Medium Voltage Distribution
Catalogue 2012

CBGS-0

Gas Insulated metal enclosed switchgear

SF6 circuit breaker - Up to 24 / 36 kV - 1250 / 1600 / 2000 A - 25 / 31.5 kA

Make the most of your energy℠

Schneider Electric

Your Requirements

Service continuity

Safety

Economic and technical efficiency

Sustainability

Reliability

Contents

Maximum safety in a reduced space

Our Offer

CBGS-0 is a gas insulated switchgear, this technology offers reliability and safety of your installations in a minimum space. Thanks to the different functions available, CBGS-0 is an excellent response to HV/MV or MV/MV substations.

Service continuity

- Not affected by the environment. Equipment sealed for life.
- Medium Voltage maintenance-free.
- Simple mechanical components which reduces the risk of failure.
- Extremely short replacement times.

Safety

- MV is not accessible “Safe to touch”.
- Tested against internal arc faults.
- Mechanical and electrical interlocks to prevent incorrect operation.
- Simple operation.

Economic and technical efficiency

- Life cycle > 30 years.
- Medium Voltage maintenance-free.
- Less civil engineering work.
- Reduced size.

Sustainability

- “RoHS compliant”.
- Equipment sealed for life.
- Low SF6 pressure.

Reliability

- Equipment designed, manufactured and tested according to IEC standards.
- Certified to ISO 9000, ISO 14000 and OSHAS 18000.
- Over 10,000 switchgears installed worldwide.
- Over 20 years’ experience.

Product presentation

Product presentation

Design

CBGS-0 cubicle - structure

The outer structure of each switchgear is a set of panels (RAL 9002), metal sheets and metal frames, all of them are earthed according to the "metal-enclosed" definition and complying with the requirements of IEC 62271-200.
It comprises four independent compartments in accordance with the "metal-clad" definition given by the IEC standards in force.

1. **The Low Voltage Cabinet** (box) is separated from the Medium Voltage area, and located at the top part of the switchgear. As an option, it can contains Sepam or MiCOM type of relays and the rest of Low Voltage auxiliary elements of protection and control.
2. **The busbar system**, which uses earthed solid and shielded insulation, is located in the top rear part of the switchgear, outside the SF6 compartment.
3. **SF6 tank compartment containing the breaking system** is located in the central part of the switchgear. The power cables and the busbar system are connected to it by means of a bushing.
   This is the only compartment (sealed for life) using gas as an insulating media.
4. **The Medium Voltage incoming/outgoing cable connection compartment**, is placed in the lower part of the switchgear, accessible from the front area.

Design

Low Voltage cabinet

1. LV cables tray.
2. Protection and control relays, Sepam, MiCOM or similar type (optional).

Busbar system: plug-in, single pole, solid insulated, screened and earthed

3. Compartment enclosure for the busbar system.
4. Plug-in to busbar system voltage transformers (optional).
5. Toroidal-core current transformers in busbar system (optional)

Sealed for life metal tank (2.5 mm stainless steel) filled with SF6 gas

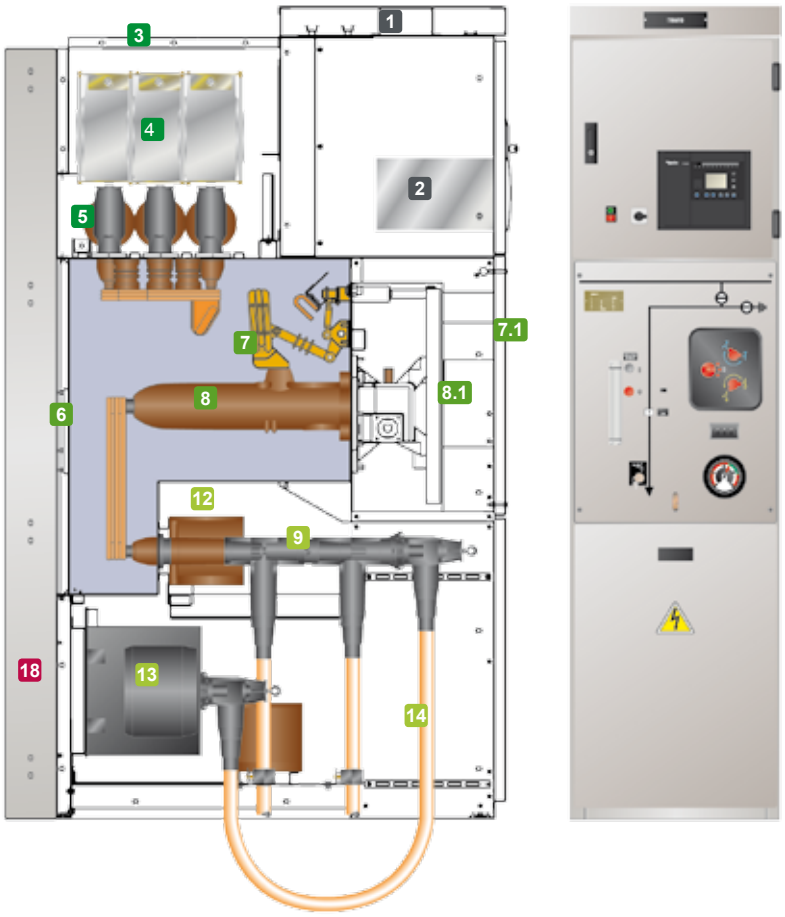
6. Pressure relief.
7. Three position disconnector:
   - 7.1. Disconnector operating mechanism.
   - 7.2. Disconnector operating mechanism selector.
   - **● Manoeuver of the three position disconnectors (with a handle):**
   - 7.3. Disconnector actuating shaft: open/ closed.
   - 7.4. Ready to earth actuating shaft: open/ready.
   - **● Position indicators for the 3 position disconnector:**
   - 7.5. Disconnector indicator: open/closed.
   - 7.6. Earth indicator: open/earthed.
8. Circuit-Breaker:
   - 8.1. Operating mechanism of the Circuit-Breaker.
   - 8.2. Actuating shaft for the spring charging system.
   - **● Opening and closing pushbuttons:**
   - 8.3. Closing pushbutton.
   - 8.4. Opening pushbutton.
   - **● Position indicators:**
   - 8.5. Position (open/closed).
   - 8.6. Spring charging system.
   - 8.7. Operation counter.

Power cables compartment:

9. Power cables connectors.
10. Opening/closing sliding trip of the power cables.
11. Earthed cables key lock (optional).
12. Current Transformers (optional).
13. Voltage Transformers (optional).
14. MV connection cable bridges for Voltage Transformers (optional)

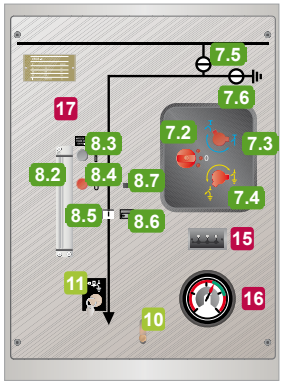
15. Capacitive voltage indicators per phase.
16. Pressure gauge for SF6 pressure indication inside the tank.
17. Characteristics nameplate.
18. Gas duct (optional).

DE90242



Front view of the mechanisms panel and synoptical

DE90243



Main characteristics

General electrical characteristics

Rated voltage		(kV)	24 (1)	36 (1)
Rated insulation level	*Power frequency, 50 Hz*	*(efficient kV)*	50	70
	Lightning impulse withstand voltage	*(kV peak)*	125	170
Rated normal current	*Busbar system*	*(A)*	1250 / 1600 / 2000	
	Incoming/outgoing	*(A)*	630 / 1250 / 1600 / 2000	
Short circuit breaking current		*(kA)*	25 / 31.5	
Short circuit breaking current		*(kA peak)*	63 / 80	
Short time withstand current		*(kA/s)*	Max 25 / 3 - 31.5 / 3	
Internal arc withstand		*(kA/1s)*	25 / 31.5	
Gas pressure at 20 °C		*(bar)*	0.30	
Standard degrees of protection	*HV Compartment*		IP65	
	LV Compartment		IP3X - IP41	

(1) *Up to 27kV / 38kV (ANSI / IEEE)*

DE60495

Ambient air temperature

- Less than or equal to + 40 °C.
- Less than or equal to + 35 °C on average over a 24 hour period.
- Greater than or equal to - 5 °C.

Vibrations

- Lack of vibrations external to the switchgear (seismic certified switchgear in option).

Height

- ≤ 1000 m over the sea level. For higher altitude, please contact us.

Atmosphere

- No dust, smoke, gas and corrosive or flammable vapor, salty air, etc.. (industrial air cleaner). For higher altitudes please contact us.

Humidity

- Average relative humidity over a period of 24 hours: 95%.
- Average relative humidity over a period of 1 month: 90%.
- Steam pressure averaged over a period of 24 hours: 2.2 kPa.
- Steam pressure averaged over a period of 1 month: 1.8 kPa.

CBGS-0 range meets the following international standards:

- IEC 62271-1: common clauses for High Voltage switchgear standards.
- IEC 62271-100: High Voltage alternating current circuit breakers.
- IEC 62271-200: metal-enclosed switchgear for alternating current at rated voltages of between 1 and 52 kV.
- IEC 62271-102: High Voltage A.C. Disconnectors and Earthing switches.
- IEC 62271-103: switches for rated voltages above 1 and less than 52 kV.
- IEC 62271-105: High Voltage alternating current switch-fuse combinations.
- IEC 60044-1: Current Transformers.
- IEC 60044-2: Voltage Transformers.
- ANSI: CBGS-0 according to ANSI, please contact us.

Quality and Environment

Quality

Our customers satisfaction is our first priority. We ensure the excellence of our products and our services.
The quality of our services is impeccable throughout the world.
Our products are manufactured according to strict criteria and following a rigorous process control at different stages of manufacturing.

- From now, more than 10,000 switchgears of the CBGS-0 type have already been installed in many activities worldwide.
- Fully factory-tested equipment, having also type tests reports available for each version of switchgear.
- ISO 9001 and OHSAS 18001 awarded.

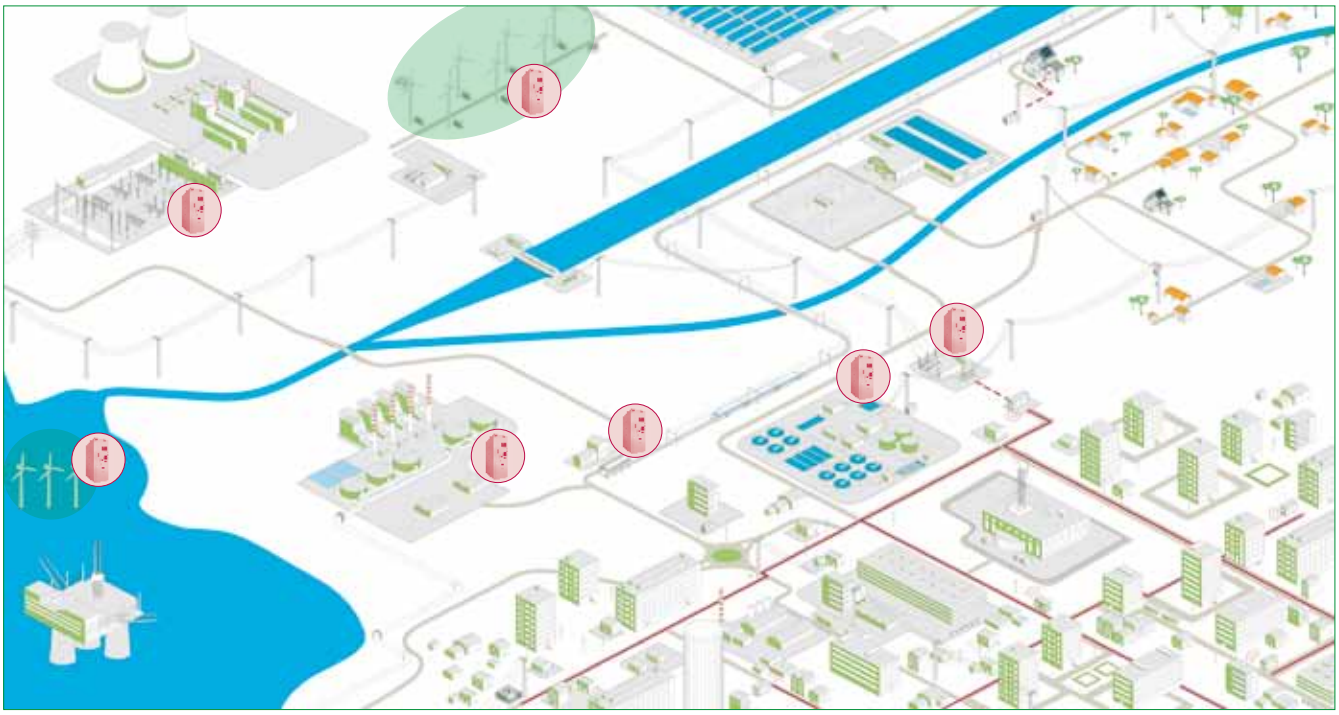
Environment

CBGS-0 switchgears have been designed with the aim of preserving the environment.
The materials used are clearly identified for an easy separation and recycling.
Besides, the gas can be collected and reused after an appropriate processing.
The environmental management system followed by Schneider Electric is certified according to the established requirements of the ISO 14001 standard “RoHS compliant”.

