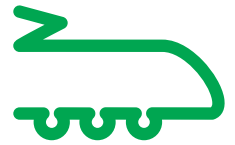


GHA Rail

27.5 kV Gas Insulated Switchgear for railway applications



GHA Rail is a modern, innovative switchgear concept with a variety of equipment options. We offer Gas Insulated Circuit-Breaker switchgear with ratings of 27.5 kV, 2000 A and 25 kA/63 kA. GHA Rail is designed as a single busbar system for one and two pole configurations. This compact and modular switchgear offers both flexibility and a long, trouble-free service life.

GHA Rail is an economically complete solution - erection, extensions and disassembly are all done on site easily, thanks to the innovative B-link busbar connection, with no gas handling requirements.

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

ENERGY SUPPLY SECURITY IS OUR PERMANENT CHALLENGE.

At Schneider Electric, we are constantly developing and improving our products and services to meet the demands of continuous electrical power supply. We are also committed to meeting the highest standards of environmental requirements. Our aim is to satisfy customer demands for a safe electrical power supply, while producing highly efficient yet economical and ecological transmission and distribution equipment.

GHA Rail - Safe and secure

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

GHA Rail - easy and innovative

GHA Rail is an optimum solution for a wide variety of requirements and applications, from railway substations to primary power supplies.

Customer Benefits

- Modular design, space savings
- Designed for wall mounting
- Distinctive busbar link, no gas handling during extension work and panel replacement
- Intuitive operator guidance from panel front
- HV and current test socket at cubicle front
- Maximum operational reliability and operator safety due to interrogative mech. interlock
- Sealed pressure system leakage rate $\ll 0,1\%$ p.a.
- Low maintenance costs
- Environmentally compatible, easy to recycle

GHA RAIL OVERVIEW

PM102841



GHA Rail is Medium Voltage gas insulated, metal-clad Circuit-Breaker switchgear for electrical railway distribution systems. It meets a variety of requirements from transformer substations to switchgear stations for primary supplies with the following features:

Operator safety

- Maximum protection against accidental contact thanks to complete metal enclosure of all switchgear components
- Optimum operator safety thanks to a comprehensive interlocking system
- Internal Arc Classification "IAC"

Secure operation

- The active Medium Voltage components are located in hermetical sealed gas-filled compartments and are thus insensitive to:
 - aggressive atmospheres
 - dirt
 - dust
 - vermin
 - contact oxidation
- Simple drive mechanisms
- Stable and reliable sealed system

Reliable

- Electronic gas monitoring equipment for each gas compartment, each with a 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 thanks to its ergonomical industrial design
- High visibility control panel in the form of a single line diagram
- Logical operation
- Good visual operator guidance for mechanical panel operation

Economically efficient

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

Climate independent

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

Ecological

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

PM102840



Improved busbar connections thanks to the innovative B-link

The busbars of each GHA Rail switchgear panel are installed in separate gas-filled compartments, as required by the system. They are independent from 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**, which connects the Busbars between the gas filled Busbar compartments. The ground-breaking B-link system does not require any maintenance. It enables assembly without gas work at the customer 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 extremely simple assembly and minimum electrical field intensities.

The busbar system on the switchgear ends are closed with voltage-proof terminations. Further benefits of the B-link system include: All silicone insulated elements are already mounted in the switchgear panel in the factory and are included in the partial discharge factory testing. On-site assembly of the B-link system is done with full visual control (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, complete busbar system or for a panel.

Improved space exploitation Minimum space requirement

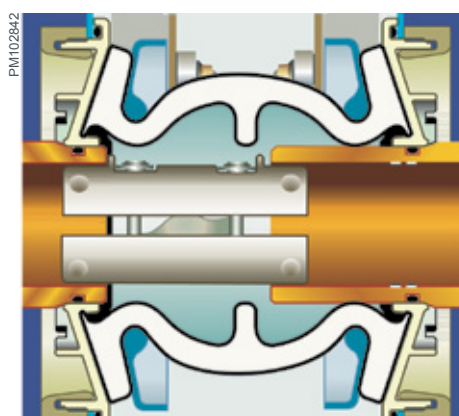
Thanks to the reduced space requirements, GHA Rail minimizes the cost of investment. The replacement of older, conventional switchgear units by GHA Rail in existing switchrooms is possible by step-wise commissioning of the GHA-Rail panels, while disassembling the existing old switchgear. This minimizes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

The GHA Rail switchgear has been designed for standard wall-mounting. It does not require a rear assembly aisle.

