoraggio, il Controllo e la Misura MT

N° 2 pannelli interruttore di manovra-sezionatore
N° 1 pannello interruttore di manovra-sezionatore con fusibili

Larghezza: 1.554 mm (comprese le coperture terminali)



Quadro HBC-HBC-SFC a 3 vie

Indicato anche per la Protezione e la Selettività logica

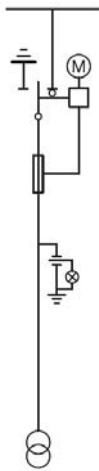
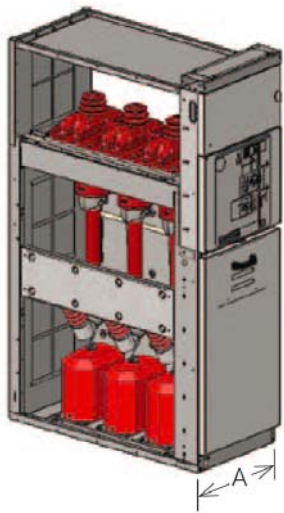
N° 2 pannelli interruttore
N° 1 pannello interruttore di manovra-sezionatore con fusibili

Larghezza: 1.554 mm (comprese le coperture terminali)

Celle MT

Unisec: celle di misura MT

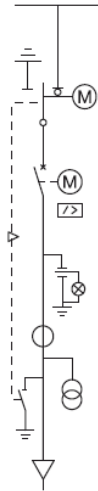
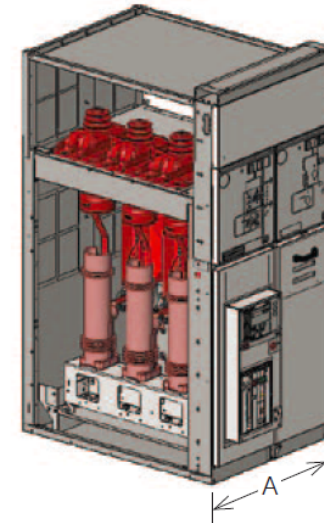
Unisec



Trasformatori di tensione di sbarra



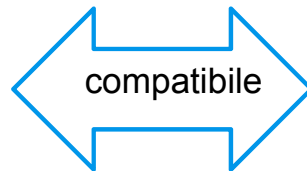
Cella di misura standard



Interruttore automatico plug-in tipo SBC-W

Celle MT

Safeplus: presentazione



Safering :

- 24 kV – 630A – 16 kA/3s max
- Espandibile con coni630A (partesup.)
- Configurazione con blocchi standard
- Monoblocco fino a 4 funzioni

Safeplus :

- 24 kV – 630A – 20 kA/3s max
- Espandibile con coni630A (partesup.)
- Sbarra 1250A possibile
- Cella di misura MT
- Monoblocco fino a 5 funzioni, configurabili
- O modulari con sbarra esterna

Celle MT

Safeplus: presentazione

Portfolio

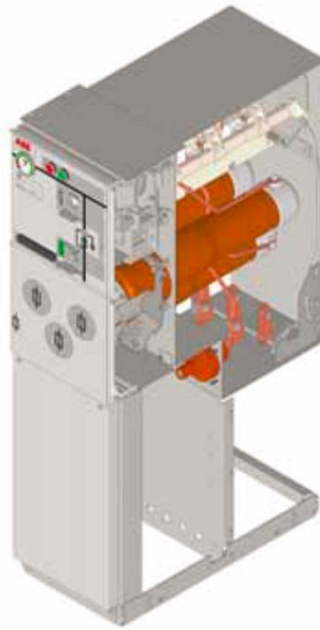
- 8 tipi di funzioni

Campi di applicazione:

- ST accessibile interni e esterni
- ST esistenti
- Industria

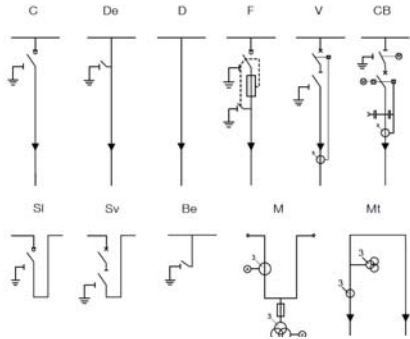
Vantaggi:

- Fino a 1250A / 24kV
- Compatto (325 mm) e modulare



Celle MT

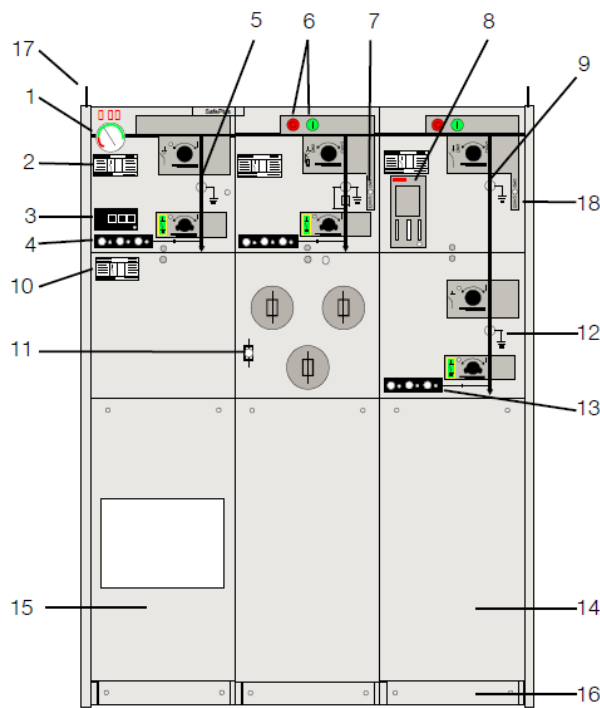
Safeplus: presentazione



SafePlus			C-module		F-module		V-module		V20/V25 module	
			Switch disconnect	Earthing switch	Switch-fuse combination	Earthing switch	Vacuum circuit-breaker	Earthing switch	Vacuum circuit-breaker	Earthing switch
Rated voltage	kV		12/17,5/24	12/17,5/24	12/17,5/24	12/17,5/24	12/17,5/24	12/17,5/24	12/24	12/24
Power frequency withstand voltage	kV		28 ¹⁾ /38/50	28 ¹⁾ /38/50	28 ¹⁾ /38/50	28 ¹⁾ /38/50	28 ¹⁾ /38/50	28 ¹⁾ /38/50	28 ¹⁾ /50	28 ¹⁾ /50
Impulse withstand voltage	kV		95/95/125	95/95/125	95/95/125	95/95/125	95/95/125	95/95/125	95/125	95/125
Rated current	A		630/630/630		200 ²⁾		630/630/630		630/630	
Breaking capacities:										
closed loop	A		650/650/650							
off load cable charging	A		140/140/140							
off load transformer	A				20/20/20					
earth fault	A		205/160/160							
earth fault cable charging	A		117/91/91							
short-circuit breaking current	kA				see ³⁾		21/16/16		25/20	25/20
Making capacity	kA		65/52,5 ⁴⁾ /52,5	62,5/52,5 ⁴⁾ /50	see ³⁾	12,5/12,5/12,5	52,5/40/40	52,5/40/40	65/50	62,5/50
Short time current 0,5 sec ⁵⁾	kA						16/16/16			
Short time current 1 sec ⁶⁾	kA		25/-/-	25/-/-		5/5/5	16/16/16		25/21	25/21
Short time current 3 sec ⁷⁾	kA		25/21 ⁴⁾ /21	25/21 ⁴⁾ /21			21/16/16	21/16/16	25/21	25/21

Celle MT

Safeplus: presentazione



Coperchio frontale superiore

1. Manometro
2. Targhetta di modulo
3. Indicatore di corto circuito
4. indicazione di tensione capacitivo - indicatore di posizione / di terra
5. rottura di carico
6. Pulsanti vicino / operazione di apertura
7. Indicatore di primavera Charged
8. relè autoalimentato protezione / posizione dell'interruttore
9. Vuoto

Coperchio frontale inferiore

10. Targhetta di quadri
11. fusibile bruciato indicatore
12. indicatore di posizione / di terra – sezionatore indicazione di tensione
13. Capacitivo coperchio del vano cavo
14. Cavo standard coperchio del vano

Scomparto a cavi

15. Cavo con finestrella
16. Supporto bar (rimovibile)

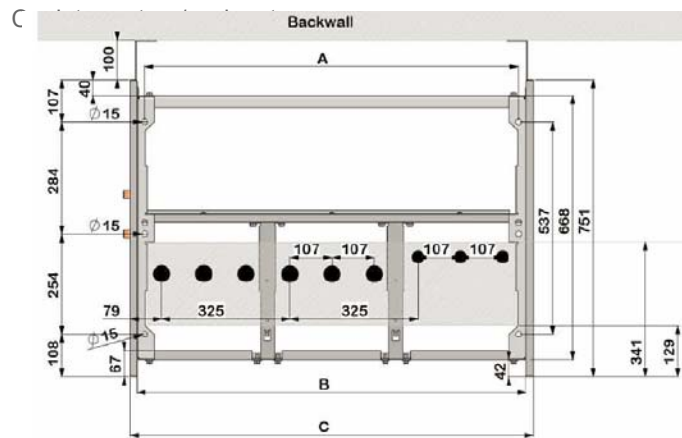
Coperchio laterale

17. Sollevamento aletta
18. maniglia operativa (sospesa sulla parete laterale, per predefinito sulla parete laterale destra)



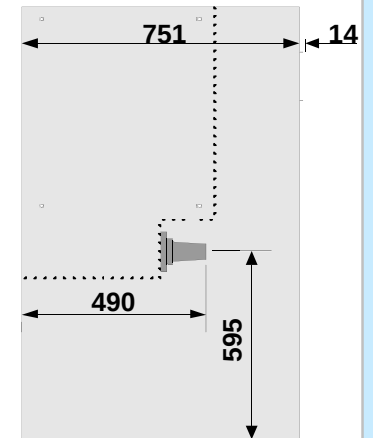
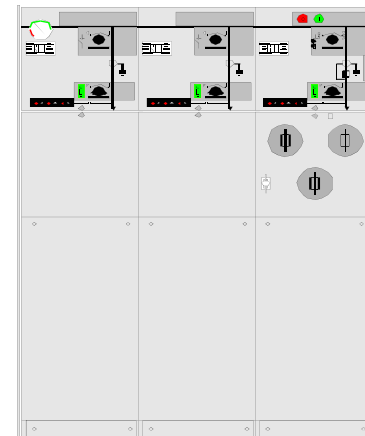
Celle MT

Safeplus: dimensioni



Unit	A	B	C
1-way	298	337	371
2-way	623	662	696
3-way	948	987	1021
4-way	1273	1312	1346
5-way	1598	1637	1671

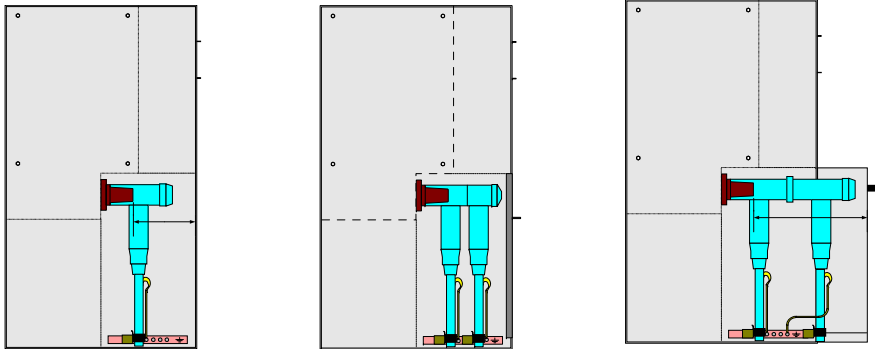
V = interruttore automatico
F = interruttore/sezionatore fusibili



Funzioni	Hauteur traversée	Type traversée
Tipo C	595 mm	Interface C
Tipo F	595 mm	Interface A
Tipo V	595 mm	Interface A ou C

Celle MT

Safeplus: presentazione



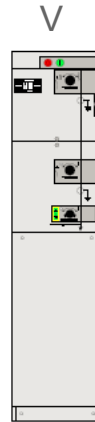
- Tutti i passanti alla stessa altezza per una standardizzazione dei lavori preparatori per il montaggio dei connettori MT
- Connettori doppi o connettore di montaggio + scaricatori su una profondità massima di 300 mm (con connettori appropriati) – tipo K430TB+K300
- Porta più profonda opzionale
- Porta del vano cavi conforme alla classe IAC AFL 20/kA 1s secondo IEC 62271-200

Celle MT

Safeplus: 3 tipi di interruttore

1) Interruttore automatico

- 1) confermati 2.000 cicli per il tipo V e V20
 - 1) oggi =M1 (classe IEC)
 - 2) 57 cicli di commutazione all'anno a 35 anni di attività
 - 3) testato per 5.000 cicli
 - 4) Per 10.000 cicli : Safeplus CB o Unisec
- 2) 10'000 cicli saranno presto disponibili per V20 (M2)

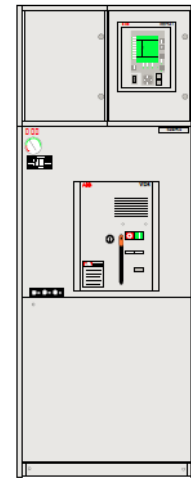


Altezza: 1336 / 1100
 Profondità: 765
 Larghezza: 325
 Operazioni: 2000 CO
 Ciclo operat.: CO-15s-CO
 Corrente: 630A-16kA/3s



1400
 765
 325
 2000 CO (5000CO)
 CO-0.3-CO-3min(15s)-CO
 630A-20kA/3s

CB

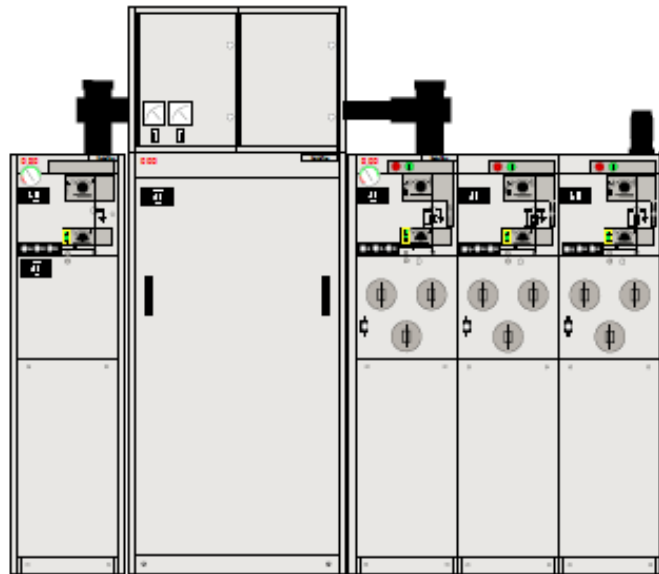


1336/1100 mm
 800 mm
 696 mm
 30'000 CO
 CO-0.3s-CO-15s-CO
 1250A-20kA/3s

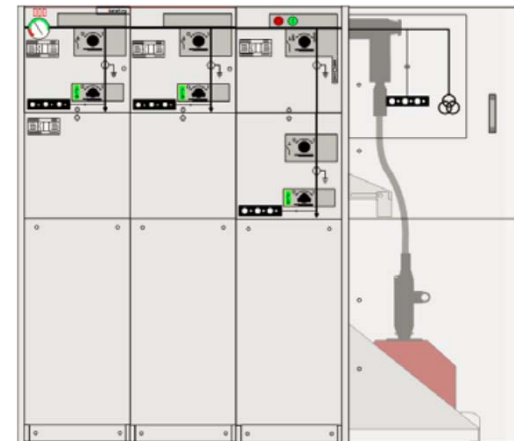
Celle MT

Safeplus: celle di misura MT

SafePlus



Misura MT ufficiale (L=696mm)



Misura della tension di sbarra

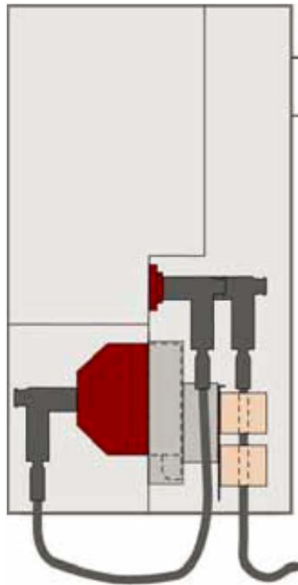
Celle MT

Safeplus: celle di misura MT



Celle MT

Safeplus: celle di misura MT integrata



Touch proof VT's with integrated bushings (Interface A) placed in the lower back of the unit, with cables connected to the T-connectors in the cable compartment in front



Factory mounted T-connectors Interface C with cables connected to VT's



Factory mounted CT's for tariff metering

Celle MT

Safeplus: Arc Suppressor

Soppressore d'arco → Dispositivo attivo per una maggiore sicurezza

Il soppressore d'arco è un ottimale dispositivo di rivelamento del corto circuito.