Application fields

Locating CBGS-0 in MV networks

E003435



Transmission & Distribution

Wind Power

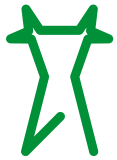
Airports

Oil & Gas

Industry

Mining

References



Transmission & Distribution:

- Iberdrola, Endesa, REE, HC, E-on (Spain)
- Scottish Power (UK)
- NEC (Sudan)
- TenneT (Holland)
- Sonelgaz (Argelia)
- ONE (Morocco)
- RG&E, CMP, NYSEG (USA)
- Vattenfall, Sydkraft (Sweden)
- PHCN (Nigeria)
- Enercal (Nueva Caledonia)
- MRI (Benin)
- EDCO (Jordan)…

Wind Power:

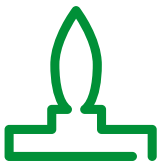
- GAMESA,
- Iberdrola Renewables,
- GE Wind,
- Vestas,
- Suzlon,
- Nordex,
- Enercon
- Acciona
- EDPR
- Enel
- Green Power
- NREA...

Airports:

- Madrid Airport (Spain)
- Barcelona Airport (Spain)
- Bilbao Airport (Spain)
- Tenerife Airport (Spain)
- Pamplona Airport (Spain)
- Lisbon Airport (Portugal)...

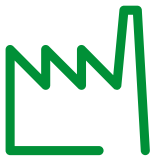
Trains:

- Undergrounds: Barcelona, Madrid, Bilbao and Málaga Undergrounds (Spain)
- High Speed Trains: ADIF High Speed Trains (Spain), Eurotunnel (France-UK)
- Railways: RENFE (Spain), Euskotren (Spain), FGC (Spain), Mexico Suburban (Mexico)…



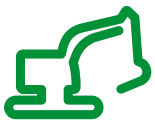
Oil & Gas:

- REPSOL (Spain)
- SAUDI ARAMCO (Saudi Arabia)
- EPS Electrical Power Distribution (Saudi Arabia)
- Sonatrach (Argelia)
- TOTAL (Congo)
- Technip (France, Malaysia, Congo, Italy)
- NESTE OIL (Holland)
- Enagas (Spain)…



Industry:

- Mercedes-Benz (Spain)
- Nestle (Spain)
- Casbega Coca Cola (Spain)
- El Corte Inglés (Spain)
- Zicuñaga Paper Mill (Spain)
- Koniambo (New Caledonia) …



Mining:

- Koniambo (New Caledonia)
- Boddington Gold Mine (Australia)
- Aznalcollar (Spain)…

Functions and characteristics

Functions and characteristics

CBGS-0 range

PE90586

MWP0042889

PE90075

PE90380

AYP0700844

PE90206

CBGS-0 range

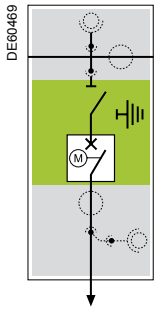
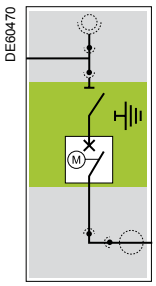
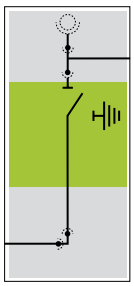
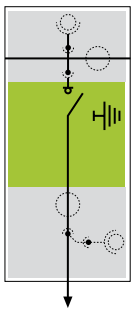
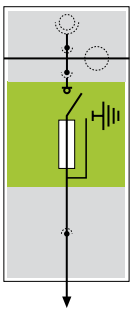
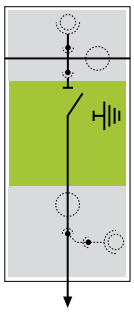
Each CBGS-0 set is made up of several functional units (switchgears) assembled together.
Each functional unit contains all the necessary elements to carry out its task.
The different switchgears (functional units) are interconnected by means of a Shielded Solid Insulated busbar system, which is outside the gas tank. The trays for the Low Voltage interconnection cables are placed at the top of the panel, above the Low Voltage cabinet.

A wide choice of configurations

CBGS-0 range gives you the choice of already standardised switchgears for different installations, even at a detailed level for the Low Voltage cabinet, which brings quite important advantages.
Anyway, if any other option is needed, the flexibility of the design of CBGS-0 switchgears allows most of them.

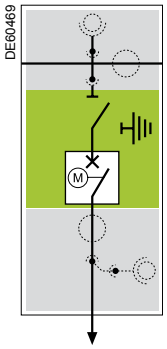
PE90588

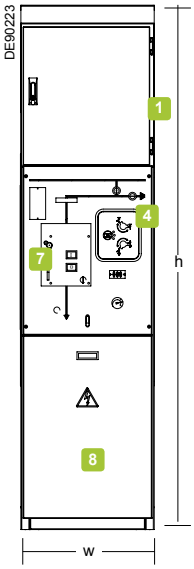
Functions and characteristics CBGS-0 range

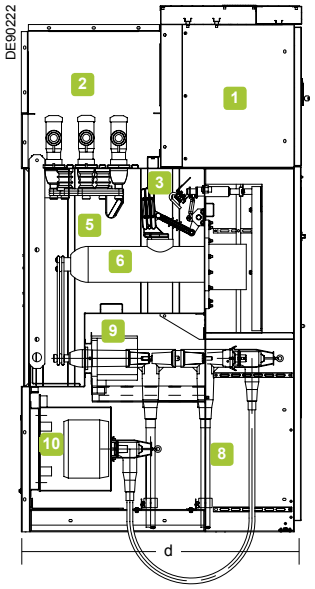
	Incomer Feeder	Bus Section*	Bus Riser*	Switch Disconnector	Auxiliary services	Disconnector
						
Nominal voltage (kV)	24 (27) / 36 (38)	24 (27) / 36 (38)	24 (27) / 36 (38)	24 (27) / 36 (38)	24 (27) / 36 (38)	24 (27) / 36 (38)
Busbar system rated current (A)	1250 / 1600 / 2000	1250 / 1600 / 2000	1250 / 1600 / 2000	1250 / 1600 / 2000	1250 / 1600 / 2000	1250 / 1600 / 2000
Outgoing rated current (A)	630 / 1250 / 1600 / 2000	1250 / 1600 / 2000	1250 / 1600 / 2000	630	200 (limited by the fuse)	630 / 1250 / 1600 / 2000
Short time withstand current (3s-1s) (kA)	25 - 31.5 / 63 - 80	25 - 31.5 / 63 - 80	25 - 31.5 / 63 - 80	25 / 50	Limited by the fuse	25 - 31.5 / 63 - 80

** 2 options: Busbar or cable connection.*

Incomer





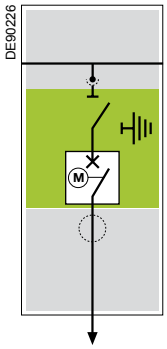


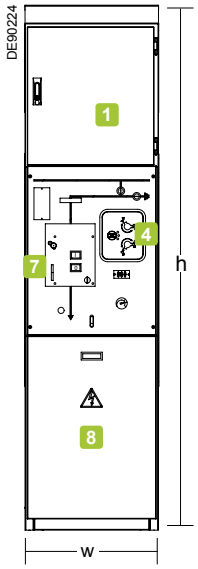
1. Low Voltage cabinet
2. General busbar system.
3. Three position disconnector (Closed-Open-Ready to earth).
4. Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Circuit-Breaker.
7. Circuit-Breaker operating mechanism.
8. Power cables compartment.
9. Current transformers (optional).
10. Voltage transformers (optional).

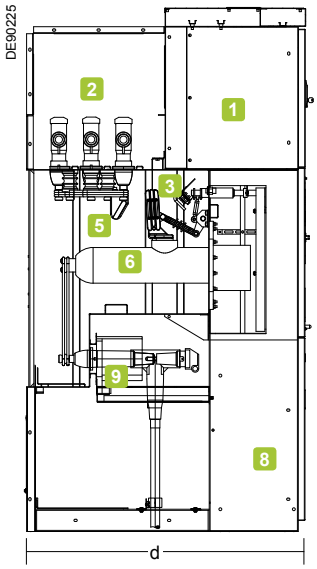
			IX-S			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 µs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*	630	■	■	■	■
		1250	□	□	□	□
		1600	□	□	□	□ *(3)*
		2000	□ *(3)*	□ *(3)*	□ *(3)*	□ *(3)*
Breaking capacity	*kA*		25/31,5			
Short time withstand current	*kA rms 3 s*		25/31,5			
(w) Width	*mm*		600			
(h) Height *(1)*	*mm*		2350			
(d) Depth *(2)*	*mm*		1250			
Aproximative weight	*kg*		650			
Aproximative weight 2000A	*kg*		1250			

(1) 2500 mm with Voltage Transformers for 2000A busbar.
(2) 1400 mm for Internal Arc Protection.
(3) 1200 mm width.

Feeder







1. Low Voltage cabinet
2. General busbar system.
3. Three position disconnector (Closed-Open-Ready to earth).
4. Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Circuit-Breaker.
7. Circuit-Breaker operating mechanism.
8. Power cables compartment.
9. Current transformers (optional).
10. Voltage transformers (optional).

			IX-S			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 μs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*	630	■	■	■	■
		1250	□	□	□	□
		1600	□	□	□	□ *(3)*
		2000	□ *(3)*	□ *(3)*	□ *(3)*	□ *(3)*
Breaking capacity	*kA*		25/31,5			
Short time withstand current	*kA rms 3 s*		25/31,5			
(w) Width	*mm*		600			
(h) Height (1)	*mm*		2350			
(d) Depth (2)	*mm*		1250			
Aproximative weight	*kg*		650			
Aproximative weight 2000A	*kg*		1250			

(1) 2500 mm with Voltage Transformers for 2000A busbar.
(2) 1400 mm for Internal Arc Protection.
(3) 1200 mm width.

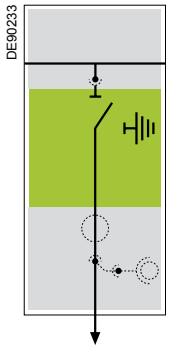
Bus tie

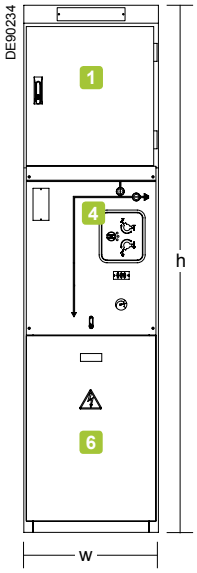
1. Low Voltage cabinet
2. General busbar system.
3. Three position disconnector (Closed-Open-Ready to earth).
4. Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Circuit-Breaker.
7. Circuit-Breaker operating mechanism.
8. Power busbar compartment.
9. Current transformers (optional).
10. Voltage transformers (optional).
11. Lower busbar system.

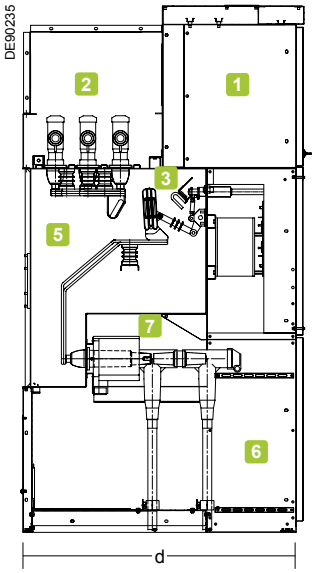
			BR			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 µs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*	630	■	■	■	■
		1250	□	□	□	□
		1600	□	□	□	□ *(3)*
		2000	□ *(3)*	□ *(3)*	□ *(3)*	□ *(3)*
Breaking capacity	*kA*		25/31,5			
Short time withstand current	*kA rms 3 s*		25/31,5			
(w) Width	*mm*		600			
(h) Height *(1)*	*mm*		2350			
(d) Depth *(2)*	*mm*		1250			
Aproximative weight	*kg*		650			
Aproximative weight 2000A	*kg*		1200			

(1) 2500 mm with Voltage Transformers for 2000A busbar.
(2) 1400 mm for Internal Arc Protection.
(3) 1200 mm width.
Riser coupling function through power cable (optional).

Disconnector





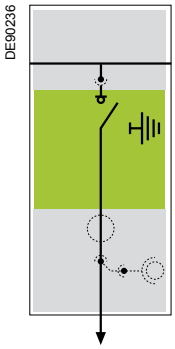


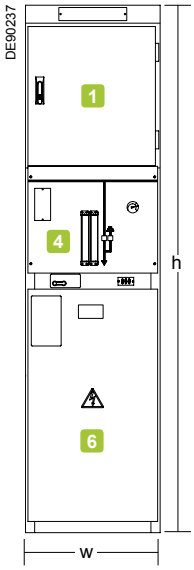
1. Low Voltage cabinet
2. General busbar system.
3. Three position disconnector (Closed-Open-Ready to earth).
4. Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Power cables compartment.
7. Voltage transformers (optional).