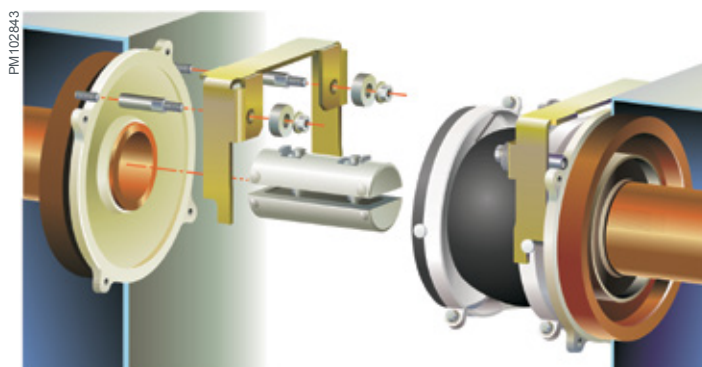
All operating and maintenance procedures can be performed from the front/operator side. Free-standing installation is possible as an option.

Improved switchboard management- No on site gas handling

GHA Rail does not require on site gas handling for erection or extension work. All gas-filled compartments are delivered to the site 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 compartment.



- B-link
- Innovative
 - Simple
 - Robust
 - Flexible



Busbar connection B-link

GHA RAIL FUNCTION UNITS

GHA Rail is designed for a new type of modularization. Each module enables implementation of the most economic switchgear configuration.

Circuit-Breaker module

- The vacuum Circuit-Breaker is located in a metal enclosed gas-filled compartment. All operating mechanisms of the switchgear and interlocking system are mounted outside the gas-compartment. The positions of the switching devices are indicated mechanically on the control panel. In addition, all operations can be provided by remote control, with motor operation.
- The circuit-breaker is fitted with a spring-charged mechanism, providing operating sequences for automatic reclosing. The drive mechanisms for the Circuit-Breaker and three-position disconnectors feature mechanical interrogation interlocks which prevent maloperation.
- Optionally, an integrated control device is available

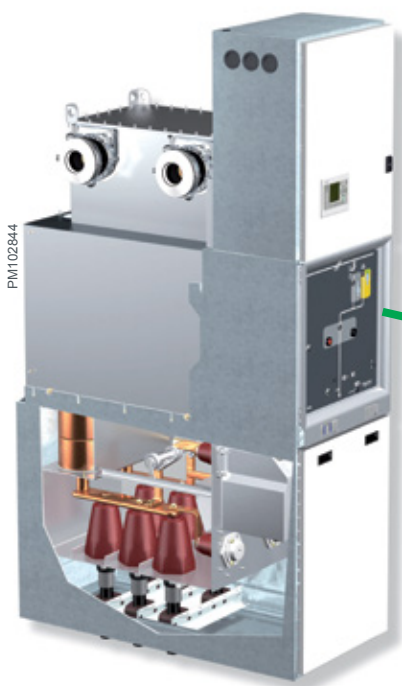
Busbar accessory modules

- Voltage Transformer with isolating/earthing device on the busbar side
- Busbar earthing switch

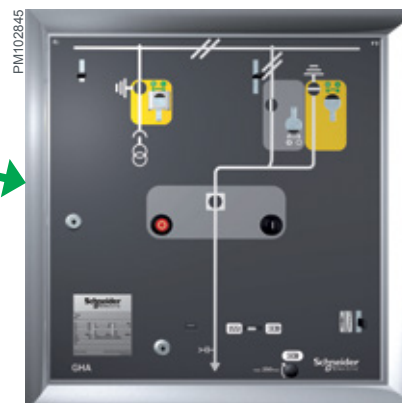
Operating mechanism

- The drive mechanism for the Circuit-Breaker and the three-position disconnector/earth switch are fitted with mechanical interrogating interlock systems, including all auxiliary components (auxiliary switch, tripping coil, motor, etc.)
- The three-position isolating earthing switch is operated by hand. Electrical operation is available as an option. The earthing is provided via three-position switch and Circuit-Breaker.
- The GHA Rail switchgear is designed according with the IEC 62271-1 and IEC 62271-200. GHA Rail is low maintenance switchgear during normal operating conditions and allows a very high number of mechanical and electrical operations.
- Separate mechanical control elements and indicators are available for the following functions:
 - Circuit-Breaker ON/OFF
 - Disconnector ON/OFF
 - Earthing switch 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.