Un rilevatore di pressione meccanico, installato nei compartimenti SF6 di ogni singola cella, SafeRing o SafePlus.

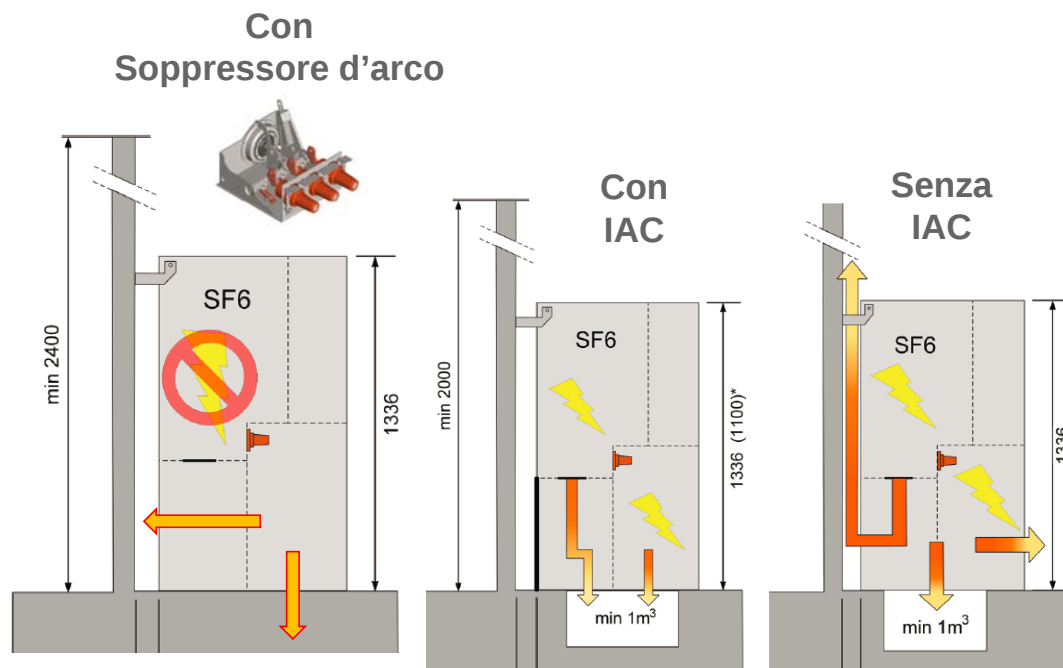
In caso di guasto l'arco che si forma all'interno del compartimento SF6, provoca un aumento di pressione, che viene immediatamente rilevata, provocando automaticamente il disinserimento dell'alimentazione.

Questo ne consegue l'immediata soppressione dell'arco, evitando un'eventuale esplosione e conseguente emissione di gas ad alta temperatura.

Nessun collegamento o meccanismi di rilascio sono installati all'esterno del serbatoio.

Contaminazione degli ambienti esclusa.

Aumento dell'affidabilità dell'impianto.



Celle MT

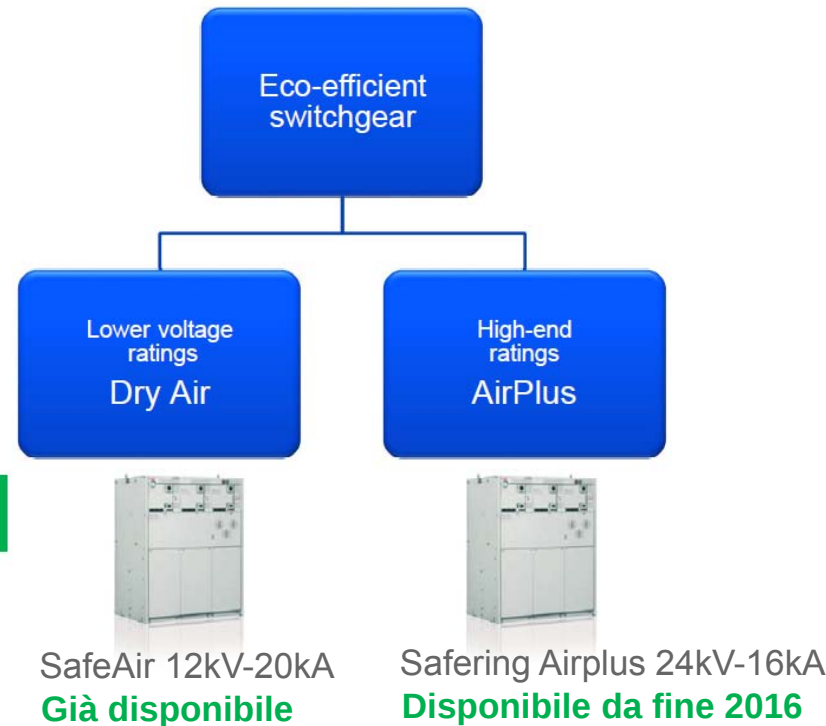
Safering/Safeplus: senza SF6

Two technologies with GWP <1

- Alternative to SF₆ shall have minimal GWP
 - **Dry Air** for lower voltage ratings, GWP 0
 - **AirPlus Ketones/air mix** for higher ratings, GWP <1

		
22'800	Global Warming Potential	<1 0

New **Ketones** gas mixture achieves close to
100% reduction of GWP;
Dry Air has **NO** GWP



Celle MT

SafeAir 12 : DRY AIR

Disponibili:

SafeAir 12 kV – 630A – 20 kA/3s
«Ring Main Unit»



Available configurations

SafeRing Air is available in the following configurations:

CC, CCC, CCCC, CCCCC

DC, DCC, DCCC, DCCCC

DV, DVV, DVVV, DVVVV

CV, CCV, CCCV, CCVV, CCCVV, CCVVV

SafeRing Air		C-module		V-module	
		Switch	Earthing switch/ disconnecter	Vacuum circuit- breaker	Earthing switch/ disconnecter
Rated voltage	kV	12	12	12	12
Power frequency withstand voltage	kV	28	28	28	28
Impulse withstand voltage	kV	75	75	75	75
Rated normal current	A	630		630	
Breaking capacities:					
- active load	A	630		630	
- closed loop	A	630			
- off load cable charging	A	10		25	
- earth fault	A	200			
- earth fault cable charging	A	115			
- short-circuit breaking current	kA			20	
- single capacitor bank breaking current	A	135			
Making capacity	kA	50	50	50	50
Short time current 3 sec.	kA	20	20	20	20

24 kV → Powertage 2016 (ABB)

A wide-angle, nighttime aerial photograph of a city and a large body of water. The city is illuminated with warm yellow and orange lights, reflecting on the water's surface. The surrounding landscape is dark, with some distant hills visible under a deep blue twilight sky. The foreground shows dark, silhouetted trees and vegetation.

Simon Joliat – Quartino, 25.05.2016

Ticino Day 2016

Relè di protezione e tecnologia dei sensori

Relais de protection

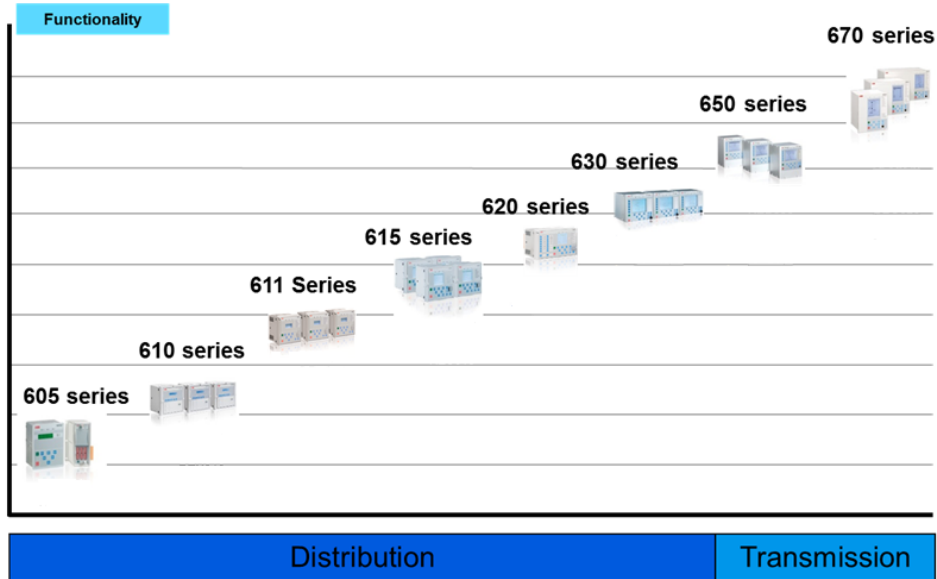
La famille Relion®



Relais de protection

De la distribution à la transmission

Une famille pour tous les niveaux de tension

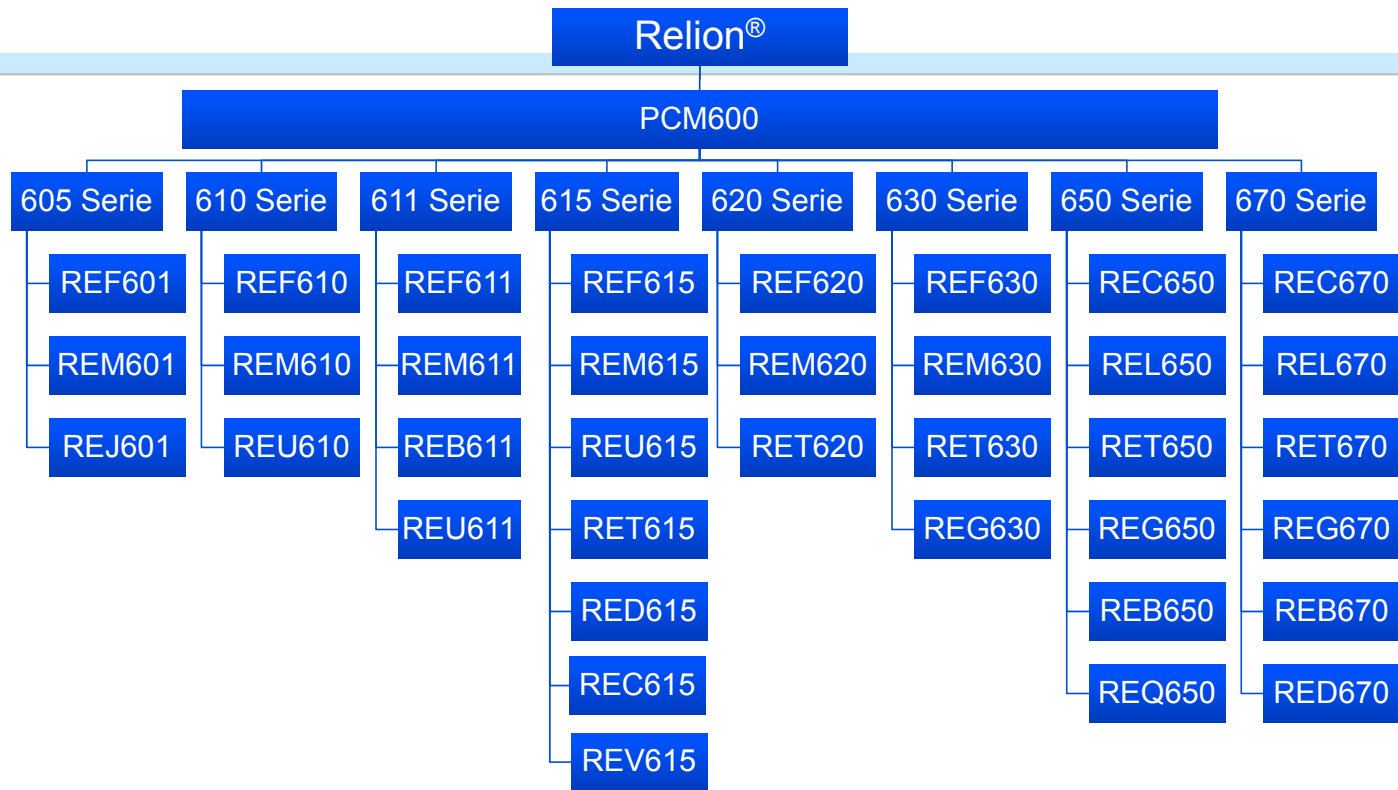


En bref

- Une famille complète
- Un principe de fonctionnement unique
- Un software unique et gratuit – PCM600
- Relais natifs IEC61850 (Une exception-605 series)
- Différents protocoles de communication disponibles
- Acces par Web server