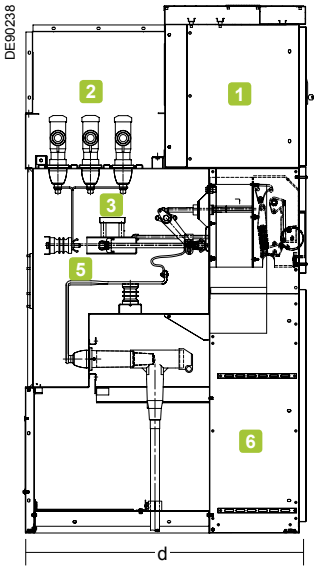
			BR			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 µs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*	630	■	■	■	■
		1250	□	□	□	□
		1600	□	□	□	□ *(3)*
		2000	□ *(3)*	□ *(3)*	□ *(3)*	□ *(3)*
Breaking capacity	*kA*		25/31,5			
(w) Width	*mm*		600			
(h) Height (1)	*mm*		2350			
(d) Depth (2)	*mm*		1250			
Aproximative weight	*kg*		450			
Aproximative weight 2000A	*kg*		800			

(1) 2500 mm with Voltage Transformers for 2000A busbar.
(2) 1400 mm for Internal Arc Protection.
(3) 1200 mm width.

Switch-Disconnector





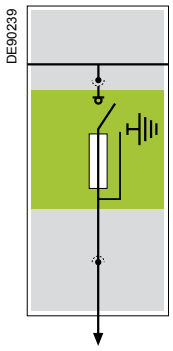


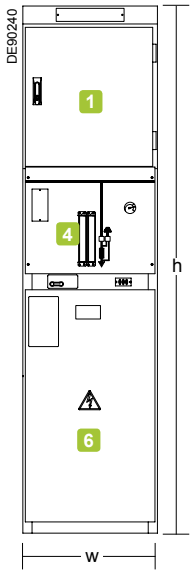
1. Low Voltage cabinet
2. General busbar system.
3. Three position switch-disconnector (Closed-Open-Ready to earth).
4. Switch-Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Power cables compartment.

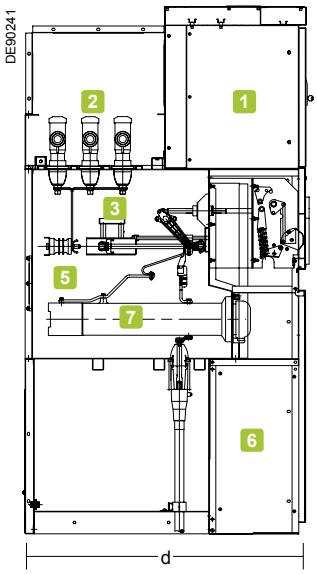
			BM-S			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 µs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*	630	■	■	■	■
Breaking capacity	*kA*		630			
Short time withstand current (3)	*kA rms 1 s*		25			
(w) Width	*mm*		600			
(h) Height (1)	*mm*		2350			
(d) Depth (2)	*mm*		1250			
Aproximative weight	*kg*		450			

(1) *2500 mm with Voltage Transformers for 2000A busbar.*
(2) *1400 mm for Internal Arc Protection.*
(3) *Peak intensity 50 kA.*

Auxiliary services





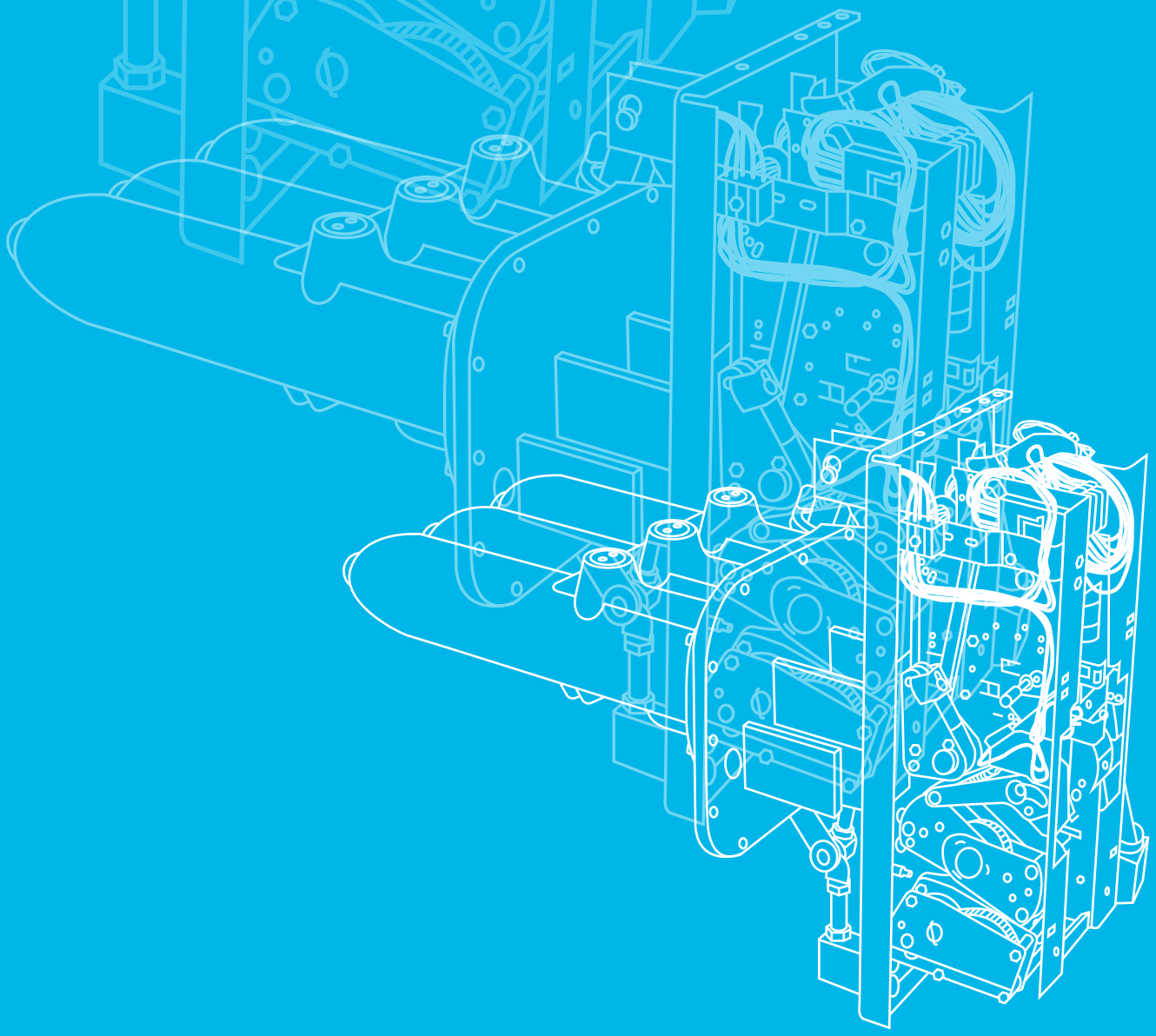


1. Low Voltage cabinet
2. General busbar system.
3. Three position switch-disconnector (Closed-Open-Ready to earth).
4. Disconnector operating mechanism.
5. Main tank (2.5 mm stainless steel) filled with SF6 gas, sealed for life.
6. Power cables compartment.
7. Fuse holder.

			AS-S			
Rated voltage	*kV*		12	17,5	24	36
Rated insulation level	*kV rms - 1 min*		28	38	50	70
	kV impulse 1,2/50 μs		75	95	125	170
Rated normal current (Busbar system)	*A*	1250	■	■	■	■
		1600	□	□	□	□
		2000	□	□	□	□
Rated normal current (incoming/outgoing)	*A*		Acc. to fuse			
Breaking capacity	*kA*		Acc. to fuse			
Short time withstand current (3)	*kA rms 3 s*		Acc. to fuse			
(w) Width	*mm*		600			
(h) Height (1)	*mm*		2350			
(d) Depth (2)	*mm*		1250			
Aproximative weight	*kg*		550			

(1) 2500 mm with Voltage Transformers for 2000A busbar.
(2) 1400 mm for Internal Arc Protection.
(3) Peak intensity 50 kA.

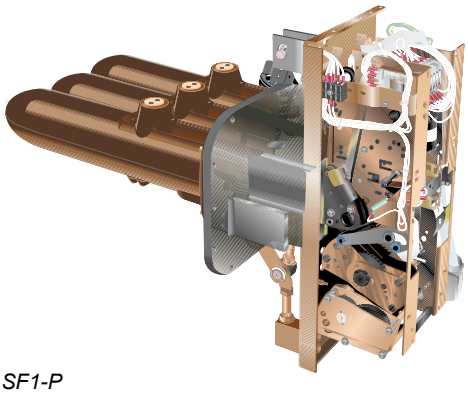
Switchgear / Apparatus



Switchgear / Apparatus

SF6 circuit-breaker up to 36 kV

DD7024103



SF1-P

SF1-P&G: SF6 Circuit-Breakers

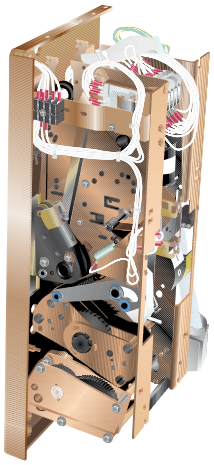
The circuit breaker is placed inside the intermediate SF6 compartment in a fixed configuration.
SF range circuit breakers equip cubicles for rated voltage values up to 36/38 kV. They work on the basis of the “puffer” type principle in SF6, which is used as a breaking and insulating medium.

- Each of the 3 poles have an independent insulating enclosure which forms a filled pressure system in compliance with IEC standard 62271-100.
- Each pole forms a gas-tight unit filled with low pressure SF6 at low relative pressure of 0.25 to 0.38 MPa (2.5 to 3.8 bars) according to the performance level required.
- No filling is required during the equipment’s life.
- Each SF6 circuit breaker is equipped with a pressure switch, in order to continuously control the SF6 pressure. In the very improbable event of a pressure falling underneath the established working threshold, 2 alarms will be automatically released.

Circuit-Breaker type			SF1-P	SF1-G
Rated voltage	*kV*		24 / 27	36 / 38
Rated insulation level	*kV rms 50Hz - 1 min*		50	70
	kV impulse 1,2/50 µs		125	170
Rated normal current (Ir)	*A*	*1250*	■	-
		2500	-	■
Breaking capacity (Isc)	*kA rms*		25	31,5
Making capacity	*kA peak*		63	80
Short time withstand current	*kA rms 3 s*		25	31,5
Rated operating sequence	*O-3 min-CO-3 min-CO*		■	■
	O-0,3 s-CO-3 min-CO		■	■
	O-0,3 s-CO-15 s-CO		■	-
Approximate operating time for supply of releases at U_n	*Opening*		50	40-60
	Breaking		65	50-70
	Closing		70	50-70
Electrical endurance classification			E2	E2
Mechanical endurance classification			M2	M2

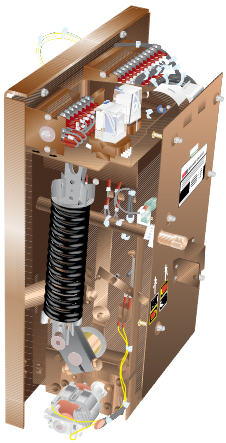
Circuit-Breaker Operating mechanism

DD7024101



RI

DD7024102



GMH

Depending on the Circuit-Breaker used in the switchgear and the requirements of the customer, two operating mechanisms are available.

Circuit-Breaker	Circuit-Breaker type	Rated voltage	Rated nominal current	Short time withstand current	Operating mechanism
SF1-P	SF6	24 / 27	1250/1200	25	RI
SF1-G	SF6	36 / 38	2500	31,5	GMH

Operating mechanism

The opening and closing speed of the circuit- breaker contacts used for CBGS-0 switchgears is independent of the operator's action. This electrically operated mechanism, which is always motorized to perform remote control functions, allows fast re-closing cycles.
In CBGS-0 type switchgears, all the operating mechanisms are arranged outside the SF6 tank.
Furthermore, maintenance in this type of operating mechanisms is quite reduced, as they use self-lubricating components.

The operating mechanism includes:

- A spring system that stores the necessary energy to open and close the Circuit-Breaker.
- A manual spring charging system.
- An electrical motor spring charging device that automatically recharges the springs in less than 5 seconds after the main contacts close.
- A mechanical push button with a padlock on the front panel for opening (optional).
- A mechanical push button with a padlock on the front panel for closing (optional).
- An electrical closing system including:
  - A closing release for remote control and an anti-pumping relay.
- An electrical opening system including:
  - Single or double (optional) tripping coil.
- Operation counter.
- A spring charging indication contact.
- An end of charging indication contact.
- An open/closed mechanical position indicator.
- A charged/uncharged mechanical position indicator.
- An optional key lock to interlock the circuit breaker in open position.

