

GHA

Gas-Insulated Circuit-Breaker Switchgear Unit up to 40.5 kV

Energy supply security is our permanent challenge.

At Schneider Electric, we are constantly developing and improving our products and services. Our aim is to satisfy our customers' high demands for a safe electrical power supply while producing highly efficient yet economical and ecological transmission and distribution equipment.

Safe, secure and environmentally friendly

Schneider Electric's Gas-Insulated Circuit Breaker Switchgear GHA is groundbreaking thanks to its high dependability, operating reliability, maximum operator safety and ergonomic operator guidance. The GHA switchgear complies with the latest ecological requirements.

Easy, innovative and economical

GHA is an optimum solution for different requirements and applications from transformer substations to switching stations for primary power supplies. GHA is perfectly suited for public and industrial distribution networks, infrastructural projects, mining, metallurgy, petrochemical oil and gas industries, railway traction power supply, container stations and ship building.

GHA is a modern, innovative switchgear concept with a variety of equipment options. It is a gas-insulated circuit breaker switchgear with ratings up to 40.5 kV, 2,500 A and 40/100 kA.

GHA is designed as a single or double busbar system. This compact and modular switchgear offers both flexibility and a long, trouble-free service life. It is also ideally suited for applications in confined spaces or for replacing older switchgear - while permitting utilisation of the existing locations.

GHA is economical, enabling erection, extensions and disassembly to be performed on site in a straightforward fashion and - thanks to its innovative B-Link busbar connection - without any special gas handling requirements.

GHA has been tested according to IEC and European EN standards, as well as the appropriate national standards derived from them.



PM103255



Customer Benefits

- No gas handling during installation, extension work and panel replacement
- Innovative, fault-tolerant busbar link
- Intuitive operator guidance
- Maximum operational reliability and operator safety
- Environmentally compatible, easy to recycle



PM100921



PM103282



PM103283

... at a glance

Operator safety

- Maximum protection against accidental contact thanks to a complete metal enclosure of all switchgear components
- Optimum operator safety thanks to a comprehensive interlocking system
- Successfully tested IAC

Secured operation

- The active medium-voltage components are located in hermetically sealed, gas-filled compartments and are insensitive to:
 - aggressive atmospheres
 - dirt
 - dust
 - vermin
- Inert insulating gas SF6 provides protection against fire in the panel and prevents contact oxidation
- Simple drive mechanisms
- Stable and reliable gas system

Reliable

- Mechanical and/or electronic gas monitoring equipment for each gas compartment, each with its own separate pressure relief device
- Low number of static and dynamic seals
- High number of mechanical and electrical operations thanks to the use of vacuum circuit breakers
- Reliable drive and interlocking system

User friendly

- Compact and clear design
- Easy access to all functional groups
- Good operator guidance due to its ergonomical industrial design
- Visually highlighted control panel
- Logical operation
- Good visual operator guidance for mechanical panel operation

Economically efficient

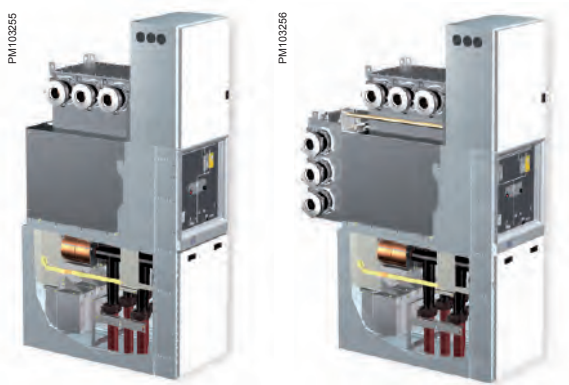
- Reduced space and surface area requirements
- Short assembly times
- Minimised operating costs
- Maintenance-free gas tank made of stainless chromium-nickel steel

Climate independant

- All HV parts are in SF6 atmosphere with a slight overpressure, thus protected against humidity and contamination, regardless of the installation altitude