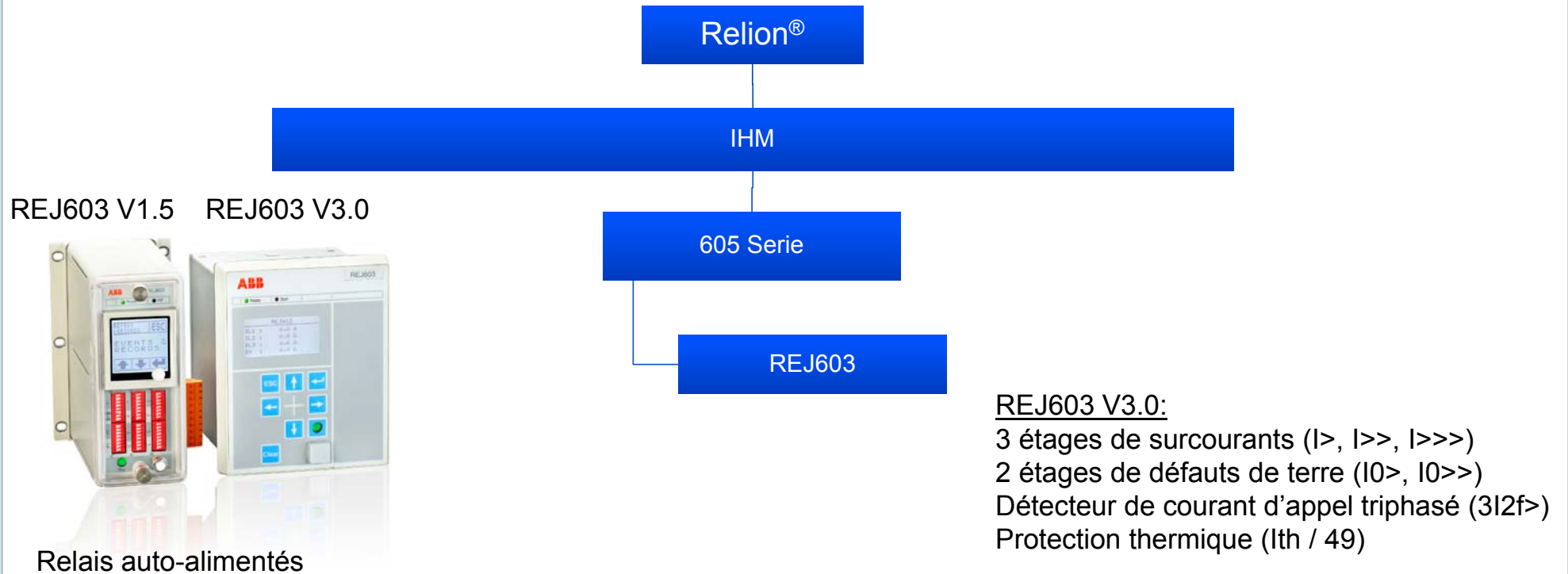
Relais de protection

Les différentes séries – Programmables avec PCM600

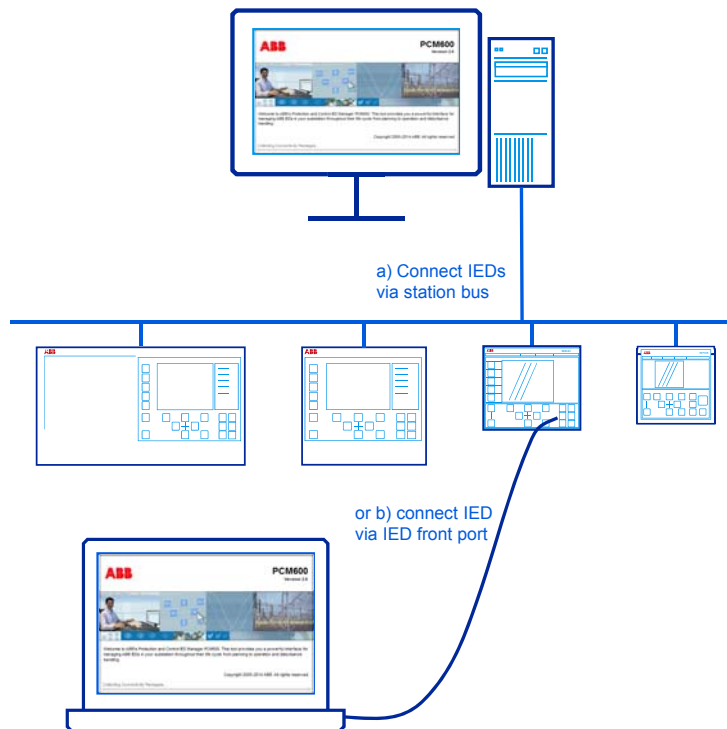


Relais de protection

Les différentes séries – Programmables sans PCM600



Relais de protection PCM600



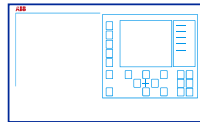
- PCM600 fournit toutes les fonctions nécessaires pour une gestion efficace des relais de protection ABB
- **Un outil unique** tout au long du cycle de vie des appareils Relion®
 - Pour l'ingénierie, la mise en service, les opérations et la maintenance des relais

Ingénierie / Configuration
Mise en service / Tests

Monitoring /
Maintenance / Service

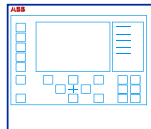
Relais de protection

PCM600 - Un outil pour les appareils de contrôle / protection de ABB



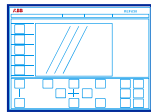
■ Relais supportés dans le nouveau PCM600 2.7:

✓ 670 series



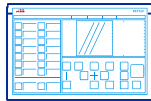
✓ 650 series

✓ 630 series



✓ 620 series

✓ 615 series



✓ 611 series

✓ 610 series



✓ 601 series



✓ REB500

✓ RBX615

✓ RIO600

✓ PML630

✓ GMS600

✓ PWC600

■ Autres:

(Paramètres, perturbographie, fonctions de monitoring ^())*

✓ REF542plus

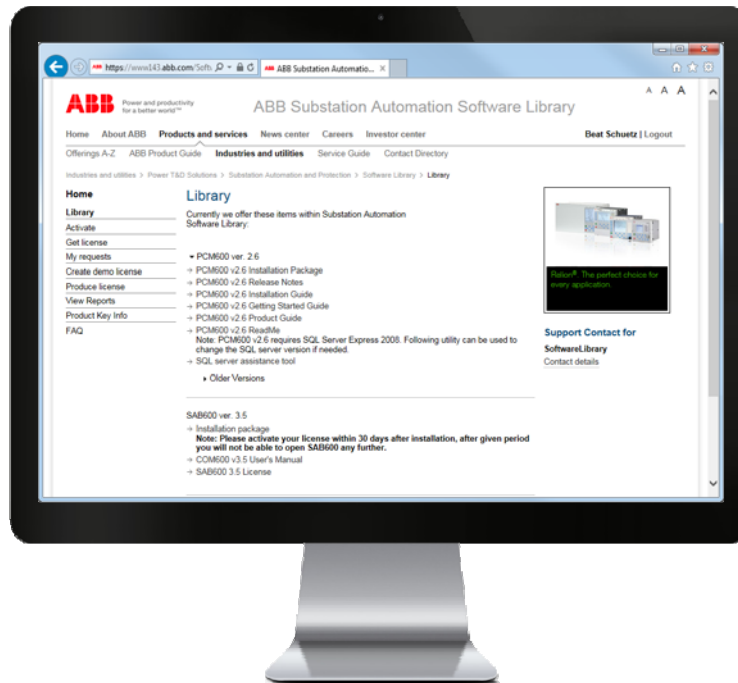
✓ REx541/543/545 ^(*)

✓ REX521 ^(*)

✓ SPACOM ^(*)

Relais de protection

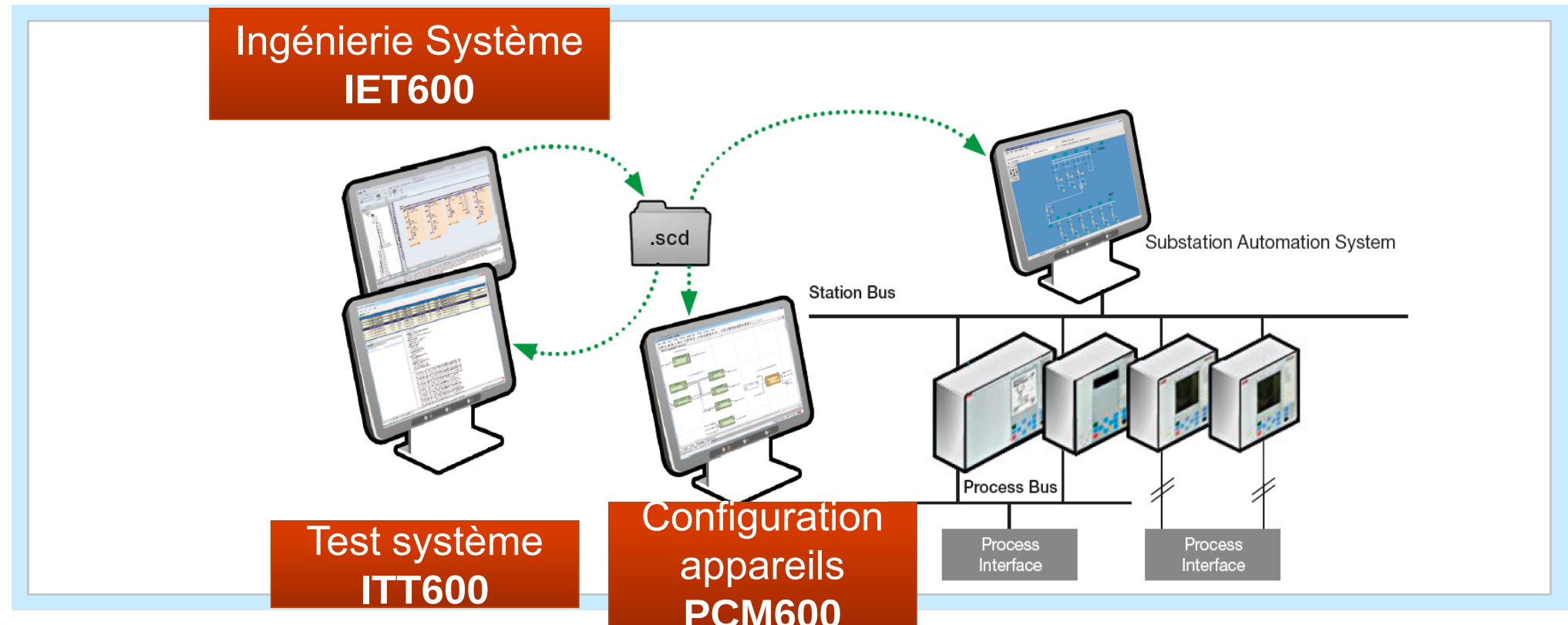
PCM600 – Téléchargement



- PCM600 est gratuit
- Télécharger PCM600 depuis la “ABB SA Software Library”:
<https://www143.abb.com/SoftwareLibrary>
- Note
 - Sur demande, un CD d’installation contenant PCM600 2.7 peut être demandé chez ABB EPMV

Relais de protection

Outils d'intégration et de supervision du bus de communication



Relais de protection

Présentation du «Best-seller MT» – REF615

Le REF615



Description courte

Appareil combiné contrôle et protection

Contrôle-commande de 8 éléments

Protocoles supportés:

- IEC 61850 et Modbus®
- IEC 61850 et DNP3
- IEC 61850 et IEC 60870-5-103
- IEC 61850 Ed1 et 2

Performance complète GOOSE (IEC 61850)

Communication redondante optionnelle

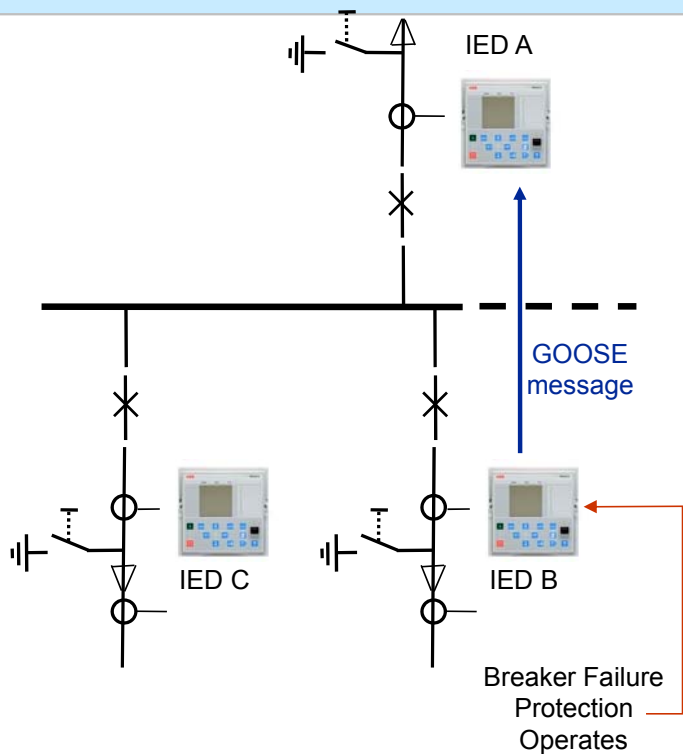
Module RTD/mA

Entrées pour senseurs

Protection contre les arcs (option)

Relais de protection

IEC61850 - Goose

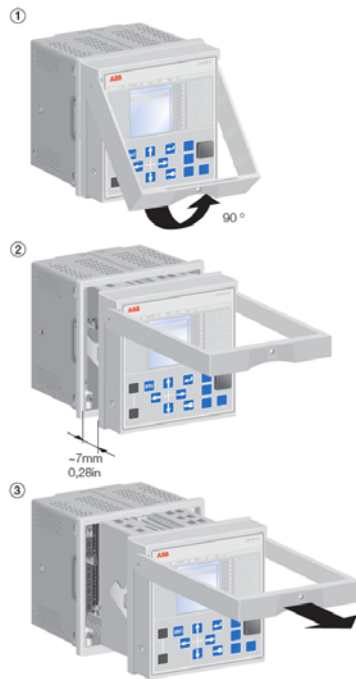


Séquence détaillée

- Après détection d'une faute sur le départ B, l'appareil B envoie un signal déclenchement au disjoncteur B et démarre la fonction de défaillance disjoncteur
- Le disjoncteur B ne parvient pas à ouvrir, même après une 2ème tentative
- La protection de défaillance disjoncteur de l'appareil B envoie un signal de déclenchement à l'appareil A à travers GOOSE
- L'utilisation de la communication GOOSE élimine le besoin d'un câblage dédié
- La protection de défaillance du disjoncteur peut être ajoutée sans renouvellement du câblage avec un minimum de perturbations dans le processus

Relais de protection

Design embrochable



Description courte

- Accélère l'installation, l'entretien et les tests de la protection
- Réduction du MTTR (mean time to repair)
- Poignée sécurisée verrouillable à l'aide d'une vis pour empêcher le retrait accidentel de l'unité de plug-in
- Système disponible sur les 611, 615 et 620 series

Relais de protection

Outil de configuration on-line



Please select your order code by clicking on the letters:

H B F G DA AH N A A 3 B A A 1 1G

Undo Redo

Copy Paste Clear

Ordering code selection:

- A** Ethernet 100Base FX (LC)
- B** Ethernet 100Base TX (RJ45)
- C** Ethernet 100Base FX (1xLC, 2xRJ45) with HSR/PRP
- D** Ethernet 100Base TX (3xRJ45) with HSR/PRP
- E** Ethernet 100Base FX (2xLC, 1xRJ45) with HSR/PRP
- F** Ethernet 100Base FX (1xLC, 2xRJ45) with HSR/PRP and IEC61850-9-2LE
- G** Ethernet 100Base TX (3xRJ45) with HSR/PRP and IEC61850-9-2LE
- H** Ethernet 100Base FX (2xLC, 1xRJ45) with HSR/PRP and IEC61850-9-2LE
- N** None

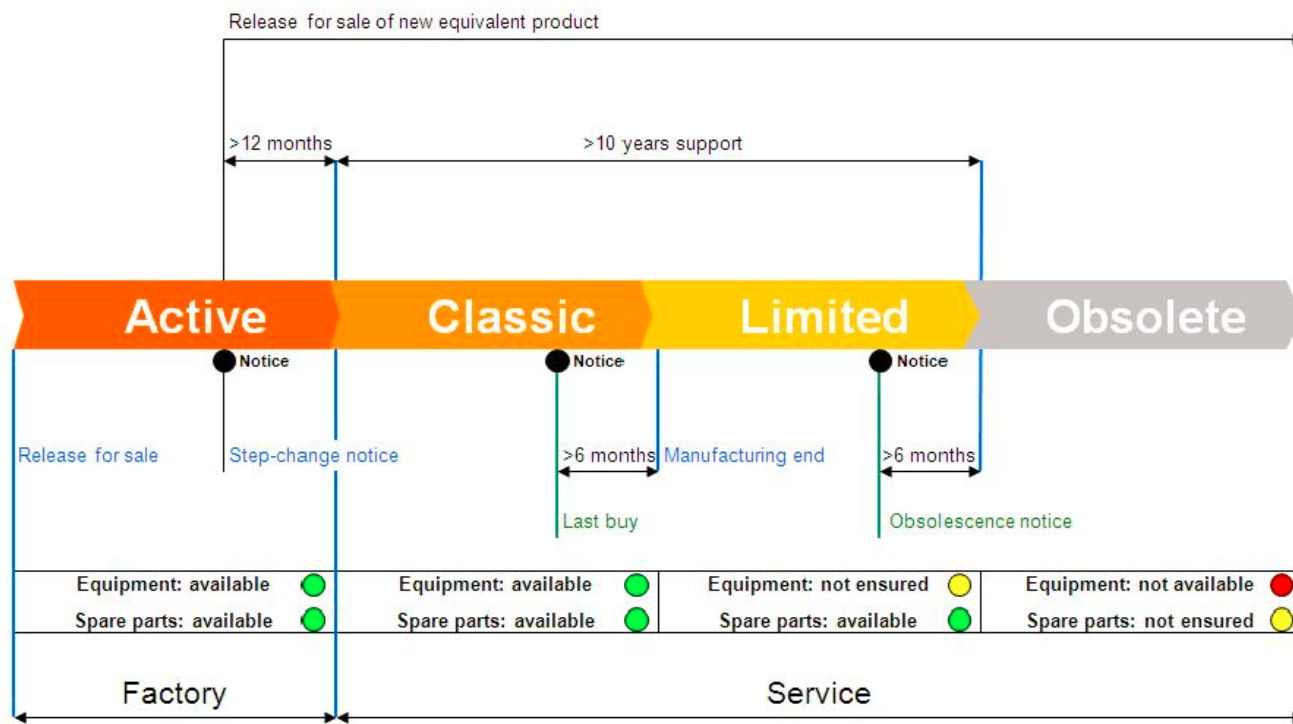
– Communication (Protocol) IEC 61850

- A** IEC 61850
- B** Modbus
- C** IEC 61850+Modbus
- D** IEC 103
- F** DNP 3.0

<https://abbtm.fi.abb.com/PST/Account/LogOn>

Relais de protection

Cycle de vie des relais de protection



Relais de protection

Retrofit

Exemple de retrofit standard



Relay Retrofit Programm

- Concerne: Series SPAM/SPAU/SPAJ/MCX
- Nouveau relais : REF/REU/REM615
- Kit Comprenant :
 - Relais REF615
 - Software de migration MST
 - Boîtier de test RTB615
 - Etiquettes pour câbles
 - Outils de découpage avec emporte-pièces
 - Documentation
 - Formation