Auxiliary contacts

The operating mechanism is equipped with a block of at least 14 auxiliary contacts. The number of available contacts depends on the composition of the operating mechanism and the options chosen. In any case, of at least 14 auxiliary composition of the least 3 O/C contacts block for the external signals.

Technical characteristics		
Rated current		10A
Rated insulation level	*AC - 220 V (cos ϕ ≥ 0,3)*	10A
	DC - 110 or 220 V (L/R ≤ 0,01 s)	1.5A

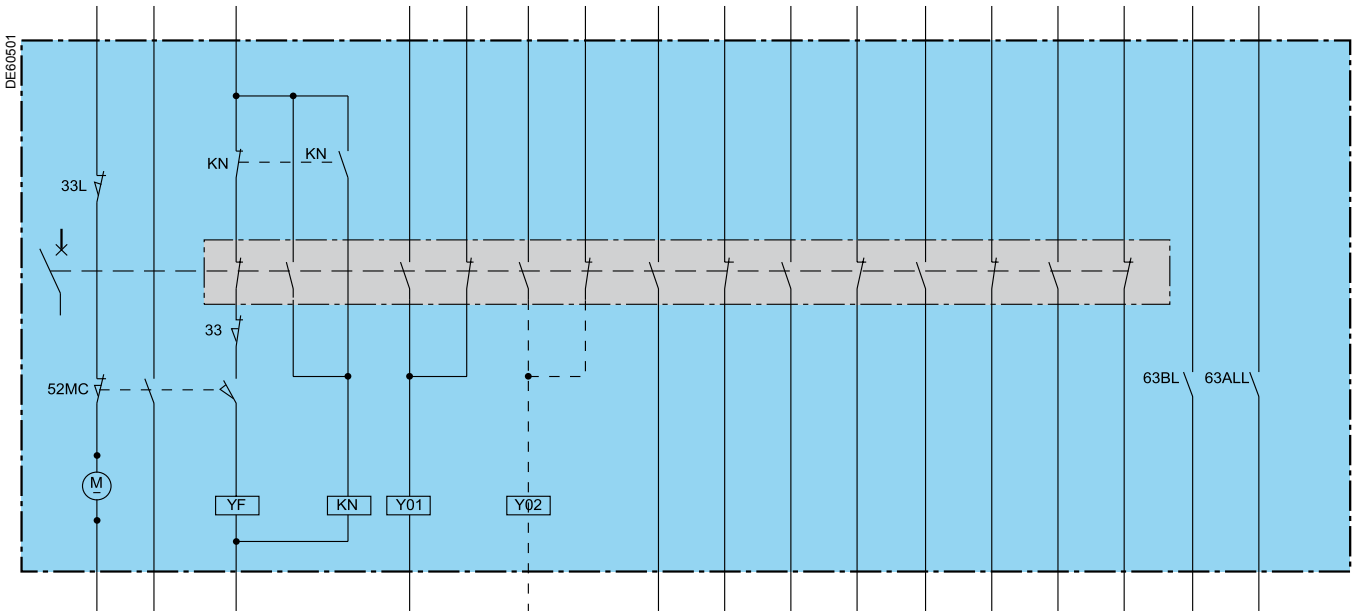
Circuit-Breaker Operating mechanisms

RI operating mechanism

SF1-P SF6 circuit breakers, are actuated by RI operating mechanism that ensures a switching device closing and opening rate that is independent of the operator. This operating mechanism enables remote and fast closing cycles.

Type of auxiliary			Spring charging motor	Closing release	Opening release Shunt		Available contact	
					Single	Double	NC	NO
Supply voltage	*AC (V)*	*50 Hz*	48-110-127-220					
		60 Hz	120-240					
	DC (V)		24-48-60-110-125-220					
Consumption	*AC (VA)*		360	160	160	320		
	DC (W)		360	50	50	100		
Possible combinations of auxiliaries and quantities			■	■	■		5	4
	o		■	■		■	5	3
	o		■	■			5	5

RI auxiliary diagram



M *Spring charging motor*
YF *Closing release*
KN *Anti-pumping relay*
Y01 *Tripping coil*
Y02 *Second tripping coil (optional)*
33 *Switch contact for mechanical closing availability*
33L *Sitch contact for blocking of spring charging motor during manual charging*
52MC *End of charging contacts*
63BL *Pressure switch contact for opening or locking*
63ALL *Low pressure alarm*

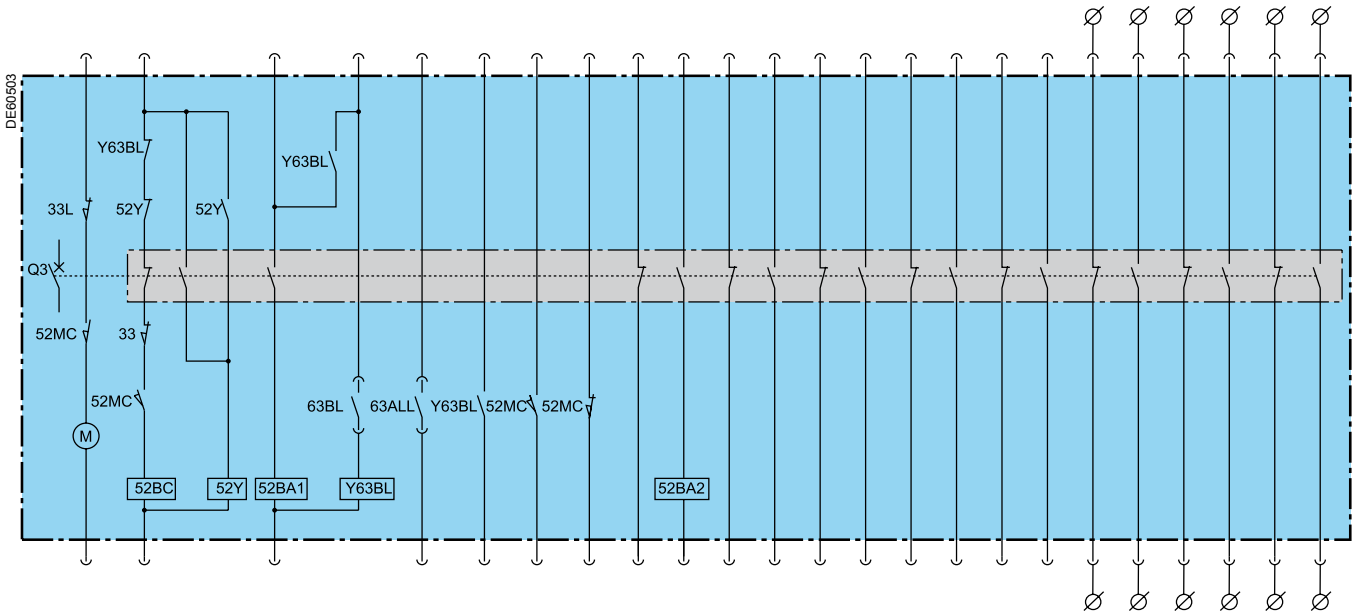
Circuit-Breaker Operating mechanisms

GMH operating mechanism

SF1-G circuit breakers are actuated by GMH operating mechanism that ensures a switching device closing and opening rate that is independent of the operator. This operating mechanism enables remote and fast closing cycles.

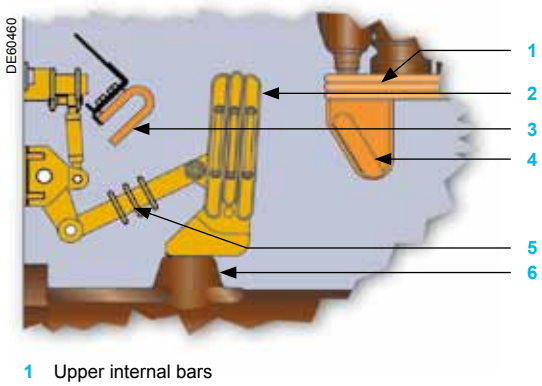
Type of auxiliary			Spring charging motor	Closing release	Opening release Shunt		Available contact	
					Single	Double	NC	NO
Supply voltage	*AC (V)*	*50 Hz*	48-110-127-220					
		60 Hz	120-240					
	DC (V)		24-48-60-110-125-220					
Consumption	*AC (VA)*		700	120	120	240		
	DC (W)		570	70	70	140		
Possible combinations of auxiliaries and quantities			■	■	■		5	4
	o		■	■		■	5	3
	o		■	■			5	5

GMH auxiliary diagram



M *Spring charging motor*
52BC *Closing release*
52Y *Anti-pumping relay*
52BA1 *Tripping coil*
52BA2 *Second tripping coil*
63BL *Pressure switch contact for opening*
63ALL *Low pressure alarm*
Y63BL *Pressure switch auxiliary relay for tripping and blocking*
33 *Switch contact for mechanical closing availavility*
33L *Switch contact for blocking of spring charging motor during manual charging operation*
52MC *End of charging*

3 position disconnector



1 Upper internal bars
2 Mobile contact fingers
3 Fixed contact "disconnector earthed"
4 Fixed contact "disconnector closed"
5 Insulating rod
6 Support

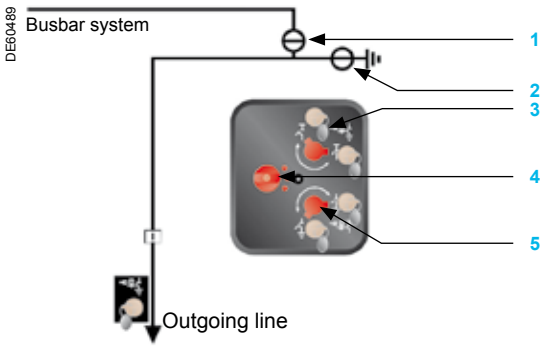
Characteristics of the 3 position disconnector

It complies with the requirements of IEC 62271-102 standard for disconnectors and earthing switches.

- Short circuit current making capacity (disconnector and earthing switch) through circuit-breaker. There are 3 versions per each voltage depending on the rated normal current:
  - 630 A
  - 1250 A
  - 1600 A
  - 2000 A
- Compact design and reduced dimensions.
- Highly reliable position indicator (without any transmission rods).
- Separate actuation shafts for the disconnector and the ready to earth function.
- Single rotation shaft for the disconnector and the earthing switch.

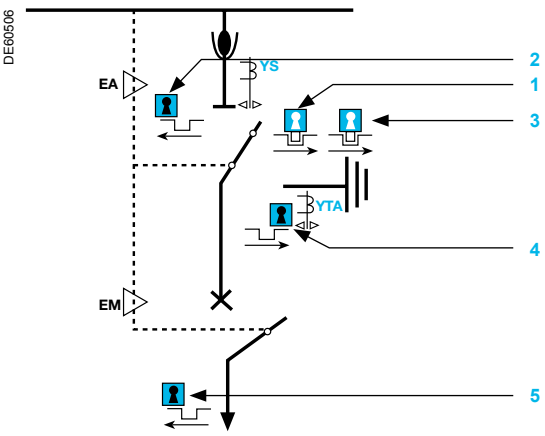
Operation and interlocks

- Operated by means of an operating handle.
- Function selection (admissible operations) by means of a selector.
- The flag type design of the selector allows the operating handle to be inserted only in the actuating shaft corresponding to the preselected function.
- The operating handle cannnot be removed from the actuating shaft until the switching operation is completed.
- The circuit-breaker cannot be closed until the function selector has returned to neutral position.
- The three position disconnector can only be operated when the circuit-breaker is in open position.
- Other special interlocks, such as key locks, can be included as an option.



Position indicators
1 Disconnector
2 Earthing disconnector

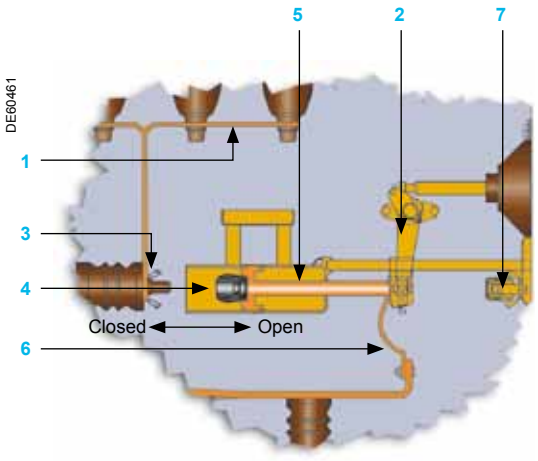
Actuating shafts operated by handle
3 Disconnector (open and close)
4 Function selector. Disconnector neutral earthing switch
5 Earthing disconnector



Key locks (key released) for:
1 Disconnector in open position
2 Disconnector in closed position
3 Earthing disconnector in open position
4 Earthing disconnector in closed position
5 Earthed cables

Electromagnetic locks for
YS Disconnector
YTA Earthing disconnector

Switch disconnector



1 Upper internal bars
2 Insulating rods
3 Fixed contact "switch in closed position"
4 Mobile contact fingers
5 Switch chamber
6 Flexible connection
7 Fixed contact "earthing switch in closed position"

Characteristics of the switch disconnector

The architecture of the switch disconnectors used for CBGS-0 switchgears is of the 3 position type: closed / open / earthed, which has been designed to prevent maloperation.
The breaking system uses the autopneumatic "puffer" technique. This flowing of gas onto the contacts separation area takes place only as a consequence of the horizontal and high speed movement of the switch chamber inside the gas tank, without having any additional gas contribution.
It complies with the requirements of IEC 62271-103 and IEC 62271-102 standards for switch disconnectors and disconnectors.

