CBGS-0

Medium Voltage, Gas-Insulated, Metal Enclosed Switchgear

Class 6047

Instruction Bulletin (U.S. Version)

46010-512-02
12/2018

Retain for future use.
Hazard Categories and Special Symbols

Read these instructions carefully and become familiar with the device before installing, operating, servicing, or maintaining it. The following special messages may appear throughout this bulletin or on the equipment to warn of hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of either symbol to a “Danger” or “Warning” safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

**DANGER**

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury.

**CAUTION**

CAUTION indicates a hazardous situation which, if not avoided, can result in minor or moderate injury.

**NOTICE**

NOTICE is used to address practices not related to physical injury. The safety alert symbol is not used with this signal word.

 Provides additional information to clarify or simplify a procedure.

Please Note

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.
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Introduction

This manual contains instructions for the proper installation, operation, and maintenance of CBGS-0 gas-insulated, metal enclosed switchgear manufactured by Schneider Electric. This product offers switching, metering, and interrupting capabilities for medium voltage systems up to 38 kV and 2000 A. The equipment is available in a variety of arrangements in enclosures designed and constructed for Type 1, indoor use.

Before You Begin

Before installing, operating, or maintaining this equipment, read and understand:

NOTE: If you need more information on CBGS-0 switchgear applications, contact your Schneider Electric representative.

• This bulletin and all steps described herein
• All one-line, electrical, wiring, and interconnection diagrams

Electrical equipment should be installed and serviced only by qualified, trained, and certified electrical personnel in accordance with national and local electrical codes.

General Description

CBGS-0 switchgear is made up of modular units containing fixed-mounted circuit breakers and disconnect switches that can be combined to build the most common functional groups. It features a compact, front accessible design and is suitable for installation in medium voltage power distribution systems. The circuit breakers and disconnect switches are housed in a stainless steel, gas-tight cubicle that uses SF₆ gas as an insulating medium.

Equipment may be furnished in single or multiple units. Sections are shipped individually for easy handling and installation. They can be fitted together using the busbar system, which is covered by solid dielectric in air.

CBGS-0 metal enclosed switchgear from Schneider Electric is designed, manufactured, and tested in accordance with and meets all applicable ANSI/IEEE and NFPA 70 standards.

Warranty

For more information regarding product warranty, refer to the Schneider Electric Conditions of Sale.
Component Description

Functional Modular Units

CBGS-0 switchgear consists of a wide range of modular functional units that can be configured to provide solutions for a number of typical applications (Figure 1).

Figure 1 – Typical Configurations
Figure 2 – Main Incoming/Feeder/Bus Section

A  Rear extension
B  Busbar compartment (air insulated)
C  Low voltage compartment
D  Circuit breaker compartment (SF₆ gas insulated)
E  Mechanism compartment for the three-position disconnecting switch and circuit breaker (pressure
gauge and live line indicators are located in this compartment)
F  Medium voltage outgoing cable compartment / current transformers (air insulated)

1  Busbar system
2  Three-position disconnecting switch
3  Circuit breaker
4  Pressure relief device
5  Current transformer(s)
6  Medium voltage connectors
7  USB port for monitoring camera system
8  Ground bar
Figure 3 – Bus Riser/Disconnecting Switch Section

A  Rear extension
B  Busbar compartment (air insulated)
C  Low voltage compartment
D  Disconnecting switch compartment (SF₆ gas insulated)
E  Mechanism compartment for the three-position disconnecting switch (pressure gauge and live line indicators are located in this compartment)
F  Medium voltage outgoing cable compartment / current transformers (air insulated)

1  Busbar system
2  Three-position disconnecting switch
3  Pressure relief device
4  Current transformer(s)
5  Medium voltage connectors
6  USB port for monitoring camera system
7  Ground bar
Figure 4 – Voltage Transformer (VT) Auxiliary Section

A  Rear extension
B  Busbar compartment (air insulated)
C  Low voltage compartment
D Disconnecting switch and fuse compartment (SF₆ gas insulated)
E  Mechanism compartment for the three-position disconnecting switch (pressure gauge is located in this compartment)
F  Medium voltage VT compartment (air insulated)

1  Busbar system
2  Three-position disconnecting switch
3  Medium voltage fuses
4  Medium voltage connectors
5  Voltage transformer
6  USB port for monitoring camera system
Tank and Compartments

**SF₆ Tank**

The SF₆ tank is constructed of stainless steel and includes welded bushings for power cable plug-in connections. The fully-welded design and robust mechanical bushings comprise a hermetically-sealed and solid unit, capable of withstanding the mechanical stresses caused by heat, handling, and normal equipment operation.

**Busbar Compartment**

The busbar compartment is completely isolated from the other compartments of the equipment and is composed of busbars, end connectors, tee connectors, and end caps. Current transformers (CTs) are optionally installed in this compartment. The busbars extend continuously through the length of the switchgear and may transition from one modular unit to another.

The busbar system is a round, copper-conductor, plug-in type that is silicone insulated and ground shielded. It is connected to the circuit breaker compartment by means of single-pole screwed bushing.

**Figure 5 – Busbar System**

![Busbar System Diagram](image)

**Low Voltage Compartment**

The low voltage compartment houses terminal blocks, relays, and monitoring devices that may be supplied with the switchgear. All auxiliary contacts for the control of the circuit breaker and disconnecting switch mechanism are wired to terminal blocks for customer access and are located in this compartment. Camera view ports for viewing the position of the disconnecting switch are also located in this compartment.

**Cable Compartment**

The cable compartments are front-accessible spaces in the switchgear enclosure that are suitable for a double-connector arrangement, if desired. They house power cable connectors and current transformers. The panel is interlocked with the circuit breaker and can be key-locked.

**Mechanism Compartment**

The mechanism compartment has a black polycarbonate and steel cover that protects the circuit breaker and disconnecting switch mechanisms. It contains instructions for operating the mechanism.

The cover also has a mimic bus that shows the position of the switch and contains nameplate information for the section. The live line indicator (LLI), interlocking system, and pressure gauge are also located on the cover.
Components

Medium Voltage Circuit Breaker
The medium voltage circuit breaker is contained inside the SF$_6$ tank. The operating mechanism is outside the tank, just behind the cubicle front cover, making it easily accessible for maintenance and inspection.

Disconnecting Switch
The three-position disconnecting switch (On/Off/Ground) is operated manually by inserting the mechanism handle in the front cover.

Current Transformers
Toroidal current transformers (one per phase) can be installed directly on the bushing or busbar outside the SF$_6$ tank and used for protection and metering.

Voltage Transformers
The voltage transformers are epoxy resin vacuum encapsulated (inductive type) and are used for protection and metering. They should be sized and supplied only by Schneider Electric.

Figure 6 – Circuit Breakers

Figure 7 – Current Transformer

Figure 8 – Voltage Transformers

Voltage Transformer on Cables (cable connected type)
Voltage Transformer on Busbar
Voltage Transformer on Disconnecting Device System
### SF₆ and Pressure Monitoring System

Although these units are factory-tested, the units are provided with a pressure gauge mounted in the front cover of the mechanism compartment to check the condition of the SF₆ gas. A low pressure contact can be optionally installed for alarm indication or control.