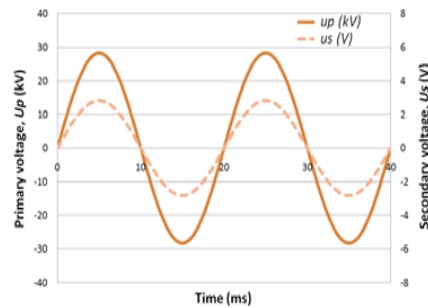
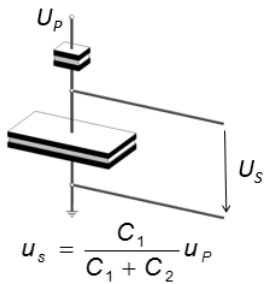
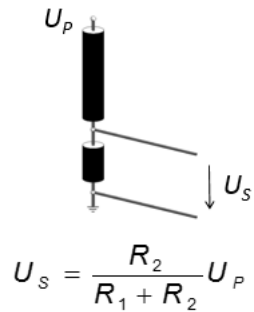


[RRP en vidéo](#)

Senseurs

Senseur de tension

Rogowski



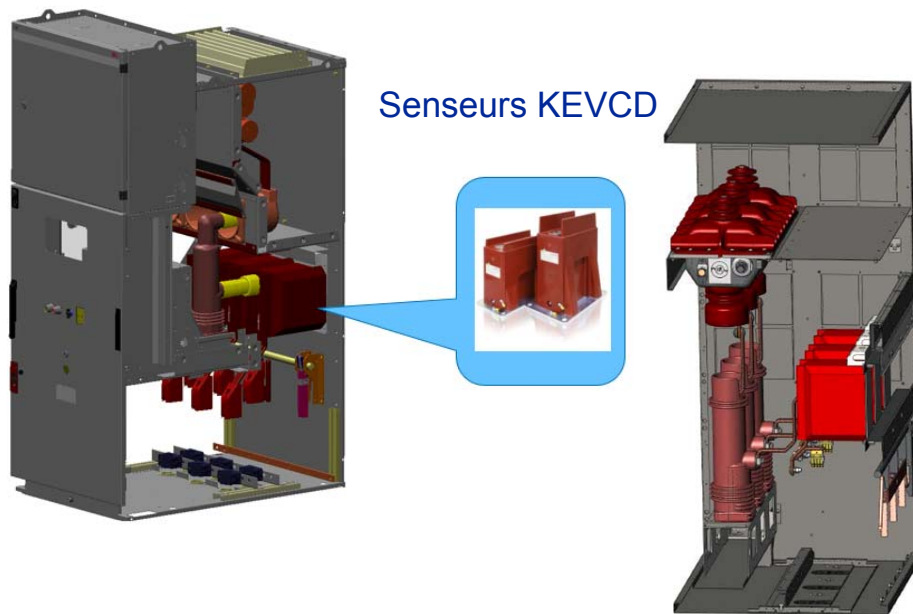
Description

- Senseur de tension résistif
 - $R_1 = 100\text{-}250 \text{ M}\Omega$
 - $R_2 = 10\text{-}25 \text{ k}\Omega$
- Senseur tension capacitif
 - $C_1 = 8\text{-}10 \text{ pF}$
 - $C_2 = 80\text{-}100 \text{ nF}$
- Ratio 1:10 000
- Classe de précision 0.5
- Conforme à la norme IEC 60044-7

Senseurs

Cellules primaires/secondaires isolées à l'air

Exemple avec ZS8.4 et Unisec



Description

- Senseur adaptés
 - Senseur combiné type KEVCD
 - Senseur tension type KEVA
 - Senseur courant anneaux type KECA

Famille KEVA



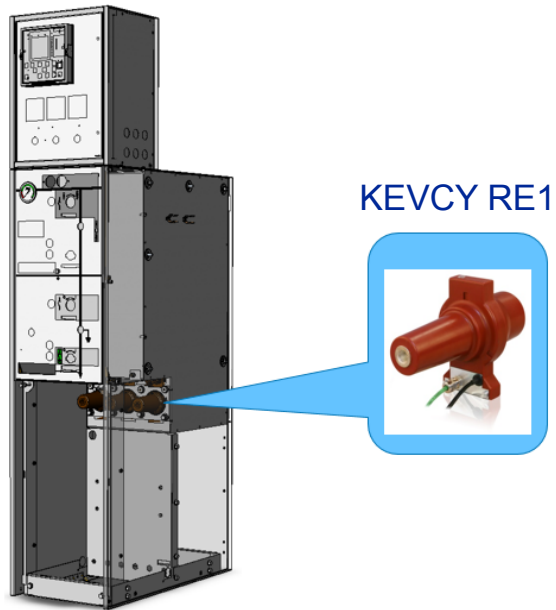
Famille KECA



Senseurs

Cellules secondaires isolées au gaz

Exemple avec SafePlus



Description

- Senseur adaptés
 - Senseur combiné type KEVCD
 - Senseur combiné type KEVCY RE1
 - Senseur tension type KEVA B ou C
 - Senseur courant anneaux type KECA

Famille KEVCD



KEVA B & C



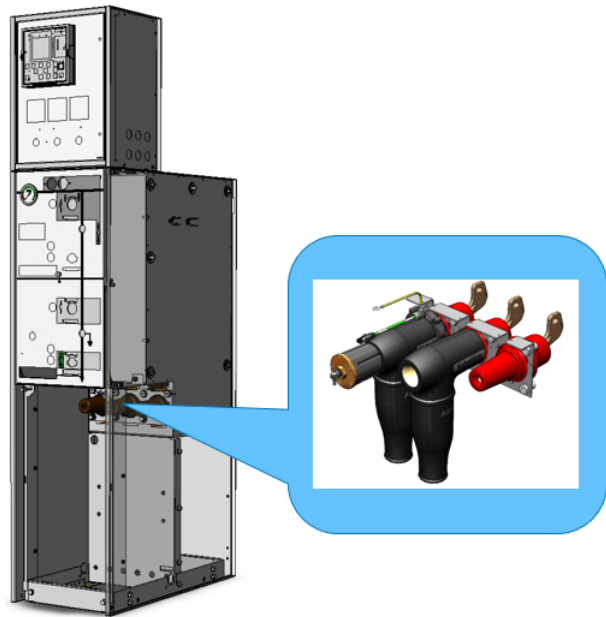
Famille KECA



Senseurs

Cellules secondaires isolées au gaz - Retrofit

Exemple avec SafePlus



Description

- Permet l'ajout de mesures sur une cellule existante
- Montage des senseurs de courant sans démontage des câbles

Famille KEVA



Famille KECA



Senseurs

Cellules secondaires isolées à l'air ou au gaz - Retrofit

Avantages (1/2)

Haut niveau de fiabilité

- Pas de saturation

Haute sécurité

- Bas niveau de tension en sortie (de mV à quelques V)
- Pas de risque de ferrorésonance
- Petit et léger
- Le circuit secondaire peut être laissé ouvert (Courant)
- Le circuit secondaire peut être court-circuité (Tension)

Avantages (2/2)

Disponibilité très rapide

- Produits standardisés
- Un produit couvre un large rang
- Diminution du temps d'ingénierie – Pas de calculation nécessaire

Economie d'échelle

- Commande simplifiée
- Livraison rapide (Disponible en stock)
- Prix inférieurs à ceux des transformateurs de tension/courant conventionnels

Solution écologique

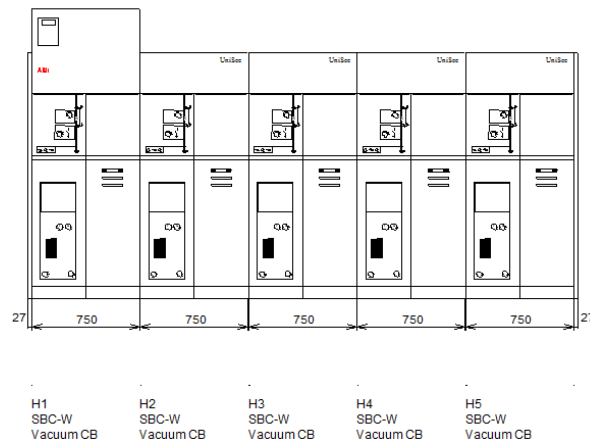
- Faibles pertes de puissance
- Moins de matériaux utilisés

Senseurs

Capitalisation

Exemple

- Unisec, 5 départs disjoncteurs avec TI/TP conventionnels sur chaque départ VS Senseurs



Result

Energy saving calculation for switchgear with 5 panel(s) are calculated for 30 years of service with price of energy 100 EUR/MWh.

Energy cost savings

8 780 EUR

Energy consumption savings

87.8 MWh



This energy consumption equals to continuous operation of standard LED TV for 120.7 year (s).

Equivalent production of CO₂ emission

46.45 t



This CO₂ emission equals to driving mid class European car for 387 083 km.

Paramètre pour exemple:

- Ur = 24kV
- Ik = 25kA/3s bzw. 31.5kA/1s
- Ip = 1A (5A = +30%)
- Is = 300A
- Preis = 100€/MWh

Source: <http://www.abb-unigeardigital.com/Calculator>



Nicola Genazzi – Quartino, 25.05.2016

Ticino Day 2016

Trasformatori di distribuzione e regolazione

Trasformatori di distribuzione e regolazione

Portfolio Traformatori MT

- Trasformatori di distribuzione isolati in olio
 - Con perdite «convenzionali»
 - Con perdite «ULTRA» ridotte
- Trasformatori di distribuzione a secco
 - Con perdite «standard»
 - Con perdite «ULTRA» ridotte
- Eco-direttiva N.548/2014
- Norme DIN EN 50588-1
- Capitalizzazione del costo del trasformatore
- Trasformatori di regolazione isolati in olio
- Trasformatori di regolazione a secco
 - LVR: regolazione sulla BT
 - MVR: regolazione sulla MT

Trasformatori di distribuzione isolati in olio

... con perdite «convenzionali»



Conception selon les normes IEC 60076 et DIN 50588-1

- **Puissance assignée :** 50 – 10'000 kVA
- **Tension primaire :** jusqu'à 36kV
- **Tension secondaire :** < 1kV
- **Matériaux des enroulements :** Cu/Cu ou Al/Al ou mix
- **Liquides d'isolation :**
 - Huile minérale → Standard
 - Huile biodégradable MIDEL → Option
- **Type de cuve :**
 - Hermétique
- **Accessoires standard :**
 - Commutateurs HT **hors charge** (5 positions)
 - Bornes HT embrochables type DIN 47636
 - Bornes BT en porcelaine type DIN 42530
 - Galets de roulement bi-directionnels
 - Thermomètre avec 2 contacts et aiguille traînante
 - Indicateur de niveau d'huile sans contact
 - Soupape de surpression sans contacts
 - Anneau de fixation pour le transport
 - Mise à terre
 - Anneaux de levage
- **Accessoires et options :**
 - Variante double HT
 - Ecran électrostatique entre enroulements HT et BT
 - Enroulement HT à isolation renforcée
 - Variante pour la solution optimisée ORNI
 - Bac de rétention d'huile intégré
 - R.I.S.® Détecteur intégré de sécurité
 - Blocs antivibrations „Vibrastop“ (set)

Trasformatori di distribuzione isolati in olio

... con perdite «ULTRA» ridotte



Conception selon les normes IEC 60076 et DIN 50588-1

- **Puissance assignée :** 50 – 800 kVA
- **Tension primaire :** jusqu'à 36kV
- **Tension secondaire :** < 1kV
- **Matériaux des enroulements :** Cu/Cu ou Al/Al ou mix
- **Liquides d'isolation :**
 - Huile minérale → Standard
 - Huile biodégradable MIDEL → Option
- **Type de cuve :**
 - Hermétique
- **Accessoires standard :**
 - Commutateurs HT **hors charge** (5 positions)
 - Bornes HT embrochables type DIN 47636
 - Bornes BT en porcelaine type DIN 42530
 - Galets de roulement bi-directionnels
 - Thermomètre avec 2 contacts et aiguille traînante
 - Indicateur de niveau d'huile sans contact
 - Soupape de surpression sans contacts
 - Anneau de fixation pour le transport
 - Mise à terre
 - Anneaux de levage
- **Accessoires et options :**
 - Ecran électrostatique entre enroulements HT et BT
 - Enroulement HT à isolation renforcée
 - Variante pour la solution optimisée ORNI
 - Bac de rétention d'huile intégré
 - R.I.S.® Détecteur intégré de sécurité
 - Blocs antivibrations „Vibrastop“ (set)

Trasformatori di distribuzione a secco (VCC) ... con perdite «convenzionali»



Conception selon les normes IEC 60076 et DIN 50588-1

- **Puissance assignée :** 50 – 2500 kVA
- **Tension primaire :** jusqu'à 36kV
- **Tension secondaire :** < 1kV
- **Matériaux des enroulements :** Cu/Cu ou Al/Al ou mix
- **Matériaux d'isolation :**
 - Vacum Cast Resin (Trasformatori in resina inglobati)
- **Accessoires et options :**
 - Prises de régulation de tension, réglable hors tension (en standard 5 niveaux $\pm 2 \times 2,5\%$)
 - Capteur de température (1 par phase), dans l'enroulement HT, installé et câblé sur boîte à bornes
 - 4 roues de transport pour manutention longitudinale et transversale
 - 4 anneaux de levage
 - 2 connexions de terre
 - 1 plaque signalétique
 - 3 terminaisons BT en aluminium pour raccordement par le dessus
 - 4 barres de raccordement en aluminium pour raccordement par le dessus
 - Protection IP21-IP54

Trasformatori di distribuzione a secco

... con perdite «ULTRA» ridotte



Conception selon les normes IEC 60076 et DIN 50588-1

- **Puissance assignée :** 50 – 5'000 kVA
- **Tension primaire :** jusqu'à 36kV
- **Tension secondaire :** < 1kV
- **Matériaux des enroulements :** Cu/Cu ou Al/Al ou mix
- **Matériaux isolant :** En couches de résine
- **Type de cuve :**
 - Hermétique
- **Accessoires standard :**
 - Prises de régulation de tension, réglable hors tension (en standard 5 niveaux $\pm 2 \times 2,5\%$)
 - Capteur de température (1 par phase), dans l'enroulement HT, installé et câblé sur boîte à bornes
 - 4 roues de transport pour manutention longitudinale et transversale
 - 4 anneaux de levage
 - 2 connexions de terre
 - 1 plaque signalétique
 - 3 terminaisons BT en aluminium pour raccordement par le dessus
 - 4 barres de raccordement en aluminium pour raccordement par le dessus
 - Protection IP21-IPX4D