Switch function

- Class: E3 / M0.
- Breaking capacity: 630A.
- Short time withstand current: 25kA/1s*.

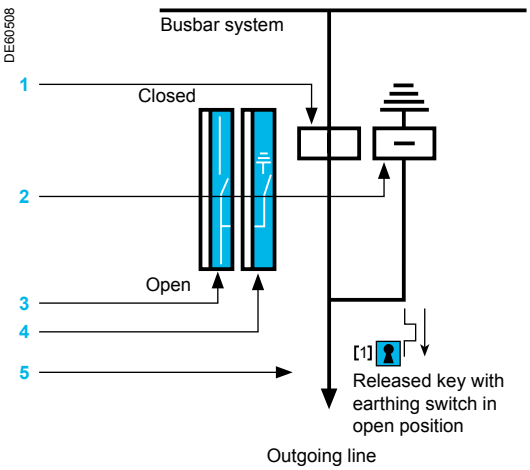
Earthing switch function

- Short time withstand current: 25kA/1s*.

This sort of switch disconnectors are optionally motorized.

Operation and interlocks

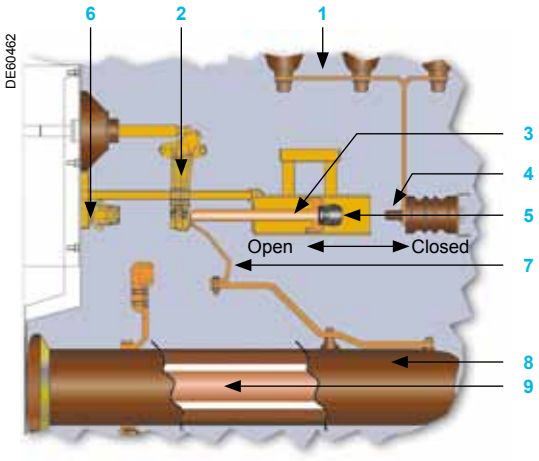
All the opening / closing operations (always tripolar) can be performed by means of a handle, the speed being always independent of the operator's action (except for the earthing switch opening).
For the switch disconnector and earthing switch operations, the operating handle cannot be removed until the operation is completed.
The earthed position of the earthing switch is always interlocked with access to the cable compartment, so that the cover of this compartment cannot be opened until the earthed position is closed. In this situation, also, the key of the interlocking lock is released.



Position indicator
1 Switch disconnector
2 Earthing switch

Actuating shafts
3 Switch disconnector
4 Earthing switch
5 Key lock interlocking

Switch disconnector with fuses



1 Upper internal bars
2 Insulating rods
3 Switch chamber
4 Fixed contact "switch in closed position"
5 Mobile contact fingers
6 Fixed contact "earthing switch in closed position"
7 Flexible connection
8 Fuseholder
9 Fuse

Fuses characteristics and arrangement

In CBGS-0 switchgears, the 3 individual fuseholders are arranged inside the gas tank, in horizontal position, all at the same height.

The fuses to be installed must comply with IEC 60282-2 standard. Fuses with a striker of the CF type (according to DIN standards), are advisable due to low heat dissipation.

As the fuseholder has been designed for 36 kV fuses, it is provided with an adaptor to be used with 24 kV.

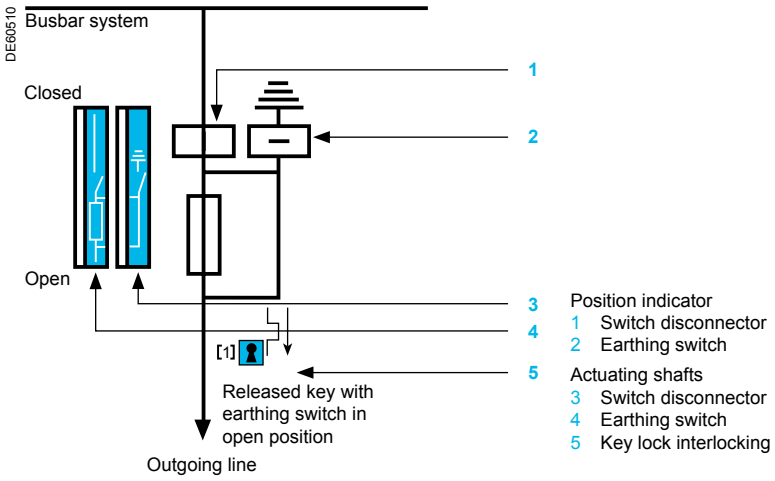
For further details about the appropriate fuse in each case, according to the network voltage and the power of the transformer to be protected, please refer to our specific catalogue for MV fuses.

Fuses replacement

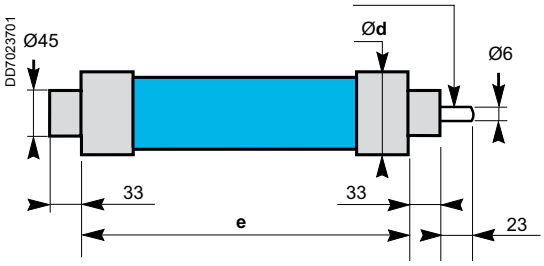
If a failure in the network implies the blowing of one (or two) fuses, the characteristics of the apparently undamaged fuses may often be affected by the action of the short circuit. A return to service in such conditions would entail danger of a sudden blow for low overcurrents. Consequently, it is advisable to replace the three fuses according to the requirements of IEC 60282-2.

Operations and interlocks

The access to the fuse compartment (usually for replacement) is always interlocked.This interlocking permits the opening of the cover only when the earthing switch is in closed position.
As an additional safety measure, the earthing is done on both fuse ends.



Fuses selection



Fuse dimensions

The fuse ratings intended to protect the transformer depend amongst other things on the following factors:

- Operating voltage.
- Transformer power.
- Fuse heat dissipation.
- Fuse technology (manufacturer).

It is recommended to use the following type of fuse, Fusarc CF type, according to dimensional standards DIN 43.625, equipped with a thermal striker.

Range	Rated normal current (A)	Lengthe (mm)	Diameter Ød (mm)	Weight (kg)
CF-24/...	6,3-10-16-20-25	442	50,5	1,6
CF-24/...	31,5-40	442	55	2,2
CF-24/...	50-63-80	442	76	4,1
CF-24/...	100	442	86	5,3
CF-36/...	6,3-10-16-20	537	50,5	1,9
CF-36/...	25	537	55	3,1
CF-36/...	31,5-40	537	76	5,4
CF-36/...	50-63	537	86	6,5

Fusarc CF fuses selection table for transformers protection

According to IEC 60076-5:2000:

- Ucc (S and 630 kVA) = 4%
- Ucc (S > 630 kVA and 1250) = 5%

Admissible overload ≤ 20% and ambient temperature < 40°C.

U_n (kV)	S (kVA)															
	25	50	75	100	125	160	200	250	315	400	500	630	800	1000	1250	1650
6	CF-12/6,3	CF-12/16	CF-12/25	CF-12/25	CF-12/31,5	CF-12/40	CF-12/40	CF-12/50	CF-12/63	CF-12/80(2)	CF-12/100(1)					
6,6	CF-12/6,3	CF-12/16	CF-12/20	CF-12/25	CF-12/31,5	CF-12/31,5	CF-12/40	CF-12/50	CF-12/50	CF-12/80	CF-12/100(2)					
10	CF-12/6,3	CF-12/10	CF-12/16	CF-12/20	CF-12/25	CF-12/25	CF-12/31,5	CF-12/40	CF-12/40	CF-12/50	CF-12/63	CF-12/80	CF-12/100(1)	CF-12/100(1)		
11	CF-12/4	CF-12/10	CF-12/16	CF-12/20	CF-12/20	CF-12/25	CF-12/31,5	CF-24/31,5	CF-12/40	CF-12/50	CF-12/63	CF-12/80	CF-12/80(1)	CF-12/100(2)		
13,2	CF-24/4	CF-24/6,3	CF-24/10	CF-24/16	CF-24/20	CF-24/25	CF-24/25	CF-24/31,5	CF-24/31,5	CF-24/40	CF-24/50	CF-24/63	CF-24/63(1)	CF-24/80(1)		
13,8	CF-24/4	CF-24/6,3	CF-24/10	CF-24/16	CF-24/20	CF-24/20	CF-24/25	CF-24/31,5	CF-24/31,5	CF-24/40	CF-24/50	CF-24/63	CF-24/63(1)	CF-24/80(2)	CF-24/100(1)	
15	CF-24/4	CF-24/6,3	CF-24/10	CF-24/16	CF-24/16	CF-24/20	CF-24/25	CF-24/25	CF-24/31,5	CF-24/40	CF-24/40	CF-24/50	CF-24/63(2)	CF-24/80	CF-24/100(2)	
20		CF-24/6,3	CF-24/6,3	CF-24/10	CF-24/10	CF-24/16	CF-24/20	CF-24/25	CF-24/25	CF-24/31,5	CF-24/31,5	CF-24/40	CF-24/50	CF-24/63	CF-24/63(1)	CF-24/80(1)
22		CF-24/4	CF-24/6,3	CF-24/10	CF-24/10	CF-24/16	CF-24/20	CF-24/20	CF-24/25	CF-24/31,5	CF-24/31,5	CF-24/40	CF-24/40	CF-24/50(2)	CF-24/63(1)	
25		CF-36/4	CF-36/6,3	CF-36/6,3	CF-36/10	CF-36/10	CF-36/16	CF-36/20	CF-36/25	CF-36/25	CF-36/31,5	CF-36/40	CF-36/40	CF-36/50(1)	CF-36/63(1)	
30		CF-36/4	CF-36/6,3	CF-36/6,3	CF-36/6,3	CF-36/10	CF-36/16	CF-36/16	CF-36/20	CF-36/25	CF-36/25	CF-36/31,5	CF-36/31,5	CF-36/40	CF-36/50(1)	
33		CF-36/4	CF-36/4	CF-36/6,3	CF-36/6,3	CF-36/10	CF-36/10	CF-36/16	CF-36/20	CF-36/25	CF-36/25	CF-36/31,5	CF-36/31,5	CF-36/40	CF-36/50(1)	

(1) No valid overload.
(2) Valid overloads < 10%.
Values according to IEC standards. Other standards: ANSI, NBR...please contact us.

Busbar system

Characteristics of the busbar system

The general busbar system of the CBGS-0 switchgears has been designed to provide this type of switchgears with the highest degree of safety and reliability, together with a great simplicity of installation.

The possibility of a failure in the busbar system is practically excluded. Nevertheless, as it is a single pole configuration, a failure in one of the busbars would not affect the rest of them.

The set consists of three or six independent copper conductive round bars, silicone insulated. The connection between the switchgear bushings is made by means of a bar and "T"(cross pieces) and "L" (end pieces) connectors.

The electrical field is controlled with the aid of semi-conductive inserts in the silicone-rubber insulation, both inside and outside. The external screen is earthed through the switchgear enclosure.

Although the whole set is insensitive to dirt and condensation, it is shock-hazard protected by an external metal covering.

Switchgears extension

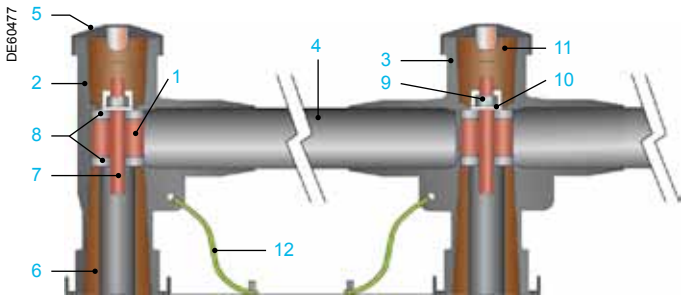
A CBGS-0 switch boards can be extended in a very quick and simple way, cutting off the service for a very short period of time.

Switchgears replacement

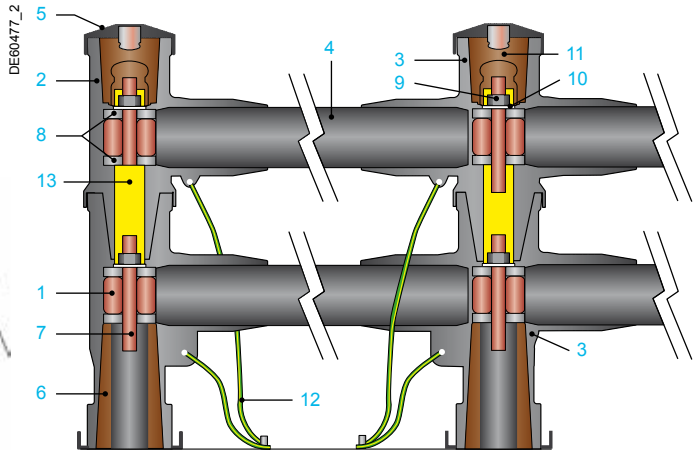
In case it was necessary to leave a switchgear out of service due to a failure, there is an optional specific kit to make a by-pass between the adjacent switchgears in order to provide service continuity to the busbar system.
In this way, the extent of the service cutting off is minimized.

