CBGS-0 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 UL listed, gas-insulated circuit breaker switchgear CBGS-0 is compact and easy to install and operate. Due to the SF₆ blanket, and solidly insulated busbar and cable connections, the internal configuration of the medium voltage components is protected from environmental influences which improves resistance to arc flash events.

Easy, innovative, and economical

CBGS-0 is the optimal solution for a variety of applications from transformer substations to primary power supplies. CBGS-0 is suited for mining, petrochemical oil and gas industries, renewable installations, and container substations.

CBGS-0 is a unique and innovative concept with ratings up to 38 kV, 2,000 A, and 31.5 kA. It is available with configurations using mains and feeders, ties, and cable sections. Primary fused voltage transformers and current transformers are available as well.

This compact and modular switchgear offers both flexibility and a long, low-maintenance service life. It is an excellent choice for any location, including those with limited space or harsh environmental conditions.

CBGS-0 is economical as assembly, expansions, and disassembly occur on site in a straightforward fashion. CBGS-0 uses a grounded and shielded solid insulated bus system installed in the top rear part of the switchgear, outside the SF₆ gas compartment, eliminating the need for gas handling on site.

Advantages

- No gas handling is required during installation, expansions, or section replacement.
- Solid insulated and shielded busbar system removes the possibility of a phase-to-phase fault.
- Mechanical and electrical interlocks prevent incorrect operation.
- Reliability provides low maintenance service life with long intervals.
- CBGS-0 is RoHS compliant.
Structural integrity

- Operating mechanism and auxiliary switches safely accessible from outside the medium voltage components
- Comprehensive interlocking system
- Reduced arc flash potential
- Medium voltage components protected from the environment and unaffected by:
  - aggressive atmospheres
  - dirt
  - dust
  - vermin
- Silicone-rubber insulated SIS busbars and inert, insulating SF₆ gas inhibits oxidation in busbar and circuit breaker compartments
- Simple drive mechanisms
- Stable gas system

Reduced installation and operating cost

- Reduced space requirements
- Reduced assembly times due to the solid insulated busbar
- Minimized operating costs
- Maintenance-free gas tank made of stainless steel

Ecological

- MV circuit breaker in an SF₆ atmosphere with a slight over-pressure, protecting against humidity and contamination
- No gas handling during assembly or switchgear expansion
- Use of recyclable materials for efficient disposal at service life end including SF₆ when using the proper procedures for gas evacuation
- RoHS compliant

Reliable

- Gas monitoring equipment for each gas compartment, with individual pressure relief devices for each circuit breaker
- Low number of static and dynamic seals
- Installation, extension, and replacement of sections requiring no SF₆ gas work
- Simple mechanical components

User-friendly

- Compact design
- Easy access to operator interface
- Operations performed from the front of the switchgear
Greater simplicity of installation using the solid insulated silicone-rubber busbar

Isolated from the circuit breaker tank and low voltage cabinet, the busbar system is composed of busbar lengths, end connectors, tee connectors, and end caps. Busbars extend continuously through the length of the switchgear and easily transition from one section to another. The busbar is a round, copper conductor, plug-in type that is grounded and shielded within a silicone-rubber insulation and is connected to the circuit breaker compartment by means of single-pole screwed bushing. Like the sealed-for-life circuit breaker compartment, the busbar does not require any maintenance. It enables assembly without gas work at the installation site and allows the switchgear line-up to be extended in a very quick and simple way, with minimal outage required.

Further benefits of this busbar system include:
- Single pole configuration to prevent phase-to-phase faults
- Hermetically sealed SF₆ circuit breaker compartment and the grounded and shielded solid insulated bus system protects components from aggressive environmental conditions and the ingress of foreign objects
- Optional current transformers mounted on the busbar

Reduced space requirement

CBGS-0 helps to minimize the cost of investment due to its space saving design. Replacement of older, conventional switchgear units by CBGS-0 in existing rooms is possible through step-by-step commissioning of the CBGS-0 panels while disassembling the existing switchgear. This process minimizes downtime for the electrical power supply.

CBGS-0 switchgear has been designed for front-access-only installations. It does not require a rear access aisle. Operating and maintenance procedures for the low voltage components and structure can be performed from the front and side.

Improved switchgear management — no on-site gas handling during assembly

CBGS-0 does not require on-site gas handling for assembly or expansion work. The circuit breaker compartment is delivered to the site of installation with the rated filling pressure. The gas-filled compartment is factory tested for leakage. If necessary, a switchgear section addition or replacement is possible without gas handling and without interference of the gas-filled compartments.

Options allow for diversity of sections

The versatile 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 MV side and transformer grounding feature
- Bus tie with circuit breaker including busbar risers and integrated busbar grounding
- Busbar risers without switching devices

Details of the Busbar System
Circuit breakers

The circuit breaker is placed inside the intermediate SF₆ compartment in a fixed configuration.

SF range circuit breakers work on the basis of the “puffer” type principle in SF₆, which is used as a breaking and insulating medium.

- Each of the three poles have an independent insulating enclosure which forms a filled pressure system.
- 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, two alarms will be automatically released.