Trasformatori di distribuzione e regolazione

Eco-direttiva N.548/2014

Pertes maximales en charge et hors charge (en W) pour transformateurs de distribution immergés triphasés avec enroulements avec BT Um ≤ 24 kV et avec HT Um ≤ 1.1kV

Puissance assignée (kVA)	Etape 1 (à partir de Juillet 2015)		Etape 2 (à partir de Juillet 2021)	
	Pertes en charge max. Pk (W)*	Perte hors charge max. Po (W)*	Pertes en charge max. Pk (W)*	Perte hors charge max. Po (W)*
≤25	Ck (900)	Ao(70)	Ak(600)	Ao-10%(63)
50	Ck (1100)	Ao(90)	Ak(750)	Ao-10%(81)
100	Ck (1750)	Ao(145)	Ak(1250)	Ao-10%(130)
160	Ck (2350)	Ao(210)	Ak(1750)	Ao-10%(189)
250	Ck (3250)	Ao(300)	Ak(2350)	Ao-10%(270)
315	Ck (3900)	Ao(360)	Ak(2800)	Ao-10%(324)
400	Ck (4600)	Ao(430)	Ak(3250)	Ao-10%(387)
500	Ck (5500)	Ao(510)	Ak(3900)	Ao-10%(459)
630	Ck (6500)	Ao(600)	Ak(4600)	Ao-10%(540)
800	Ck (8400)	Ao(650)	Ak(6000)	Ao-10%(585)
1000	Ck (10500)	Ao(770)	Ak(7600)	Ao-10%(693)
1250	Bk (11000)	Ao(950)	Ak(9500)	Ao-10%(855)
1600	Bk(14000)	Ao(1200)	Ak(12000)	Ao-10%(1080)
2000	Bk (18000)	Ao(1450)	Ak(15000)	Ao-10%(1305)
2500	Bk (22000)	Ao(1750)	Ak(18500)	Ao-10%(1575)
3150	Bk (27500)	Ao(2200)	Ak(23000)	Ao-10%(1980)

Etude de marché BFE	Lien: Marktstudie zu Bestand und energetischem Verbesserungs-Potential der installierten Verteiltransformatoren in der Schweiz
Eco-directive	Lien: VERORDNUNG (EU) Nr. 548/2014
ABB	Lien: New efficiency standards for EU

Puissance assignée (kVA)	Etape 1 (à partir de Juillet 2015)	Etape 2 (à partir de Juillet 2021)
	Peak Efficiency Index (PEI) minimum (%)	
80000	99.723	99.758
≥100000	99.737	99.770

Etude de marché BFE	Lien: Marktstudie zu Bestand und energetischem Verbesserungs-Potential der installierten Verteiltransformatoren in der Schweiz
Eco-Directive	Lien: VERORDNUNG (EU) Nr. 548/2014
ABB	Lien: New efficiency standards for EU

Le PEI est une mesure qui caractérise l'efficacité énergétique des transformateurs de puissance.

Le PEI considère la **puissance nominale**, les **pertes** et la **puissance transmise**.

Calcul du PEI :

$$PEI = 1 - \frac{2(P_0 + P_{c0})}{S_r \sqrt{\frac{P_0 + P_{c0}}{P_k}}}$$

Trasformatori di distribuzione e regolazione

Norma DIN EN 50588-1 – Classe di perdite

Tabelle 2 – Leerlaufverluste und Schallleistungspegel für flüssigkeitsgefüllte Transformatoren (P_o)

S_r kVA	AAAO W	L_{Wa} dB(A)	AAO W	L_{Wa} dB(A)	Ao W	L_{Wa} dB(A)
≤ 25	35	48	63	36	70	37
50	45	50	81	38	90	39
100	75	52	130	40	145	41
160	105	55	189	43	210	44
250	150	58	270	46	300	47
315	180	60	324	48	360	49
400	220	61	387	49	430	50
500	260	62	459	50	510	51
630	300	63	540	51	600	52
800	330	64	585	52	650	53
1000	390	66	693	54	770	55
1250	480	67	855	55	950	56
1600	600	69	1080	57	1200	58
2000	730	71	1305	59	1450	60
2500	880	74	1575	62	1750	63
3150	1100	76	1980	63	2200	64

Tabelle 3 – Kurzschlussverluste (P_k) und Kurzschlussimpedanz für flüssigkeitsgefüllte Transformatoren

S_r kVA	A_k W	B_k W	C_k W	Kurzschlussimpedanz %
≤ 25	600	725	900	4
50	750	875	1100	4
100	1250	1475	1750	4
160	1750	2000	2350	4
250	2350	2750	3250	4
315	2800	3250	3900	4
400	3250	3850	4600	4
500	3900	4600	5500	4
630	4600	5400	6500	4 oder 6
800	6000	7000	8400	6
1000	7600	9000	10500	6
1250	9500	11000		6
1600	12000	14000		6
2000	15000	18000		6
2500	18500	22000		6
3150	23000	27500		6

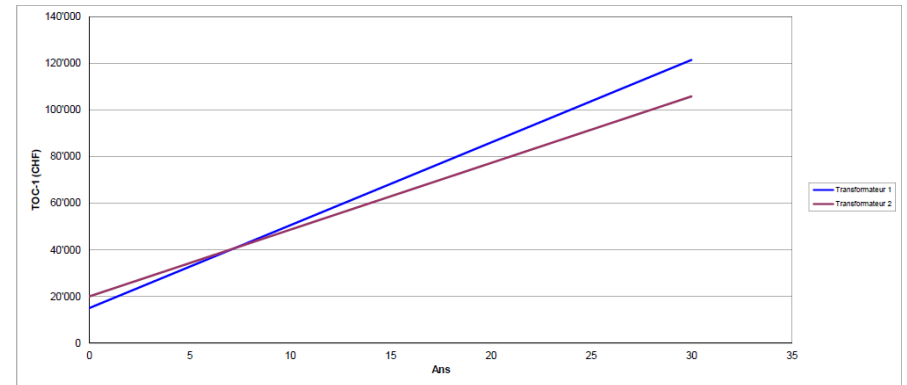
Trasformatori di distribuzione e regolazione

Capitalizzazione del costo del trasformatore

Petit outil pour le calcul des pertes capitalisées des transformateurs

Power and productivity
for a better world™ **ABB**

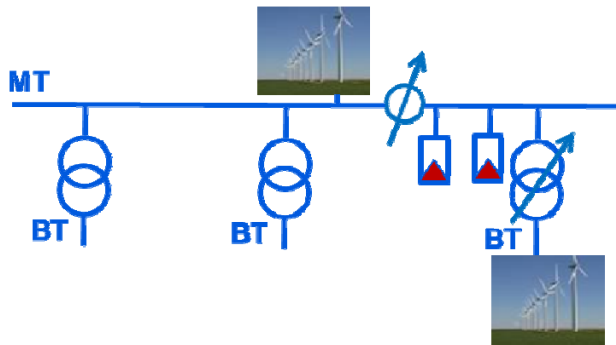
TOC = Total Ownership Cost / Coût total de la propriété (ou encore: Coût de la durée de vie) TOC = TOC1 + TOC2 (CHF) (note: CHF ou toute autre devise)	Transformateur 1	Transformateur 2
Formule TOC classique: TOC1 = CT + A * P0 + B * PL (CHF) CT = Prix du transformateur (achat) (CHF) A = Facteur A: facteur de capitalisation pour les pertes à vide (CHF/W), resp. VAN (Valeur Actualisée Nette) des pertes à vide P0 = Pertes à vide (W) B = Facteur B: cfacteur de capitalisation pour les pertes en charge (CHF/W), resp. VAN des pertes en charge PL = Pertes en charge (W)	TOC1= 121'451 CHF	TOC1= 105'847 CHF
Calcul des valeurs A et B: $A = (12 * C_d + 8760 * C_e) * F_e$ Cd = Coût mensuel de l'énergie de pointe (CHF/kW/mois) Ce = Coût de l'énergie (CHF/kWh) Fe = Facteur de capitalisation $B = C_e * h * (S_L / S_r)^2 * F_e$ h = Utilisation annuelle (heures) SL = Puissance maximum/moyenne de la charge (kVA) Sr = Puissance nominale du transformateur (kVA) $F_e = \frac{(1+i)^n - 1}{i * (1+i)^n}$ i = Discount/taux d'intérêt (%) n = Nombre d'années prises en compte	Ecrire seulement dans les cases jaunes TOC1= 121'451 CHF CT= 15'000 CHF A= 22.89 CHF/W P0 900 W B= 5.72 CHF/W PL 15'000 W	Ecrire seulement dans les cases jaunes TOC1= 105'847 CHF CT= 20'000 CHF A= 22.89 CHF/W P0 750 W B= 5.72 CHF/W PL 12'000 W
	Ecrire seulement dans les cases jaunes A= 22.89 CHF/W Cd= 0.0 CHF/kW/mois Ce= 0.170 CHF/kWh B= 5.72 CHF/W h= 8760 heures (max. 8760 h/année) SL= 400 kVA Sr= 800 kVA Fe= 15.37 i= 5.0% n= 30.0 années	Ecrire seulement dans les cases jaunes A= 22.89 CHF/W Cd= 0.0 CHF/kW/mois Ce= 0.170 CHF/kWh B= 5.72 CHF/W h= 8760.0 heures (max. 8760 h/année) SL= 400 kVA Sr= 800 kVA Fe= 15.37 i= 5.0% n= 30.0 années



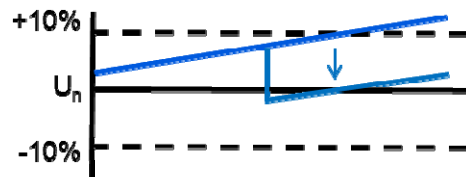
Trasformatori di regolazione

Problematica dovuta ai produttori decentralizzati

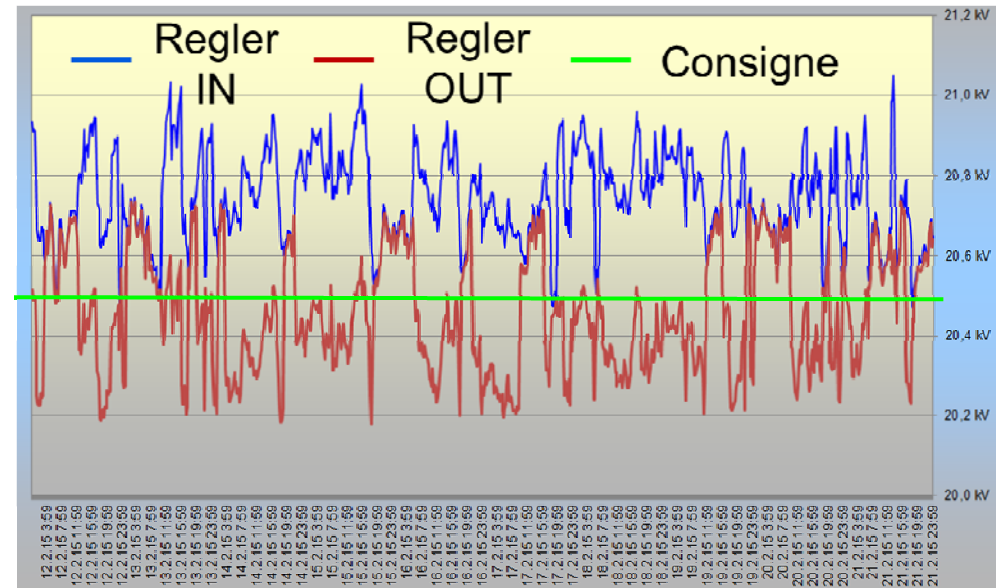
Problema



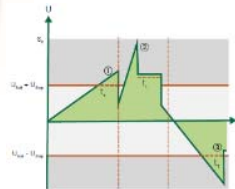
Conseguenza



Soluzione



Trasformatori di regolazione isolati in olio Smart-R



① Wird die Spannung U_{LH} für die Ebene von 1, um mindestens die Stufenweite U_{LH} überschritten, wird die Spannung durch eine Schaltung wieder in den Regelbereich gebracht.
② Wird die Stufenhochschaltspannung U_{LH} überschritten, werden sofort Hochschaltungen vorgenommen, bis die Spannung wieder unter U_{LH} liegt.
③ Wenn die Hochschaltspannung U_{LH} für die Ebene von 1, um mindestens die Stufenweite überschritten, wird die Spannung durch eine Schaltung wieder in den Regelbereich gebracht.

Conception selon les normes IEC 60076 et DIN 50588-1

- **Puissance assignée :** 50 – 800 kVA
- **Tension primaire :** jusqu'à 36kV
- **Tension secondaire :** < 1kV
- **Matériaux des enroulements :** Cu/Cu ou Al/Al ou mix
- **Liquides d'isolation :**
 - Huile minérale → Standard
 - Huile biodégradable MDEL → Option
- **Type de cuve :**
 - Hermétique
- **Accessoires standard :**
 - Commutateurs HT en charge à 5, 7 ou 9 positions
 - Bornes HT embrochables type DIN 47636
 - Bornes BT en porcelaine type DIN 42530
 - Galets de roulement bi-directionnels
 - Thermomètre avec 2 contacts et aiguille traînante
 - Indicateur de niveau d'huile sans contact
 - Soupape de surpression sans contacts
 - Anneau de fixation pour le transport
 - Mise à terre
 - Anneaux de levage
- **Accessoires et options :**
 - Variante double HT
 - Ecran électrostatique entre enroulements HT et BT
 - Enroulement HT à isolation renforcée
 - Variante pour la solution optimisée ORNI
 - Bac de rétention d'huile intégré
 - R.I.S.® Détecteur intégré de sécurité
 - Blocs antivibrations „Vibrastop“ (set)

Trasformatori di regolazione isolati in olio

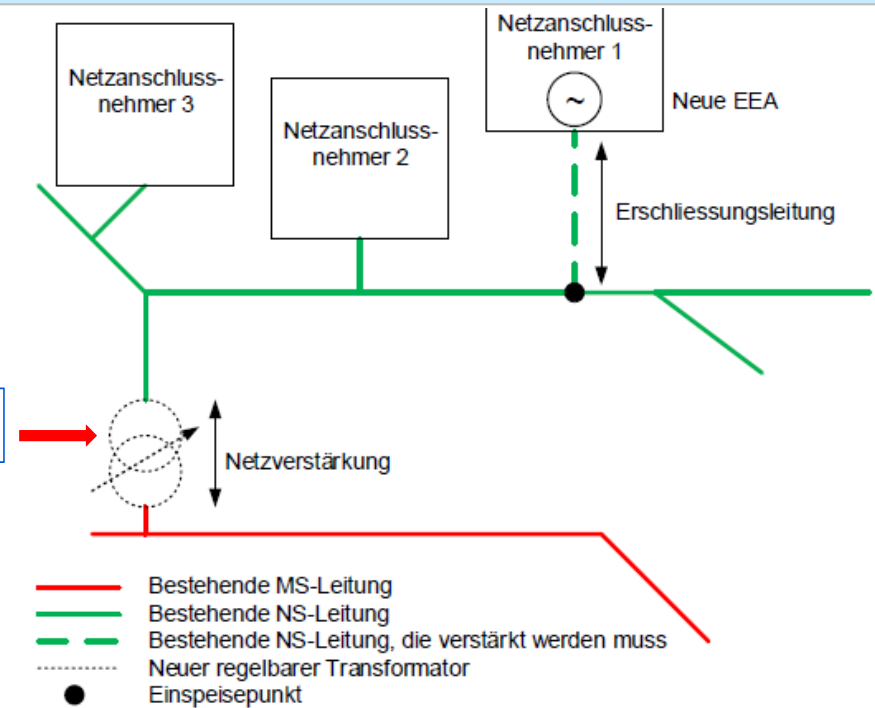
Smart-R → Finanziamento tramite ELCOM



Smart-R



Smart-R

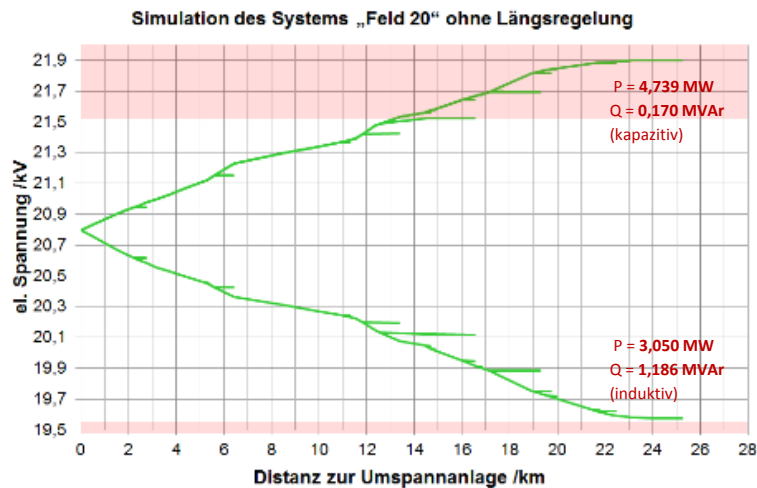


Beispiel 2b: Die neue EEA erfordert keine Verstärkung der NS-Leitung, für die Einhaltung der technischen Vorgaben genügt ein regelbarer Transformator. Die Verstärkung der Erschliessungsleitung bis zum Einspeisepunkt ist durch den Produzenten zu tragen. Der neue regelbare Transformator gilt als notwendige Netzverstärkung gemäss Artikel 22 Absatz 3 StromVV.