The positions of the individual elements have been selected according to their function, i. e. according to their allocation to the corresponding device functions. The elements which 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.



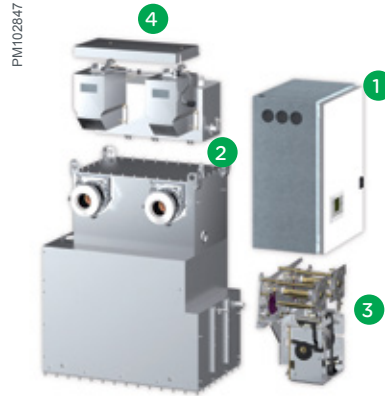
GHA Rail shown with 2 phases



Mechanical operation panel with front operation of Busbar VT switch for disconnecting

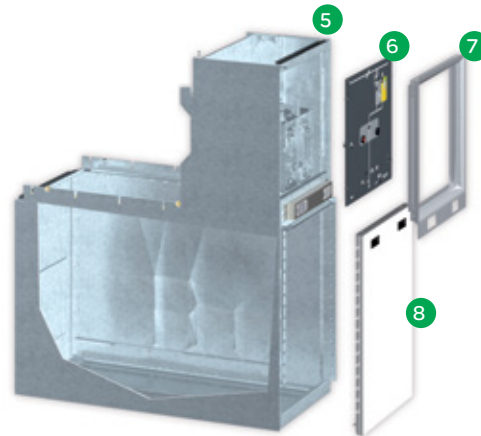
Current Transformers and Voltage Transformers

- The Current Transformers are toroidal and mounted outside the gas-filled compartment. There is no dielectric stress on the Current Transformer. The transformer ratio, accuracy class and performance are adapted to customer requirements.
- The Voltage Transformers for feeder and busbar metering are electromagnetic metal enclosed transformers and are also arranged outside the gas compartment. They are plug-in type and mounted via inner cone-type systems.



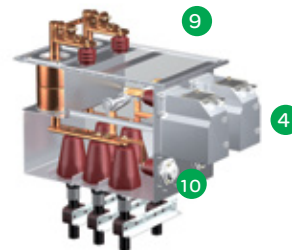
Low Voltage cabinet

- The Low Voltage devices for line protection, control and monitoring and terminal blocks are installed in the spacious Low Voltage cabinet. The door of the Low Voltage cabinet accommodates all devices required for operation of the switchgear panel.
- The basic model of the metal-enclosed, Low Voltage switch cabinet, mounted on the top of Circuit-Breaker compartment, is 800 mm high (this corresponds to a panel height of 2400 mm).



The GHA Rail modules

1. Separate Low Voltage cabinet plug in type
2. Circuit-Breaker module with busbar and three-position switch
3. Drive mechanism
4. Optional Voltage Transformer to cubicle front for Feeder (plug-in type) or Busbar Voltage Transformer (plug-in type) both with switch for disconnecting
5. Panel rack
6. Operation panel
7. Front mounting frame
8. Cable compartment cover
9. Outgoing feeder block with inner cone-type system, 1-3 cables per phase with toroidal core Current Transformer and optional Voltage Transformer
10. HV and current test socket at cubicle front



Gas compartment technology and monitoring

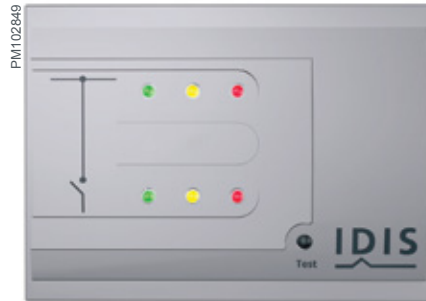
- GHA Rail Gas Insulated Switchgear has been designed as a “sealed pressure system” in conformity with the IEC 62272-200 standard requirements. All switchgear is also fitted with an IDIS display in accordance with the standards.
- Each gas-compartment is monitored by means of the gas density monitoring system IDIS. The gas density is detected via density sensors and is retransmitted to the IDIS display by electrical signals. The gas density is monitored on the front end of the switchgear on the IDIS and separately for each gas compartment.
- Up to three pressure sensors can be connected to an IDIS display. When an alarm level is reached, a remote signal is issued as a gas pressure alarm message via voltage free contacts.
- 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.

