SIEMENS

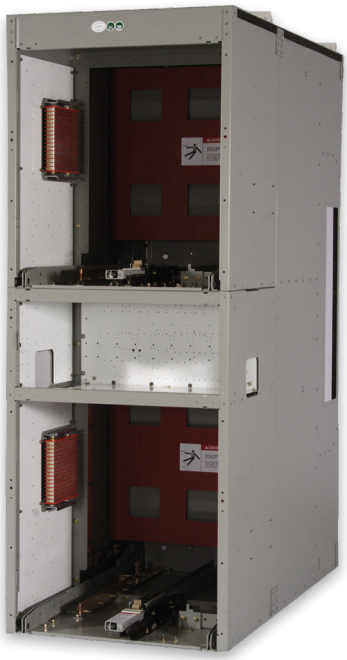
SELECTION AND APPLICATION GUIDE

Medium Voltage OEM Components and Skeletons

Version 5

usa.siemens.com/mvcomponents

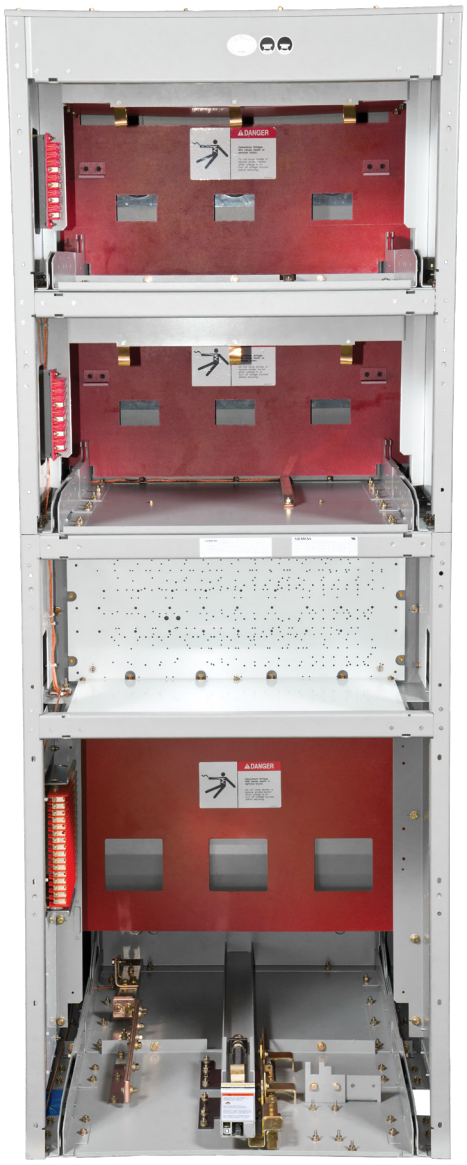




MV OEM components and skeletons

This catalog presents Siemens GMSG and GM27 medium-voltage offering of OEM skeletons and OEM components for partners ANSI/IEEE switchgear to building standards.

SIPROTEC Solution



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Vacuum circuit breakers

Vacuum circuit breaker ratings

Siemens type GMSG circuit breakers are available in 25 kA through 63 kA "constant kA" interrupting classes or 250 MVA through 1,000 MVA on the older "constant MVA" rating basis. Continuous current ratings include 1,200 A, 2,000 A and 3,000 A self-cooled. 4,000 A is available using a 3,000 A circuit breaker together with forced-air (fan) cooling in the switchgear cubicle. Partner is responsible for type testing to higher amperages.

Siemens type 27 kV GMSG circuit breakers are available in 25 kA and 40 kA interrupting classes. Continuous current ratings in-clude 1,200 A, 2,000 A, and 2,500 A self-cooled and 3,000 A forced air cooled. 3,000 A is available using a 2,500 A circuit breaker together with forced-air (fan) cooling in the switchgear cubicle. Partner is responsible for type testing to higher amperages.

Common operator family

Since the entire GMSG and GM27 circuit breaker families uses a common stored energy operating mechanism design, less training of maintenance personnel is required and stocking of spare parts is reduced.

Floor rollout

If the switchgear is not located on a "housekeeping" pad, the circuit breakers located in the lower cells are arranged to rollout directly on the floor in front of the switchgear. No adapter, hoist or lift truck is necessary, provided the partner installs the kit on the bottom of their structure.

Maintenance features

Type GMSG circuit breakers incorporate many features designed to reduce and simplify maintenance, including:

- Low maintenance Vacuum interrupter
- Ten-year maintenance interval (assuming ANSI "usual service" conditions)
- Floor rollout depending on partner design
- Front-mounted operator
- Common operator family
- Simple outer-phase barriers
- "Universal" spare circuit breaker concept
- Non-sliding current transfer
- Visible rugged secondary disconnects.

Ten-year maintenance interval on GMSG and GM27 circuit breakers

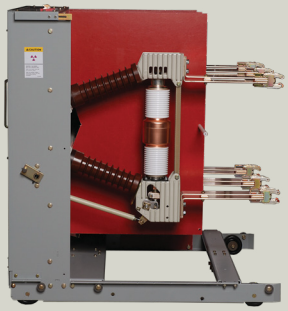
When applied under normal IEEE operating conditions (IEEE "usual service" conditions), maintenance is typically needed at 10-year intervals on the circuit breaker. The maintenance interval for the racking hardware is five years.

Low maintenance requirements

The vacuum interrupter is a sealed unit so the only maintenance typically required is to remove contaminants and check the vacuum integrity.



Front



Side (barrier removed)



Rear

GMSG Circuit Breaker

Vacuum circuit breakers

"Universal" spare circuit breaker concept

The physical configuration and interlock logic allow the use of a single circuit breaker to serve as a "universal" spare circuit breaker at an installation site, based on the groupings below. The rating interlock logic checks the principal rating characteristics (continuous current, maximum voltage and interrupting current) and allows a circuit breaker to be inserted in a breaker cell, provided that the circuit breaker equals or exceeds the ratings required by the cell.

Universal breaker groups (not interchangeable with each other):

- GMSG distribution breakers rated 50 kA and below
- GMSG distribution breakers rated 63 kA
- GM27 breakers (40 kA and below)

Primary disconnects

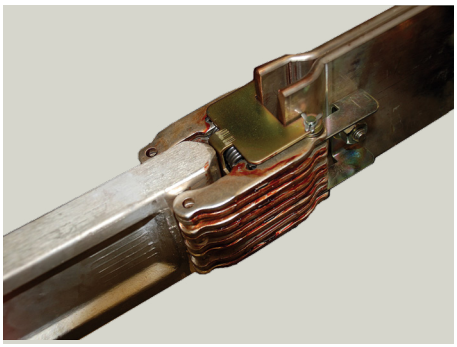
The primary connection between the circuit breaker and the cubicle is made of multiple sets of silver-plated copper finger contacts, which are mounted on the ends of the circuit breaker disconnect stabs. The contacts are compression spring loaded (one spring per double pair of fingers). This arrangement offers a large number of contact points to ensure proper alignment. The circuit breaker finger assemblies are withdrawn with the circuit breaker and are available for inspection without de-energizing the switchgear main bus.

Secondary disconnects

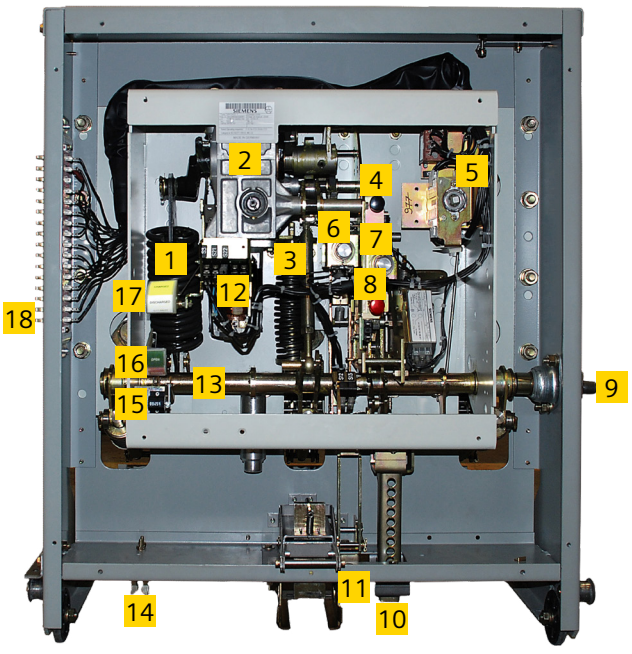
The circuit breaker-to-cubicle secondary disconnects are designed with sliding fingers. The secondary disconnects are automatically engaged as the circuit breaker is racked into the test position. They remain engaged as the circuit breaker is racked to the connected position. Because they are engaged in both of positions, there is no need to operate a separate linkage for testing. The secondary disconnects are located on the side of (GMSG) or the top of (GM27) the circuit breaker element, where they are shielded from accidental damage. They are extremely rugged design, in contrast to other designs that employ light duty electronics-style disconnects, located in hidden or inaccessible locations. Alignment of the disconnects can be visibly observed, if desired, allowing positive verification of secondary integrity. This feature is not possible with designs employing a disconnect underneath or behind the circuit breaker.

Non-sliding current transfer

Pioneered by Siemens in the 1970s, the Vacuum interrupter movable stem is connected to the lower disconnect stab of the circuit breaker by a reliable flexible connector. This provides a low-resistance current transfer path, not subject to the wear and contamination problems associated with sliding or rolling joints used in some designs.



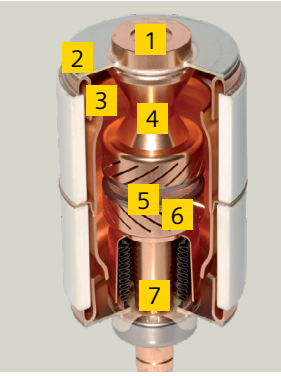
Primary disconnects



Type GMSG circuit breaker key components

1	Closing spring
2	Gearbox
3	Opening spring
4	Push-to-close
5	Auxiliary switch
6	Close coil
7	Trip coil
8	Push-to-trip
9	MOC switch operator
10	Closed circuit breaker interlock
11	Trip-free interlock
12	Spring charging motor
13	Jack shaft
14	Ground disconnect
15	Operations counter
16	OPEN/CLOSED indicator
17	CHARGED/DISCHARGED indicator
18	Secondary disconnect

Vacuum circuit breakers



1	Stationary current connection terminal
2	Insulator
3	Arc shield
4	Chrome-copper contacts
5	Moving contact stem
6	Stainless steel bellows
7	Mechanical coupling for operating mechanism

Vacuum interrupter



Vacuum interrupter family

Mechanism operation

The mechanism is arranged to pre-store closing energy in the closing springs. The closing springs are selected so that they provide sufficient energy not only to close the circuit breaker safely into maximum "close and latch" currents but also to prestore the tripping energy necessary to open the circuit breaker. The closing springs can be manually charged during maintenance or in emergency conditions, but are normally charged automatically via electric motor after each closing operation.

Front accessible operating mechanism

The GMSG and GM27 stored-energy operators are located at the front of the circuit breaker. The front cover can be easily removed to expose the operator for inspection and maintenance. This feature eliminates the need to tilt or turn over the circuit breaker for normal service.

Interlocks

The racking system prevents racking of a closed circuit breaker and keeps the circuit breaker trip free during racking. The racking mechanism can be padlocked to prevent unauthorized operation. Padlocks can also be applied to the racking mechanism to maintain the circuit breaker in the trip-free condition.

Manual controls and indicators

All circuit breaker manual controls and indicators are conveniently located on the front of the circuit breaker. Standard features include manual close button, manual trip button, open-close indicator, stored-energy closing spring, charge/discharge indicator, manual spring charging access port and close operation counter.

Trip-free design

The operating mechanism conforms to the trip-free requirements of ANSI/IEEE standards. The mechanism design assures that the tripping function prevails over the closing operation.

Simple barriers (GMSG)

Outer phase barriers are of very simple design and located on the circuit breaker, allowing the cell to be free of barriers, except the current transformer barrier located in front of the shutters. The barriers on the circuit breaker remove quickly and easily for maintenance. Most maintenance can be performed with the barriers in place.

Vacuum interrupters

The GMSG and GM27 circuit breakers use the Siemens family of vacuum interrupters, proven in over 600,000 circuit breakers produced since 1976. The cup-shaped contacts (used for lower interrupting ratings GMSG) have chrome-copper arcing rings with a unique radial magnetic field geometry to provide fast interruption with minimal contact erosion. For higher interrupting ratings in GMSG and all GM27 axial magnetic field contacts are used to maintain the arc in diffuse mode and minimize contact erosion. The chrome-copper contact material assures lower chopping currents than designs employing copper-bismuth contacts.

Vacuum circuit breakers



Secondary disconnect circuit breaker portion

Auxiliary switch (circuit breaker mounted)
The auxiliary switch assembly is mounted on the vacuum circuit breaker with contacts for use in the circuit breaker control circuit and as spare contacts for other use. Normally, four auxiliary switch contacts, two NO (52a) and two NC (52b), can be wired out for purchaser use.