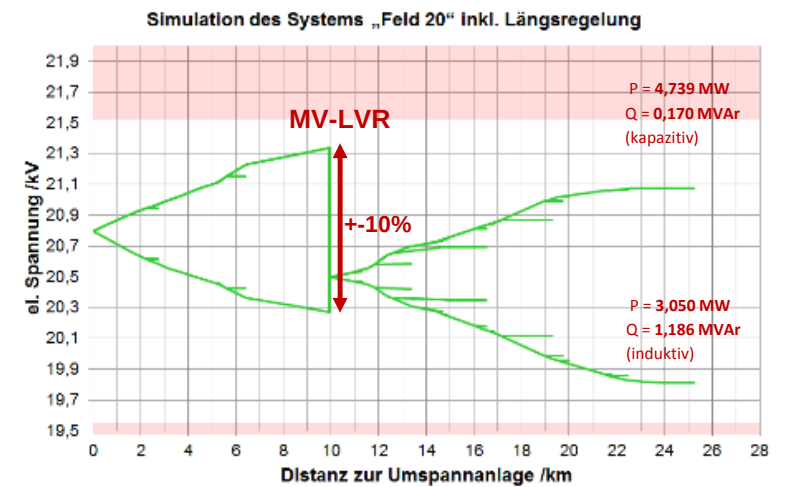
Trasformatori di regolazione secchi

Principio della regolazione della tensione

Senza regolazione

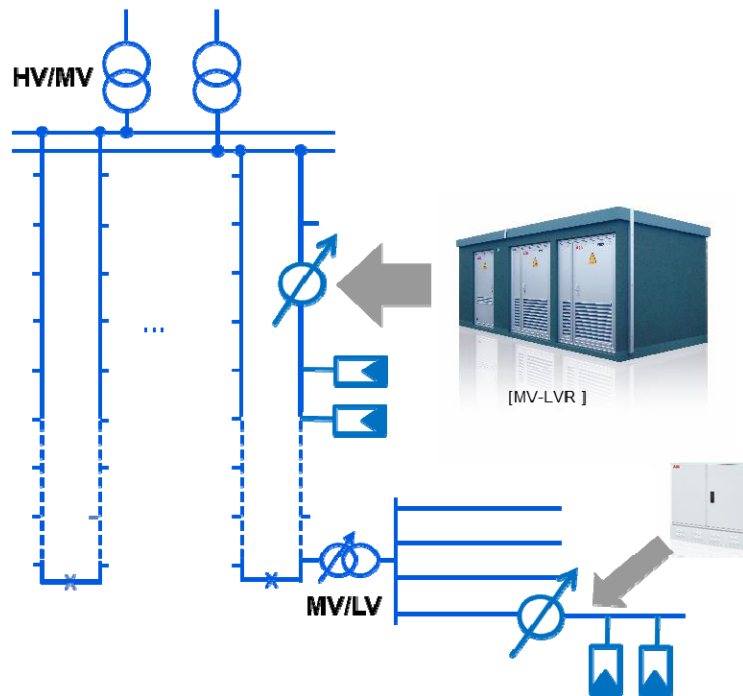


Con regolazione MV-LVR



Trasformatori di regolazione secchi

Principio della regolazione della tensione



Estensione/modifica di una rete MT e BT con una produzione decentralizzata:

- Il livello di tensione varia dalla lunghezza della linea
- L'estensione o modifica di una rete convenzionale è complicata, lunga e molto costosa
- I trasformatori MV-LVR et LV-LVR permettono una regolazione della tensione senza estensione/modifica della rete esistente

Trasformatori di regolazione secchi MV-LVR – Regolazione sulla MT

- **Potenza** – Fino a 8 MVA con reg. $\pm 10\%$ o 14 MVA con reg. $\pm 6\%$
- **Tensione** – Fino a 24 kV
- **Regolazione in carica** – Regolazione automatica
 - Tipica con 11 gradini di regolazione $\rightarrow \pm 5 \times 2\%$
 - Celle MT integrate
 - Regolazione bidirezionale
- **Efficienza energetica** – molto alta a tutti i livelli $\rightarrow >99,75\%$
- **Funzionamento della regolazione**
 - Sorveglianza a distanza e connesso alla supervisione grazie ad un modulo di comando RTU
 - Controllo del flusso della corrente e dei valori di tensione
 - Protocollo di comunicazione IEC 60870-5-101, 60870-5-104, 61850.



[ABB RTU 540]



[ABB Brilon, Mittelspannungslängsregler 20 kV / 8 MVA]

P [MVA]	2	4	6	8
Pertes [kW]	2,87	4,64	8,73	13,86
η [%]	99,86	99,88	99,85	99,83

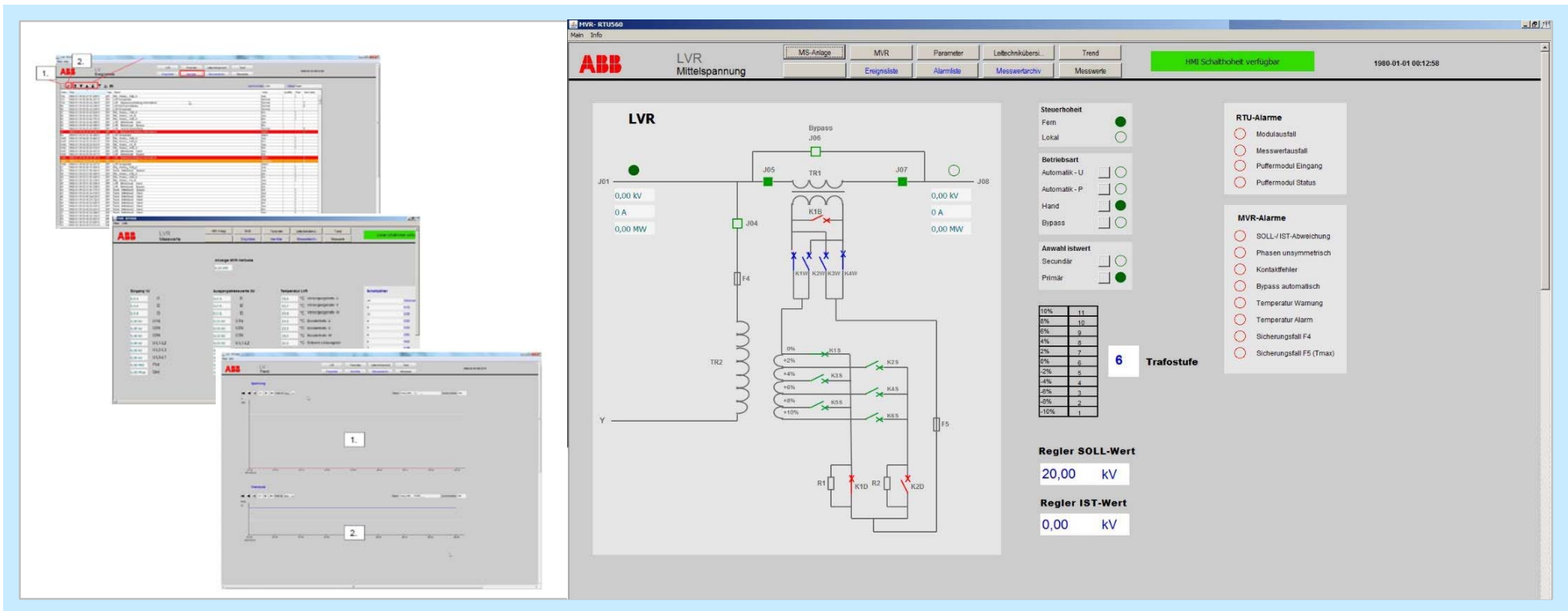
[gemessene Werte bei 6% Spannungsanpassung]

Trasformatori di regolazione secchi

Supervision della RTU (online)



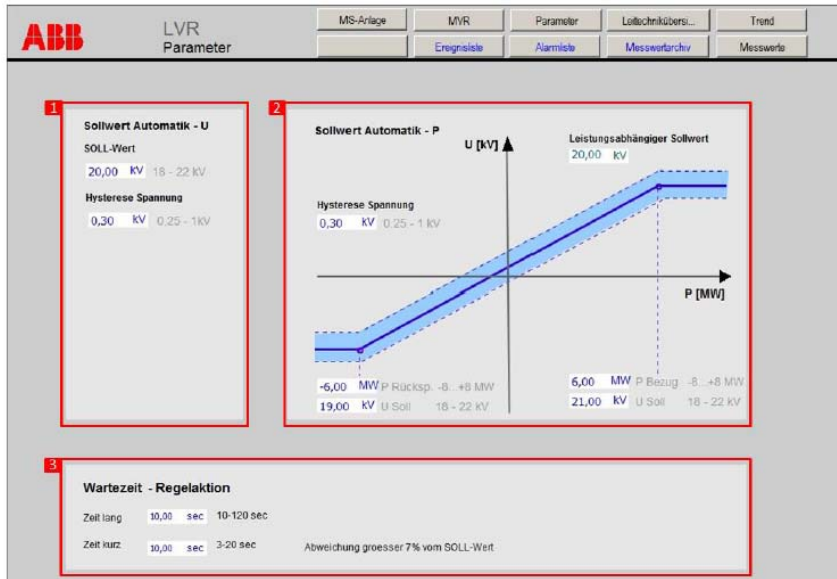
[ABB RTU 540]



Trasformatori di regolazione secchi

MV-LVR – Regolazione sulla MT

Funzionamento automatico con la isterisi



Dati per fare la simulazione con NEPLAN

Parameter

Name: MV-LVR

Typ:

☒ 3-Phasen-Transformator ☐ 3 x 1-Phasen-Transformator

Un1 .. kV: 20 Un2 .. kV: 20 Sr .. MVA: 8

Ur1 .. kV: 20 Ur2 .. kV: 20

URr(1) .. %: 0 kW: 0 URr(0) .. %: 0 kW: 0

Ukr(1) .. %: 0,01 Ukr(0) .. %: 0

X(1)/R(1): 0 X(0)/R(0): 0

I0 .. %: 0 U01(0) .. %: 0 LMUNS .. pu: 0

P fe .. kW: 0 U02(0) .. %: 0 LMSAT .. pu: 0

KP .. pu: 0

phiresA .. pu: 0

phiresB .. pu: 0

phiresC .. pu: 0

☒ hat geregelten Stufensteller (IEC 60909)

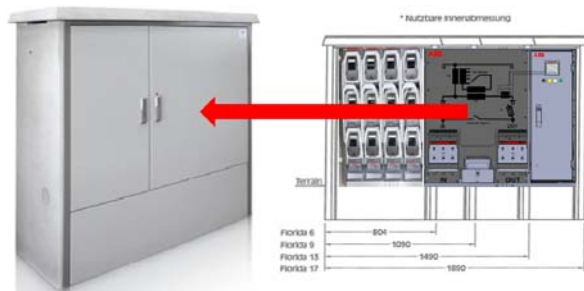
☒ Geregelt

☐ Schaltbar

☐ Autotransformator

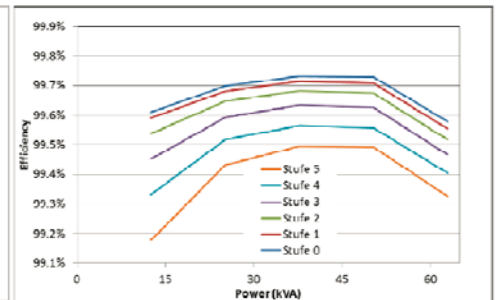
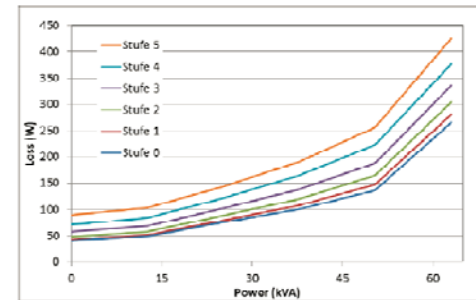
Trasformatori di regolazione secchi LV-LVR – Regolazione sulla BT

- **Potenze** - 63 kVA, 125 kVA & 250 kVA
- **Tensione** – 0,4 kV
- **Regolazione** – Regolatore in carica automatica
 - 11 gradini di regolazione (es. $\pm 5 \times 1,2\%$).
- **Efficienza energetica** – Rendimento $> 99,5\%$
- **Regolazione e controllo** – Locale o a distanza
- **Soluzione**
 - Cabina in beton
 - Cabina in poliestere



Typ	Ur1 kV	Ir A	ukr %	uRr %	Stufe min L1	Stufe max L1	Delta U L1 %
LV-LVR 125kVA	0,4	180,42	0,31	0,22	1	11	1,2
LV-LVR 250kVA	0,4	360,8	0,33	0,27	1	11	1,2
LV-LVR 63kVA	0,4	90,9	0,13	0,094	1	11	1,2

Rating LVR	63 kVA		125 kVA		250 kVA	
Type	feeder	booster	feeder	booster	feeder	booster
NLL (W)	40	51	60	70,6	98,2	113
LL (W); @115°C	110	126	174	207	316	285
Impedance	2,81%	3,18%	2,49%	2,70%	2,64%	2,80%