Environmentally friendly

- Optimisation of material and energy consumption during manufacturing
- No gas handling on the assembly or switchgear extension on either side
- Compliance with all environmental requirements during its service life
- The use of recyclable materials for efficient disposal at the end of its service life



Single busbar

Double busbar

Improved busbar connections thanks to the innovative B-link

The busbars of each GHA switchgear panel are installed in separate gas-filled compartments. They are independent of external environmental influences and integrated into the insulating gas monitoring system. The connection of the busbars from adjacent panels is established via our innovative busbar link system: B-link. Like the gas-filled compartments, the B-link system does not require any maintenance. It enables assembly without gas work at the customer's site. Extensions or panel replacements within the panel assembly are possible without gas handling and without interference in the gas-filled compartments. The potential-controlled, externally grounded, flexible and robust silicone insulated elements of the B-link system distinguish themselves by their extremely simple assembly and minimum electrical field intensities. The busbar on the switchgear ends is closed with voltage-proof terminations.

Further benefits of the B-link system include:

- All silicone insulated elements are already mounted on the switchgear panel at the factory and are included in the partial discharge factory testing.
The on-site assembly of the B-link system is performed under visual supervision (you see what you do).
- After disassembly of a B-link system between adjacent panels, an isolating distance can be established to form separate busbar sections without gas handling.
- If necessary, the resistance can be measured separately for each busbar section, for a complete busbar system or for a panel.

**innovative
simple
robust
flexible -> B-link.**

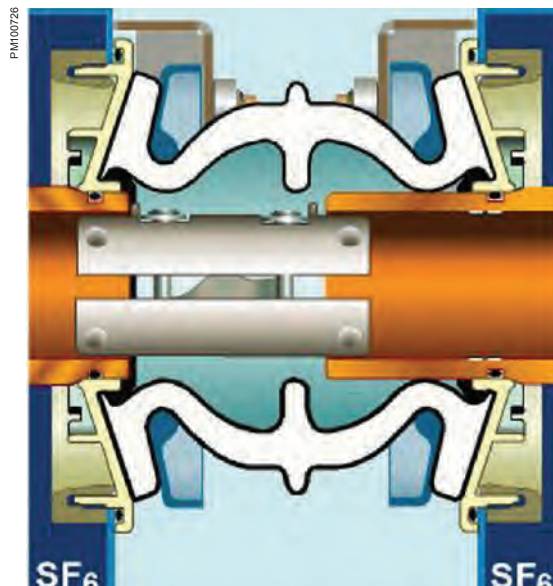
Improved, minimum space requirement

Thanks to the reduced space requirement, GHA minimises the cost of investment. The replacement of older, conventional switchgear units by GHA in the existing rooms is possible by a step-wise commissioning of the GHA panels while disassembling the existing old switchgear. This minimises downtime for your electrical power supply.

The GHA switchgear has been designed for standard wall-mounting. It does not require an assembly aisle. All operating and maintenance procedures can be performed from the front / operator side. Free-standing installation is possible as an option.

Improved switchboard management - no on-site gas handling

GHA does not require on-site gas handling for erection or extension work. All gas-filled compartments are delivered to the site of installation with the rated filling pressure. All gas-filled compartments are completely factory tested against leakage. If necessary, switchgear assembly panel replacement is possible without gas work and without interference within the gas filled compartments.



Economic efficiency thanks to diversity

The versatile GHA modules enable the implementation of especially economic switchgear configurations:

- Circuit breaker panels for incoming and outgoing feeders, with optional inner cone type and outer cone-type cable connection systems
- Outgoing voltage transformer with isolating device on HV side and a transformer earthing feature
- Bus couplers within one panel width for double busbars
- Bus section couplers with circuit-breakers including busbar risers within one panel width
- Bus section couplers and bus couplers with integrated busbar earthing
- Busbar risers without switching devices
- Bus sectionalizer panels with two-/three-position disconnectors
- Metering panels with current and/or voltage transformers

Busbar accessory modules:

- Busbar voltage transformer with isolating / earthing device for voltage transformers on the HV side
- Busbar earthing switch
- Busbar terminals for cable or fully insulated bars

Front view



Double busbar

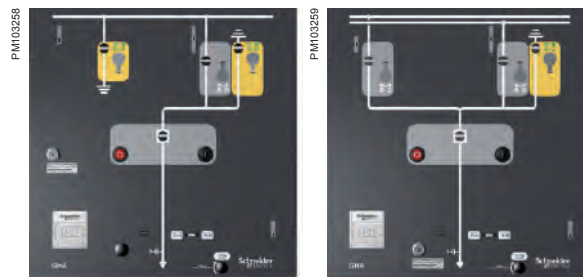
Ergonomic operation

Mechanical operation is performed the same way as with the habitual operation of conventional switchgear with stationary switching devices. Separate mechanical control elements and indicators are available for the following functions:

- Circuit breaker ON / OFF
- Disconnector ON / OFF
- Outgoing feeder / busbar earthing ON / OFF

The mechanical control panel is located at an operator-friendly height and arranged in a recessed position on the switchgear front. The operating area is clearly visible without control elements protruding from the switchgear front.

Control Panel



Single busbar

Double busbar

The position of the individual elements has been selected according to their function, i.e. according to their allocation to the corresponding device functions. The elements that form part of a main switching device, such as position indicators, interrogating levers and crank ports, are visually linked by a specific pattern and integrated in a mimic diagram.

High variety of circuit-breaker panel

- Circuit breaker module
The vacuum circuit breaker is located in a metal-enclosed gas-filled compartment. The drive units for all switching devices and the interlocks are easily accessible from the front.
- Single busbar module. The separate, gas-filled compartment accommodates the three-position disconnecter with the busbar system.
- Double busbar module
The upper gas-filled compartment accommodates the busbar system and the three-position disconnecter. The system arrangement at the rear of the panel houses the two-position disconnecter together with the busbar system.
- Safe, reliable interlocking drive. The circuit-breaker is fitted with a spring mechanism with the operating sequences for automatic reclosing. The drive mechanisms for the circuitbreaker and the two-to three-position disconnectors feature mechanical interrogation interlocks, which rule out operating errors.

Current transformers and voltage transformers

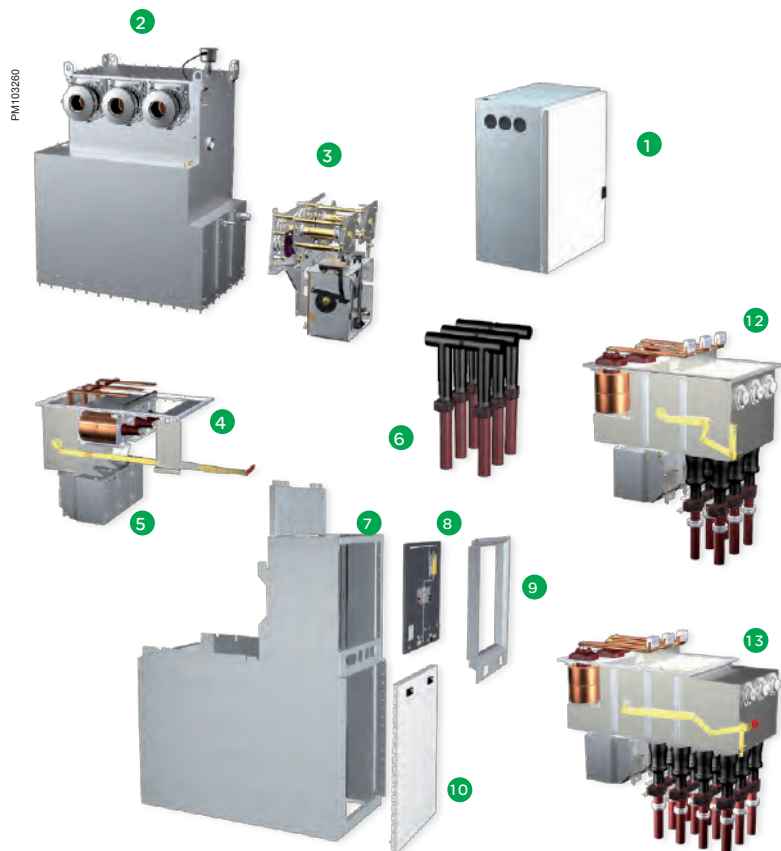
The current transformers are designed as toroidal-current transformers and are connected to the earth potential. There is no dielectric stress on the HV end. The transformer ratio, accuracy class and performance are adapted to the project-specific requirements.