Voltage detection system

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.

The basic design is the integrated voltage detection system IVIS, which means that repeat tests (otherwise necessary) can be dispensed with.



IDIS display for gas monitoring
 • Green (normal)
 • Yellow (pre-alarm level)
 • Red (alarm level)



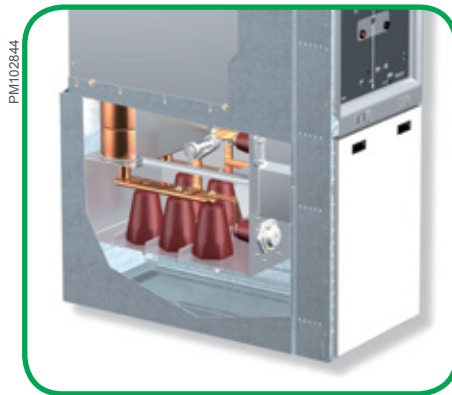
Gas density switch for gas monitoring



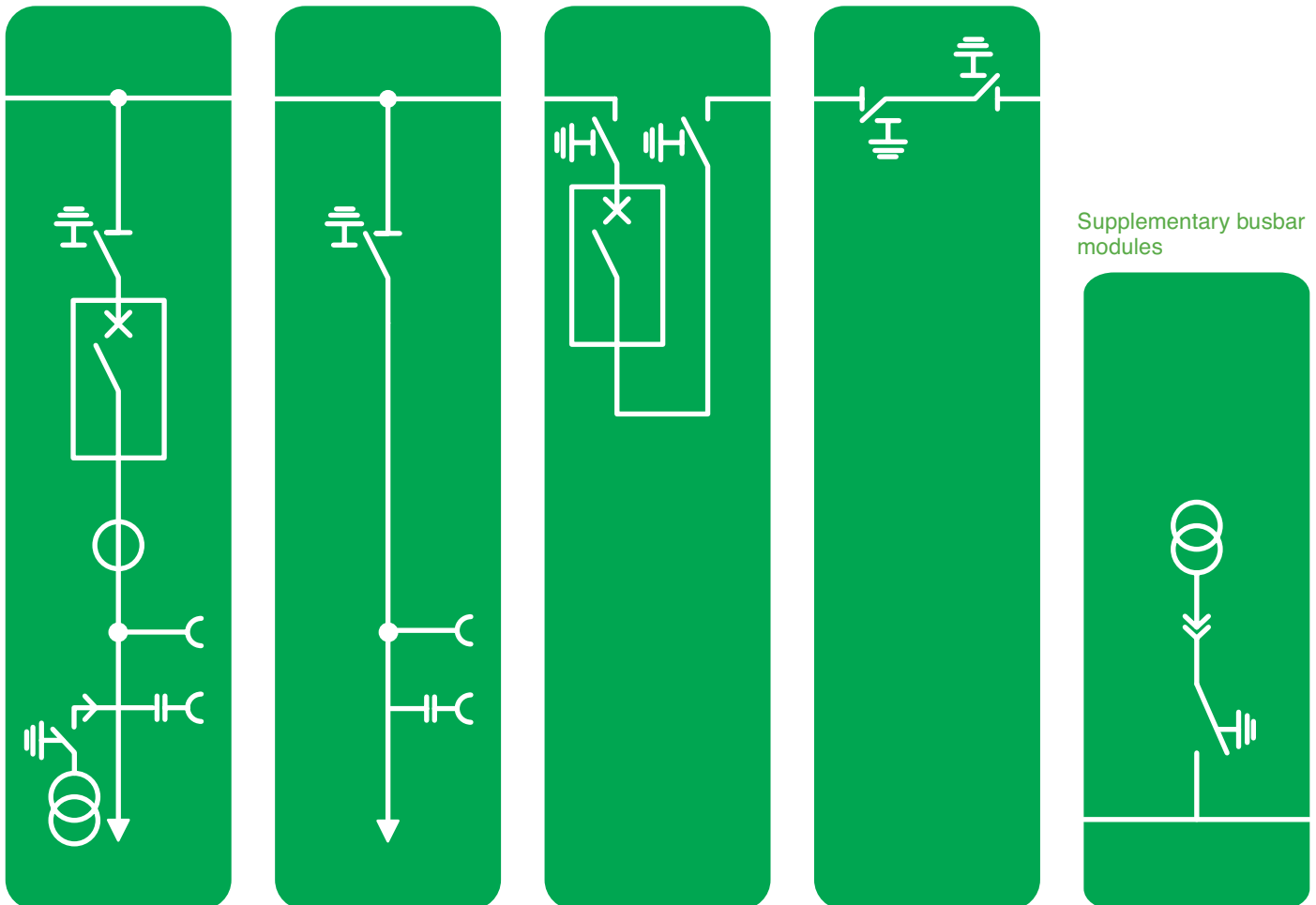
IVIS-display (2-pole) for voltage indication

