

# GHA Gas-Insulated Switchgear

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**Schneider**  
Electric™

# GHA Gas-insulated Circuit Breaker Switchgear Unit up to 38 kV

## Energy Supply Reliability is our 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 reliable electrical power supply while producing highly efficient yet economical transmission and distribution equipment.

The Gas-insulated Circuit Breaker Switchgear GHA from Schneider Electric is compact and easy to install and operate. It reduces arc flash potential with high-voltage parts that are protected from environmental influences.

## Easy, Innovative, and Economical

GHA is an ideal solution for a different variety of requirements and applications from transformer substations to switching stations for primary power supplies. GHA is well-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 38 kV, 2500 A and 40 kA RMS symmetrical, 170 kV BIL.

This compact and modular switchgear offers both flexibility and a long, low-maintenance service life. It is also ideally suited for applications in confined spaces or for replacing older switchgear — while permitting utilization of the existing locations.

GHA is economical as erection, expansions, and disassembly occur on site in a straightforward fashion. Thanks to its innovative B-link busbar connection assembly, times are shortened, with no need for gas handling on site.



## Advantages

- No gas handling during installation, expansions, and section replacement.
- Innovative, state-of-the-art busbar link.
- Intuitive operator guidance.
- Improved operational reliability.
- Recyclable materials for efficient reuse or disposal at the end of life.





### Structural integrity

- Improved protection against accidental contact as a result of the metal enclosed switchgear components
- Comprehensive interlocking system
- Reduced arc flash potential
- The medium-voltage components are contained in hermetically sealed, gas-filled compartments and are unaffected by:
  - aggressive atmospheres
  - dirt
  - dust
  - vermin
- Inert, insulating SF<sub>6</sub> gas inhibits oxidation on bus bars
- Simple drive mechanisms
- Stable gas system

### Reliable

- Electronic gas monitoring equipment for each gas compartment, with individual pressure relief devices
- Low number of static and dynamic seals
- High number of mechanical and electrical operations as the result of the use of vacuum circuit breakers
- Robust drive and interlocking system

### User-friendly

- Compact design
- Easy access to operator interface
- Visually highlighted control panel
- Operations are performed from the front of the switchgear

### Reduced installation and operating cost

- Reduced space requirements
- Reduced assembly times due to the innovative B-link busbar connections
- Minimized operating costs
- Maintenance-free gas tank made of stainless chromium-nickel steel

### Ecological

- All HV parts are in a SF<sub>6</sub> atmosphere with a slight overpressure, protecting against humidity, contamination, and rodents
- Optimization of material and energy consumption during manufacturing
- No gas handling during assembly or switchgear expansion
- The use of recyclable materials for efficient disposal at the end of its service life



## Improved busbar connections as a result of 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 section replacements within the switchgear 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 extremely simple assembly and minimum electrical field intensities. The busbar on the switchgear ends are closed using an insulating end cap.

Further benefits of the B-link system include:

- The silicone insulated elements are mounted on the switchgear assembly in the factory and are tested by partial discharge factory testing.
- B-link components are visible, providing easy assembly.
- After disassembly of a B-link system between adjacent sections, an isolating distance can be established to form separate busbar sections without gas handling.
- When required, the resistance can be measured separately for each busbar section, for a complete busbar system, or for a section.