SF₆ is identified as a high global warning potential gas. It should not be emitted into the atmosphere, but recovered and recycled.


Each functional modular unit is equipped with a pressure relief valve that will operate in the event of an internal fault or over-pressure.

### Live Line Indicator (LLI)

The LLI is equipped with neon lamps, visible from the front of the mechanism compartment, that indicate the presence of voltage. It is connected to the capacitor divider located on the load side of the circuit breaker.

**NOTE:** The LLI is not a replacement for voltage testing when accessing a switch compartment.

---

### DANGER

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Always use properly rated test equipment to ensure no voltage is present before performing any maintenance procedures.

Failure to follow these instructions will result in death or serious injury.

---

### Panel Interlocks

#### Mechanical Interlocks

The CBGS-0 is equipped with mechanical interlocks as a standard feature. The interlocks minimize hazards to the user and operate as follows in a typical functional configuration:

- Block operation of the ground switch while the busbar disconnecting switch is in the closed position.
- Block operation of the busbar disconnecting switch while the ground switch is in the closed position.
- Block operation of the circuit breaker when the selector on the operating mechanism panel is in the disconnecting switch position and the port for the operating shaft is accessible, or if the switch operating handle is inserted.
- When grounding the cables, allow operation of the circuit breaker to the closed position only when the disconnecting switch reaches the grounded position. The disconnecting switch operating handle can only be removed or inserted once the final position is reached.
- Block electrical, local, or remote operation of the circuit breaker when the operating handle for the disconnecting switch is inserted or the port for the operating shaft is accessible.
- Allow closing of the circuit breaker with the disconnecting switch in the grounded position only by pushing the CLOSE button located in the mechanism compartment panel.
• Allow opening of the ground switch only if the circuit breaker is in the open position.
• Block removal of the cable compartment panel while the disconnecting switch is closed. If the panel has been removed, all the mechanical operations of the disconnecting switch will be blocked.

**Key Interlocks**

Key interlocks are optional equipment. They are often supplied with metal enclosed switchgear for proper operation and coordination of the equipment. The key interlock schemes are usually described on the switchgear assembly drawings supplied with the equipment.
Safety Precautions

Carefully read and follow the safety precautions outlined below before attempting to lift, move, install, use, or service CBGS-0 switchgear or any of its components.

**WARNING:** This product can expose you to chemicals including Nickel Compounds and Bisphenol A (BPA), which are known to the State of California to cause cancer, birth defects or other reproductive harm. For more information go to [www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov).

**DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Qualified electrical personnel must perform work in accordance with national and local electric codes.
- Perform such work only after reading and understanding all of the instructions in this bulletin.
- Before performing visual inspections, testing, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back-feeding.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before making any electrical connections, ensure that all leads to be connected are de-energized and proper safety grounds are applied.
- Metal enclosed switchgear has interlocks designed to minimize hazards to the user. The user of this device is responsible for recognizing the potential hazards, for wearing protective safety equipment, and for taking adequate safety precautions.
- Do not make any adjustments to the equipment or operate the system with safety features removed. Contact your local Schneider Electric representative for additional instructions if the device does not function as described in this manual.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly. Neglecting fundamental installation and maintenance requirements may lead to personal injury as well as damage to electrical equipment or other property.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on the power to this equipment.
- All instructions in this manual are written with the assumption that the customer has taken these measures before performing maintenance or testing.

Failure to follow these instructions will result in death or serious injury.
Receiving, Handling, and Storage

This section contains information regarding the receiving, handling, and storage of CBGS-0 switchgear.

Receiving

CBGS-0 switchgear is shipped in shipping splits on pallets and covered with protective wrapping. Compare the packing list to the equipment received to ensure the order and shipments are complete. Claims for shortages or other errors must be made in writing to Schneider Electric within 30 days of the receipt of shipment. Failure to do so constitutes unqualified acceptance and a waiver of all such claims by the purchaser. Upon receipt, immediately inspect the switchgear for damage that may have occurred during transit. If damage is found or suspected, immediately file a claim with the carrier and notify Schneider Electric.

Identification

The rating nameplate is located on the front cover of the CBGS-0 switchgear and provides the following information:

- Factory order number
- Part number
- Date of manufacture
- Rated maximum voltage (kV)
- Rated impulse withstand BIL (kV)
- Rated power frequency withstand (kV)
- Rated power frequency (Hz)
- Rated continuous current (A sym)
- Rated momentary withstand current (kA asym)
- Rated short time withstand current and time (kA sym, sec)
- Rated fault closing current (kA asym)
- Rated filling pressure SF₆ (PSI)
- Minimal operational pressure SF₆ (PSI)
- SF₆ mass (lbs)

**NOTE:** This is a general listing; the information will vary according to which functional units are in place.
Handling

Use care when uncrating, rolling, hoisting, or handling the switchgear.

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF UNBALANCED LOAD OR EQUIPMENT DISTORTION</td>
</tr>
<tr>
<td>Do not remove the skids until the shipping sections have reached the installation location.</td>
</tr>
<tr>
<td>Failure to follow these instructions can result in serious injury or equipment damage.</td>
</tr>
</tbody>
</table>

**NOTE:** Avoid blows or stresses to the sides of the equipment.

Use only properly rated lifting equipment for moving the switchgear. Review the shipping documentation for the actual weight of the equipment.

Handling by Forklift

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF TOP HEAVY LOAD</td>
</tr>
<tr>
<td>• If lifting the equipment by forklift, stabilize the shipping section with a safety strap.</td>
</tr>
<tr>
<td>• Consult with a certified rigging and lifting expert for any situation not covered in these instructions.</td>
</tr>
<tr>
<td>Failure to follow this instruction can result in death or serious injury.</td>
</tr>
</tbody>
</table>

CBGS-0 switchgear is shipped on a pallet and can be unloaded and transported with a forklift. When using a forklift, position the rear of the switchgear toward the driver to avoid damaging the front of the equipment with the forklift mechanism.

**Figure 9 – Lifting with a Forklift**

![Safety strap](image)
Handling by Crane

**WARNING**

**RISK OF EQUIPMENT TIPPING**

- To lift and move each section, insert hooks into the provided lifting angles.
- Consult with a certified rigging and lifting expert for any situation not covered in these instructions.

**Failure to follow this instruction can result in death or serious injury.**

Use hooks to properly lift and move CBGS-0 switchgear. Removable lifting angles are provided for inserting hooks to lift each section.

Arrange the cables/straps so that the minimum angle between the lifting cables/straps and the equipment top is 60°. Ensure that the hook of the lifting gear is placed vertically on the center of the switchgear and that it is perfectly balanced.

**Figure 10 – Lifting with Overhead Crane**
Storage

If the CBGS-0 switchgear is stored before being placed into service, keep it in a clean, dry place free from corrosive elements and mechanical abuse. Covering the equipment with a tarpaulin may be necessary to protect it from contaminants or moisture. Do not store indoor units outdoors.