Mechanism-operated cell (MOC) and truck-operated cell (TOC) switches
When required, 6, 12, 18 or 24 stages of a mechanism-operated cell (MOC) auxiliary switch can be mounted in the circuit breaker cell. This switch is operated by the circuit breaker mechanism, so that the switch contacts change state whenever the circuit breaker is closed or opened. Normally, the MOC switch is operated only when the circuit breaker is in the connected position, but provisions for operation in both the connected and the test positions can be furnished.

Similarly, 4, 8 or 12 stages of a truck operated cell (TOC) switch can be mounted in the circuit breaker cell. The TOC switch contacts change state when the circuit breaker moves into or out of the connected position.

MOC and TOC switches can be purchased alone or together in predefined combinations.

The advantages inherent in vacuum interruption are summarized as follows:

Ideal dielectric
In a vacuum, the dielectric strength across a contact gap recovers very rapidly allowing a small contact separation and an efficient vacuum interrupter design. The vacuum does not interact with the arc or its components.

Quiet operation
Interruption of currents by a vacuum circuit breaker is quieter than the loud report that accompanies interruptions in some other types of circuit breakers.

Low current chopping characteristics
The chrome-copper contact material used in Siemens vacuum interrupters limits chopping currents to a maximum of five amperes. This low value prevents the build-up of unduly high voltages and results in lower stress on the insulation of load equipment.

No arc products vented to the atmosphere
The sealed vacuum interrupter prevents venting of arc products to the atmosphere and prevents contamination of the contacts by the atmosphere. The metal vapor of the arc quickly recondenses on the surface of the contacts, although a small amount may recondense on the arc chamber wall or arc shield. The recondensing metal vapor acts as a "getter" and recaptures more molecules of certain gases that might be liberated during vaporization. This action tends to improve the vacuum in the interrupter during its operating life.

Non-toxic interruption by-products
The interruption process occurs entirely within the sealed Vacuum interrupter. Even if a vacuum interrupter is physically broken, the arc products inside the Vacuum interrupter are not toxic. In contrast, gas-filled interrupters produce toxic arc by-products, requiring special precautions in the event of a ruptured interrupter housing.

Vacuum circuit breakers

Fewer components
The vacuum interrupter pole construction is extremely simple and consists of only seven moving parts within the high voltage area and only two moving parts within the vacuum interrupter chamber. This means greater reliability and less maintenance with vacuum interrupters as compared to the greater number of parts in other types of interrupters, such as gas or oil.

Long vacuum interrupter life
Due to the careful selection of components, the vacuum interrupter has a long expected service life. The chrome-copper contacts allow efficient interruption of both diffused and contracted arcs with very little contact erosion.

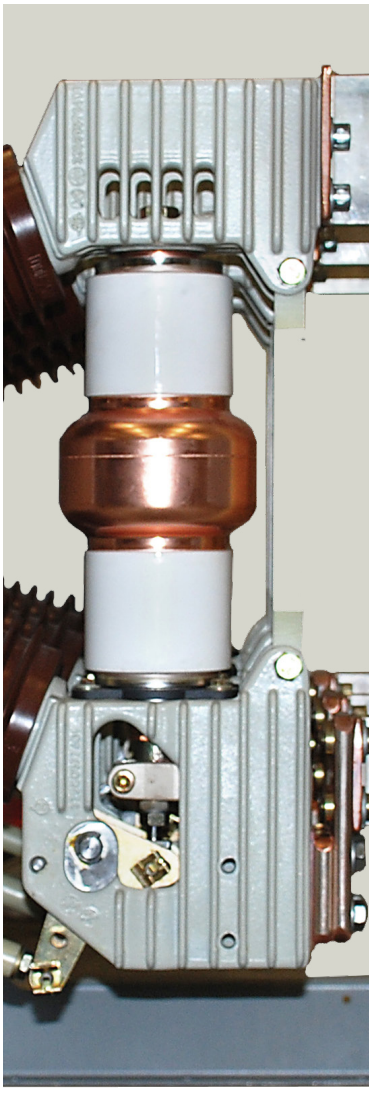
Immunity to environment
The capability of the vacuum interrupter to interrupt current or to withstand voltage is not directly affected by conditions external to the vacuum interrupter. High or low altitudes, hot or cold temperatures, moist or dry conditions, or heavy dust conditions do not affect the conditions internal to the vacuum interrupter. Conditions external to the vacuum interrupter, however, could affect the overall system operation and should be considered in the specifications.

Low maintenance
Vacuum interrupter maintenance typically requires wiping dust or other atmospheric elements from the exterior, visually checking the contact wear indicator and periodic dielectric testing to confirm vacuum integrity.

Lower force requirements
The vacuum interrupter has a very low moving mass compared to that found in other interrupters. This allows for a smaller, more compact stored-energy operator leading to the long life and low maintenance of the circuit breaker.

Siemens vacuum heritage
Type GMSG vacuum circuit breakers take full advantage of Siemens' long history with vacuum interrupters for power applications. While early work was carried out in the 1920s, a successful vacuum interrupter could not be perfected until the high vacuum pump became available in the 1960s. Siemens began to focus development efforts in 1969, culminating with the introduction of the type 3AF circuit breaker in 1976. The knowledge gained over years of application of this technology in the types 3AF and 3AH circuit breakers is now available in the type GMSG design.

Vacuum circuit breakers



Vacuum interupter bottle

Vacuum interrupter principles

With Siemens type GMSG vacuum circuit breakers, the chopping currents are held to five amperes or less. This is low enough to prevent the build-up of unduly high voltages that may occur on switching of inductive circuits. The chrome-copper contact material keeps overvoltages to a minimum so special surge protection is not required in most applications.

When the contacts open, the current to be interrupted initiates a metal vapor arc discharge and current continues flowing through this plasma until the next current zero.

The arc is extinguished near the current zero and the conductive metal vapor recondenses on the contact surfaces and the arc chamber wall or arc shield within a matter of microseconds. As a result, the dielectric strength of the break recovers very rapidly and contact erosion is almost negligible.

The arc drawn in the vacuum interrupter is not cooled. The metal vapor plasma is highly conductive and the resulting arc voltage is only 20 to 200 volts. This low arc voltage, combined with very short arcing times, produces only a very small arc energy in the vacuum interrupter, accounting for the long electrical life expectancy of the Siemens vacuum interrupter.

There are two types of arc shapes. Up to approximately 10 kA, the arc remains diffused. It takes the form of a vapor discharge and covers the entire contact surface. Diffused arcs are easily interrupted.

Radial magnetic field design Vacuum interrupters are used for lower interrupting ratings. In radial magnetic field interrupters, when the arc current exceeds about 10 kA, the arc is constricted considerably by its own magnetic field and contracts essentially to a point arc. If the contracted arc is allowed to remain stationary, it overheats the contact at the arc roots to the point where molten metal vapor does not allow the dielectric to rebuild during the current zero and large magnitude currents cannot be interrupted. To overcome this, the contacts are designed in a cup shape with oblique slots, so that a self-generated field causes the arc to travel around the contacts. This prevents localized overheating when interrupting large magnitudes of short circuit current.

For high interrupting ratings in GMSG and all GM27 axial magnetic field design is employed. In this configuration, the current flow creates a magnetic field along the longitudinal axis of the vacuum interrupter. This field prevents constriction of the arc and this forces the arc to remain in diffuse mode. Since the arc remains in diffuse mode, localized overheating is avoided and contact erosion is held to low levels.

Catalog number logic : MV OEM circuit breakers



A Category

MV MV OEM

B Product Family

SG GMSG

27 GM27

C Product Line

BR Breaker

D Product Type

GB Generator Breakers

DD Drawout Distribution Breakers

ST Stationary

DG Drawout Generator Rated Breakers

E Interrupt Rating

2	25 kA	**A**	250 MVA
3	31.5 kA	**B**	350 MVA
4	40 kA	**C**	500 MVA
5	50 kA	**D**	750 MVA
6	63 kA	**E**	1000 MVA
		F	1500 MVA

F Current Rating

12 1200 A

20 2000 A

31 3150 A

3F 3000 A Fan Cooled

30 3000 A

4F 4000 A Fan Cooled

G Voltage

05 5 kV

15 15 kV

27 27 kV

H Controls

A 125 VDC Motor, Close & Trip

B 120 VAC Motor, Close & Capacitor Trip

C 125 VDC Motor, Close & Trip with Second Trip Coil

D 125 VDC Motor, Close & Trip with Undervoltage Trip Device

E 120 VAC Motor & Close, 125 VDC Trip

F 125 VDC Close & Trip with Separate 125 VDC Motor

G 120 VAC Motor, Close & Trip

H 64 PIN Connect, 125 VDC

I 120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

J 48 VDC Motor, Close & Trip

K 125 VDC Motor, Close & Trip (3 cycle)

L 120VAC Motor, Close, 125VDC Trip Coil1-3 cyc. 125VDC Trip Coil 2- 5 cyc.

M 125 VDC Motor, Close & Trip with Second Trip Coil (1st coil is 3 cycle)

N 120VAC Motor, DC Close & Trip Coil 1-3 cyc. DC Trip Coil 2- 5 cyc.

O 120VAC Motor, Close, Trip Coil, 120VAC UVTD

P 48VDC Motor, Close, Trip, w/ 2nd Trip Coil

Q 120VAC/125VDC Motor, DC Close & Trip Coil

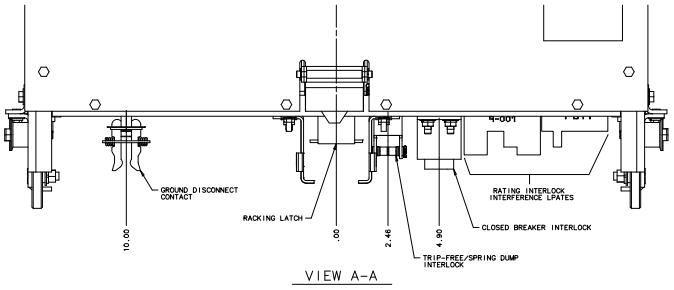
R 120VAC/125VDC Motor, DC Close & Trip Coil, 2nd DC Trip Coil

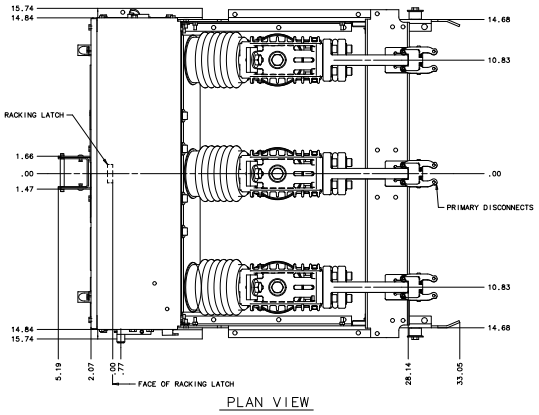
S 120 VAC Motor & Close, 125 VDC Trip w/ 2nd DC Trip Coil

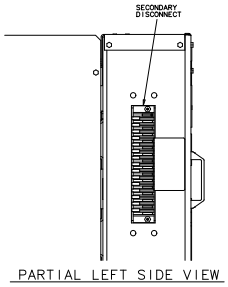
T 48VDC Motor, DC Close & Trip 3 cycle

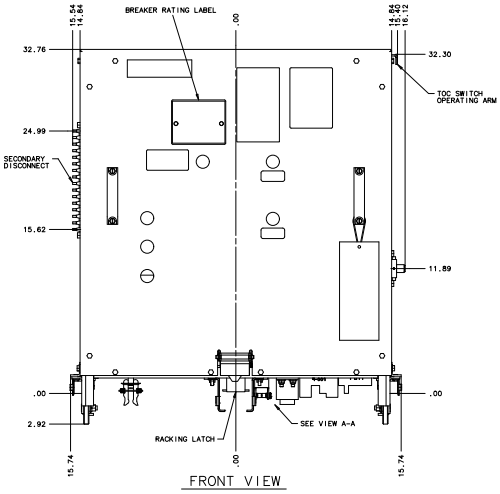
All parts are subject to availability. If a Catalog Number is not found that matches the desired application requirements, please contact your Siemens sales representative for more information about possible availability.