Detail of the shielded busbar system

1250 - 1600A

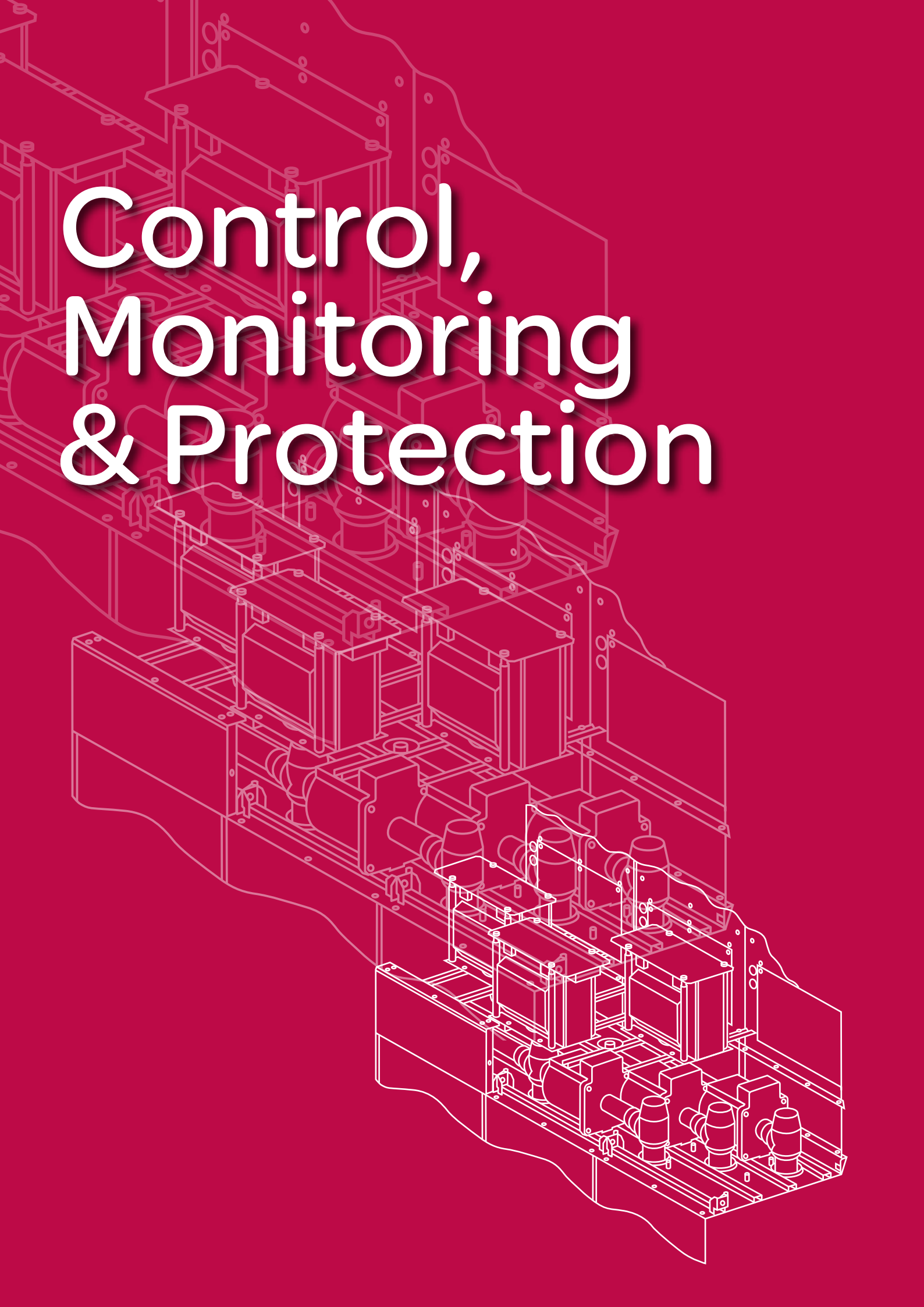


2000A



1 Busbar connection
2 Insulating plug
3 Cross adapter
4 Busbar
5 Covering cap
6 Bushing
7 Threaded bolt
8 Contact shell
9 Nut
10 Washer
11 Insulating plug
12 Earthing strand
13 Intermediate connection

Control, Monitoring & Protection



Current Transformers

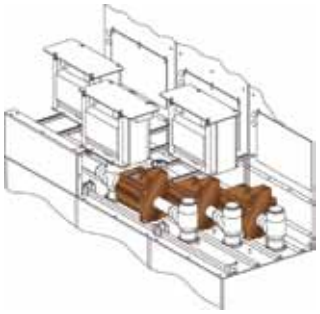
DE60517

Ring type (toroidal core) Current Transformer

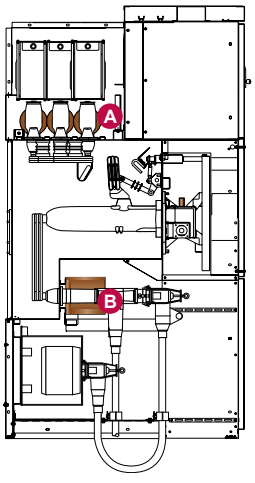
PD7023204

Low Power Ring type Current Transformer

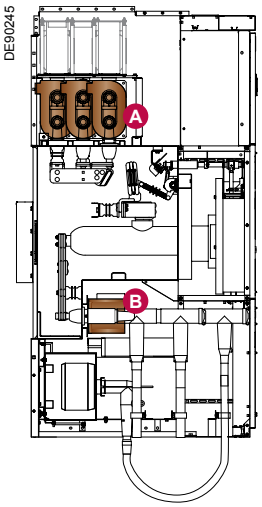
DE60515



DE90244



DE90245



Depending on the cubicle type, application and customer needs CBGS0 has several options for current transformers.

Ring type Current Transformers (Upstream and Downstream)

- Primary outside SF6 atmosphere (not connected primary).
- Not dielectrically stressed.
- According to IEC 60044-1 *(for other specific standards: ANSI, AS, BS, NBR... please contact us).*

Characteristics				
Thermal current	*Permanent (max. Value)*		1.2 x I_n	
Rated normal current	*Primary*	*A*	25 to 2000	
	Secondary	*A*	1 to 5	
Switch possibilities on the secondary	*From*		25 - 50	
	Up to		1000 - 2000	
Core data depending on normal primary current (max. 3 cores)			*Measuring core*	*Protection core*
Power		*VA*	2.5 to 25	0.5 to 30
Class			0.2 to 1	5 to 10
Overcurrent factor			FS5	P10 to P30
Dimensions (type A)*				
Inside diameter		*mm*	Min.: 60 - Max.: 205	
Max. effective length		*mm*	Min.: 130 - Max.: 225	
*Dimensions (type B**)*				
Height x Width x Length		*mm*	435 x 420 x 190	
Operating ambient air temperature		*° C*	- 5 °C / + 40 °C	
Insulation class			E	

** Located on busbar system. The space required on the busbar system for the arrangement of a complete set of 3 current transformers corresponds to the width of 2 CBGS-0 switchgears.*
*** On incoming / outgoing bushings*

Low power Ring type current transformers

Reasons to develop these applications:

- To avoid the use of high burdens (not needed for actual state electronic relays).
- To have combined class burdens and accuracies (Measuring + protection).
- Electronic relays normally have 1 CT input both for measuring and protection.
  - □ Not connected primary - Not thermically stressed.
  - □ LV→ Not dielectriically stressed.
  - □ According to IEC 60044-1 *(for other specific standards: ANSI, AS, BS, NBR... please contact us).*

Rated Voltage		N.A. (Low Voltage)
Possible ratios		2 x primary current*
		1 x secondary current
Burdens	*VA*	0.5
Accuracies		CI 1/5P20 (combined)
		CI 0,5 /5P20 (combined for several cases)
Ratios	*A*	100
		150
		600
		200 - 400
		250 - 500
		300 - 600
		400 - 800
		500 - 1000

** Number of cores depending on client needs*

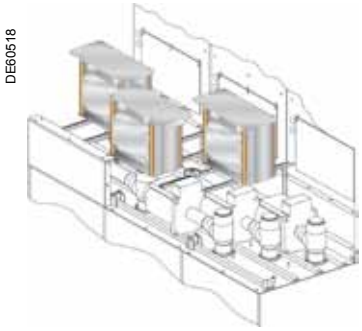
Upstream: above cable connection./ Downstream: below cable connection.

Voltage Transformers

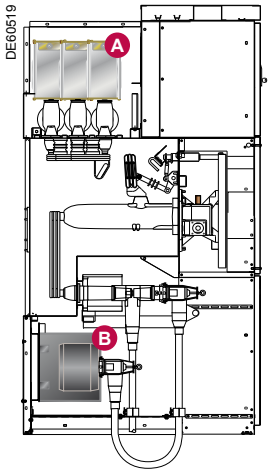
These Voltage Transformers supply power to:
- Measuring, metering and monitoring devices.
- Relays or protective devices.

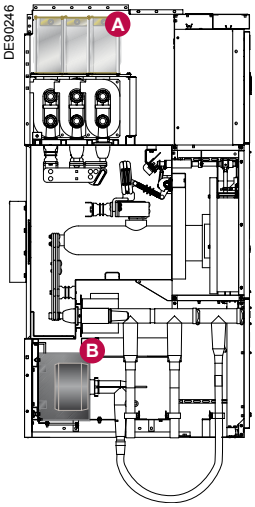
General characteristics

- Inductive principle.
- Architecture:
  - Busbar connected **(type A)**.
  - Cable connected **(type B)**.
- Safe to touch by means of a shielded metal enclosure.
- Cast resin insulated
- According to IEC 60044-2 standards *(for other specific standards: ANSI, AS, BS, NBR...please contact us).*



Characteristics			A	B
Normal voltage (U_N)		*kV*	> 3.6 up to 36/38	
Normal alternal voltage on the primary			1.2 x U_N	
Voltage normal factor (U_N / 8h)			1.9	
Normal voltage on the secondary		*V*	100 / √3 V	
			110 / √3 V	
			100 / 3 V	
			110 / 3 V	
			120 / 3 V	
Thermal current limit (measuring winding)		*A*	8	
Normal long duration current (8 h)		*A*	5	
Power output depending on the accuracy class	*Class 0.2*	*VA*	20, 25, 30	25
	Class 0.5	*VA*	30, 50, 60	50
	Class 1	VA	50, 60, 100	100





Mounting possibilities and types

Reasons to develop these applications:
- MV Cable connected.
- Busbar connected.

Protection and control solutions

PE60300

Sepam range

PM102898

MiCOM range

Sepam & MiCOM

CGBS-O switchgear integrates Schneider Electric's proven Sepam & MiCOM systems for advanced protection, control and monitoring.

Sepam & MiCOM offer comprehensive protection schemes and advanced control functions for even the most demanding application.

For more basic applications such as cable and transformer feeders, the range also includes a lower specification device offering communications and fault recording capabilities coupled with overcurrent and earth fault protection.

Full integration achieves the highest level of system protection at a substantially reduced overall cost.

Main characteristics

- Protection, metering, control, monitoring and annunciation functions.
- Trip circuit supervision, logic selectivity, circuit breaker fail protection, intertripping and circuit breaker lockout.
- Local indication of phase currents, maximum demand, line voltages, power factor, active and reactive power.
- Integral analogue and digital disturbance recorder.
- High level of electromagnetic compatibility.
- High reliability from advanced self supervision systems.
- Indication of phase and earth fault values at the time of tripping to aid fault analysis.
- Simple to set and no routine maintenance help cut costs.
- Some relays can be supplied with Ethernet, to allow a full IEC 61850 solution for the substation.