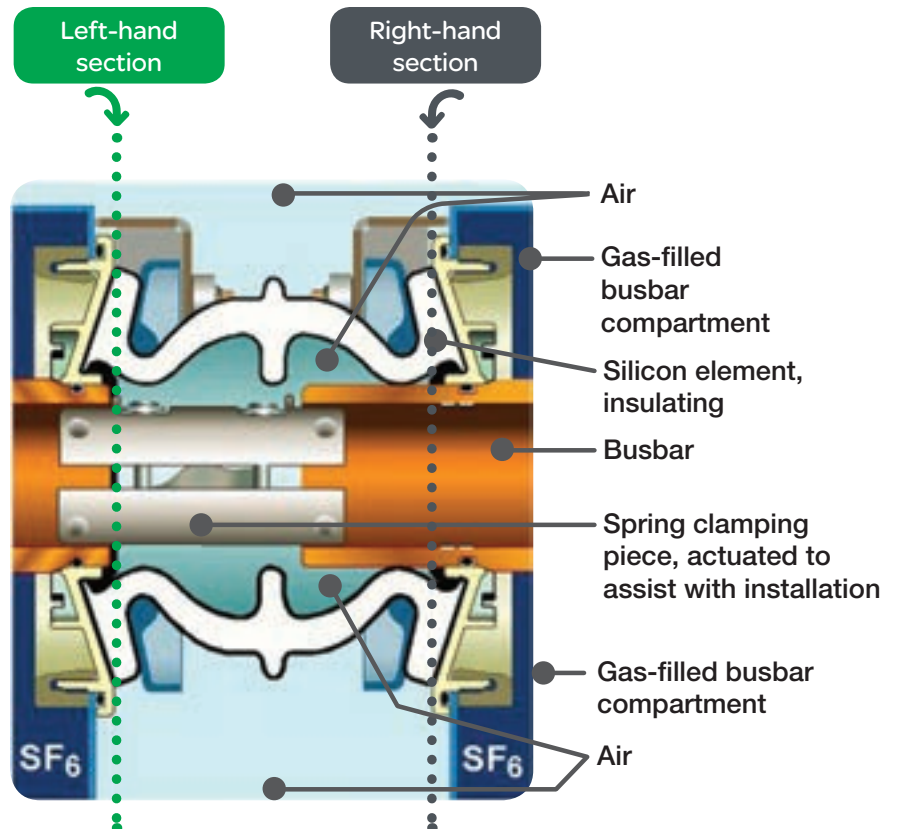
## Reduced space requirement

Thanks to the reduced space requirement, GHA helps to minimize the cost of investment. The replacement of older, conventional switchgear units by GHA in the existing rooms is possible through step by step commissioning of the GHA panels while disassembling the existing switchgear. This process minimizes downtime for the electrical power supply.

The GHA switchgear has been designed for front access only installations. It does not require a rear access aisle. Operating and maintenance procedures can be performed from the front side.

## Improved switchgear management – no on-site gas handling

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



## Economic efficiency thanks to diversity

The versatile GHA modules enable implementation of a variety of switchgear configurations:

- Circuit breaker sections for incoming and outgoing feeders with outer cone-type cable connection systems
- Outgoing voltage transformer with isolating device on HV side and transformer grounding feature
- Bus tie with circuit breaker including busbar risers and integrated busbar grounding within one section width
- Busbar risers without switching devices
- Bus sectionalizer sections with three-position disconnecter
- Metering sections with current and/or voltage transformer

### Busbar accessory modules:

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



Front view

### Ergonomic operation

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

- Circuit breaker ON/OFF
- Disconnecter ON/OFF
- Outgoing feeder/busbar grounding 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

The position of the individual controls are located on the panel according to their position internal to the switchgear. The elements which form part of a main switching device, such as position indicators, interlocking levers, and the disconnect handle port, are visually linked by a specific pattern and integrated in a mimic diagram.

### Section components

- 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.
- Busbar module.  
The separate, gas-filled compartment accommodates the three-position disconnecter with the busbar system.
- The circuit breaker is fitted with a spring mechanism with operating sequences for automatic reclosing. The drive mechanisms for the circuit breaker and the three-position disconnecters feature mechanical interlocks.

## The GHA modules

1. Low-voltage cabinet
2. Circuit breaker module with busbars and three-position switch
3. Drive block
4. Outgoing feeder block with outer cone-type system and window-type current transformer
5. Voltage transformer (pluggable)
6. Cable connection: double connection per phase shown
7. Panel rack
8. Control panel
9. Front mounting frame
10. Cable compartment cover



## Current transformers and voltage transformers

The current transformers are designed as window-type current transformers and are connected to ground potential. 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 disconnector for the voltage transformers is integrated into the GHA switchgear. Primary fused voltage transformers are provided as required per the National Electric Code.

## Clearly arranged gas compartment technology

Each gas-filled compartment is monitored by means of the gas density monitoring system, Intelligent Density Information System (IDIS). The gas status is detected via pressure sensors and is transmitted to the IDIS display by electrical signals. The gas status is displayed on the front of the switchgear via the IDIS display. Each gas compartment is monitored separately.

Up to three pressure sensors can be connected to an IDIS display. When an alarm level is reached, remote signalling can be issued as a gas alarm message.