In areas of high humidity, remove the plastic protective wrapping and monitor the equipment closely for signs of condensation or corrosion. If necessary, add heat from a separate source, such as a light bulb or space heater. Use a minimum of 100 watts of heat per vertical section.

**Figure 11 – Typical Application**

![Typical Application Diagram]

**Table 1 – Dimensions and Weight**

<table>
<thead>
<tr>
<th>Modular Functional Units</th>
<th>Bus Riser Disconnecting Switch</th>
<th>Bus Section Incoming/Feeder Protection</th>
<th>VT Auxiliary Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Current Rating</td>
<td>1200 A</td>
<td>2000 A</td>
<td>1200 A</td>
</tr>
<tr>
<td>Width (inches (mm))</td>
<td>23.5 (598)</td>
<td>47.2 (1198)</td>
<td>23.5 (598)</td>
</tr>
<tr>
<td>Depth (inches (mm))</td>
<td>55.1 (1400)</td>
<td>55.1 (1400)</td>
<td>55.1 (1400)</td>
</tr>
<tr>
<td>Height (inches (mm))</td>
<td>92.5 (2350)</td>
<td>92.5 (2350)</td>
<td>92.5 (2350)</td>
</tr>
<tr>
<td>Weight lbs (kg)</td>
<td>1058 (480)</td>
<td>2050 (930)</td>
<td>1598 (725)</td>
</tr>
</tbody>
</table>

1 The weight is approximate and does not represent all possible combinations. Refer to the customer drawings for actual weights, dimensions, and conduit entry locations.
Installation

This section contains instructions for installing the CBGS-0 switchgear. Before installing, removing, or performing work on or inside the equipment, read and understand the following precautions.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protection equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Turn off all power supplying this equipment before working on or inside it.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Site Preparation

Good site preparation is necessary to eliminate installation problems and ensure proper switchgear operation. Compare the site plans and specifications with the switchgear drawings to be sure there are no discrepancies. Check the site to ensure the equipment will fit.

- A minimum room height of 118.1 in. (3000 mm) is recommended to ensure proper operation of the switchgear in case of an arcing event inside the switchgear.
- The equipment has been designed for front access. Schneider Electric recommends the rear side of indoor equipment be placed a minimum of 6 in. (150 mm) from the wall. Please see the National Electrical Code (NEC) for the minimum distance between the front side of indoor equipment and walls/other equipment. Minimum clearances must also meet all local requirements.
- The building floor and switchgear anchoring foundation must be designed to support the weight of the switchgear.
- The floor should be flat. To prevent distortion of the enclosure, the “U” steel section (Item 2, Figure 13 on page 23) that is anchored to the floor and the mounting frame should be level within a maximum of ± 0.375 in. per yard (1 mm per meter) within the area of the switchgear. There should be a maximum difference of 0.2 in. (5 mm) between the first unit and the last unit.
- Refer to Figure 12 on page 22 for site preparation and Figure 13 on page 23 for level adjustment.
• Provide area ventilation at all times to maintain an ambient temperature of 32–104 °F (0–40 °C) around the equipment.
• Adequate lighting and convenience outlets should be available near the switchgear. Route sewer, water, and steam lines away from the equipment. Provide floor drains to prevent water buildup.

Figure 12 – Site Preparation Diagram for Installations With a Trench

1. Switchgear baseplate
2. Washer
3. Expansion screw
4. Check local regulations
5. Trench dimensions are in accordance with the characteristics of the cables being used (minimum cable bending radius). Always use the bending radius recommended by the medium voltage cable manufacturer.
6. Minimum distance required for installation. 19.7 in. (500 mm) is recommended to ease installation.
Figure 13 – Detail of the Switchgear Level Adjustment

1. M12 x 75 hexagonal socket head screw for switchgear level adjustment
   Front foundation rail and anchoring point.
   "U" steel section: 4 x 2 x 0.25 in. (100 x 50 x 6 mm)
   "L" steel section: 2 x 2 x 0.25 in. (50 x 50 x 6 mm)

2. Exhaust duct

3. Relief area for SF₆ gas

4. Circuit breaker and disconnecting switch tank

5. Continuous trench

6. Minimum front operating aisle: per NEC

7. Floor

8. Outgoing medium voltage cables
Field Assembly

After proper site preparation has been made, field assembly of shipping splits is required. Field assembly includes:

- Joining shipping splits
- Anchoring shipping split assemblies
- Connecting the bus
- Connecting the control wiring

### NOTICE

**HAZARD OF IMPROPER ELECTRICAL CONNECTION**

Install the shipping split bus connectors only after the shipping sections are fastened in place and no additional movement will be made to the assembly. Failure to follow this instruction can result in serious equipment damage.

Joining and Anchoring the Shipping Split Frames

Follow the steps listed below for joining and anchoring shipping split frames.

**NOTE:** Be sure to mount all shipping splits on the same plane and level them to ensure proper connection.

1. Review the assembly drawings (provided separately) to ensure the switchgear sections will be assembled in the correct order.
2. Position, level, and anchor the first section (see “Site Preparation” on page 21).
3. Remove the lifting bar assemblies. Retain the hardware and lifting bar assembly parts as they will be used to join sections.
4. Position the next section according to the assembly drawings.
5. Level the section and place it beside the previous section. All the bolt holes between sections should match up. Refer to Figure 18 on page 27 for the location of the bolt holes.
6. Remove the lifting bar assemblies and retain all hardware and parts.
7. Using a verification tool (part number 51083906M0) and a level, check that the height of all bushings is equal within ± 0.04 in. (1 mm) (Figure 14). If necessary, adjust the height of the switchgear using the level adjustment screws (Figure 13 on page 23).
8. Using the verification tool, check that the distance between bushings is 23.6 in. (600 mm) ± 0.04 in. (1 mm) (Figure 15). Perform this check for all three phases.

Figure 15 – Check Distance Between Bushings

9. Place two lifting bars between the sections in the front of the switchgear (Figure 18 on page 27).

10. Join the sections together using M8 x 20 mm bolts (Figure 18 on page 27).

11. Install the joint plate (part number 852317) in the front to cover the space between sections (Figure 18 on page 27).

12. Install an M8 flat washer (part number DIN 9021) (Figure 18 on page 27) on the upper joint.

13. Install the ground bus splice plate (part number 51083696M0) (Figure 18 on page 27) on the lower rear connection.

14. Anchor the added section using the instructions provided in "Site Preparation" on page 21.

15. Perform steps 4–14 for each section added to the line-up.
For a line-up that includes a 47.2 in. (1200 mm) wide section, use the verification tool specified for this application (part number WLW01283P01) to check the distance between bushings (Figure 16). The correct distances are shown in Figure 17.

**Figure 16 – Check Distance Between Bushings**

**Figure 17 – Correct Distances Between Bushings When Line-up Includes a 47.2 in. (1200 mm) Wide Section**
Figure 18 – Joining Switchgear Sections

On the upper connection point between switchgear sections, use an M8 flat washer (part # DIN 9021).