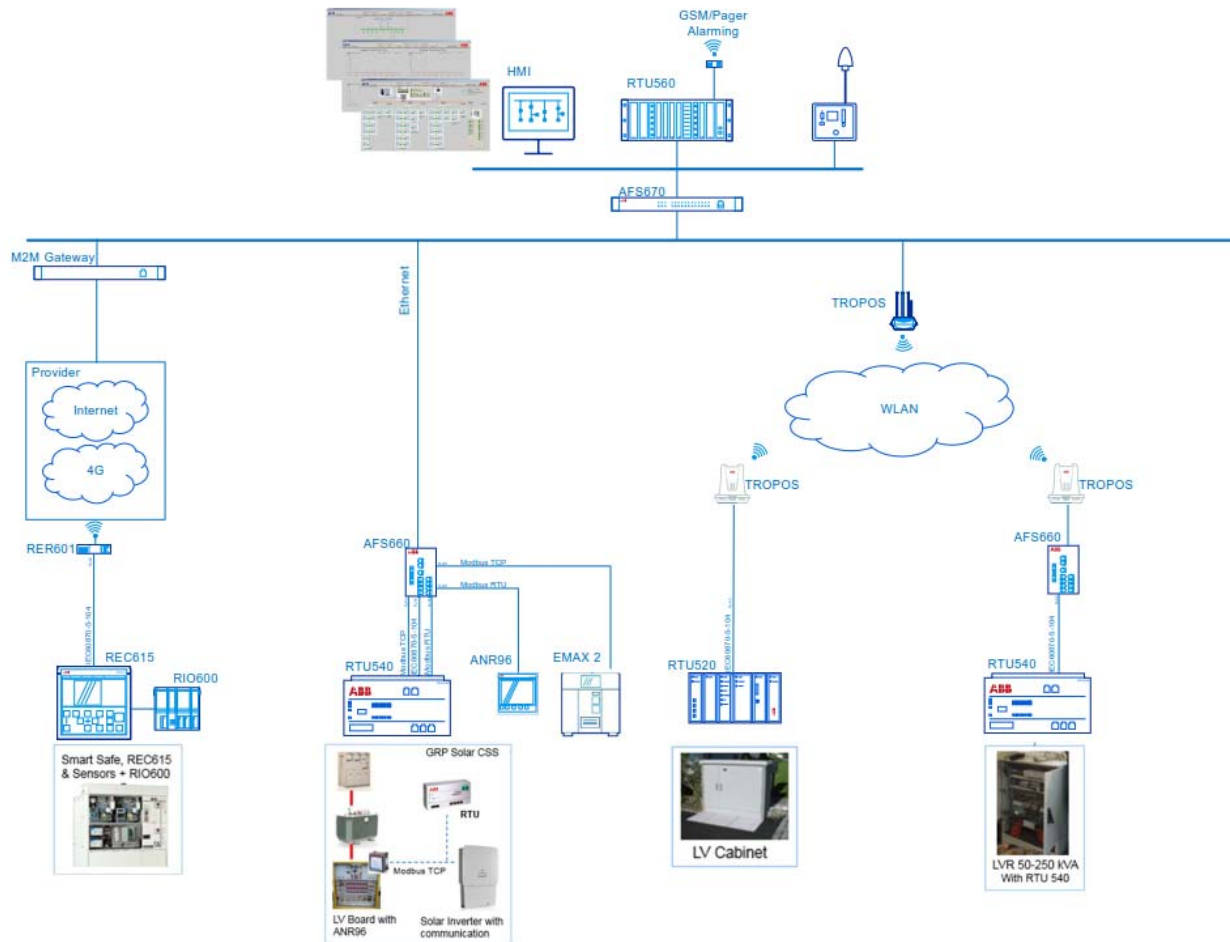
Simon Joliat – Quartino, 25.05.2016

Ticino Day 2016

Automatizzazione delle reti MT

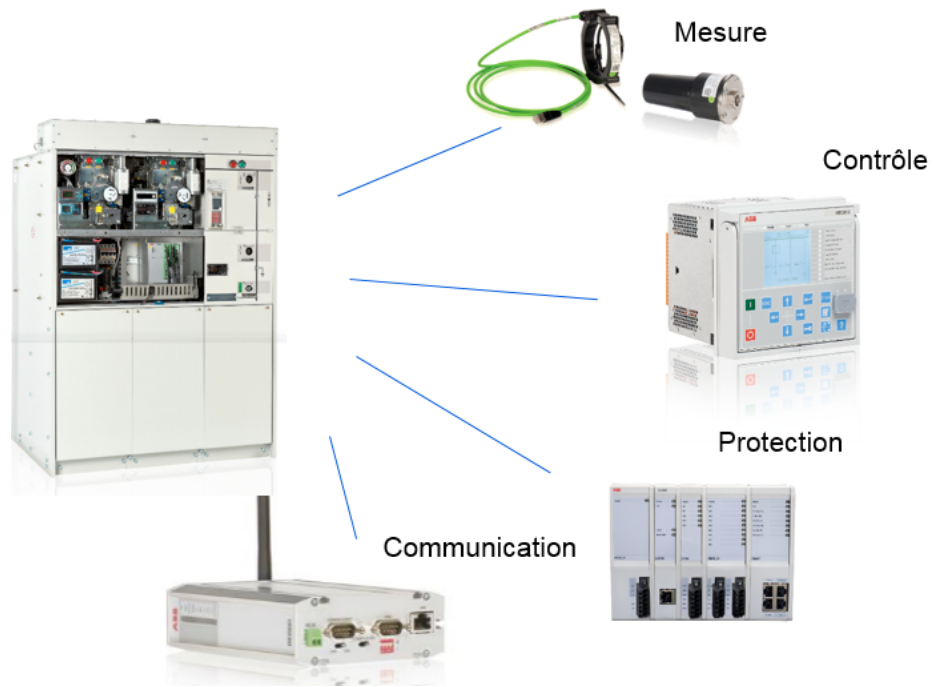
Automatisation des réseaux MT

Passerelles et communications à distance



Automatisation des réseaux MT

Les différents composants



Automatisation des réseaux MT

REC615 Série – Relais de contrôle et protection

Relion® 615 Serie

REF615
RED615
REM615
RET615
REU615
REC615
REV615



Fonctions de contrôle:

- **11 éléments contrôlables (1x disjoncteur)**
- Ré-enclenchement automatique
- Syncrocheck
- Verrouillage

Fonctions de protection:

- **Surintensité directionnelle**
- **Défaut de terre directionnel**
- Protection de la fréquence
- Protection contre les surtensions et mesures
- Protection contre les arcs avec 3 capteurs (Option)
- **Entrée pour senseur (RJ45)**

Protocole de Communication:

- IEC 61850 et Modbus®
- IEC 61850 et DNP3
- IEC 61850 et IEC 60870-5-103
- **IEC 60870-5-101/104**
- **GOOSE (IEC 61850)**
- Communication redondante (en Option)

Automatisation des réseaux MT

RIO600 - Produit modulaire

Un produit "A la carte"



- Module d'alimentation
- Module de communication
- Module entrée/sortie binaire
- **Module entrée Senseurs**
- Module d'entrée mesure mA
- Module Smart (entrées/sorties de puissance)

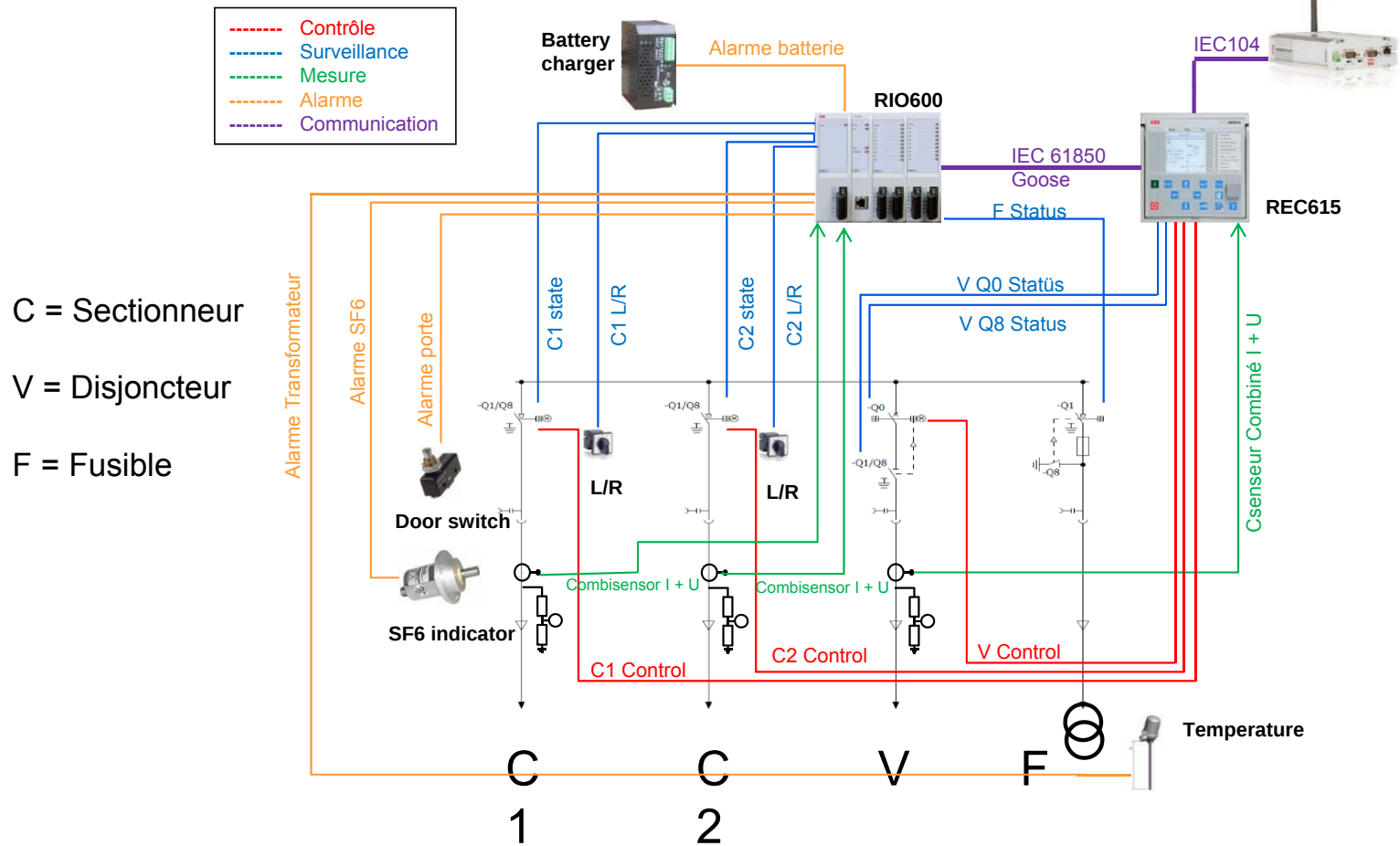
Le module de senseurs en quelques points



- Mesures des puissances: P, Q, S et $\cos \phi$
- Compteur d'énergie active et réactive
- **Détection de défauts directionnels et non-directionnels de court-circuit et de terre**
- Détection des perturbations harmoniques (THD, TDD) jusqu'à la 8ème harmonique

Automatisation des réseaux MT

Smart Safe - CCVF



Automatisation des réseaux MT

Smart Safe – Solution intégrée

Vue extérieure



Intégration



Automatisation des réseaux MT

Smart Safe – Solution externe

Vue extérieure



Intégration



Senseurs

Communication à distance

Tropos

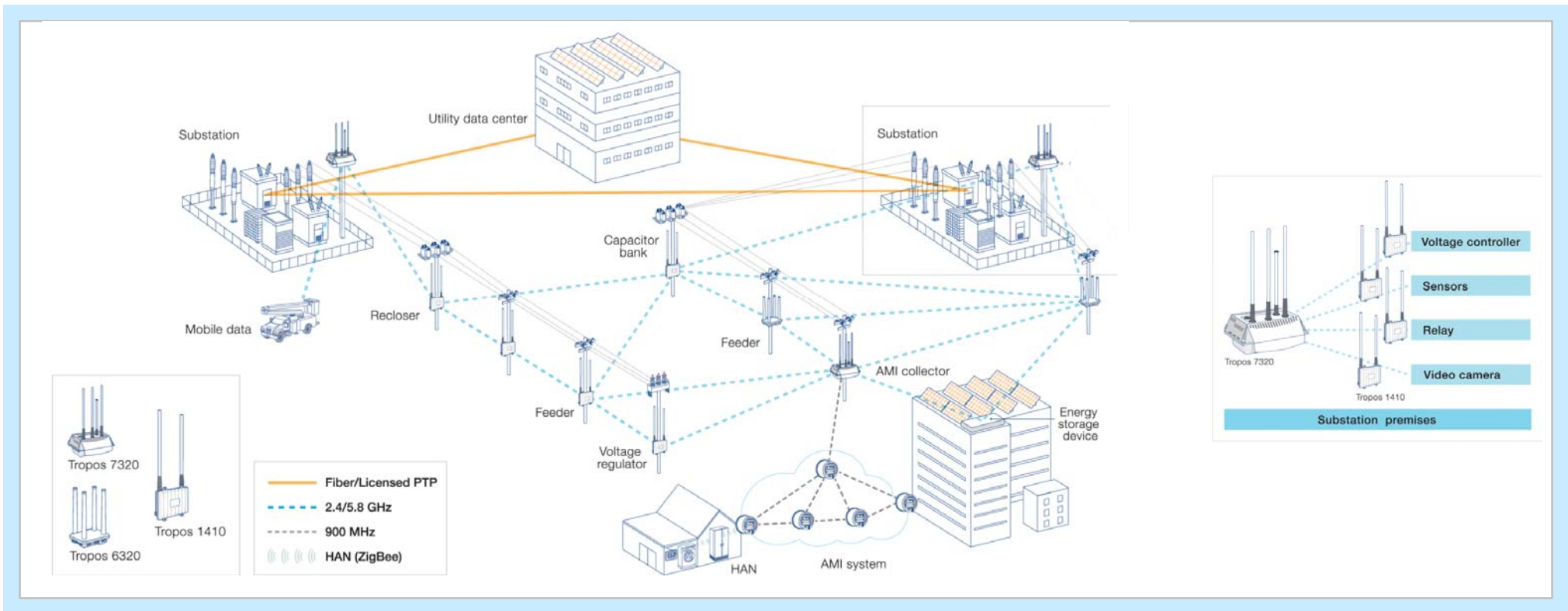


Description

- Portée jusqu'à 1.5km
- Protocol Wifi Standard
- Haute performance
- Fiabilité >99.999%
- Design résistant aux fortes conditions
- Cyber sécurité intégrée avec VPN et Pare-feu

Automatisation des réseaux MT

Communication à distance



Senseurs

Communication à distance

Routeur GPRS, 3G, LTE

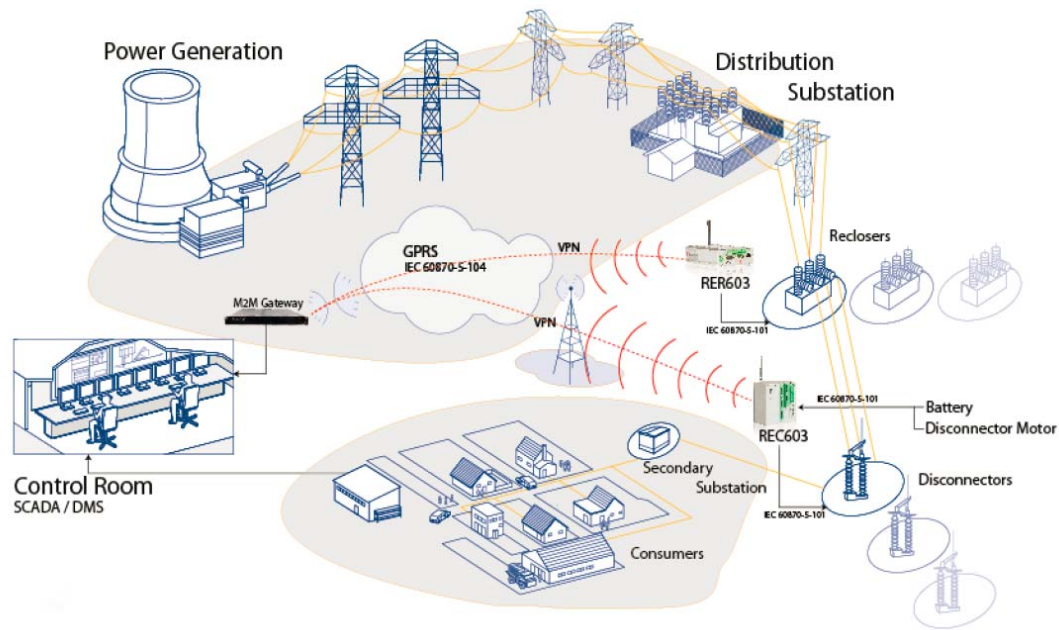


Description

- Communication GPRS, 3G ou LTE (4G)
- HMI avec indications LED et outil Web HMI
- Options:
 - Convertisseur de protocoles
 - Modbus RTU vers Modbus TCP
 - IEC101 vers IEC104
 - Entrées/sorties intégrées (8 BI und 2 BO)