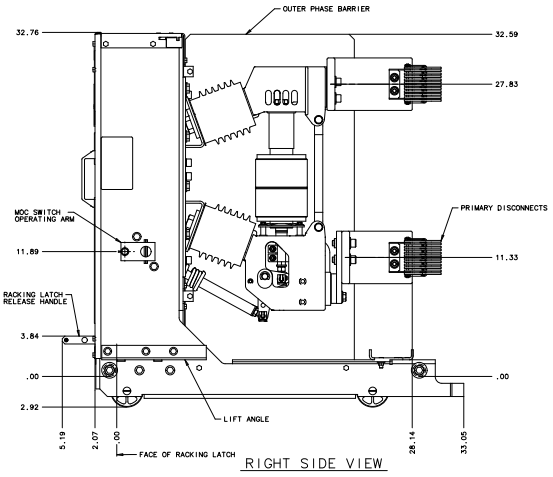
5 kV (GMSG) Vacuum circuit breakers







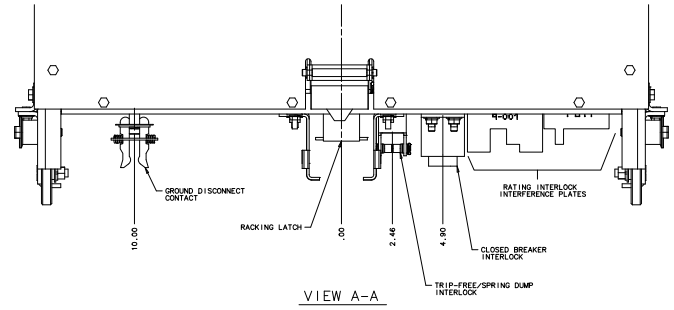




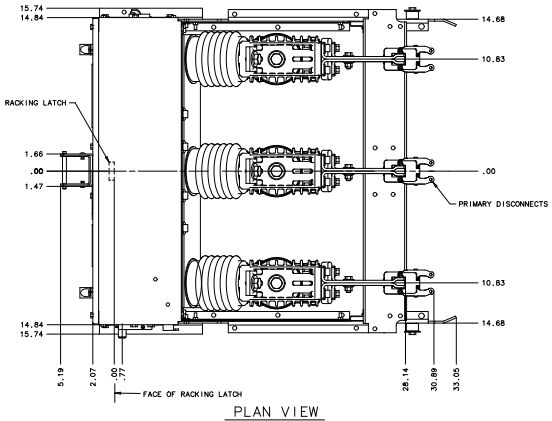
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD41205A ①	5 kV	40 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD41205B ①	5 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD41205C ①	5 kV	40 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD41205D ①	5 kV	40 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD41205E ①	5 kV	40 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD41205F ①	5 kV	40 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD41205G ①	5 kV	40 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD41205I ①	5 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD41205K ①	5 kV	40 kA	1200 A	125 VDC, Motor, Close & Trip (3 cycle)

① Use with 50 kA cell kit / skeleton

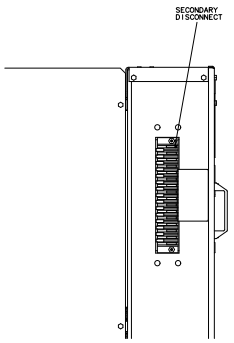
5 kV (GMSG) Vacuum circuit breakers



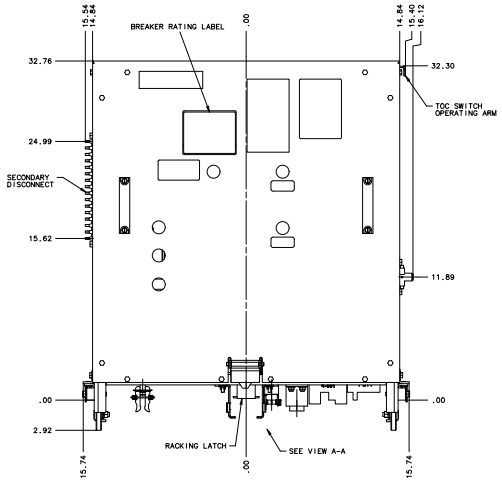
VIEW A–A



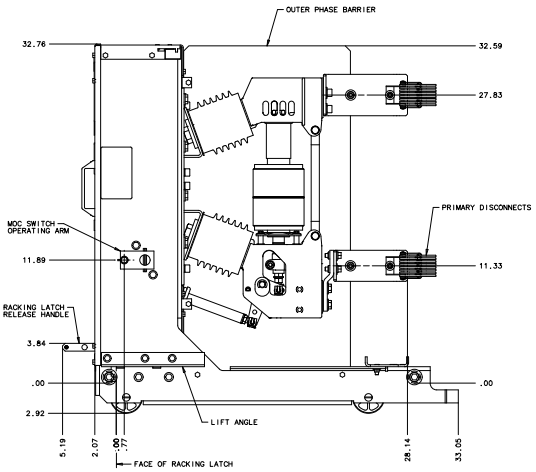
PLAN VIEW



PARTIAL LEFT SIDE VIEW



FRONT VIEW

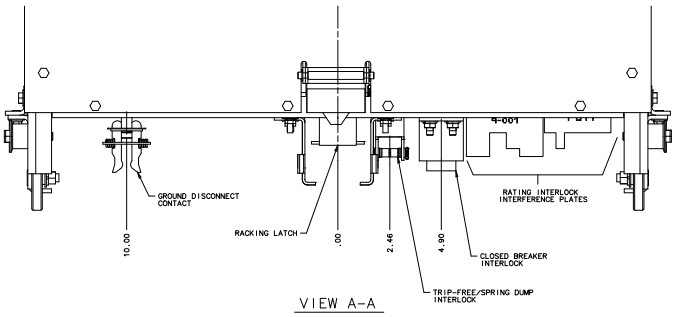


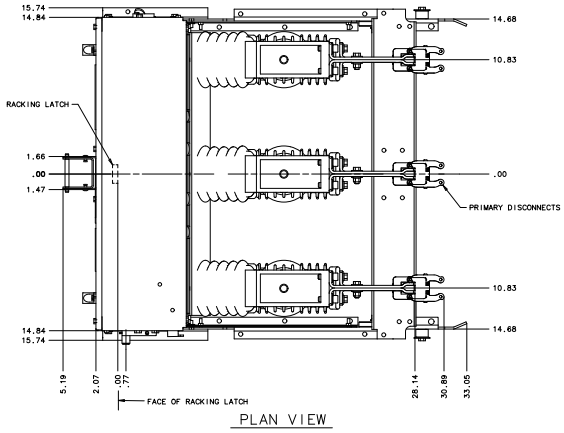
RIGHT SIDE VIEW

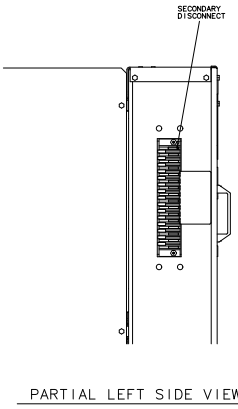
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD42005A ①	5 kV	40 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD42005B ①	5 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD42005C ①	5 kV	40 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD42005D ①	5 kV	40 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD42005E ①	5 kV	40 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD42005F ①	5 kV	40 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD42005G ①	5 kV	40 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD42005I ①	5 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD42005K ①	5 kV	40 kA	2000 A	125 VDC, Motor, Close & Trip (3 cycle)

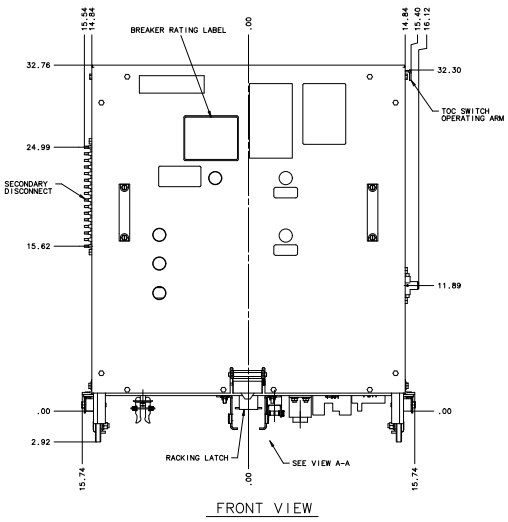
① Use with 50 kA cell kit / skeleton

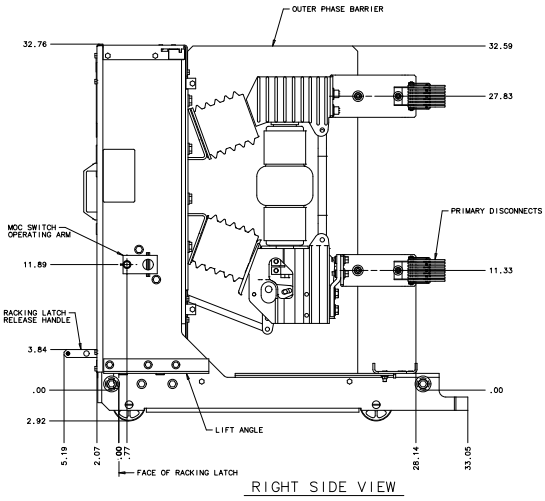
5 kV (GMSG) Vacuum circuit breakers







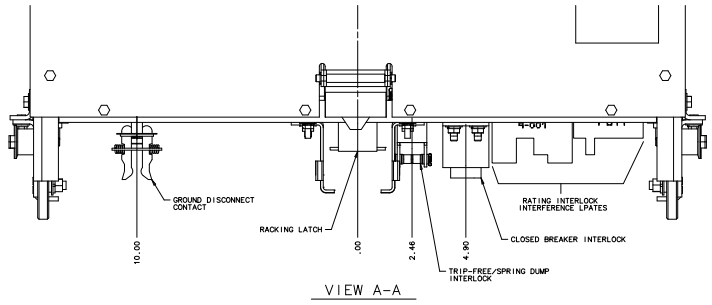




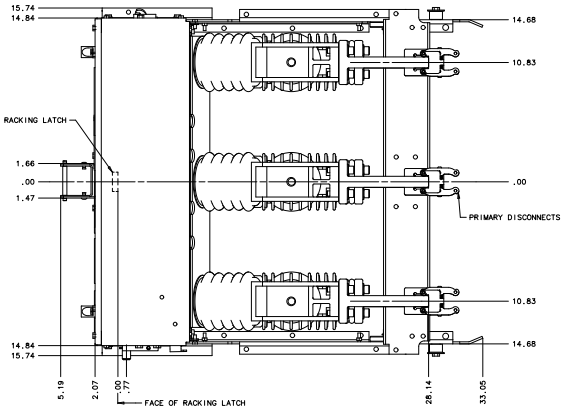
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD51205A ①	5 kV	50 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD51205B ①	5 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD51205C ①	5 kV	50 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD51205D ①	5 kV	50 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD51205E ①	5 kV	50 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD51205F ①	5 kV	50 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD51205G ①	5 kV	50 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD51205I ①	5 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