Joint plate between switchgear sections
Lifting bars
Bolt hole
Ground bus splice plate (part # 51083696M0)—join with the ground bar of the adjacent switchgear section.

Detail A
Union points between switchgear sections

Hex-head bolt, M8 x 20
Contact-type washer, M8

Nut, M8
Contact-type washer, M8
Busbar Connection

The busbars extend continuously through the length of the switchgear and may transition from one modular unit to another.

The busbar system is a round, copper-conductor, plug-in type that is silicone insulated and ground shielded. It is connected to the circuit breaker compartment with a single-pole, screwed bushing.

For busbar rated 2000 A continuous current, a second busbar is added in the double deck assembly.

Figure 19 – Busbar Components
Follow the steps outlined in this section to make bus connections.

1. Verify that the sections are aligned and the position between bushings is as specified in “Joining and Anchoring the Shipping Split Frames” on page 24.
2. Clean the bushings, connectors, and insulating caps with isopropyl alcohol and a non-abrasive, lint-free cloth.
3. Handle all busbar components with care to avoid hits, scratches, dirt, dust, humidity, and condensation.
4. Assemble the busbar according to the instructions provided by the manufacturer.
5. To connect the ground bus at each shipping section, remove and retain the existing hardware (Figure 18 on page 27). Position the unit, then reinstall and tighten the hardware.
6. To verify correct assembly, perform the contact resistance measurements using a test set with at least 100 A DC output. The test should include each phase of the main bus from at least three adjacent vertical sections. The recorded values should not deviate by more than 15% between the phases.

Current Transformer (CT) Installation

Review the job documentation (provided separately) to confirm the location of the current transformer and verify the polarity to properly install this device.

The current transformer can be installed on the main busbar and/or on the coupling/rising busbar.
Installation onto Main Busbar

Single Busbar Assembly

1. Install the supplied vertical and horizontal supports inside the identified main busbar compartment.
2. Pass the busbars thru the opening of the current transformer and install the busbar system as described in “Busbar Connection” on page 28.
3. Attach the current transformer to the support using the supplied hardware.
4. Make the secondary connection based on the control wiring schematic and wiring diagram (see the reference example provided on page 59).

Double-deck Busbar Assembly

1. Install the supplied horizontal CT support inside the identified main busbar compartment.
2. Attach the current transformer to the CT vertical support using the supplied hardware.
3. Install the pre-assembly vertical CT support on the horizontal support.
4. Pass the busbars thru the opening of the current transformer and install the busbar system as described in “Busbar Connection” on page 28.
5. Attach the vertical CT support to the horizontal support using the supplied hardware.
6. Make the secondary connection based on the control wiring schematic and wiring diagram (see the reference example provided on page 59).
Installation on Coupling/Rising Busbar

Single Busbar Assembly

1. Position the three supplied CT supports inside the coupling/rising busbar compartment.
2. Pass the busbar thru the opening of the current transformer and, beginning with the lowest busbar, install the busbar system as described in "Busbar Connection" on page 28.
3. Attach the current transformers to the supports using the supplied hardware.
4. Make the secondary connections based on the control wiring schematic and wiring diagram (see the reference example provided on page 59).

Double Deck Busbar Assembly

1. Position the three supplied CT supports inside the coupling/rising busbar compartment.
2. Pass the busbar thru the opening of the current transformer and, beginning with the lowest busbar, install the busbar system as described in "Busbar Connection" on page 28.
3. Attach the current transformers to the supports using the supplied hardware.
4. Make the secondary connections based on the control wiring schematic and wiring diagram (see the reference example provided on page 59).
Busbar Compartment Covers Assembly

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before energizing equipment, ensure all barriers are installed using original hardware.

Failure to follow these instructions will result in death or serious injury.

After the busbar connection is completed, proceed with assembly of the busbar compartment covers.

Each vertical section is supplied with the top covers and side panels; different heights can exist depending on the type of functional vertical sections and their arrangement.

Figure 20 shows the assembly points and hardware required for each assembly. See Table 2 for torque values.

**Figure 20 – Assembly Points and Hardware for Busbar Compartment Panels**

![Assembly Points Diagram]

**Table 2 – Torque Values**

<table>
<thead>
<tr>
<th>Bolt Size</th>
<th>Torque Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>M6</td>
<td>7 in. lb. (0.8 N·m)</td>
</tr>
<tr>
<td>M8</td>
<td>13 in. lb. (1.5 N·m)</td>
</tr>
</tbody>
</table>
End Panel Installation

After the assembly of the busbar connection and busbar compartment covers is completed, the switchgear end panels must be installed.

Figure 21 shows the assembly points and hardware required for each item. See Table 2 on page 32 for torque values.

Figure 21 – Assembly Points and Hardware for End Panels
Wiring Connections

DANGER
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed or serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

Follow the steps in this section to make control wiring connections.

1. Consult the customer wiring diagram for re-connection of control wiring at the shipping splits or sections, when applicable. Each wire was identified and connected during factory assembly and testing.
2. Make all outgoing control connections according to the wiring diagrams. After wiring is complete, carefully check all connections to verify they are secure and in their proper location.

Cable Connections

Figure 22 – Incoming Line Section and Transformer Protection Section

DANGER
HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

Before energizing equipment, ensure all barriers are installed using original hardware.

Failure to follow these instructions will result in death or serious injury.
Before making the cable connections, verify the proper phasing of each cable. Viewing the switchgear from the front, the standard bus sequence is normally phased A-B-C (left-to-right), unless labeled otherwise.

CBGS-0 switchgear is provided with plug-in bushings, suitable for connecting incoming cables with threaded, screened, tee plug-in connectors (Elastimold M400TB or equivalent), supplied by Schneider Electric or by the customer. The Elastimold M400TB connector can accommodate a cable from 2 AWG to 1250 MCM. The maximum torque value to be applied when tightening the plug-in bushing is 37 ft. lb. (50 N•m). Follow the manufacturer’s specifications for ordering and installation.

**NOTE:** Cable supports must be in place when installing the cables. Properly support the cable weight prior to connecting the cables to the bushings. The weight of the cables at the cable supports must not exceed 55 lbs (25 kg). Any cable exiting the enclosure must be properly supported to prevent the excess cable length from exceeding the cable support weight limit.

When cable terminations are made, follow the cable manufacturer's instructions in stripping the shield and cleaning the unshielded portion of the cable.

**NOTE:** Elastimold M400TB connectors have an IEC rating of 36 kV but are suitable for use in CBGS-0 switchgear in applications with up to 38 kV cable.

### Ground Connections

CBGS-0 switchgear is provided with a general ground bus connection by means of a 1.57 x 0.20 in. (40 x 5 mm) copper busbar that is located in the lower compartment. This busbar is provided with connection terminals to connect the unit to the substation ground system.
Figure 23 – Ground Busbar
Final Inspection

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed or serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

**NOTE:** Follow all equipment testing procedures required by your company in addition to the ones listed in this section.

After the switchgear is installed and all interconnections are made, follow the steps listed below to test the equipment and perform a final inspection before placing it in service.