The metal-enclosed voltage transformers are inductive transformers arranged outside of the gas compartments. They are pluggable and mounted via inner cone-type systems. An HV disconnecter for the voltage transformers is integrated into the GHA switchgear.

Power-frequency tests on the switchgear are performed without dismantling transformers or plug-and-socket connectors.

The GHA modules

1. Low voltage cabinet
2. Circuit-breaker module with busbars and three-position switch (not shown)
3. Drive block
4. Outgoing feeder block with outer cone-type system and toroidal core current transformer
5. Voltage transformer (pluggable)
6. Cable connection
Example: double connection per phase
7. Panel rack
8. Control panel
9. Front mounting frame
10. Cable compartment cover



Optional

11. Outgoing feeder block with inner cone-type system, 1 cable per conductor with toroidal core current transformer and voltage transformer (not shown)
12. Outgoing feeder block with inner cone-type system, 2 cables per conductor with a toroidal core current transformer and voltage transformer
13. Outgoing feeder block with inner cone-type system. Quadruple cable connection with a toroidal current transformer and voltage transformer

GHA

Attention to detail

Clearly arranged gas compartment technology

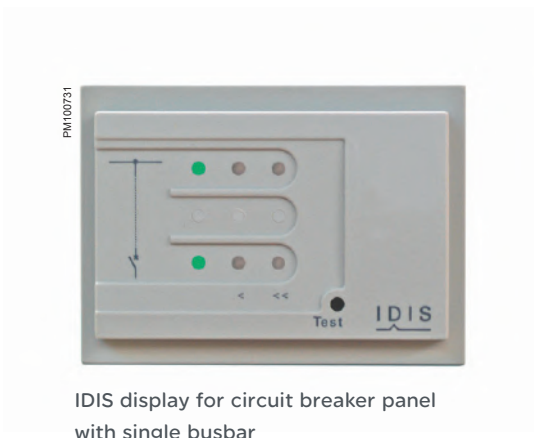
Each gas-filled compartment is monitored by the gas density monitoring system IDIS. The gas status is detected via pressure sensors and is retransmitted to the IDIS display by electrical signals. The gas status is monitored on the front end of the switchgear on the IDIS and separately for each gas compartment.

Safe testing for zero voltage

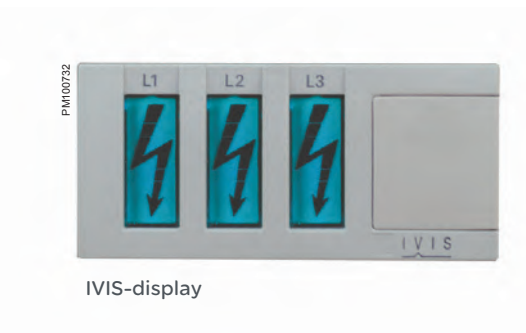
The test for zero voltage is effected via capacitive decoupling in the cone-type cable bushings for the cable connection.

The indicators for the zero voltage test are arranged on the front side below the control panel. All voltage testing systems are Voltage Detecting Systems (VDS) according to IEC 61243-5 and VDE 0682-415.

The basic design is a non-integrated voltage testing system HR. The integrated voltage detection system IVIS is also available as an option, meaning that otherwise necessary repeat tests can be dispensed with.