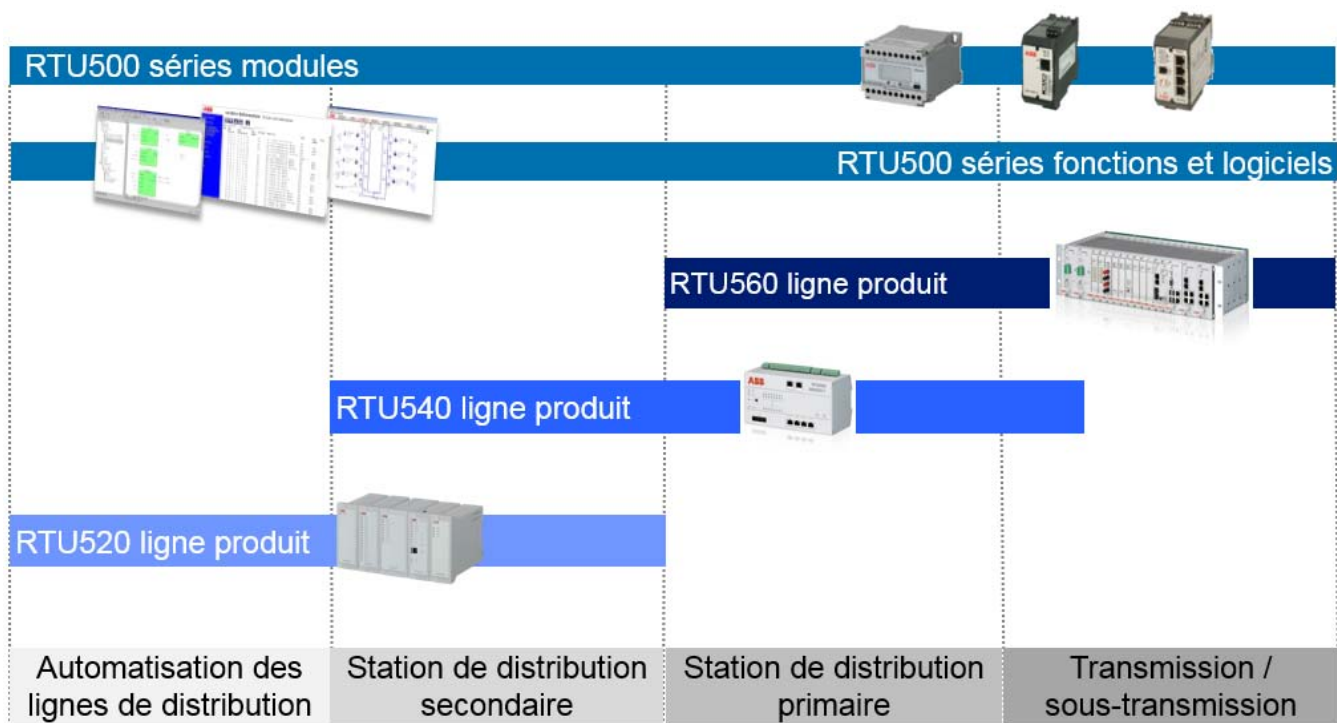
Automatisation des réseaux MT

Communication à distance



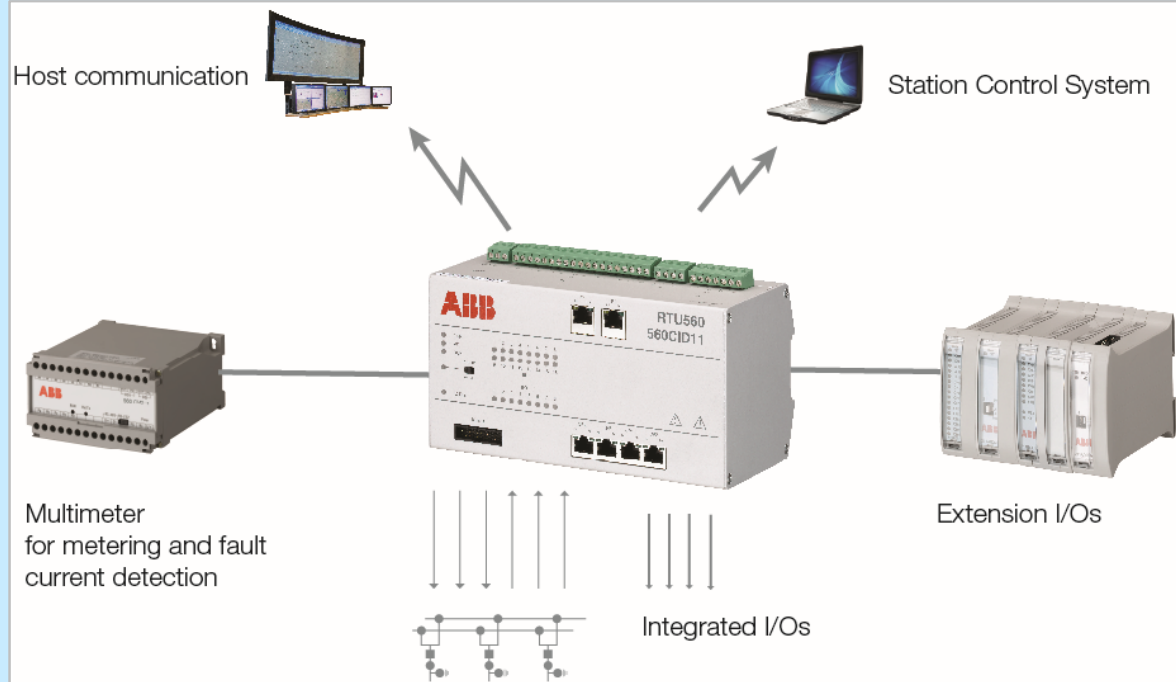
Automatisation des réseaux MT

Passerelles RTU



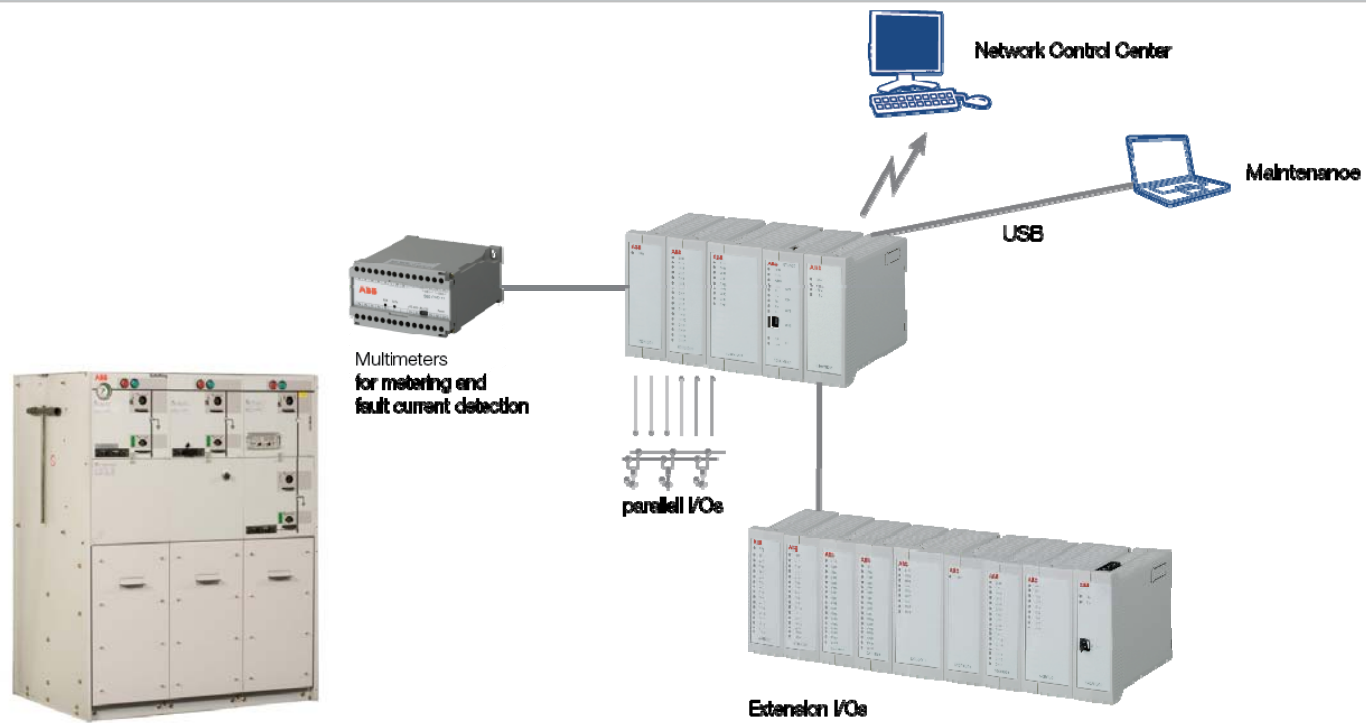
Automatisation des réseaux MT

Passerelles – RTU540



Automatisation des réseaux MT

Passerelles – RTU520

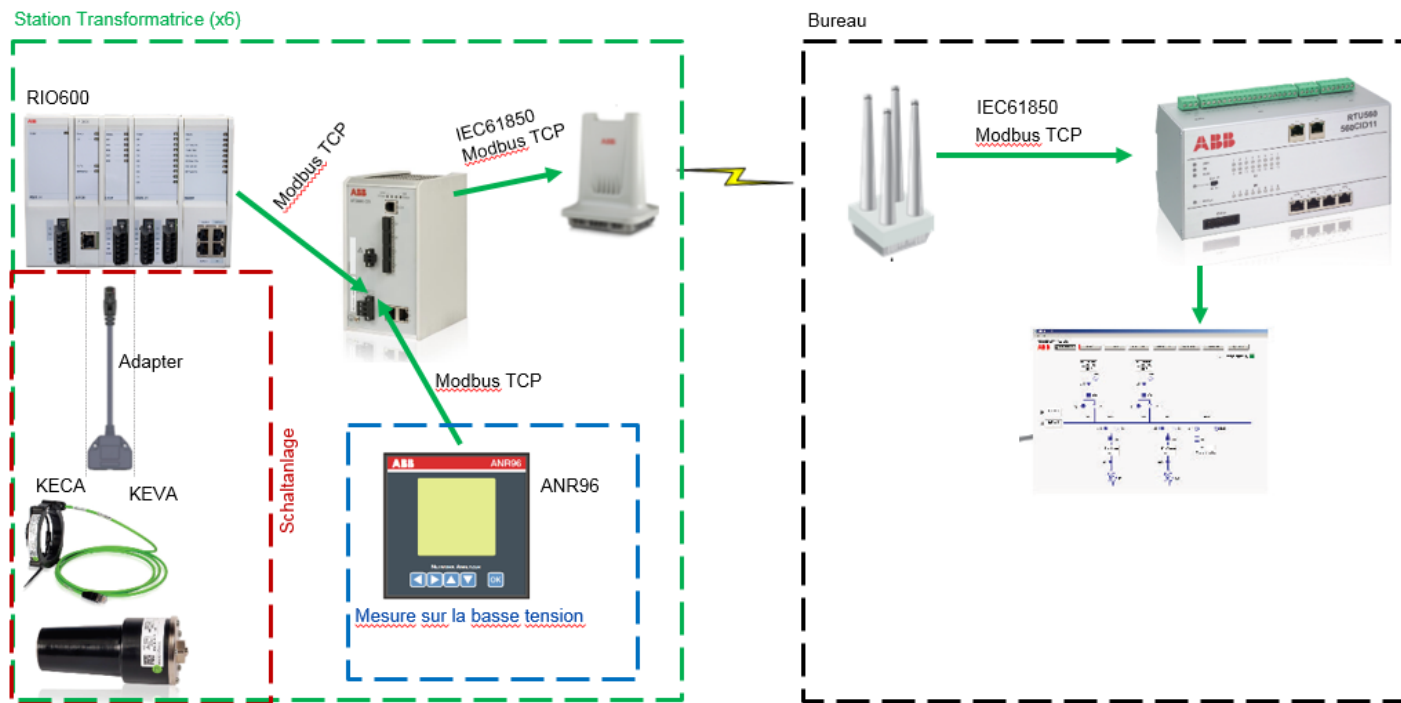


Exemple d'automatisation d'un réseau existant



Automatisation des réseaux MT

Exemple d'automatisation d'un réseau existant – RTU540 HMI



Automatisation des réseaux MT

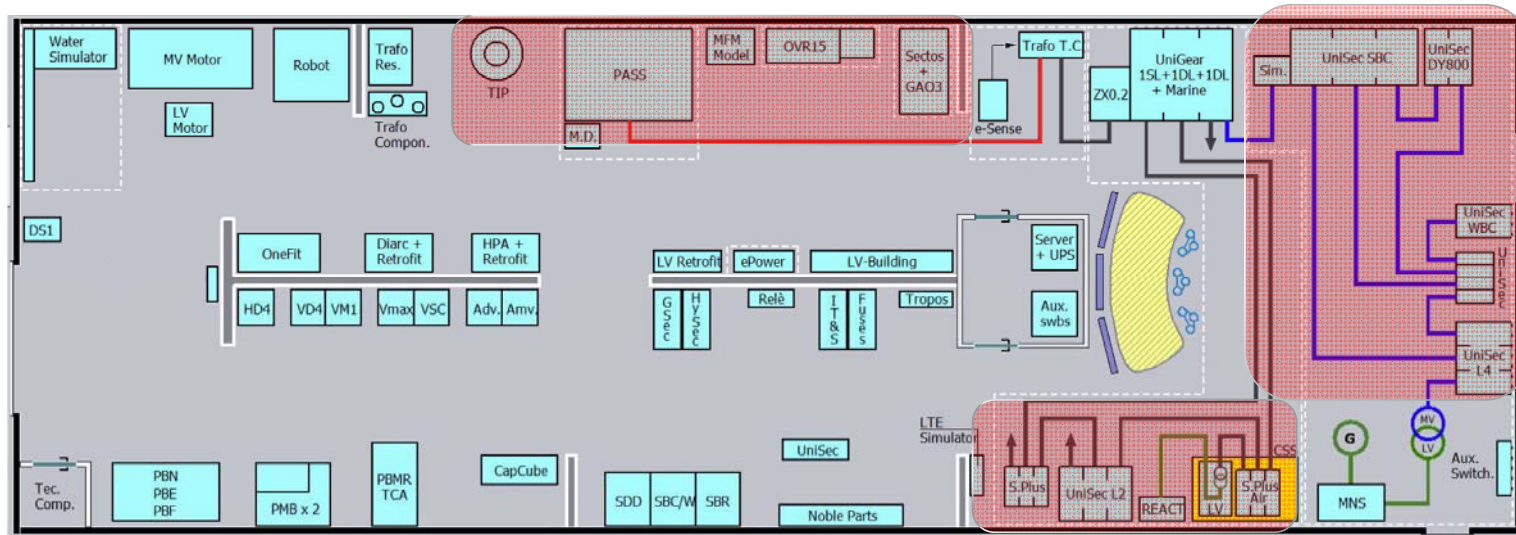
SmartLab à Dalmine



- Un réseau MT complet a été installé physiquement
- Algorithmes permettant de simuler le comportement réel d'un réseau
- Intègre tous les paramètres de protection et de communications en IEC61850

Automatisation des réseaux MT

SmartLab à Dalmine



Automatisation des réseaux MT

Formation sur mesure



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