1. Completely de-energize the switchgear to perform the following checks.
2. Perform an AC hi-pot test. See Table 3 on page 56 for the proper test values.
3. Verify correct installation of the equipment (see “Installation” on page 21.)
   - level adjustment
   - floor anchoring
   - distance from wall
4. Check all control wiring with the wiring diagrams. Verify that all connections are properly made and tightened to the proper torque values, all fuses are installed, all current transformer circuits are complete, and all fault detection devices have been properly connected. If any disconnecting switch is not in operation and is left without incoming cables, the corresponding grounding switch must be closed and locked by means of a padlock to avoid possible unintentional operation.
5. Verify that all insulating surfaces are clean and dry.
6. Before the switchgear is energized, make a final check of the equipment. Inspect every compartment for loose parts, tools, litter, and miscellaneous construction items.
7. Verify that all barriers and covers are in place and secured.
8. Operate the grounding switch, disconnecting switch, circuit breaker, and mechanical interlocks a minimum of five times and verify they are functioning properly. Follow the instructions in “Operation” on page 38.
9. Verify that the CT circuits are not shorted.
10. Replace all devices and close all doors and covers before energizing the switchgear.

11. Review key interlock schemes carefully (if used). Insert only the proper keys in the locks. Remove all extra keys and store them where only authorized personnel can access them.

**Energization**

After the proper testing has been completed and the incoming service cables are ready, the switchgear is ready to be energized.

1. Confirm the disconnecting switch and circuit breaker are in the Open (O) position.
2. The live line indicator will indicate voltage when the equipment is energized.
3. Check the phase sequence.

**NOTE:** Phase sequences test must be performed on equipment through the test ports on the live line indicator, see “Live Line Indicator” on page 52 for more information.

4. Once all these requirements are fulfilled, the unit is ready to be put into service.

**Operation**

**Three-Position Disconnecting Switch**

This section contains instructions for operating the three-position, switchgear disconnecting switch that is provided with the following modular functional units:

<table>
<thead>
<tr>
<th>DANGER</th>
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</thead>
<tbody>
<tr>
<td><strong>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</strong></td>
</tr>
<tr>
<td>• Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.</td>
</tr>
<tr>
<td>• This equipment must only be installed or serviced by qualified, trained, and certified electrical personnel.</td>
</tr>
<tr>
<td>• Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.</td>
</tr>
<tr>
<td>• Turn off all power supplying this equipment before working on or inside equipment.</td>
</tr>
<tr>
<td>• Always use a properly rated voltage sensing device to confirm power is off.</td>
</tr>
<tr>
<td>• Replace all devices, doors, and covers before turning on the power to this equipment.</td>
</tr>
</tbody>
</table>

**Failure to follow these instructions will result in death or serious injury.**

- Main Incoming/Feeder section
- Bus section
- Bus Riser section
- VT Auxiliary section
Switches must be in the grounded position to gain access to the load-side compartment.

**NOTE:** Always use the monitoring camera system to verify the actual position of the disconnecting switch blades. See Appendix A on page 60 for operating instructions for the camera system.

**Figure 24 – Position of the Disconnecting Switch Blades**

![Diagram of disconnecting switch blades]

1. Grounding contacts
2. Mobile contact
3. Busbar fixed contact

**Figure 25 – CBGS-0 Equipment Manipulation Handles**

- SF1G-type Circuit Breaker Spring Charging Handle
- Disconnecting Switch Mechanism Handle
- SF1P-type Circuit Breaker Spring Charging Handle
The design of the three-position disconnecting switch and the arrangement of the independent operating shafts for the disconnecting switch and grounding switches block the following from occurring:

- Simultaneous operation of the disconnecting switch and the grounding switch.
- Possibility of directly moving the switch from the closed position to the ground position.

**NOTE:** When performing any operation, pay special attention to the indications on the mimic diagram where the state of the different mechanisms is shown. Once an operation is initiated, do not change the direction of the operation before reaching the final position.

**Figure 26 – Front Panel Components**

- Position indicator of the busbar disconnecting switch
- Position indicator of the grounding switch
- Shaft port of the disconnecting switch
- Disconnecting switch key lock (optional)
- Shaft port of the grounding switch
- Live line indicator
- Pressure gauge
- Cable compartment interlock latch
- Cable grounding key lock (optional)
- Circuit breaker spring charging indicator
- Circuit breaker position indicator
- Circuit breaker counter
- Circuit breaker Open push button
- Circuit breaker Close push button
- Circuit breaker manual spring charging system
- Selector switch

---

38 kV (max.) up to 2000 A and 27 kV, 31.5 kA Switchgear

27 kV (max.) up to 1200 A Switchgear
Disconnecting Switch Operation

This section contains instructions for operating the switchgear disconnecting switch.

1. Choose the operation by pushing in the selector switch smoothly and rotating it to the desired position. This will open the shutter and the operating shaft will become accessible.

2. Insert the mechanism handle into the disconnecting switch operating port.
3. Rotate the handle in the indicated direction, depending on the desired operation.
4. Remove the mechanism handle.

5. Return the selector switch back to its original position (O).

Figure 28 – Disconnecting Switch Operation
Grounding Switch Operation

This section contains instructions for operating the grounding switch.

1. Open the circuit breaker.
2. Confirm the line cables are de-energized.

NOTE: The live line indicator should not be lit. Perform a voltage test on the equipment through the test ports in the live line indicator using a properly rated voltage sensing device. See “Live Line Indicator” on page 52 for more information.

3. Choose the operation by pushing in the selector switch smoothly and rotating it to the desired position. This will open the shutter and the operating shaft will become accessible.

4. Insert the mechanism handle into the grounding switch operating port.

5. Rotate the handle in the indicated direction, depending on the desired operation.
6. Remove the mechanism handle.

7. Return the selector back to its original position (O).

8. Close the circuit breaker.

Figure 29 – Ground Switch Operation
Circuit Breaker Operation

This section contains instructions for manually operating the circuit breaker included in the CBGS-0 switchgear. Before operating the circuit breaker, the circuit breaker mechanism handle must be removed from the operating mechanism panel and the selector must be in its original position (O).

Mechanical push buttons located on the front panel of the switchgear are used to open (O) and close (I) the circuit breaker. The push buttons operate the circuit breaker whether it is charged manually or electrically.

Figure 30 – Mechanical Push Buttons

Before closing the circuit breaker, the closing spring must be charged. This is done by the motor charging system automatically prior to any closing operation. An opening operation is always allowable locally using the mechanical Open push button. It is the closing operation of the circuit breaker that causes the opening spring charge. The circuit breaker is equipped with a tripping coil that will be operated by the protection relay.

The closing spring can be charged manually by placing the handle in the opening and moving it up and down several times (Figure 31). After the charging is complete, the spring indicator will change to charged indication. The opening spring is always charged when the circuit breaker is in the closed position and control power applied.
Voltage Transformer (VT) Auxiliary Section

The VT auxiliary section houses fuses, a voltage transformer, disconnecting switch, and bus connections. The control panel interlocks with the disconnecting switch and can be padlocked.