IDIS display for circuit breaker panel with single busbar



IVIS-display

Up to three pressure sensors can be connected to an IDIS display. When an alarm level reacts, remote signalling can be issued as a gas group alarm message. Optionally, temperature-compensated pressure gauges with auxiliary contacts can be used on the switchgear front.

Each gas-filled compartment has its own pressure relief device. In case of excess pressure, the pressure is relieved towards the rear part of the switchgear. An additional switchgear pressure relief duct is optionally available.

Flexible low voltage cabinet

Low voltage devices for line protection, control and monitoring as well as terminal strips are installed in the spacious low-voltage cabinet. The rugged door of the low-voltage cabinet accommodates all devices required for the operation of a switchgear panel. The basic model of the metal-enclosed, low-voltage switch cabinet mounted on the panel is 800 mm high (this corresponds to a panel height of 2,400 mm). An optional low-voltage cabinet with a height of 1,200 mm can be implemented (which corresponds to a panel height of 2,780 mm).

The low-voltage cabinet is available separately, hence on site assembly is required.

The interface to the panel on the low-voltage end is a pluggable design.

A great variety of cable connections

The metal-enclosed cable connection compartment is easily accessible on the switchgear front and suitable for a great variety of cable connection techniques. The GHA cable connection system can be selected with outer cone-type cable bushings (type C according to EN 50 181) or inner cone-type cable bushings (according to EN 50 181).

Outer-cone cable bushings

A great variety of cable types with cross sections up to 800 mm² can be connected via cable T-type plugs or terminal adapters. Up to 3 cable T-type plugs or terminal adapters can be connected for each bushing with a current carrying capacity of 1,250 A. Cable screw-type connectors or terminal adapters can easily be combined with system-specific surge arresters.

Outgoing feeders > 1,250 A feature 2 outer cone-type bushings per phase.

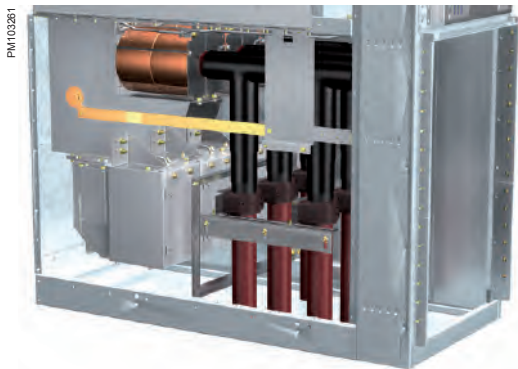
Cable testing (with the cables connected) does not require an additional test socket in the GHA switchgear.

Inner cone-type bushings

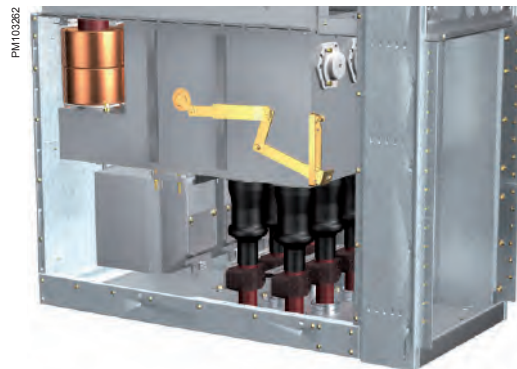
For the selected cable types and cross-sections, appropriate inner cone-type bushings are available for cable connector terminal types 2 and 3 and for modified connectors, terminal type Connex size 4, (manufacturer: Pfister). Up to four inner cone-type bushings per conductor can be installed in the GHA switchgear, depending on the inner-cone connection type.

One bushing per conductor is required for inner cone-type surge arresters.

For cable testing with the cables connected, the inner cone-type system features, as standard equipment, additional terminal type 2 test sockets on the front of the switchgear.