Ergonomic operation

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

- Circuit breaker OPEN/CLOSE
- Isolation switch OPEN/CLOSE
- Outgoing feeder/busbar grounding OPEN/CLOSE

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.

Low voltage cabinet

Low voltage devices for 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 92.5 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 combinations. The CBGS-0 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 1,250 kcmil (630 mm²) 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. Cable screw-type connectors or terminal adapters can easily be combined with system-specific surge arresters. Cable testing (with the cables connected) does not require an additional test socket in the CBGS-0 switchgear.

Verifying voltage presence

CBGS-0 switchgear is provided with a live line indicator (LLI) installed in the front panels and capacitive divider installed in the output bushings. Each of the LLI’s three lamps will flash to indicate voltage presence in the cable corresponding to the indicated phase. The LLI will indicate voltage when the equipment is energized.
General Architecture

Low voltage cabinet:
1. Tray for LV cables
2. Protection and control relays
3. Isolation switch monitoring port

Plug-in general busbar system with single pole, solid insulation, shielded, and grounded:
4. Toroidal core current transformer in busbar system (optional)

Stainless steel tank (2.5 mm) filled with SF$_6$ and sealed for life
5. Pressure relief valve
6. Three-position disconnector:
   6.1. Disconnector operating mechanism
7. Circuit breaker:
   7.1. Circuit breaker operating mechanism

Power cable compartment:
8. Power cable connectors
9. Current transformers (optional)
10. Live line indicator
11. SF$_6$ pressure gauge
12. Nameplate
13. Rear exhaust duct
### Functional Units

<table>
<thead>
<tr>
<th></th>
<th>Main/feeder</th>
<th>Bus section*</th>
<th>Bus riser*</th>
<th>Disconnecting switch</th>
<th>Auxiliary services**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage (kV)</td>
<td>15, 27, 38</td>
<td>15, 27, 38</td>
<td>15, 27, 38</td>
<td>15, 27, 38</td>
<td>15, 27, 38</td>
</tr>
<tr>
<td>Busbar system rated current (A)</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
</tr>
<tr>
<td>Outgoing rated current (A)</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
<td>1,200/2,000</td>
</tr>
<tr>
<td>Short time withstand current (kA)</td>
<td>25 – 31.5</td>
<td>25 – 31.5</td>
<td>25 – 31.5</td>
<td>25 – 31.5</td>
<td>Limited by the fuse</td>
</tr>
</tbody>
</table>

* Two options: busbar or cable connection.
** Used for primary fused potential transformer.

### Dimensions and weight

<table>
<thead>
<tr>
<th>Modular functional units</th>
<th>Main/feeder, bus section</th>
<th>Bus riser, disconnecting switch</th>
<th>VT auxiliary section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Current Rating</td>
<td>1,200 A</td>
<td>2,000 A</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Dimensions in. (mm)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Width</td>
<td>23.5 (598)</td>
<td>47.2 (1,198)</td>
<td>23.5 (598)</td>
</tr>
<tr>
<td>Depth</td>
<td>55.1 (1,400)</td>
<td>55.1 (1,400)</td>
<td>55.1 (1,400)</td>
</tr>
<tr>
<td>Height</td>
<td>92.5 (2,350)</td>
<td>92.5 (2,350)</td>
<td>92.5 (2,350)</td>
</tr>
<tr>
<td>Weight lb. (kg)</td>
<td>1,598 (725)</td>
<td>2,249 (1,020)</td>
<td>1,058 (480)</td>
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</tbody>
</table>

### General electrical characteristics*

<table>
<thead>
<tr>
<th>Rated voltage</th>
<th>kV</th>
<th>27</th>
<th>38</th>
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</thead>
<tbody>
<tr>
<td>Rated insulation level</td>
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<td></td>
<td></td>
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<tr>
<td>Power frequency, 60 Hz</td>
<td></td>
<td>(efficient kV)</td>
<td>60</td>
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<tr>
<td>Lightning impulse withstand voltage</td>
<td>(kV peak)</td>
<td>125</td>
<td>150</td>
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<tr>
<td>Rated normal current</td>
<td></td>
<td>(A)</td>
<td>1,200/2,000</td>
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<tr>
<td>Busbar system</td>
<td></td>
<td>(A)</td>
<td>1,200/2,000</td>
</tr>
<tr>
<td>Incoming/outgoing</td>
<td></td>
<td>(kA)</td>
<td>25/31.5</td>
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<tr>
<td>Short circuit breaking current</td>
<td>(kA peak)</td>
<td>63/80</td>
<td></td>
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<tr>
<td>Gas pressure at 20 ºC</td>
<td></td>
<td>(psi)</td>
<td>18.85</td>
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<tr>
<td>Standard degrees of protection</td>
<td>HV Compartment</td>
<td>IP65</td>
<td></td>
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<tr>
<td></td>
<td>LV Compartment</td>
<td>IP3X – IP41</td>
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</tbody>
</table>

* Designed, manufactured, and tested in accordance with and meets the applicable ANSI/IEEE and NFPA 70 requirements.
For more information, visit www.schneider-electric.com/us or contact your local Schneider Electric representative.