This section is offered as a cold sequence unit. It uses the CBGS-0 disconnecting switch to disconnect the power circuit from the voltage transformer. See “Disconnecting Switch Operation” on page 41 for the description and operation.

The disconnecting switch must be open and in the grounded position to access the medium voltage fuses and transformer. See “Voltage Transformer (VT) Primary Fuse Access” on page 54 for fuse removal and fuse installation.

Actuating the Voltage Transformers Disconnecting Device

Voltage transformer disconnecting devices (optionally available for certain functional units) are operated by a manual mechanism located inside the cable connection compartment. See Figure 33 on page 48.
Grounding the Voltage Transformers

**Figure 33 – Optional VT +switch**

To ground the voltage transformers, proceed as follows and refer to Figure 34 and Figure 35 on page 49:

1. Open the cable compartment panel by following the instructions in “Cable Compartment Access” on page 53.
2. Remove the padlock (A) if it is present.
3. Pull locating pin (B)
4. Turn the handle (C) to the appropriate direction until the selector has reached the final position (D) and the locating pin is re-engaged (approximately 90º turn).
5. Reposition the padlock (if present).

**DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Actuate disconnecting device for the voltage transformers only in a de-energized state.
- Isolate and ground cable compartment prior to removing the cable compartment cover.
- Voltage transformer (busbar side) can be energized during the time the cable connection cover is removed. There is no interlock between the door and the voltage transformers when the voltage transformers are connected to the busbar side. Always use a properly rated voltage sensing device to confirm power is off.
- Ground voltage transformers prior to working on them.

Failure to follow these instructions will result in death or serious injury.
Figure 34 – Grounding the Voltage Transformers

Figure 35 – Voltage Transformer on Cable Side and Busbar Side

Connecting the Voltage Transformers

To connect the voltage transformers, proceed as follows and refer to Figure 36 and Figure 37 on page 50:

1. Open the cable compartment panel by following the instructions in “Cable Compartment Access” on page 53.
2. Remove the padlock (A) if it is present.
3. Pull locating pin (B)
4. Turn the handle (C) to the appropriate direction until the selector has reached the final position (D) and the locating pin is re-engaged (approximately 90º turn).
5. Reposition the padlock (if present).
Figure 36 – Connecting the Voltage Transformers

Figure 37 – Voltage Transformer on Cable Side and Busbar Side

Voltage transformer on cable side

Voltage transformer on busbar side
Gas Check

Although CBGS-0 switchgear units are factory-tested to help ensure reliability, they are provided with a pressure gauge to check the condition of the gas. When the indicator needle is in the green sector, the condition of the gas is correct. If the needle is out of the green sector, contact your local Schneider Electric representative.

Figure 38 – Gas Pressure Gauges
Live Line Indicator

CBGS-0 switchgear is provided with a live line indicator (LLI) installed in the front panels of the different modular functional units. Each of the LLI’s three lamps will flash to indicate voltage presence in the cable corresponding to the indicated phase (L1/L2/L3). The LLI will indicate voltage when the equipment is energized.

NOTE: Under extremely bright lighting conditions, it may be necessary to shade the LLI to increase visibility of the lamps.

Figure 39 – LLI

<table>
<thead>
<tr>
<th>DANGER</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH</td>
</tr>
<tr>
<td>• Apply appropriate personal protection equipment (PPE) and follow safe electrical work practices. See NFPA 70E.</td>
</tr>
<tr>
<td>• Turn off all power supplying this equipment before working on or inside it.</td>
</tr>
<tr>
<td>• Always use a properly rated voltage sensing device to confirm power is off.</td>
</tr>
<tr>
<td>• This equipment must only be installed and serviced by qualified, trained, and certified electrical personnel.</td>
</tr>
<tr>
<td>• Replace all devices, doors and covers before turning on the power to this equipment.</td>
</tr>
</tbody>
</table>

Failure to follow these instructions will result in death or serious injury.

The test ports on the voltage indication system are suitable for checking voltage presence with a properly rated voltage sensing device. The maximum phase-to-ground voltage present in the test port will not exceed 150 Vac. Voltage presence verification is not a replacement for manual voltage testing when accessing a compartment with potentially energized components.

Phase Sequence Testing

Each phase is provided with a test port for checking phase sequence by connecting a suitable phase comparator unit (available as an option) or by use of a multimeter. The maximum phase-to-ground voltage present in the test port will not exceed 150 Vac.

Connect the phase comparator unit between the test ports of the phases you want to check. If the phases are in sequence, the test lamp will remain off. If the phases are NOT in sequence, the test lamp will illuminate.
Access Panel Removal

Cable Compartment Access

This section contains instructions for removing the CBGS-0 switchgear access panels.

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protection equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Turn off all power supplying this equipment before working on or inside it.
- Always use a properly rated voltage sensing device to confirm power is off.
- This equipment must only be installed and serviced by qualified, trained, and certified electrical personnel.
- Replace all devices, doors and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

The cable compartment access panels are interlocked with the grounding switch so that the panels can be removed only if the disconnecting switch is in the grounded position.

1. With the circuit breaker in the open position, open the disconnecting switch.
2. Place the disconnecting switch in the grounded position.
3. Place the circuit breaker in the closed position.
4. Remove the fastening screws from the cable compartment access panel.
5. Pull the interlocking latch up to the limit (Figure 40) and remove the panel.

Figure 40 – Interlocking Latch

6. Use a properly rated voltage sensing device to verify the power is off before working inside this compartment.
7. To reinstall the panel, place it into position, pull the interlocking latch down to the limit, and reinstall the fastening screws.

NOTE: Replace all devices, doors, and covers before turning on power to this equipment.
Voltage Transformer (VT) Primary Fuse Access

This section contains instruction for correct removal and installation of voltage transformer primary fuses.

**DANGER**

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- Before performing visual inspections, tests, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back-feeding.
- Always use a properly rated voltage sensing device to confirm power is off.
- Handle this equipment carefully and install, operate, and maintain it correctly in order for it to function properly. Neglecting fundamental installation and maintenance requirements may lead to personal injury as well as damage to electrical equipment or other property.
- Do not make any modifications to the equipment or operate the system with the interlocks removed. Contact your local Schneider Electric representative for additional instructions if the device does not function as described in this manual.
- Carefully inspect your work area and remove any tools and objects left inside the equipment.
- Replace all devices, doors, and covers before turning on the power to this equipment.

*Failure to follow these instructions will result in death or serious injury.*

Always follow the steps listed below before accessing the fuse and VT compartment to install, replace, or perform maintenance on the fuses.

1. Place the VT disconnecting switch in the open position.
2. Close the grounding switch.
3. Remove the fastening screws from the VT compartment access panel.
4. Pull the interlocking latch up to the limit (Figure 40 on page 53), and remove the panel.
5. Use a properly rated voltage sensing device to verify the power is off before working inside this compartment.
6. Open each individual fuse holder cover.
7. To remove or install fuses, follow the procedures as described in “Removing Fuses” or “Installing Fuses” sections on page 55.
8. To reinstall the panel, place it into position, pull the interlocking latch down to the limit, and reinstall the fastening screws.
9. Close the medium voltage door and replace all devices, doors, and covers before turning on power to this equipment.
10. Open the grounding switch.
11. Place the disconnecting switch in the close position to re-energize the circuit.
Removing Fuses

**CAUTION**

**HAZARD OF HOT FUSES**
Always wear gloves when working with fuses. The fuses could be extremely hot and will burn unprotected hands.