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

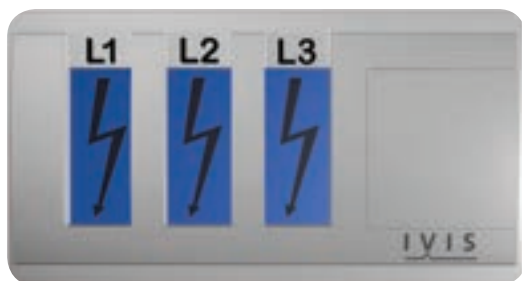


IDIS display for circuit breaker section

## Testing for zero voltage

The test for zero voltage is accomplished by 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.

The basic design is a non-integrated, high-resistance voltage testing system. Optionally, the integrated voltage detection system, Intelligent Voltage Information System (IVIS), is available, which minimizes the need for repeated tests.



IVIS display

## Low-voltage cabinet

The 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 the devices required for operation of a switchgear section. The basic model of the metal-enclosed, low-voltage switch cabinet mounted on the section is 31.5 in. high (total section height of 94.5 in.). An optional low-voltage cabinet with a height of 47 in. can be provided (total section height of 109.5 in.). The interface to the section on the low-voltage end is a pluggable design.

## Cable connections

The metal-enclosed cable connection compartment is easily accessible on the switchgear front, and suitable for a variety of cable connection techniques.

The GHA cable connection system is provided with outer cone-type cable bushings.

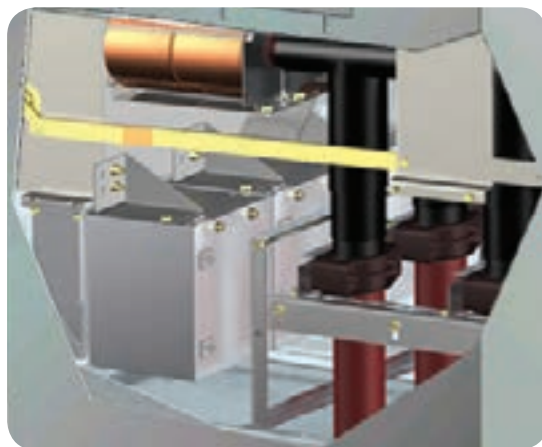
## Outer-cone cable bushings

A great variety of cable types with cross sections up to 1250 mcm can be connected via cable Tee screw-type plugs or terminal adapters.

Up to three cable Tee screw-type plugs or terminal adapters can be connected for each bushing with a current carrying capacity of 1250 A. Cable screw-type connectors or terminal adapters can easily be combined with system-specific surge arresters.

Outgoing feeders with current carrying capacities greater than 1250 A feature two outer cone-type bushings per phase.

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



Outer cone-type system



## Technical characteristics

### Ambient conditions

Maximum value	104 °F/40 °C
Average value over 24 hours	95 °F/35 °C
Minimum value <sup>(2)</sup>	23 °F/5 °C
Installation altitude	3280 ft./1000 m <sup>(1)</sup>

<sup>(1)</sup> higher values on request

<sup>(2)</sup> GHA is designed as an indoor product. Temperature values are indoor values.

### Ratings

Rated voltage	kV	12	15	27	38
Rated lightning impulse withstand voltage	kV	75	95	125	170
Rated power frequency withstand voltage	kV	28	38	50	80
Rated short-time withstand current	max. 3 s	kA	40	40	40
Rated busbar current	max.	A	2500	2500	2500
Rated current of outgoing feeders with natural cooling	max.	A	2500	2500	2500
Internal arc classification IAC, AFL, or AFLR	max.	40 kA			
		duration for 1 second			

### Dimensions

Electrical Characteristics		Dimensions				
Rated voltage	Rated normal current	Cubical width			Depth <sup>(4)</sup>	Section height
		Main/Feeder	Bus tie with circuit breaker <sup>(2)</sup>	Bus sectionalizer <sup>(3)</sup>		
kV	A	in./mm	in./mm	in./mm	in./mm	
12 17.5 24 38	less than or equal to 1200	23.6/600	31.5/800	23.6/600	62.8/1595	94.5/2400 (with LV compartment 31.5 in.)
	2500	35.5/900	39.4/1000	23.6/600	62.8/1595	

<sup>(2)</sup> in one cubical width

<sup>(3)</sup> only with disconnecter


<sup>(4)</sup> with pressure relief channel, uniform 1595 in.

<sup>(5)</sup> 47 in. LV compartment available as an option

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