① Use with 50 kA cell kit / skeleton

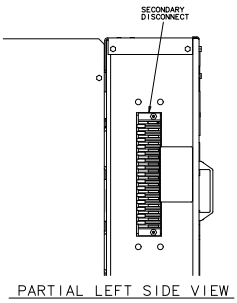
5 kV (GMSG) Vacuum circuit breakers



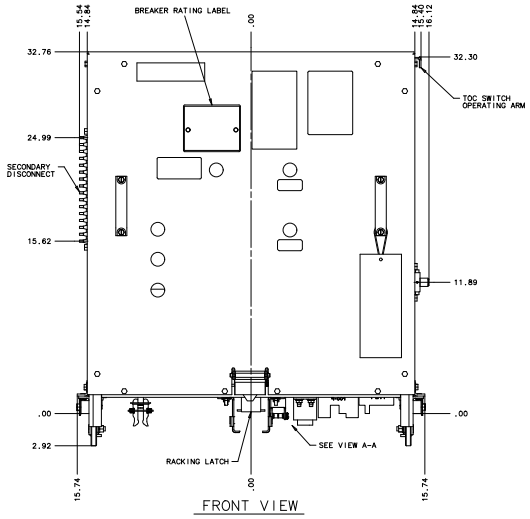
VIEW A–A



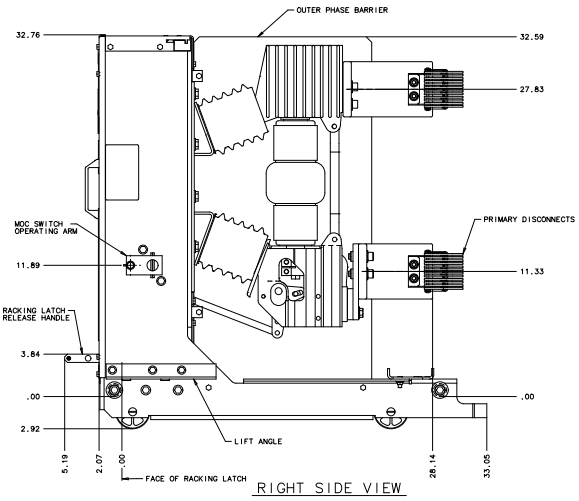
PLAN VIEW



PARTIAL LEFT SIDE VIEW



FRONT VIEW

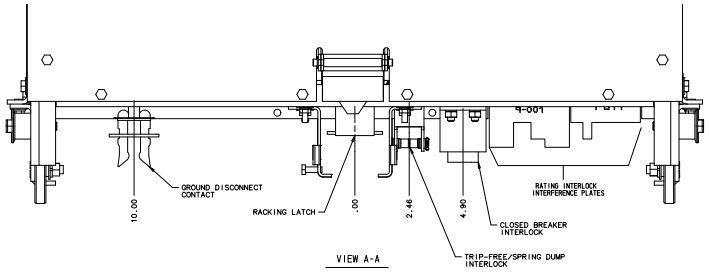


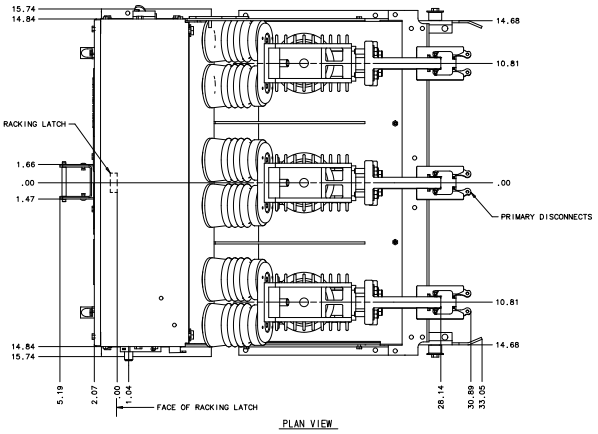
RIGHT SIDE VIEW

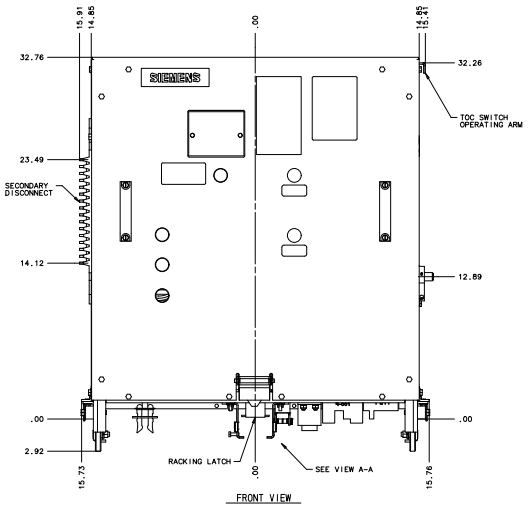
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD52005A ①	5 kV	50 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD52005B ①	5 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD52005C ①	5 kV	50 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD52005D ①	5 kV	50 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD52005E ①	5 kV	50 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD52005F ①	5 kV	50 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD52005G ①	5 kV	50 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD52005I ①	5 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD53005A ①	5 kV	50 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD53005B ①	5 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD53005C ①	5 kV	50 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD53005D ①	5 kV	50 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD53005E ①	5 kV	50 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD53005F ①	5 kV	50 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD53005G ①	5 kV	50 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD53005I ①	5 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

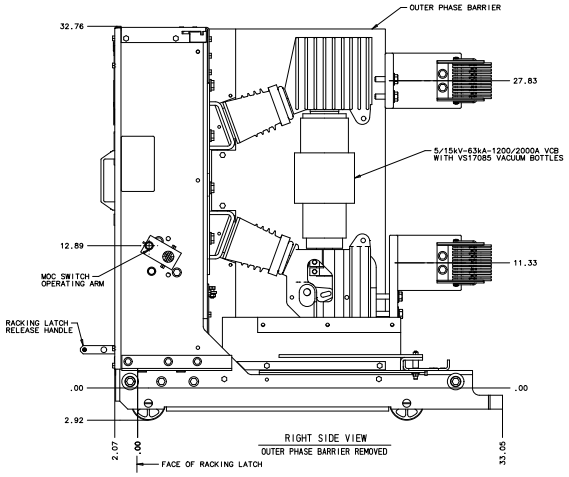
① Use with 50 kA cell kit / skeleton

5 kV (GMSG) Vacuum circuit breakers









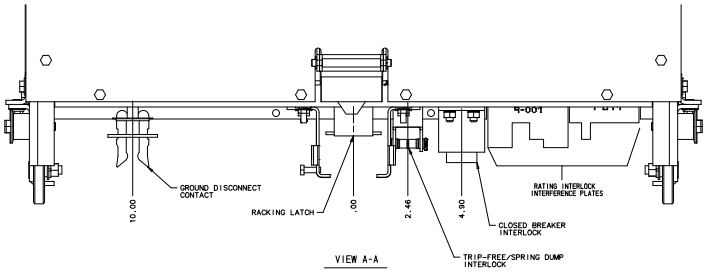
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD61205A ②	5 kV	63 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD61205B ②	5 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD61205C ②	5 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD61205D ②	5 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD61205E ②	5 kV	63 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD61205F ②	5 kV	63 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD61205G ②	5 kV	63 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD61205I ②	5 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD62005A ②	5 kV	63 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD62005B ②	5 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD62005C ②	5 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD62005D ②	5 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD62005E ②	5 kV	63 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD62005F ②	5 kV	63 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD62005G ②	5 kV	63 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD62005I ②	5 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

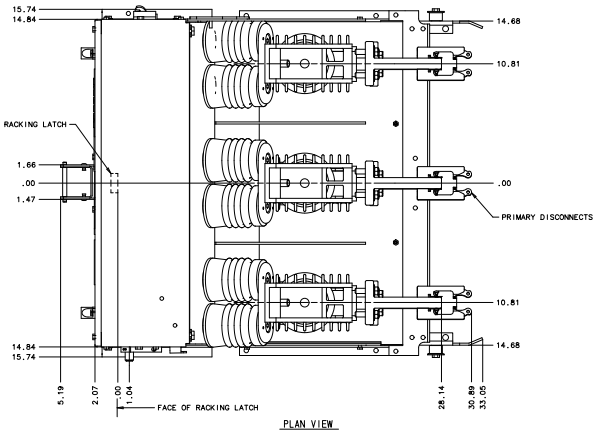
① Use with 50 kA cell kit / skeleton

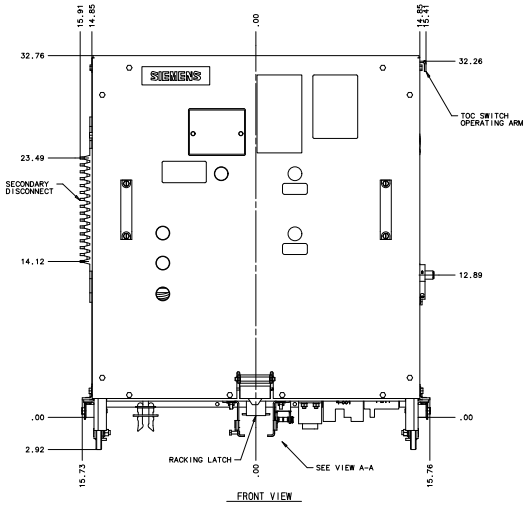
② Use with 63 kA cell kit

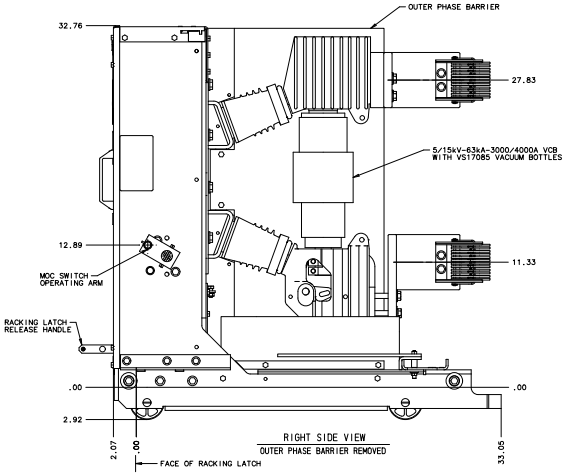
③ Siemens GMSG 3000 A draw-out breakers are capable of operation up to 4000 A provided the following conditions are met: Use with MVSGCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

5 kV (GMSG) Vacuum circuit breakers









Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD63005A ②	5 kV	63 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD63005B ②	5 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD63005C ②	5 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD63005D ②	5 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD63005E ②	5 kV	63 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD63005F ②	5 kV	63 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD63005G ②	5 kV	63 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD63005I ②	5 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD64F05A ②③	5 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDD64F05B ②③	5 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD64F05C ②③	5 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD64F05D ②③	5 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD64F05E ②③	5 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD64F05F ②③	5 kV	63 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD64F05I ②③	5 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

② Use with 63 kA cell kit

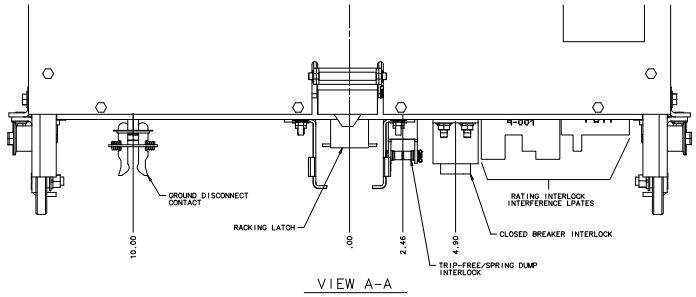
③ Siemens GMSG 3000 A draw-out breakers are capable of operation up to 4000 A provided the following conditions are met: Use with MVSGCK BAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

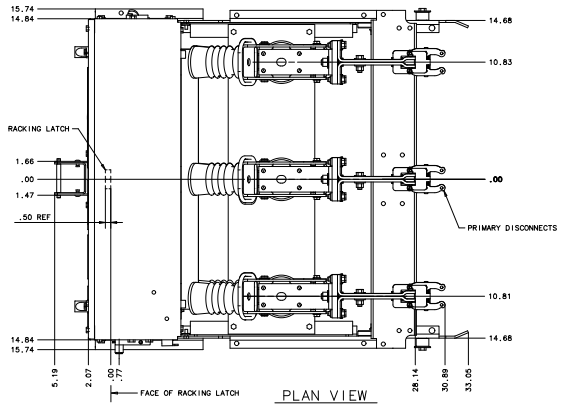
5 kV (GMSG) Vacuum circuit breakers

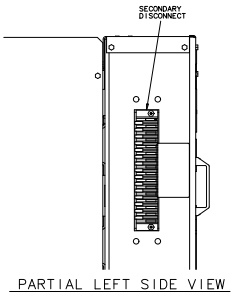
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD43005A ①	5 kV	40 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD43005B ①	5 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD43005C ①	5 kV	40 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD43005D ①	5 kV	40 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD43005E ①	5 kV	40 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD43005F ①	5 kV	40 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD43005G ①	5 kV	40 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD43005I ①	5 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD54F05A ①③	5 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDD54F05B ①③	5 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD54F05C ①③	5 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD54F05D ①③	5 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD54F05E ①③	5 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD54F05F ①③	5 kV	50 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD54F05I ①③	5 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

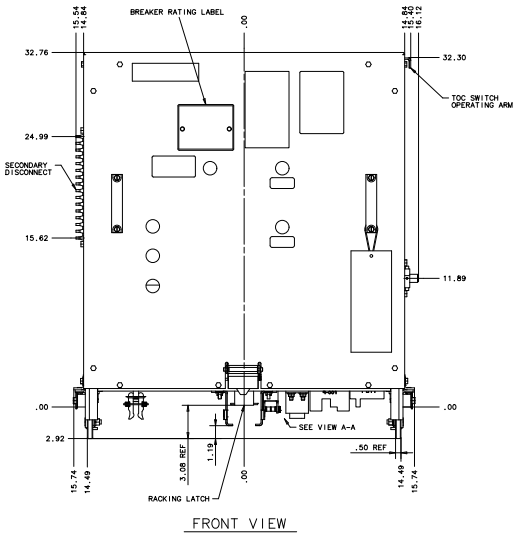
① Use with 50 kA cell kit / skeleton
③ Siemens GMSG 3000 A draw-out breakers are capable of operation up to 4000 A provided the following conditions are met: Use with MVSGCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