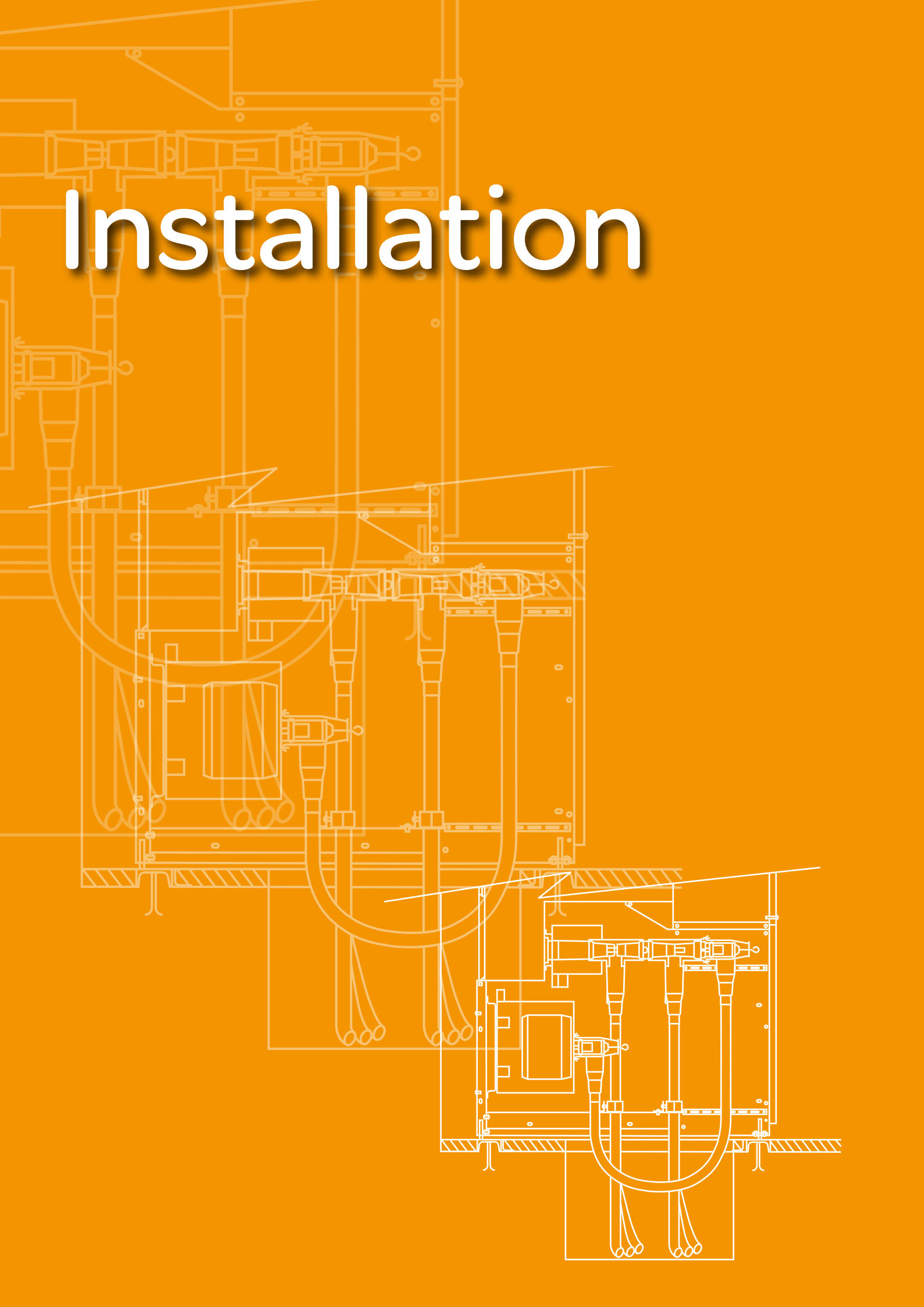
Sepam is a self contained unit and brings many advanced feature

- **Sepam Series 20** suitable for common applications, Sepam series 20 offers simple solutions based on current or voltage metering.
- **Sepam Series 40** with its current and voltage metering capabilities offers high performing solutions for more demanding application.
- **Sepam Series 60** to go further on the demanding application with more inputs/outputs (up to 28 binary inputs and 16 outputs) and optional mimic-based display units to view a portion of single-line and phasor diagrams.
- **Sepam Series 80** is specially designed for demanding customers on large industrial sites.

MiCOM offers varying levels of functionality and hardware

- **MiCOM Series 10** designed for universal overcurrent protection for main or back-up protection on LV or MV systems.
- **MiCOM Series 20** fulfill the basic requirements of industrial, utility & building applications providing simplicity and ease of use in a wide range of installations.
- **MiCOM Series 30** designed to meet the rigorous requirements of MV & HV applications with particular focus on feeder and transformer protection and control.
- **MiCOM Series 40** fulfills the protection requirements for a wide market of utility and industrial systems and offers a complete range of protection functions.

Installation



Installation

Power cables

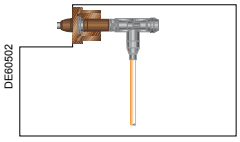
(1) The connectors used for the MV connection bridges for voltage transformers are plug in elbow type, not threaded and shielded, for 250 A in 24 kV and 400 A in 36 kV.

Plug in connectors for incoming / outgoing cables

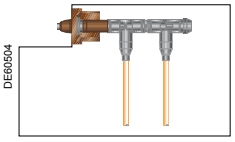
The connectors used for the incoming cables in all the CBGS-0 24 / 36 kV switchgears (1) are plug in, "T" type, threaded (M16) and shielded, according to EN 50181.

The maximum cross-section (630 mm ≤ approx.) and the characteristics of the cables that can be connected to CBGS-0 switchgears by means of connectors such as the already described, is given by each connector manufacturer.
For further details about the characteristics of the different connectors, please contact the main manufacturers, such as Pirelli, Raychem, Felten & Guilleme and Euromold.

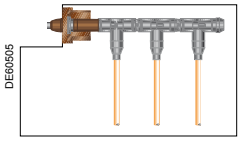
The power cables compartment allows a maximum of three cables per phase.



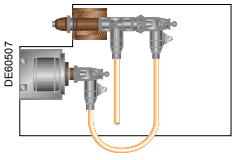
1 cable per phase



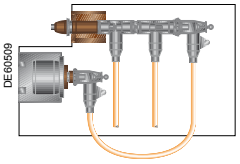
2 cables per phase



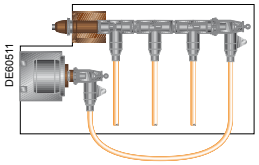
3 cables per phase



1 cable per phase + TT

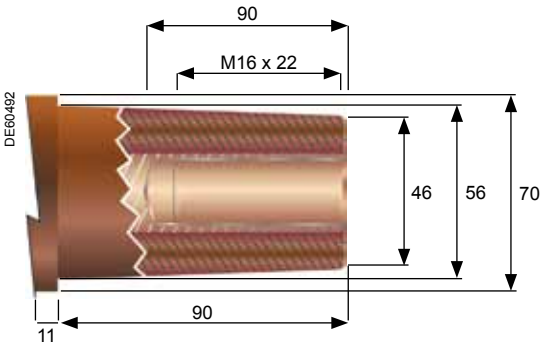


2 cables per phase + TT



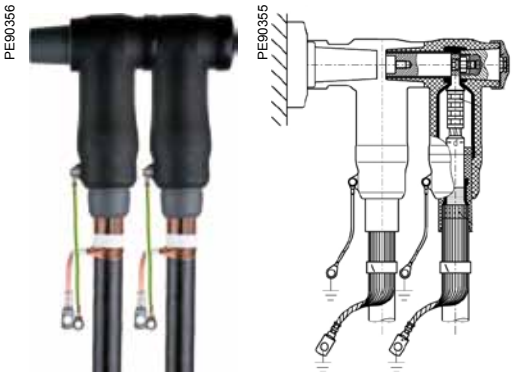
3 cables per phase + TT (up to 24kV 1600A or 36kV 1250A)

Detail of a type C standardized bushing according to the requirements of EN 50181for power connectors



Dimensions in mm.

Coupling connectors

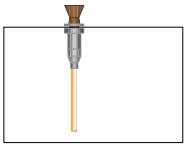


** Same installation possibilities as standard connectors*

Outgoing connectors for Auxiliary Services switchgear

CBGS-0 switchgears 24 / 36 kV with switch disconnector combined with fuses need the following type of connectors: plug in straight type, not threaded and shielded, always of 36 kV and 400 A.

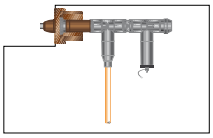
DE60513



1 cable per phase (Aux. S.)

Installation of surge arrestors

DE60514



Surge arrestors

In the cable compartment it is possible to install surge arrestors. The surge arrestors must be suitable for type C bushing, according to EN 50181 standard (same space of a connector).

Direct cable connection to upper bushings

Upper bushings for busbar connection, are also type C according to EN 50181, that is why they eventually allow the direct connection of MV cables to them by means of adequate connectors.

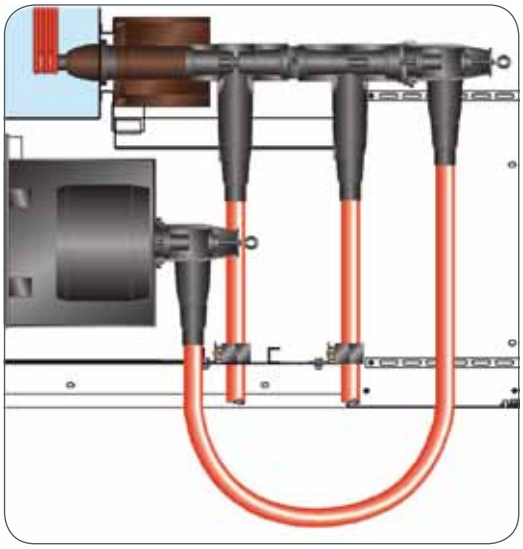
Power cables

The maximum cross-section and the characteristics of the cables that can be connected by means of connectors, is given by each manufacturer.
See samples for 24kV and 36kV

Installation possibilities for connectors

Number of cables per panel and phase	Brand	Core cross section (1) mm²	Insulation	Cable T-plugs bolted	Coupling inserts bolted
Circuit-breaker panel 1250A outer cone ≤ 24 kV					
1	Euromold	≤ 300	EPDM	1x(K)400 TB/G	-
		185 to 630	EPDM	1x(K)440 TB/D	-
		≤ 300	EPDM	-	-
		≤ 300	EPDM	1x430 TB-630A	-
		≤ 240	Silicone	1xAGT 20, con rev. metálico	-
		≤ 240	Silicone	1xAGTL 20, sin rev. metálico	-
1	Südkabel	25 to 240	Silicone	1xSET 24/12	-
		300 to 500	Silicone	1xSEHDT 23/13	-
1	NKT cables	≤ 300	Silicone	1xCB 12/24 630	-
		400 to 630	Silicone	1xCB 36/630 (1250) 24kV	-
1	Tyco Electronics Raychem	≤ 300	Silicone	1xRSTI-L56xx	-
		400 to 360	Silicone	1xRSTI-xxLxx	-
2	Euromold	≤ 300	EPDM	2x(K)400 TB/G	1x(K)400 CP
		185 to 630	EPDM	2x(K)440 TB/G	1x(K)440 CP
		≤ 300	EPDM	1x(K)400 TB/G	1x(K)400 CP-LB
2	Prysmian	0 to 400	EPDM	PMA3-400/24	FMPCs-400
2	Südkabel	25 to 240	Silicone	2xSET 24/12	1xKU 23.2
		300 to 500	Silicone	2xSEHDT 23/13	1xKU 33
2	NKT cables	≤ 300	Silicone	2xCB 12/24630	1xCP 630C
		≤ 300	Silicone	1xCB 12/24630+ 1xCC 12/24 630	-
		400 to 630	Silicone	2xCB 36/630 (1250) 24kV	1xCP 630 C
		400 to 630	Silicone	1xCB 36/630 (1250) 24kV+ 1xCC 36/630 (1250) 24kV	-
2	Tyco Electronics Raychem	≤ 300	EPDM	1xRSTI-L56xx+	1xRSTI-CC-L56xx
		400 to 630	EPDM	1xRSTI-xxLxx+	1xRSTI-CCxL56xx

(1) Only for reference. Complete cable characteristics to be transmitted to connectors manufacturer for real reference.