Cable connections

- The metal-enclosed cable connection compartment is easily accessible from the switchgear front. Type 3 cable plugs are selected according to EN50181.
- For the selected cable and cross-sections, appropriate bushings are available for cable connector terminal type 3. Up to 1-3 bushings per phase can be installed in GHA Rail switchgear, depending on the connection type.



Typical overview (1-pole or 2-pole)



Implementation standard

Standards and regulations	IEC standard	EN standard
Switchgear	IEC 62271-200 IEC 62271-1	EN 62271-200 EN 62271-1
Railway application	IEC 62271-200 IEC 62505-1 IEC 62505-2	EN 50163 EN 50152-1 EN 50152-2
Vacuum Circuit-Breaker	IEC 62271-100	EN 62271-100
Disconnecter and earthing switch	IEC 62271-102	EN 62271-102
Internal Arc Classification (IAC)	IEC 62271-200	EN 62271-200
Protection against accidental contact, foreign objects and water	IEC 60529	EN 60529
Current Transformers	IEC 61869-2	EN 61869-2
Voltage Transformers	IEC 61869-3	EN 61869-3
Voltage detection system	IEC 61243-5	EN 61243-5
Installation	IEC 61936-1	

Normal service condition (IEC62271-1)

Ambient temperature (min/max)	°C	from -5 °C, optional -25 °C, to +40 °C ¹⁾
Average value over 24 hours (max)	°C	≤ 35 °C ¹⁾
Average relative humidity (24 hours / one month)	%	≤ 95 / ≤ 90
Maximum altitude for installation above sea level	m	1000 ¹⁾

Technical characteristics

Nominal voltage	kV	25/25-0-25
Rated voltage	kV	27.5/27.5-0-27.5
Highest non permanent voltage for up to 5 minutes	kV	29/29-0-29
Highest non permanent voltage for up to 20 ms	kV	38.75/38.75-0-38.75
Rated overvoltage category	OV4	
Rated lightning impulse withstand voltage	kV	200/220
Rated power frequency withstand voltage	kV	95/110
Rated current - busbar - feeder	up to A up to A	2000 2000
Rated peak withstand current	up to kA	63
Rated short-circuit breaking current	up to kA	25
Rated short-time withstand current	up to kA	25 - 3s
Rated frequency	up to Hz	50
Internal arc classification IAC AFL (R) -1s	up to kA	25

Degree of protection

Main electrical circuits	IP65
Operating mechanisms	IP2X ⁽²⁾
Low voltage compartment	IP3X ⁽²⁾
Cables connection compartment	IP3X ⁽²⁾

Dimensions

Typicals	Rated current (A)	Width (mm)	Depth ⁽³⁾ (mm)	Height ⁽⁴⁾ (mm)	Weight ⁽⁵⁾ (kg)
Incomer	1250	600	1380	2400 2800	650
Direct Incomer	2000				750
Bus Coupler & sectionalizer	1250 2000	800	1380		750
					850
					1050

Mechanical Endurance Test

Circuit Breaker, class M2, operations	qty.	10 000
Earthing switch with automatically close/open of the circuit breaker operations	qty.	3 000
Earthing switch operations	qty.	10 000
Disconnecter, class M2, operations	qty.	10 000

- (1) for more characteristics, please contact us
- (2) option up to IP5X
- (3) with pressure relief duct uniform 1,590 mm
- (4) depending on the height of LV cabinet
- (5) depending on secondary equipment and customer requirements - approximation

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