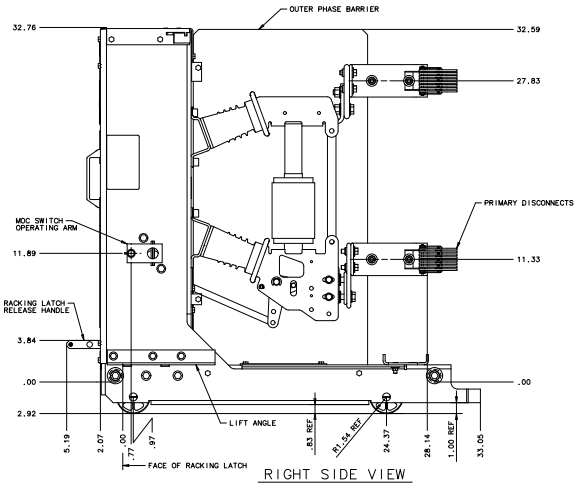
15 kV (GMSG) Vacuum circuit breakers







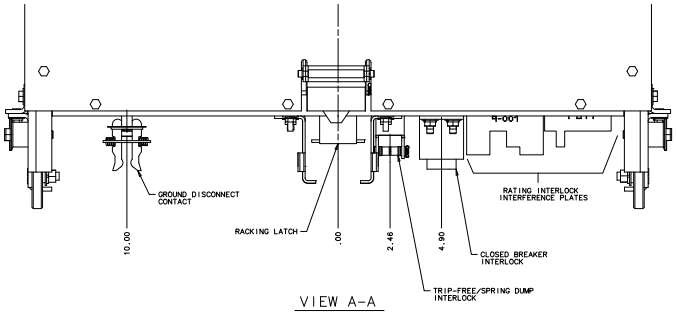


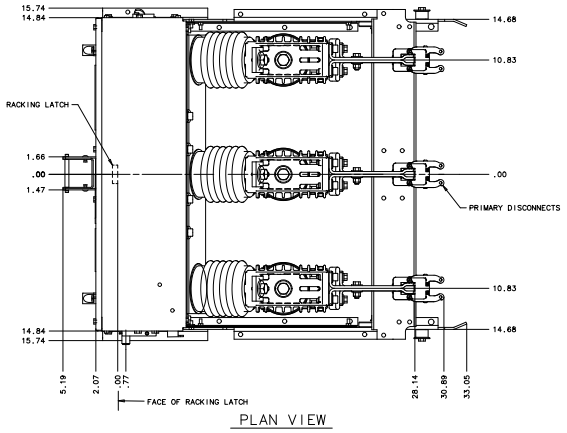


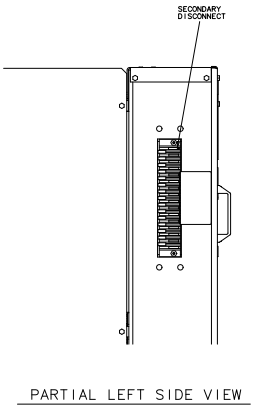
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDC1215A ①	15 kV	500 MVA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDDC1215B ①	15 kV	500 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDC1215C ①	15 kV	500 MVA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDC1215D ①	15 kV	500 MVA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDC1215E ①	15 kV	500 MVA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDC1215F ①	15 kV	500 MVA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDC1215G ①	15 kV	500 MVA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDDC1215I ①	15 kV	500 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

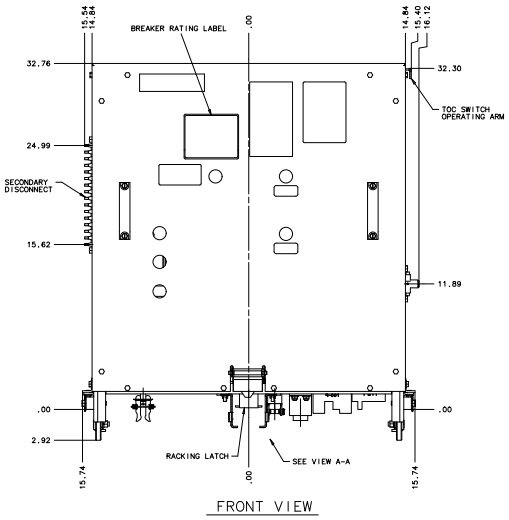
① Use with 50 kA cell kit / skeleton

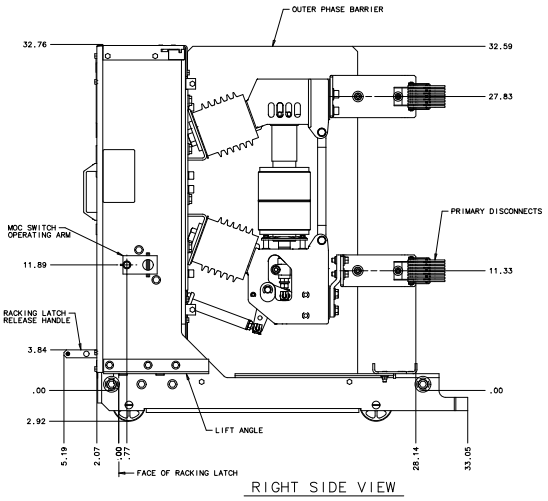
15 kV (GMSG) Vacuum circuit breakers







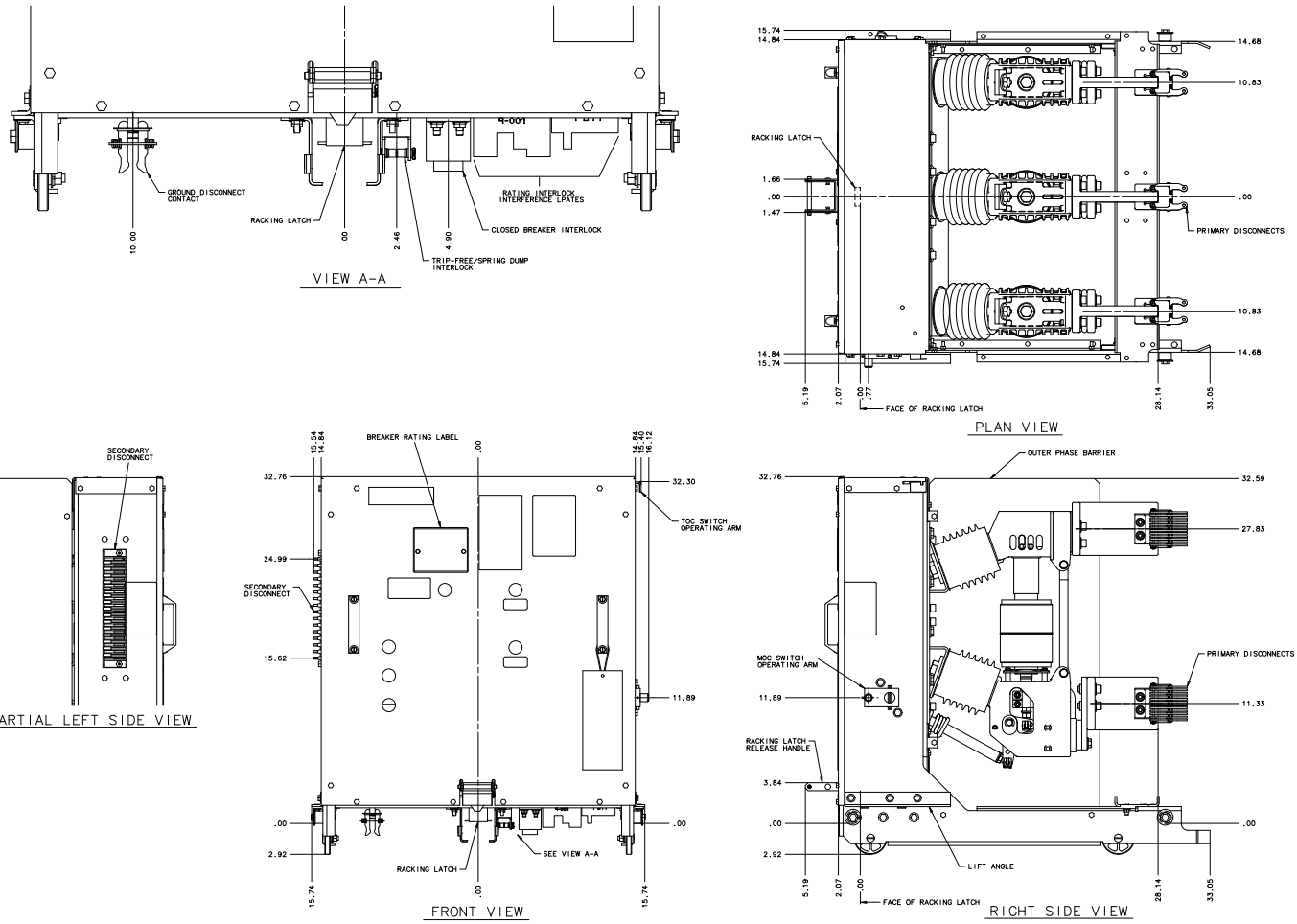




Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDD1215A ①	15 kV	750 MVA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDDD1215B ①	15 kV	750 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDD1215C ①	15 kV	750 MVA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDD1215D ①	15 kV	750 MVA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDD1215E ①	15 kV	750 MVA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDD1215F ①	15 kV	750 MVA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDD1215G ①	15 kV	750 MVA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDDD1215I ①	15 kV	750 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

① Use with 50 kA cell kit / skeleton

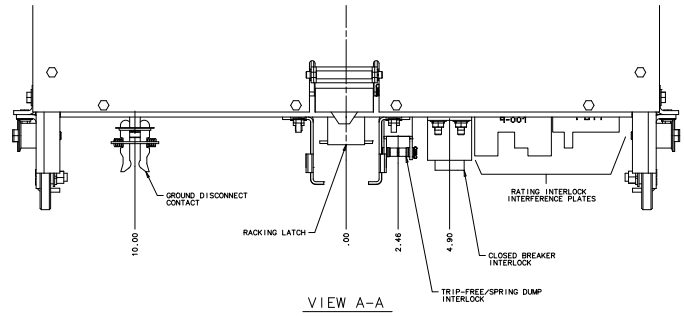
15 kV (GMSG) Vacuum circuit breakers



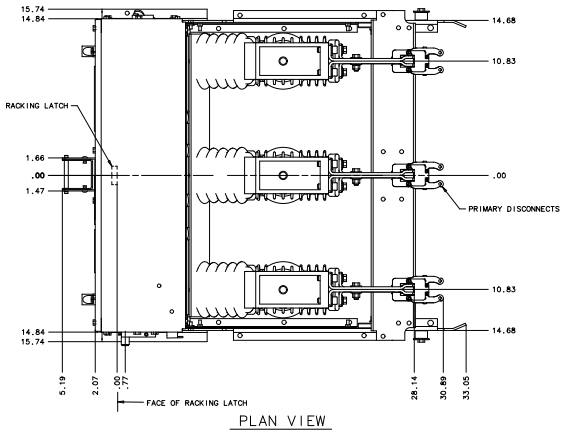
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDD2015A ①	15 kV	750 MVA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDDD2015B ①	15 kV	750 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDD2015C ①	15 kV	750 MVA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDD2015D ①	15 kV	750 MVA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDD2015E ①	15 kV	750 MVA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDD2015F ①	15 kV	750 MVA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDD2015G ①	15 kV	750 MVA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDDD2015I ①	15 kV	750 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDD2015K ①	15 kV	750 MVA	2000 A	125 VDC, Motor, Close & Trip (3 cycle)