**Failure to follow this instruction can result in personal injury.**

Always follow the steps listed on page 54 before accessing the fuse and VT compartment to install, replace, or perform maintenance on the fuses.

**NOTE:** To avoid nuisance tripping, always replace all fuses, even if only one has blown. When one fuse blows, the others have been exposed to overcurrents and may also be damaged.

1. Always use a properly rated voltage sensing device to confirm that power is off. Always wear personal protective equipment appropriate for the hazard when handling the fuses.
2. Open each individual fuse holder cover.
3. Remove each fuse by grasping it at one end and gently pulling it out.
4. Inspect the fuse trigger (a trigger button on top of the fuse that pops up when the fuse blows) on each fuse.

**NOTE:** The power fuses have a top-mounted trigger (striker pin) that pops up when the fuse element melts. This can activate an optionally available contact for remote indication.

Installing Fuses

Always follow the steps listed on page 54 before accessing the fuse and VT compartment to install, replace, or perform maintenance on the fuses.

1. Always use a properly rated voltage sensing device to confirm that power is off. Always wear personal protective equipment appropriate for the hazard when handling the fuses.
2. Gently insert the fuse into the fuse holder.

**NOTE:** The position of the striker indicated on the fuse must be taken into account, that is, the striker must be on the same side as the cover of the fuse holder.

**Figure 41 – Fuse Installation**

3. Close the fuse holder covers.
Hi-Pot Testing

This section contains instructions for conducting hi-pot testing (also known as high-potential or dielectric withstand testing) on the CBGS-0 switchgear.

⚠️ DANGER ⚠️

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices before performing hi-pot (dielectric) tests. See NFPA 70E.
- Only qualified, trained, and certified electrical personnel should perform this testing.
- During testing maintain a minimum clearance of six feet from the equipment.
- After completing hi-pot testing, temporarily ground the bus bars to remove any residual charge.

Failure to follow these instructions will result in death or serious injury.

De-energize the primary and secondary circuits. Perform a standard AC hi-pot (dielectric) test to verify the integrity of the bus insulation. This test needs to be performed at initial installation, during periodic maintenance, and after an abnormal or stressful event has occurred.

**NOTE:** Short-circuit interruption or a nearby lightning strike should be considered a stressful event.

1. Restrict entry into the area to prevent any unauthorized personnel from approaching the switchgear during testing.
2. Notify all personnel that the test will be conducted.
3. Follow all local lockout and tag-out procedures.
4. Remove all primary fuses.
5. Disconnect all potential transformer secondary connections or remove all secondary fuses to isolate the transformer.
6. Short all current transformer secondary terminals or connections.

**NOTE:** LLIs, if installed, do not have to be disconnected for the hi-pot test. However, VTs should be disconnected before performing the test.

To perform the hi-pot test:

1. Apply voltage to each phase individually for one minute with the other two phases and the enclosure grounded (see Table 3 for hi-pot test values).
2. Gradually increase the voltage.
3. Verify that the equipment sustains the specific voltage without flashover for one minute.
4. Turn off the test equipment. Discharge the phase bus to ground before removing the test cables.

**Table 3 – Hi-Pot Test Values**

<table>
<thead>
<tr>
<th>Equipment Rating</th>
<th>AC Field Test Voltages a</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 kV</td>
<td>27 kV</td>
</tr>
<tr>
<td>27 kV</td>
<td>45 kV</td>
</tr>
<tr>
<td>38 kV</td>
<td>60 kV</td>
</tr>
</tbody>
</table>

a For DC test values, contact your local Schneider Electric representative.
**Maintenance**

This section contains information on inspecting and performing preventive maintenance on CBGS-0 switchgear.

**DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed and serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Before performing visual inspections, test, or maintenance on the equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of back-feeding.
- Replace all devices, doors, and covers before turning on the power to this equipment.

*Failure to follow these instructions will result in death or serious injury.*

**Service Conditions**

This section contains information on CBGS-0 switchgear operating conditions.

- The temperature of the cooling air (ambient air temperature) surrounding the enclosure of the switchgear is within the limits of 23 °F and +104 °F (–5 °C and +40 °C).
- The altitude of the installation does not exceed 3300 ft (1000 m).
- The effect of solar radiation is not significant.
- Unusual service conditions do not prevail.

**Unusual Service Conditions**

For switchgear applications under unusual service conditions, contact your local Schneider Electric representative.
Inspection

Periodic inspection of the equipment is necessary to establish the conditions to which the units are being subjected.

Inspection Interval

Because CBGS-0 switchgear is used in a variety of environments, maintenance intervals should be developed for the particular end use. At a minimum, inspect the unit every three years and immediately after any abnormal operation or stressful event.

**NOTE:** Short-circuit interruption or a nearby lightning strike should be considered a stressful event.

Inspection Procedure

The following is a minimal list of inspection procedures that should be performed to ensure proper maintenance:

1. Service the instruments, relays, and other devices according to the specific instructions supplied with them. Inspect the devices and their contacts for dust or dirt; and wipe clean as necessary. Set the maintenance schedule for individual devices, such as meters and relays, per the recommendations of each device’s instruction manual. Coordinate the various schedules with the overall maintenance program.

2. Inspect control wiring connections for tightness and damage.

3. Manually operate mechanical moving parts such as switch assemblies, interlocks, and doors.

4. Make sure all bus areas are well ventilated. Inspect the grillwork and air passages on indoor switchgear sections to ensure they are free from obstruction and dirt accumulation.

5. Check the SF$_6$ gas pressure with the included pressure gauge. If the pressure gauge indicator needle is in the green area, the gas is under proper pressure. If the pressure gauge needle is in the red area, contact your local Schneider Electric representative.

6. Clean the circuit breaker operating mechanism and lubricate using Isoflex Topas NB52. Use this lubricant for bearings, sliding surfaces, joints, rollers, gearbox, and interlocking mechanism.

All inspection, service, and maintenance calls should be listed and dated in the switchgear maintenance log, along with any corrective and preventative actions taken.

These inspection/maintenance guidelines cover only the switchgear and enclosure manufactured by Schneider Electric. If the conditions cannot be established and documented, then aggressive operating conditions must be assumed. These inspection/maintenance guidelines do not warrant any field connections, field modifications, or supersede any maintenance procedures or schedules recommended by component manufacturers.

Replacement Parts

Contact your local Schneider Electric representative for replacement parts.
This schematic is provided for general reference only.

Operation of Circuit Breaker

1. The circuit breaker will close if the closing springs have been charged electronically or manually. 52/MS blocks the motor for spring charging during the manual charging.