Outer cone-type system



Inner cone-type system

Standards

Design, model	IEC 62271-200	EN 62271-200
Vacuum circuit breaker (M2/E1 and E2 ⁽¹⁾)	IEC 62271-100	EN 62271-100
Disconnecter and three-position switch (M1)	IEC 62271-102	EN 62271-102
Busbar earthing switch and earthing via vacuum circuit-breaker (E2)	IEC 62271-102	EN 62271-102
Protection against accidental contact, foreign objects and watercontact, foreign objects and water	IEC 60529	EN 60529
Aggravated ambient conditions - optional	IEC 62271-304	
Current transformers	IEC 60044-1	EN 60044-1
Voltage transformers	IEC 60044-2	EN 60044-2

Erection	EN 50522 / IEC 61936-1
Ambient conditions IEC 62271-1 / EN 62271-1	
Temperature of the ambient air:	
Maximum value	40 °C
Average value over 24 hours	35 °C
Minimum "indoor" value	-5 °C
Installation altitude	1,000 m ⁽²⁾

⁽¹⁾ depends on operating sequence

⁽²⁾ higher values on request

Technical characteristics
Ratings

Rated voltage		kV	12	17.5	24	36	40.5
Rated lightning impulse withstand voltage		kV	75	95	125	170	185
Rated power frequency withstand voltage		kV	28	38(42)	50	80	80
Rated peak withstand current	max.	kA	100	100	100	100	80
Rated short-time withstand current	max. 3s	kA	40	40	40	40	40
Rated busbar current	max.	A	2500	2500	2500	2500	2500
Rated current of outgoing feeders with natural cooling	max.	A	2500	2500	2500	2500	2500
Internal arc classification IAC AFL or AFLR	max.	40 kA					31.5kA
							duration for 1 second

Dimensions of Single Busbar

Electrical characteristics		Dimensions ⁽¹⁾ mm					
Rated voltage	Rated normal current	Cubical width				Depth ⁽⁴⁾	Height
		Feeder		Transverse bus coupler ⁽²⁾	Longitudinal bus coupler ⁽³⁾		
kV	A	Outer cone	Inner cone				
		mm	mm	mm	mm	mm	mm
12 17.5 24 36 38 40.5	800 < 1,250	600	600	800	600	1,340	2,400 (with LV compartment 800 mm)
	1,600	800	600	800	600	1,340	
	2,000	800	600	800	600	1,348 1,380	
	2,500 ⁽⁵⁾	900	900	1,000	600	1,340	2,780 mm (with LV compartment 1,200 mm)
	800 < 1,250	-	600	800	600	1,340	
	1,600	-	600	800	600	1,340	
	2,000	-	600	800	600	1,340	
	2,500 ⁽⁵⁾	-	900	1,000	600	1,340	

⁽¹⁾ Basic version ⁽⁴⁾ with pressure relief channel, uniform 1,595 mm
⁽²⁾ in one cubical width ⁽⁵⁾ with natural cooling
⁽³⁾ only with disconnecter

Dimensions of Double Busbar

Electrical Characteristics		Dimensions ⁽¹⁾ mm						
Rated voltage	Rated normal current	Cubical width				Depth ⁽⁴⁾	Height	
		Feeder		Transverse bus coupler	Longitudinal bus coupler for 1 BB ⁽²⁾			Bus sectionalizer ⁽³⁾
kV	A	Outer cone	Inner cone					
		mm	mm	mm	mm	mm	mm	
12 17.5 24 36 38 40.5	800 < 1,250	600	600	600	800	600	1,700	2,400 mm (with LV compartment 800 mm)
	1,600	800	600	600	800	600	1,700	
	2,000	800	600	600	800	600	1,860	
	2,500 ⁽⁵⁾	900	900	900	1,000	600	1,860	2,780 mm (with LV compartment 1,200 mm)
	800 < 1,250	-	600	600	800	600	1,700	
	1,600	-	600	600	800	600	1,700	
	2,000	-	600	600	800	600	1,860	
	2,500 ⁽⁵⁾	-	900	900	1,000	600	1,860	

⁽¹⁾ Basic version ⁽⁴⁾ with pressure relief channel, uniform 1,595 mm
⁽²⁾ in one cubical width ⁽⁵⁾ with natural cooling
⁽³⁾ only with disconnecter