① Use with 50 kA cell kit / skeleton

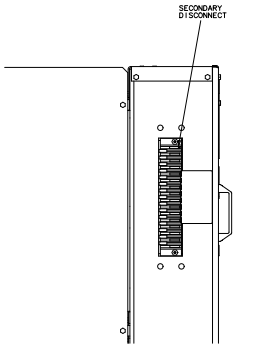
15 kV (GMSG) Vacuum circuit breakers



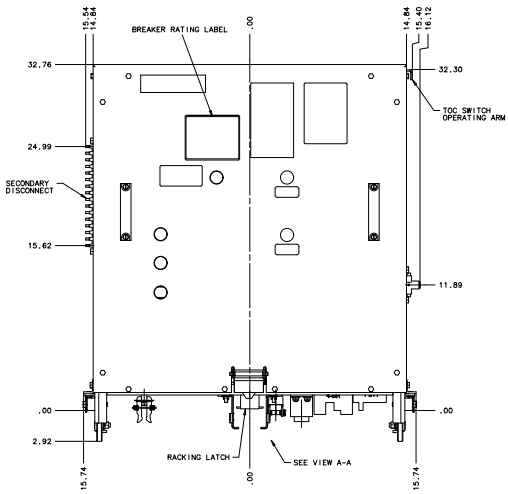
VIEW A–A



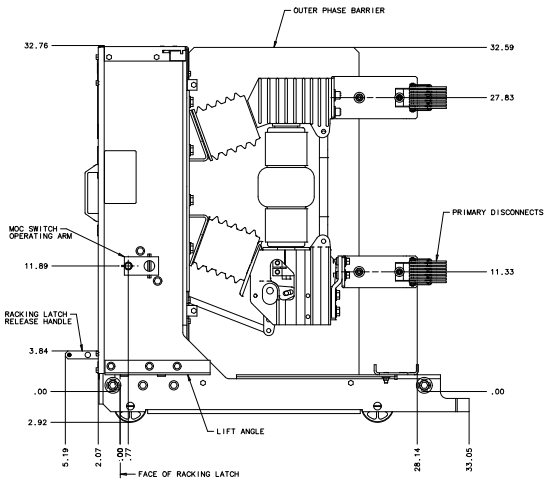
PLAN VIEW



PARTIAL LEFT SIDE VIEW



FRONT VIEW

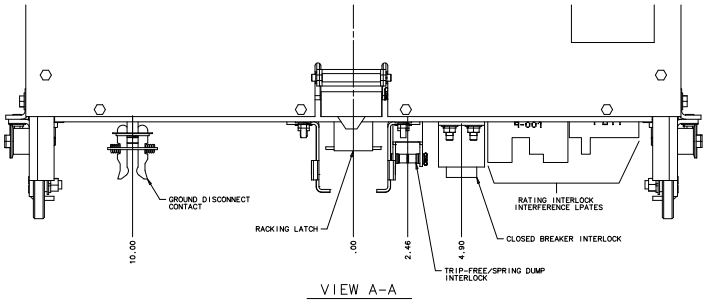


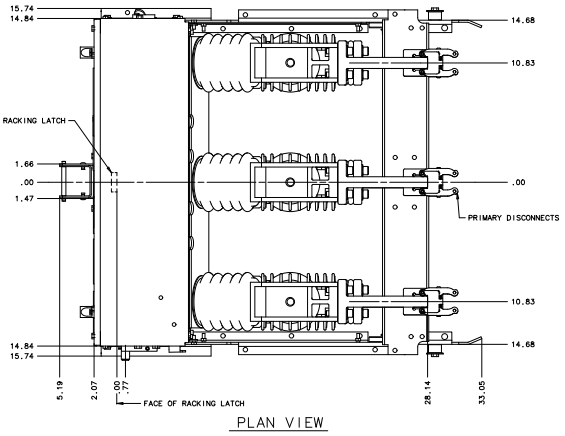
RIGHT SIDE VIEW

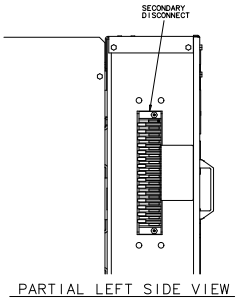
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDE1215A ①	15 kV	1000 MVA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDDE1215B ①	15 kV	1000 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDE1215C ①	15 kV	1000 MVA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDE1215D ①	15 kV	1000 MVA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDE1215E ①	15 kV	1000 MVA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDE1215F ①	15 kV	1000 MVA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDE1215G ①	15 kV	1000 MVA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDDE1215I ①	15 kV	1000 MVA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

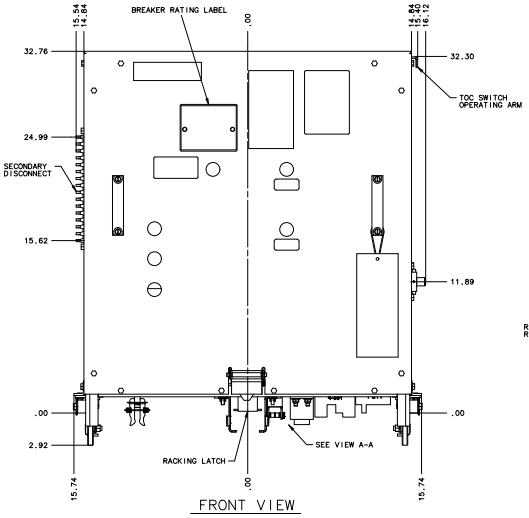
① Use with 50 kA cell kit / skeleton

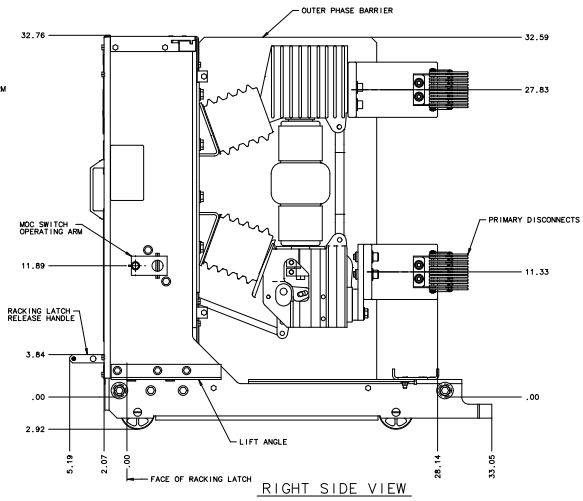
15 kV (GMSG) Vacuum circuit breakers







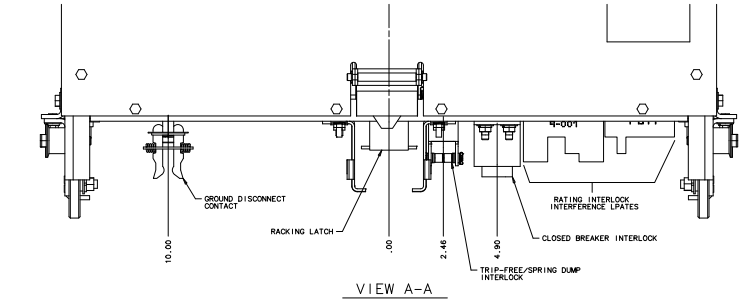


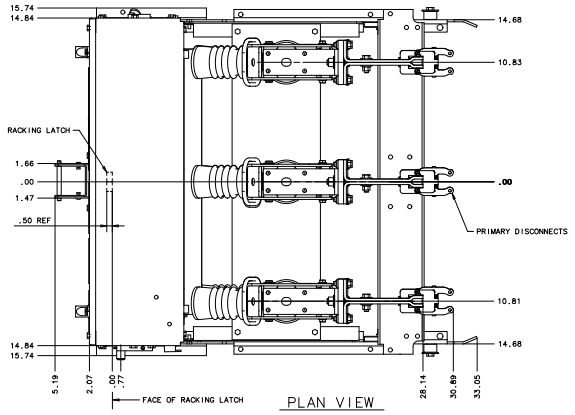


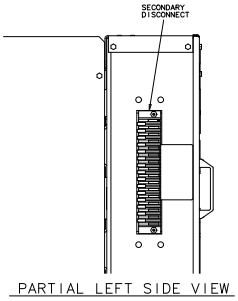
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDE2015A ①	15 kV	1000 MVA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDDE2015B ①	15 kV	1000 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDE2015C ①	15 kV	1000 MVA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDE2015D ①	15 kV	1000 MVA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDE2015E ①	15 kV	1000 MVA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDE2015F ①	15 kV	1000 MVA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDE2015G ①	15 kV	1000 MVA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDDE2015I ①	15 kV	1000 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDE3015A ①	15 kV	1000 MVA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDDE3015B ①	15 kV	1000 MVA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDE3015C ①	15 kV	1000 MVA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDE3015D ①	15 kV	1000 MVA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDE3015E ①	15 kV	1000 MVA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDE3015F ①	15 kV	1000 MVA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDE3015G ①	15 kV	1000 MVA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDDE3015I ①	15 kV	1000 MVA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

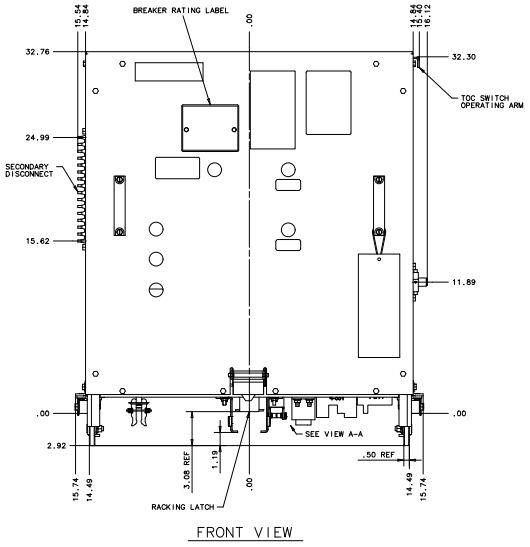
① Use with 50 kA cell kit / skeleton

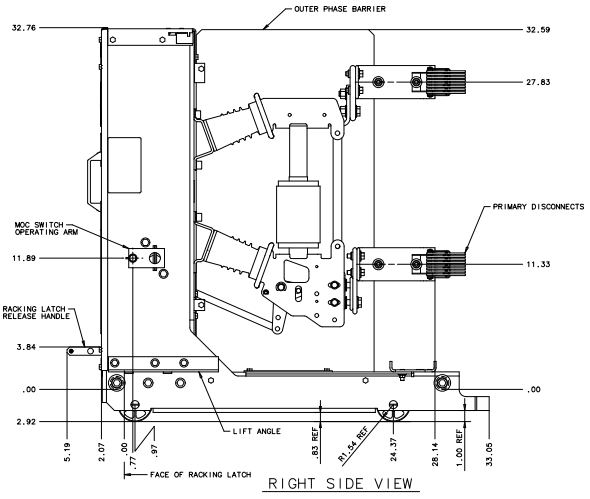
15 kV (GMSG) Vacuum circuit breakers







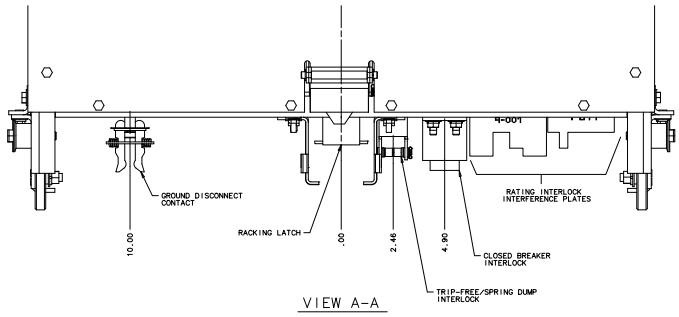


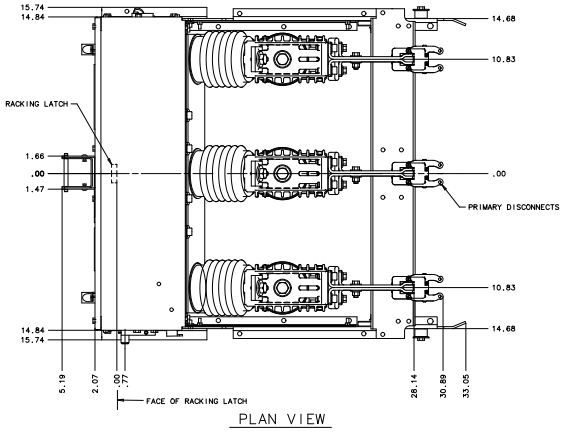


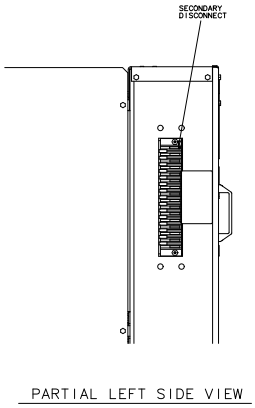
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD21215A ①	15 kV	25 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD21215B ①	15 kV	25 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD21215C ①	15 kV	25 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD21215D ①	15 kV	25 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD21215E ①	15 kV	25 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRST21215E ①	15 kV	25 kA	1200 A	120 VAC, Motor & Close, 125 VC Motor
MVSGBRDD21215F ①	15 kV	25 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD21215G ①	15 kV	25 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD21215I ①	15 kV	25 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD21215P ①	15 kV	25 kA	1200 A	48 VDC, Motor, Close, Trip, with 2nd Trip Coil
MVSGBRDD22015A ①	15 kV	25 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD22015B ①	15 kV	25 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD22015C ①	15 kV	25 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD22015D ①	15 kV	25 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD22015E ①	15 kV	25 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD22015F ①	15 kV	25 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD22015G ①	15 kV	25 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD22015I ①	15 kV	25 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