Power cables

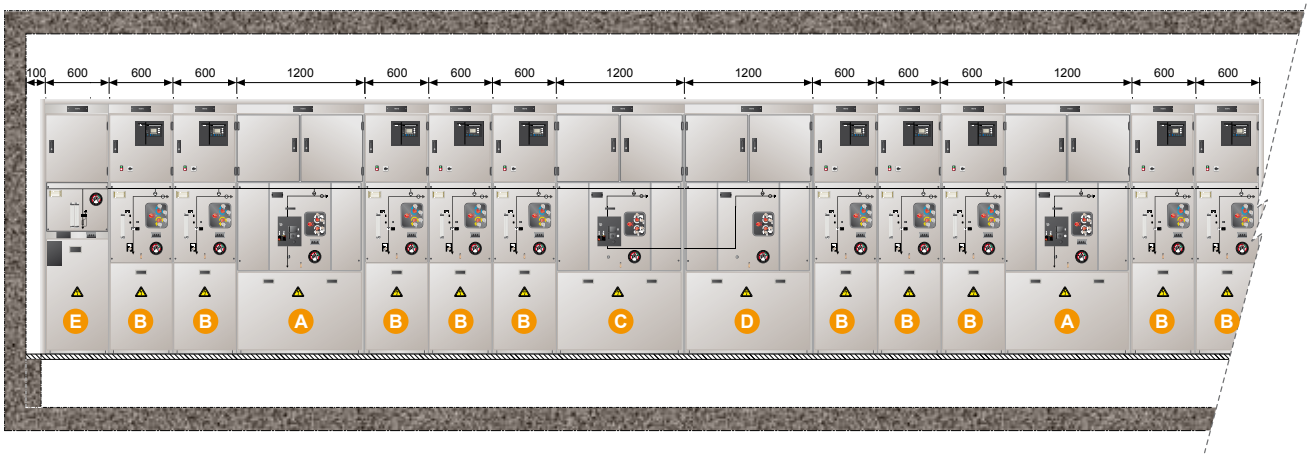
The maximum cross-section and the characteristics of the cables that can be connected by means of connectors, is given by each manufacturer.
See samples for 24kV and 36kV

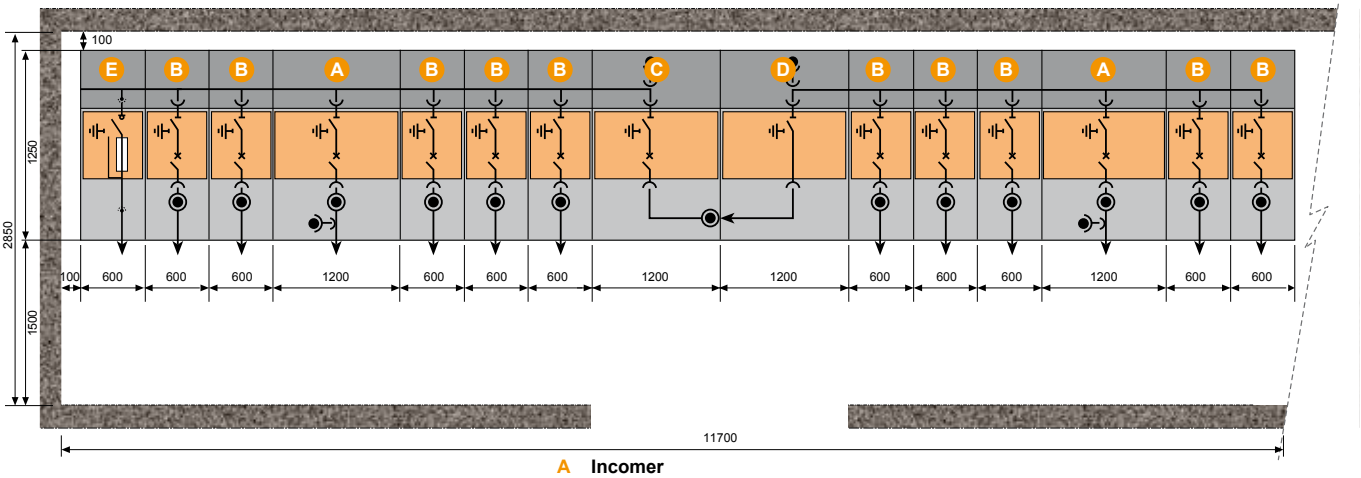
Installation possibilities for connectors

Number of cables per panel and phase	Brand	Core cross section (1) mm²	Insulation	Cable T-plugs bolted	Coupling inserts bolted
Circuit-breaker panel 1250A outer cone ≤ 24 kV					
1	Euromold	≤ 185	EPDM	1xM400 TB/G	-
		240 to 630	EPDM	1xM400 TB/G	-
1	Südkabel	≤ 500	Silicone	1xSEHDT 33	-
1	NKT cables	≤ 300	Silicone	1xCB 36/630	-
		400 to 630	Silicone	1xCB 36/630 (1250)	-
1	Tyco Electronics Raychem	≤ 300	Silicone	1xRSTI-L66xx	-
		400 to 360	Silicone	1xRSTI-xxLxx	-
2	Euromold	≤ 185	EPDM	2xM400 TB/G	1xM400 CP
		240 to 630	EPDM	2xM440 TB/G	1xM440 CP
2	Prysmian	0 to 400	EPDM	PMA5-400/36	FMPCs-400
2	Südkabel	≤ 500	Silicone	2xSEHDT 33	1xKU 33
2	NKT cables	≤ 300	Silicone	2xCB 36/630	1xCP 630C
		≤ 300	Silicone	1xCB 36/630+ 1xCC 36/630	-
		400 to 630	Silicone	2xCB 36/630 (1250)	1xCP 630 C
		400 to 630	Silicone	1xCB36/630 (1250)+ 1xCC 36/630 (1250)	-
2	Tyco Electronics Raychem	≤ 300	Silicone	1xRSTI-66xx+	1xRSTI-CC-L66xx
		400 to 630	Silicone	1xRSTI-xxLxx+	1xRSTI-CC-xLxx

(1) Only for reference. Complete cable characteristics to be transmitted to connectors manufacturer for real reference.

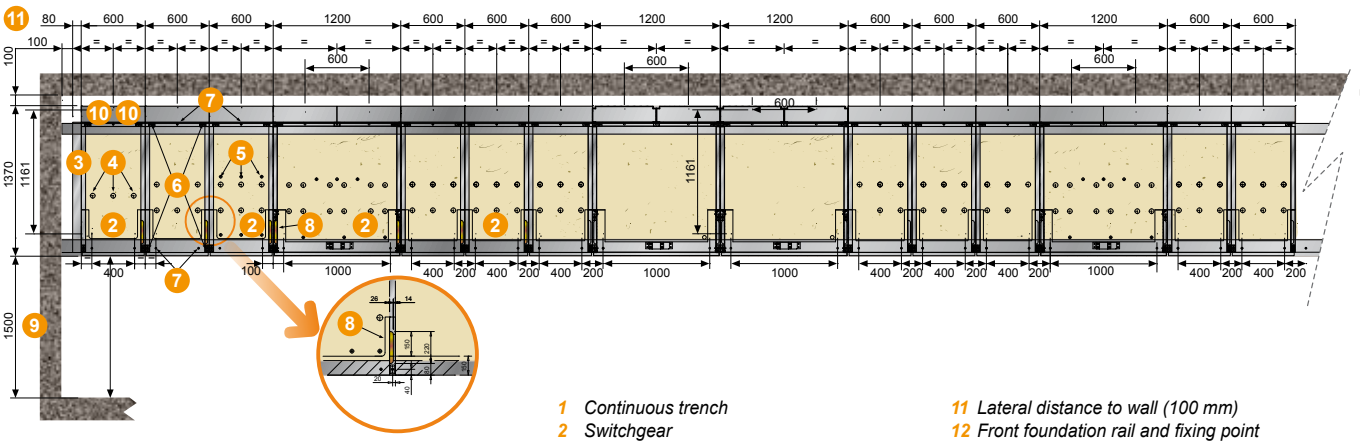
2000 A substation layout





A Incomer
B Feeder
C Bus section
D Bus riser
E Auxiliary Services

Layout



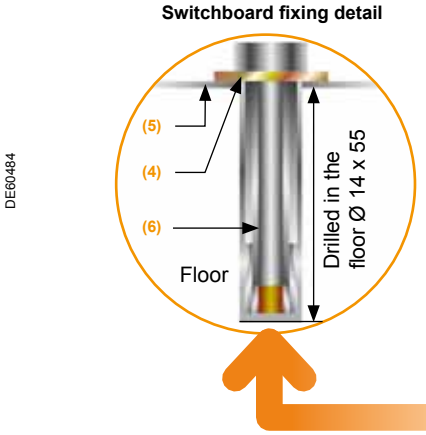
1 Continuous trench
2 Switchgear
3 Left side end panel
4 Situation of MV power cables
5 Situation of VT cables
6 Level adjustment points
7 Fixing points
8 Control cables routing, 220x26mm open to right
9 Minimum front operating aisle (1500 mm).
10 Relief area for SF6 gas (100 mm).
11 Lateral distance to wall (100 mm)
12 Front foundation rail and fixing point
13 Area for outgoing MV cables
14 Floor
15 M12 x 75 DIN 912 Allen screw (hexagonal socket head screw) for switchgear level adjustment
16 Washer
17 Switchgear baseplate
18 Expand screw

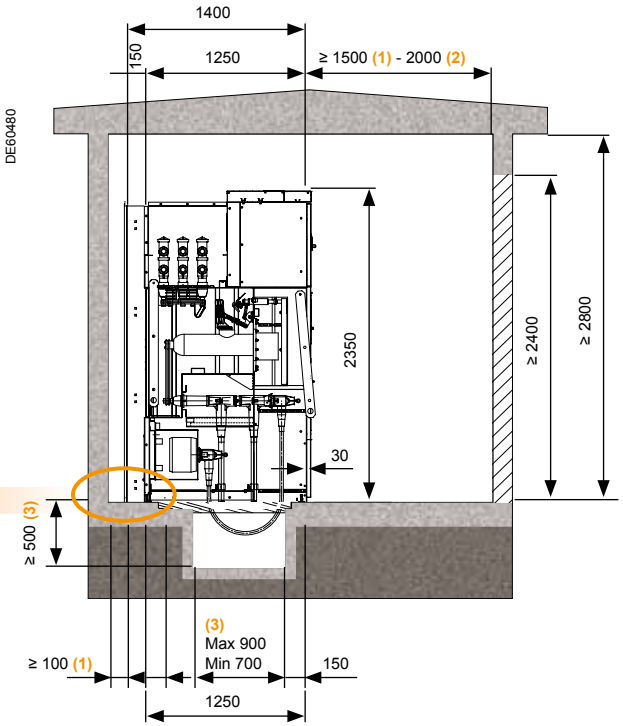
Civil engineering

The use of CBGS-0 switchgears implies a maximum optimization of the necessary space. Space saving is about 50 % (24 kV) and 70 % (36 kV), compared to the traditional air insulation solutions.

- Weight per cubicle from 450 up to 650 kg.
- All the given numbers are minimum values.
- Dimensions in mm.
- For further details, please refer to the Instructions Manual.

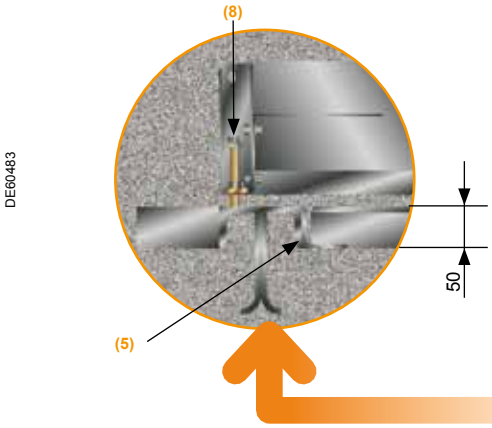
Switchgear positionning in the substation

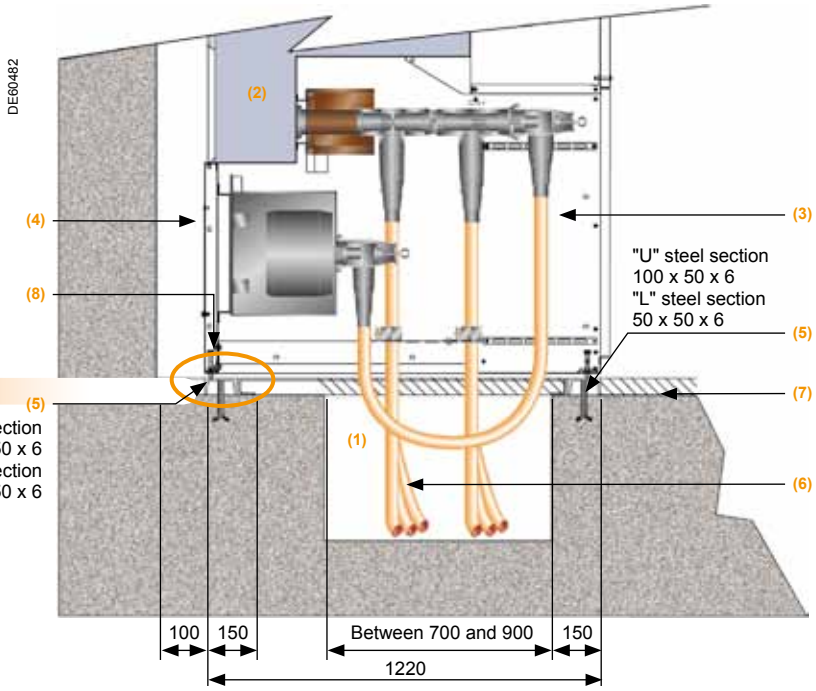




(1) *Minimum distance required for operation.*
(2) *Necessary distance for the extraction of a functional unit from the switchboard, without moving the rest of the units.*
(3) *Trench dimensions in accordance with the characteristics of the cables used (minimum cable bending radius).*
(4) *Washer.*
(5) *Switchgear baseplate.*
(6) *Expand screw.*

Detail of the switchgear level adjustment





(1) *Continuous trench*
(2) *Switchgear*
(3) *Minimum front operating aisle (1500 mm).*
(4) *Relief area for SF6 gas (100 mm)*
(5) *Front foundation rail and fixing point*
(6) *Area for outgoing MV cables*
(7) *Floor*
(8) *M12 x 75 DIN 912 Allen screw (hexagonal socket head screw) for switchgear level adjustment*

Notes

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