2. The closing circuit has continuity when the closing springs are charged and the circuit breaker is open. Applying a close signal energizes the close coil, 52/CC. It discharges the opening springs, opening the circuit breaker and charging the opening springs. When the circuit breaker closes, 52/a, 52/b, and 52/LS change state.

3. 52/a closing allows continuity in the trip circuit and picks up the anti-pump relay, 52Y. 52Y seals itself in, causing the close signal to be removed and reapplied before the circuit breaker can close. Applying a trip signal again energizes the trip coil, 52/TC. It discharges the opening springs, opening the circuit breaker. When the circuit breaker opens, 52/a and 52/b change state.

4. Spare 52/a and 52/b contacts indicate the circuit breaker state. 52/a closes when the circuit breaker closes. 52/b closes when the circuit breaker opens.

Legend

- 52 Circuit Breaker
- 52M Spring Charging Motor
- 52Y Anti-Pump Relay
- 52/a Aux. Switch Contacts, Open When Breaker is Open
- 52/b Aux. Switch Contacts, Closed When Breaker is Open
- 52/CC Close Check Switch
- 52/TC Trip Coil
- SP1 Low Pressure Alarm Contact First Level
- SP2 Low Pressure Alarm Contact Second Level

Notes:

1. Circuit breaker shown in the open state with closing springs charged.
2. CBGS-0 wiring diagram XXXXXXXXXXXXX
3. Elementary diagram CBGS-0 XXXXXXXX
Appendix: Monitoring Camera System for the Three-Position Disconnecting Switch

This appendix describes the camera system for the three-position disconnecting switch in the CBGS-0 switchgear. The three-position switch can be used as:

- a disconnecting switch
- a grounding switch

⚠️ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E.
- This equipment must only be installed or serviced by qualified, trained, and certified electrical personnel.
- Only qualified electrical personnel familiar with medium voltage circuits should perform the instructions in this bulletin. Personnel must understand the hazards involved in working with or near medium voltage equipment.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors, and covers before turning on the power to this equipment.

Failure to follow these instructions will result in death or serious injury.

This section does not describe all configurations or every custom arrangement of the product. For additional information, please contact your local Schneider Electric representative.

⚠️ NOTICE

RISK OF CAMERA DAMAGE AND/OR SOFTWARE DETECTED ISSUE

Due to EMC safety regulations, do not use an AC power supply with the computer while connecting it to the camera via the USB port. Operate the computer only with its integrated battery. Before connecting the camera system, check that the integrated computer battery is fully charged.

Failure to follow this instruction can result in equipment damage.

Use the following general guidelines for proper operation of the camera system.

- The instructions in this section are based on the Microsoft® Windows® XP operating system. If you are using another Windows-based operating system, the actual screen contents and procedures may vary slightly.
- The connection may not operate correctly if you attach the camera to the computer with an interface cable via a USB hub.
- The connection may not operate correctly if you are using other USB devices, excluding USB mice or keyboards, at the same time as the camera. If this occurs, disconnect the other devices from the computer and try reconnecting the camera.
• Do not connect two or more cameras at the same time to the same computer. The connections may not operate correctly.

• Never allow the computer to go into standby (sleep) mode while a camera is connected via the USB interface cable. If it does happen, never disconnect the interface cable.

Try to wake the computer with the camera in the connected state. Some computers will not wake up properly if you disconnect the camera while they are in standby mode. Please refer to your computer manual for instructions regarding the standby mode.
General Description

Figure 43 – Camera System Components

Camera System Specifications

- Image sensor: CMOS, 1/3 monochrome
- Resolution: 752 x 480 (WVGA)
- Refresh rate: 18 fps
- USB version: 2.0
- Operating temperature: -13 to +167 °F (-25 to +75 °C)
- Sensitivity: < 0.1 lux
- Power supply: 5 Vdc, 300 mA via USB (including LEDs)
Schneider Electric View Port Camera Software License Terms

These license terms are an agreement between Schneider Electric and you. Please read them. They apply to the Schneider Electric View Port Camera software, referred to hereafter as “the software.”

By using the software, you accept these terms. If you do not accept them, do not use the software.

If you comply with these license terms, you have the rights below for each license you acquire.

Overview

License Model. The software is licensed on a per user basis.

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Software Package Contents

The View Port Camera software package included with the switchgear contains the following items:

- 3.3 ft. (1 m) USB cable with two type A plugs
- “Schneider Electric View Port Camera” CD containing user software, USB drivers, and a PDF of the instruction bulletin
- Printed instruction bulletin

Computer System Requirements

Hardware

- 2 GHz processor
- 1 GB RAM
- 10 MB free disk space
- 256 MB graphics memory
- 1024 x 768 pixels display
- USB 2.0 port

Software

- Microsoft® Windows® XP, 32-bit (Service Pack 2), or Microsoft Windows Vista®, 32-bit
- Adobe® Reader®, version 5 or higher

Operating Instructions

NOTE: Do not connect the computer to the switchgear panel until the camera software and the USB driver have been installed.

Before operating the three-position disconnecting switch, initiate the view monitoring system:

1. Start the View Port Camera application by double-clicking the desktop icon.
2. Remove the USB view port cover or cap on the front of the CBGS-0 unit (Figure 44).

Figure 44 – USB View Port
3. Connect the USB cable to the computer and then to the view port (Figure 45).

**Figure 45 – Connecting USB Cable**

**NOTE:** For a 47.25 in. (1200 mm) wide section, the camera system includes two USB ports (Figure 46). One USB port is for connecting the camera; the other is for connecting the power supply for an internally mounted light. Both connections have to be made for the monitoring camera system to operate properly.

**Figure 46 – Dual USB Ports**
The following reference images represent the actual view on the computer screen for the 23-⅝ in. (600 mm) wide section.

**Figure 47 – Reference Images from Monitoring Camera System**

1. Camera ID: When there is no connection between the camera and the computer, the following message is shown instead of the camera ID: unconnected

2. Live image: The live image shows the actual position of the three-position disconnecting switch. When the user operates the three-position disconnecting switch to change from one position to the another (connected to open, open to ground, etc), the live image will show these changes. See the reference images on the right side (items 3, 4, and 5).

3. Reference image: Closed position

4. Reference image: Open position

5. Reference image: Ground position

6. Exit button: closes the software

7. Mobile contact

8. Busbar fixed contact
Disconnecting Switch Positions

The position of the switch blades is shown by the position indicator on the mimic bus. Always look through the switch position viewing window to verify the actual position of the blades.

**NOTE:** When operating the disconnecting switch, look for real-time movement of the switch blades in the live camera images. This will help prevent mistaking a static image for a live one.

Check the position indicator of the disconnecting switch, and compare the live image with the representative reference images shown on the following pages.
23-⅝ in. (600 mm)-wide Section View

Disconnecting Switch in the CLOSE Position

Disconnecting Switch in the OPEN Position

Disconnecting Switch in the GROUND Position
47-¼ in. (1200 mm)-wide Section View

Disconnecting Switch in the CLOSE Position

Disconnecting Switch in the OPEN Position

Disconnecting Switch in the GROUND Position