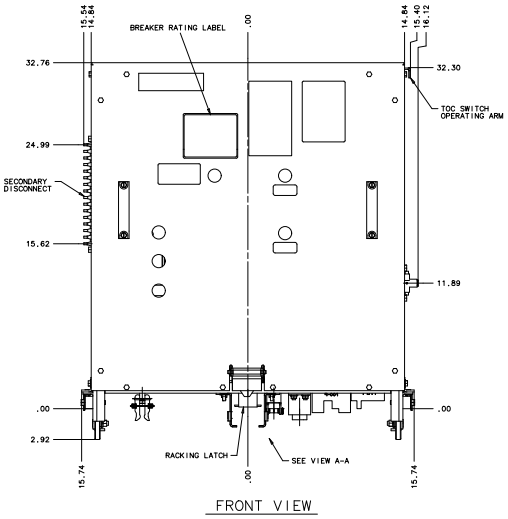
① Use with 50 kA cell kit / skeleton

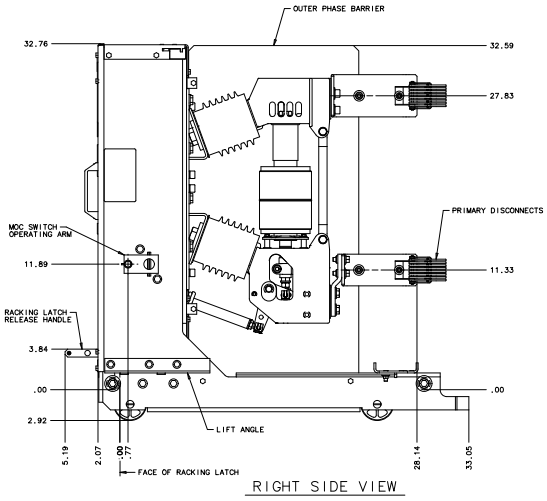
15 kV (GMSG) Vacuum circuit breakers







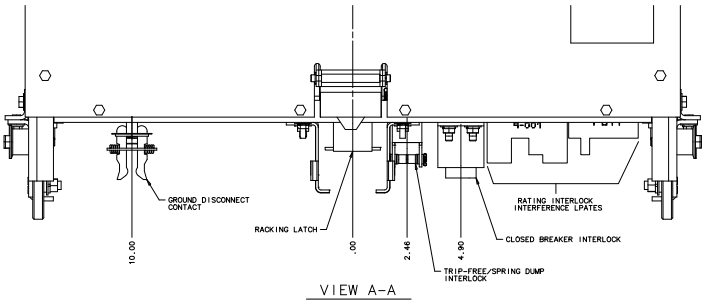


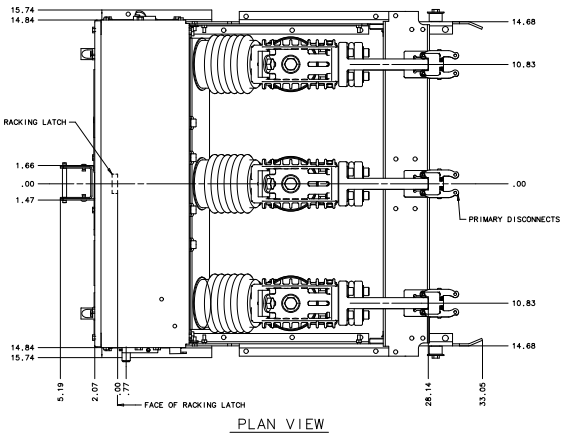


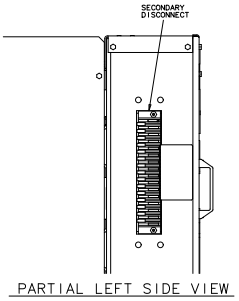
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD41215A ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD41215B ①	15 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD41215C ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD41215D ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD41215E ①	15 kV	40 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD41215F ①	15 kV	40 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD41215G ①	15 kV	40 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD41215I ①	15 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD41215J ①	15 kV	40 kA	1200 A	48 VDC, Motor, Close & Trip
MVSGBRDD41215K ①	15 kV	40 kA	1200 A	125 VDC, Motor, Close & Trip (3 cycle)
MVSGBRDD41215L ①	15 kV	40 kA	1200 A	120 VAC, Motor, Close, 125VDC Trip Coil1-3 cyc. 125VDC Trip Coil 2- 5 cyc.
MVSGBRDD41215T ①	15 kV	40 kA	1200 A	48 VDC, Motor, DC Close & Trip (3 cycle)

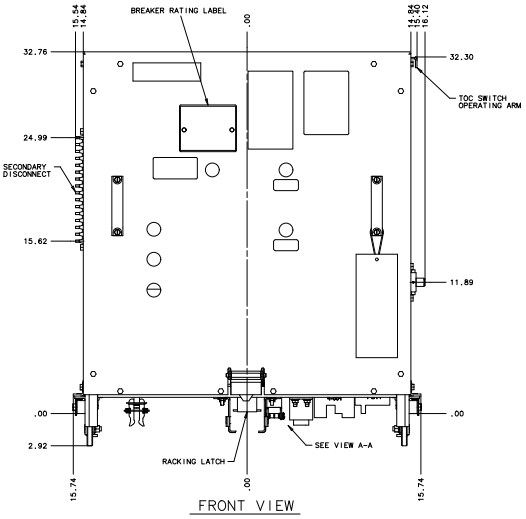
① Use with 50 kA cell kit / skeleton

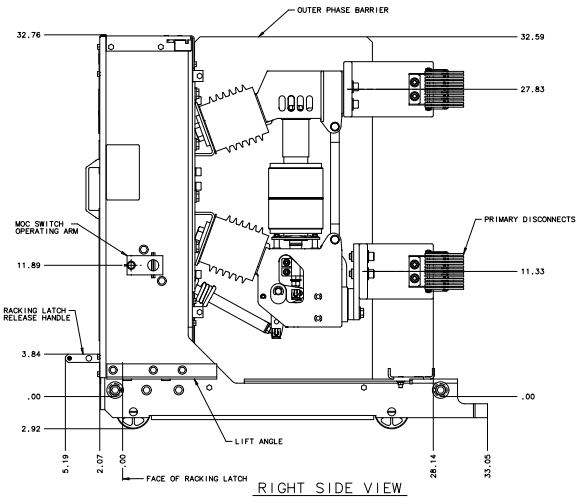
15 kV (GMSG) Vacuum circuit breakers







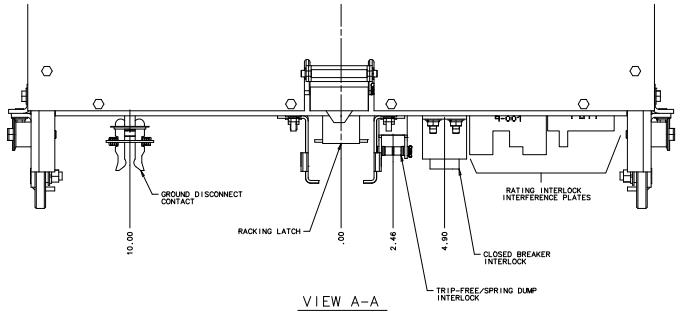


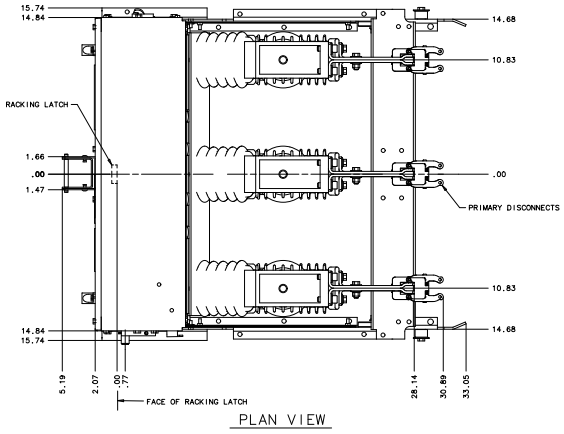


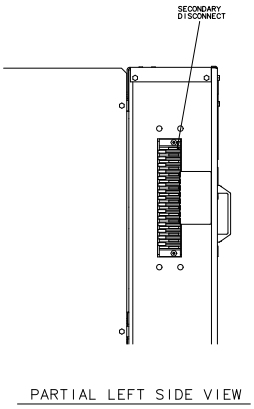
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD42015A ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD42015B ①	15 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD42015C ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD42015D ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD42015E ①	15 kV	40 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD42015F ①	15 kV	40 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD42015G ①	15 kV	40 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD42015I ①	15 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD42015K ①	15 kV	40 kA	2000 A	125 VDC, Motor, Close & Trip (3 cycle)
MVSGBRDD42015L ①	15 kV	40 kA	2000 A	120 VAC, Motor, Close, 125VDC Trip Coil1-3 cyc. 125VDC Trip Coil 2- 5 cyc.
MVSGBRDD42015N ①	15 kV	40 kA	2000 A	120 VAC Motor, DC Close & Trip Coil 1-3 cyc. DC Trip Coil 2- 5 cyc.

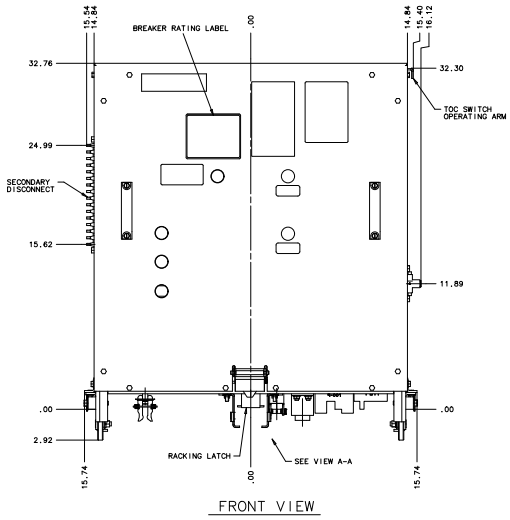
① Use with 50 kA cell kit / skeleton

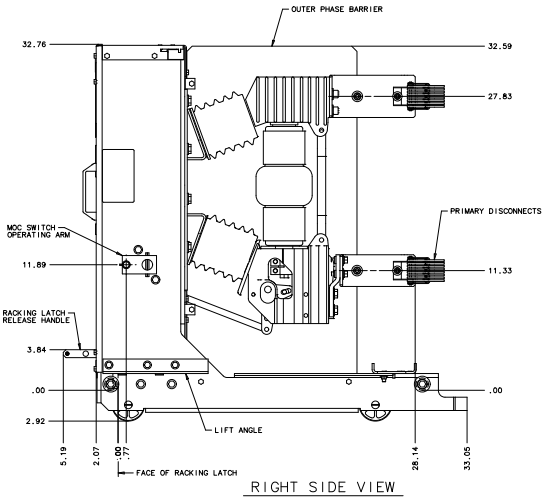
15 kV (GMSG) Vacuum circuit breakers







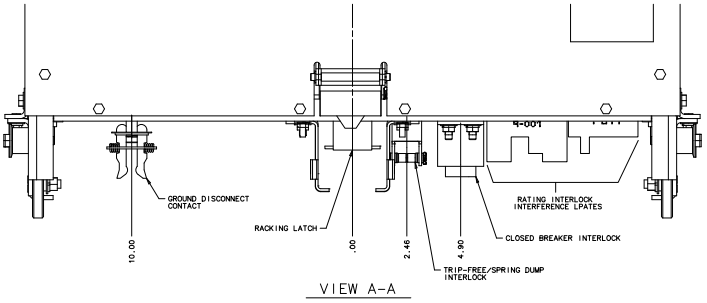


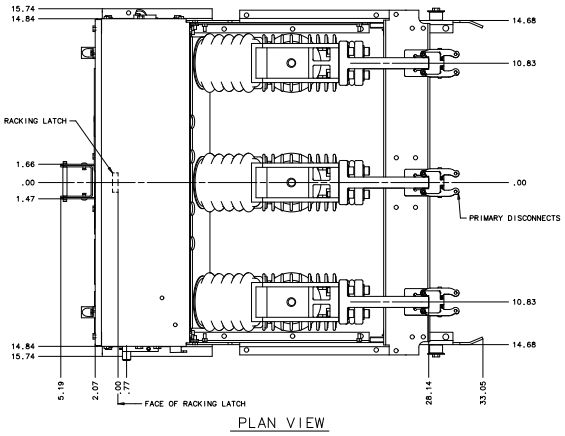


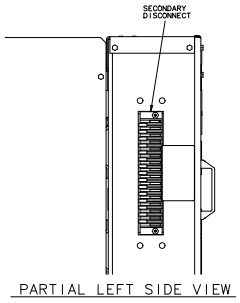
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD51215A ①	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD51215B ①	15 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD51215C ①	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD51215D ①	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD51215E ①	15 kV	50 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD51215F ①	15 kV	50 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD51215G ①	15 kV	50 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD51215I ①	15 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD51215M ①	15 kV	50 kA	1200 A	125 VDC, Motor, Close & Trip with Second Trip Coil (1st coil is 3 cycle)
MVSGBRDD51215Q ①	15 kV	50 kA	1200 A	120 VAC / 125 VDC Motor, DC Close & Trip Coil

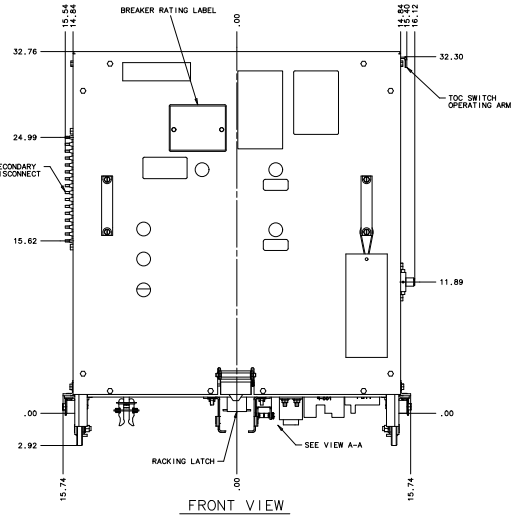
① Use with 50 kA cell kit / skeleton

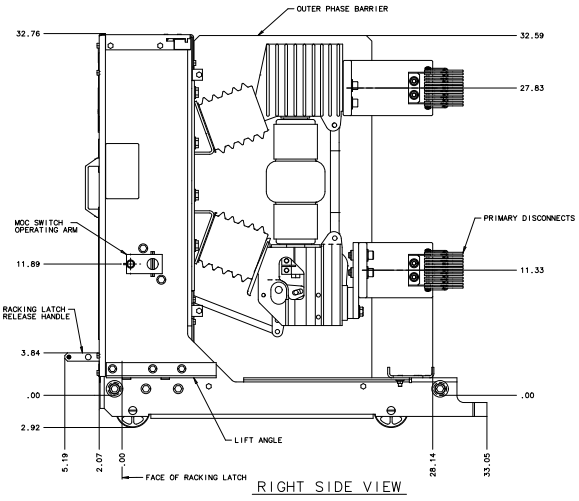
15 kV (GMSG) Vacuum circuit breakers







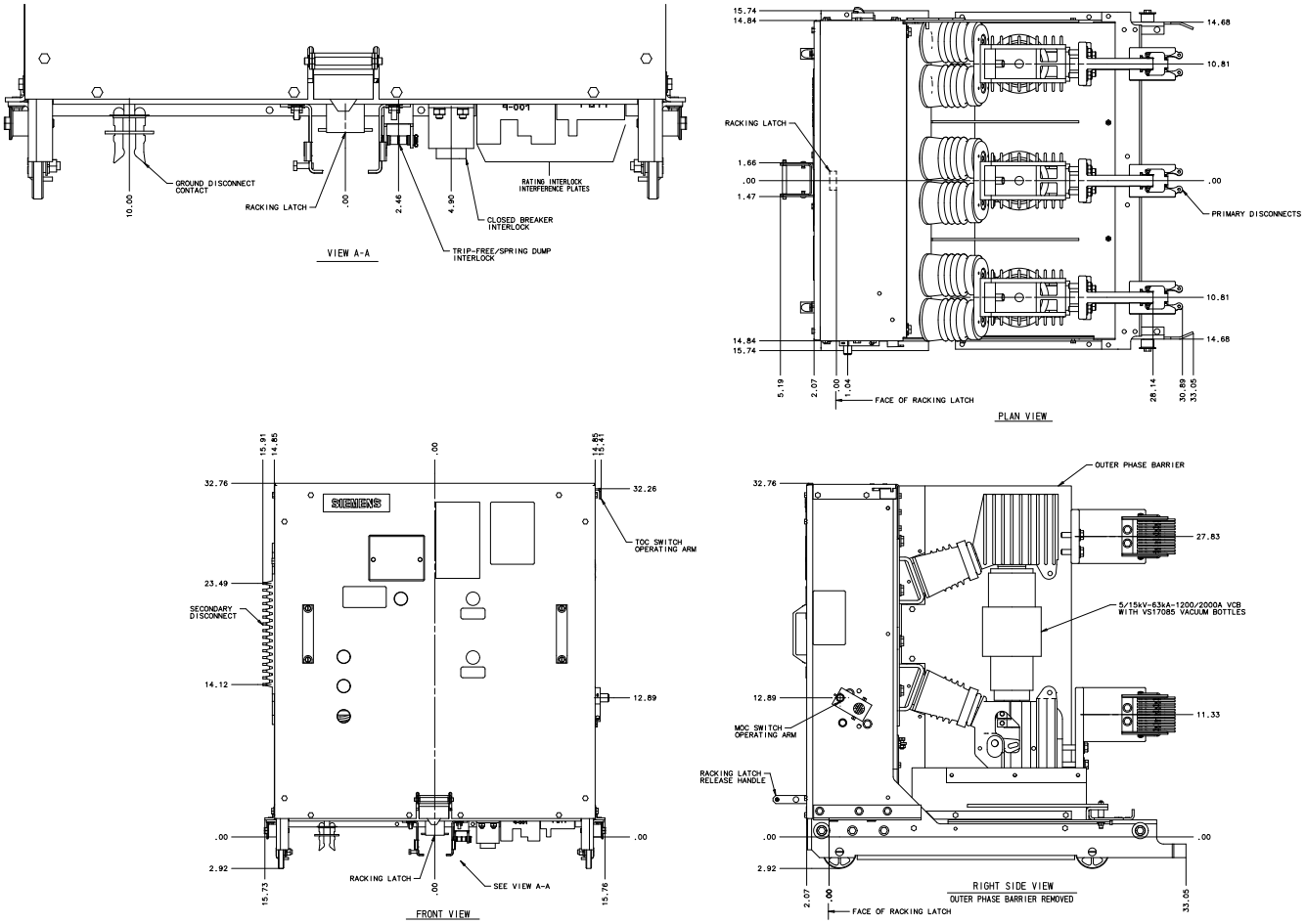




Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD52015A ①	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD52015B ①	15 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD52015C ①	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD52015D ①	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD52015E ①	15 kV	50 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD52015F ①	15 kV	50 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD52015G ①	15 kV	50 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD52015I ①	15 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD53015A ①	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD53015B ①	15 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD53015C ①	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD53015D ①	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD53015E ①	15 kV	50 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD53015F ①	15 kV	50 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD53015G ①	15 kV	50 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD53015I ①	15 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD53015R ①	15 kV	50 kA	3000 A	120 VAC / 125VDC Motor, DC Close & Trip Coil, 2nd DC Trip Coil

① Use with 50 kA cell kit / skeleton

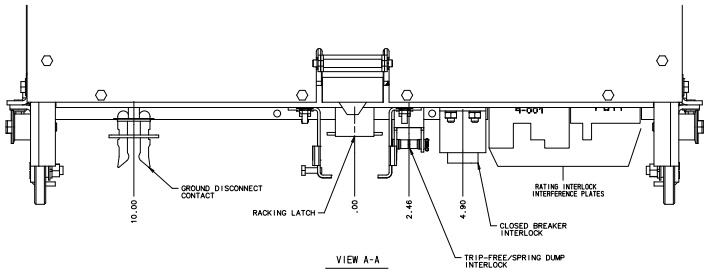
15 kV (GMSG) Vacuum circuit breakers

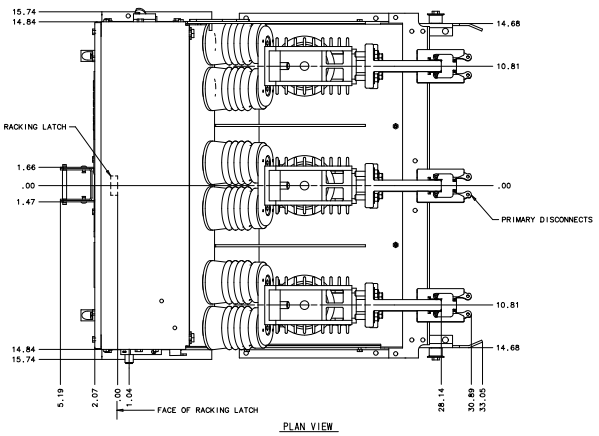


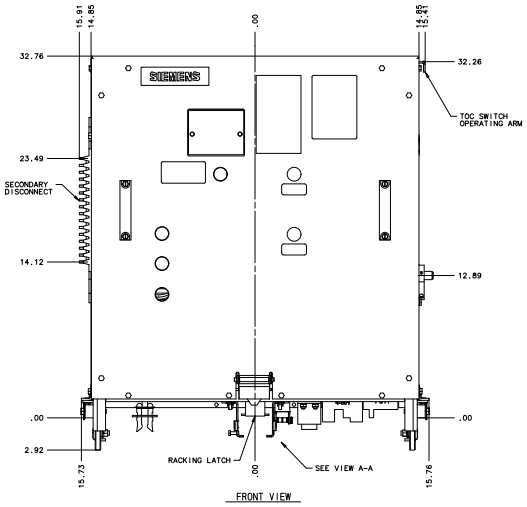
Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD61215A ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDD61215B ②	15 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD61215C ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD61215D ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD61215E ②	15 kV	63 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD61215F ②	15 kV	63 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD61215G ②	15 kV	63 kA	1200 A	120 VAC Motor, Close & Trip
MVSGBRDD61215I ②	15 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

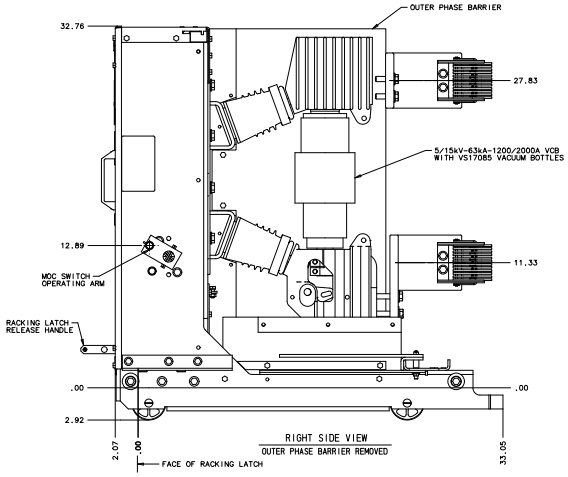
② Use with 63 kA cell kit

15 kV (GMSG) Vacuum circuit breakers





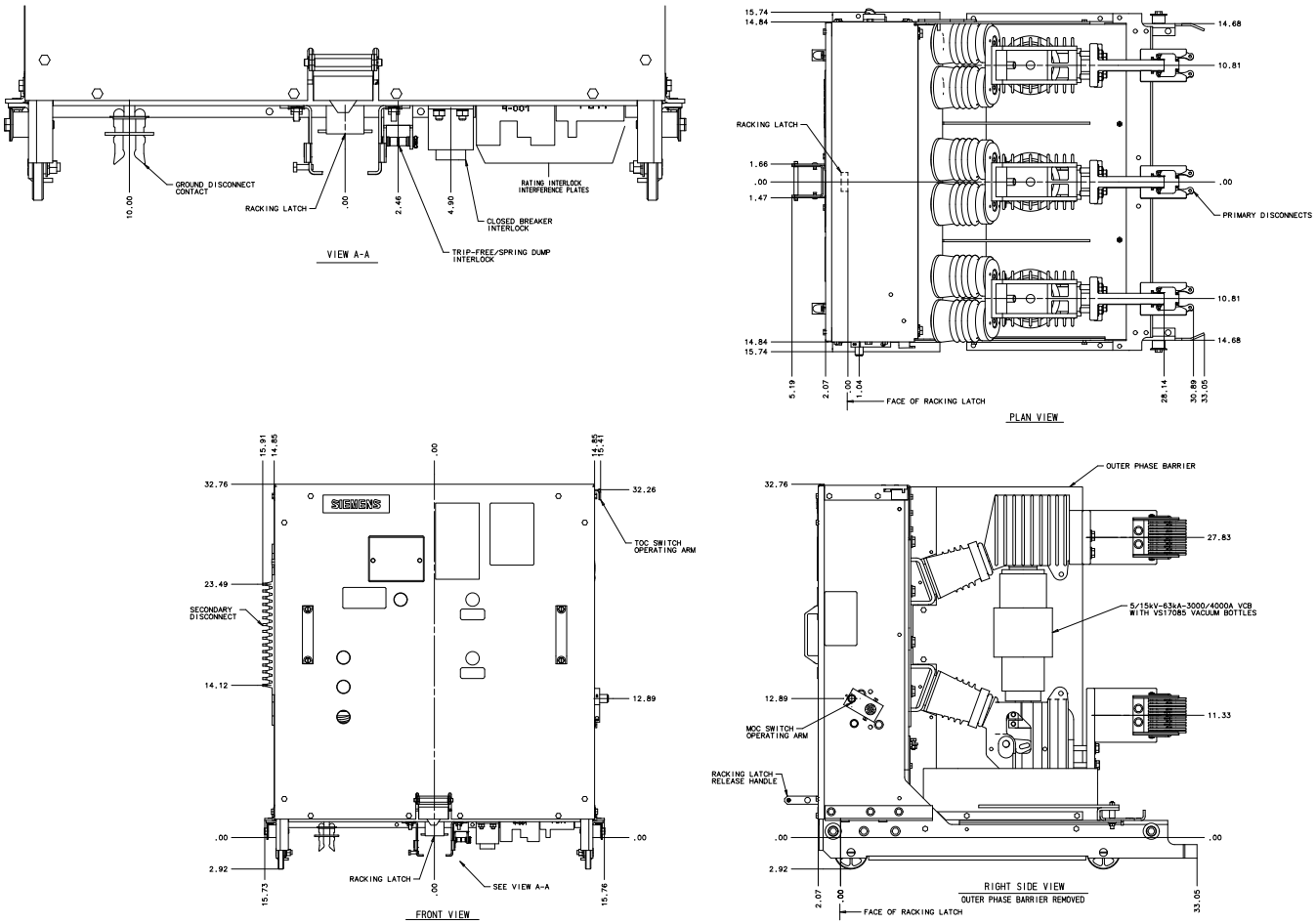




Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD62015A ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD62015B ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD62015C ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD62015D ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD62015E ②	15 kV	63 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD62015F ②	15 kV	63 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD62015G ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD62015I ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD62015A ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDD62015B ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD62015C ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD62015D ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD62015E ②	15 kV	63 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD62015F ②	15 kV	63 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD62015G ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDD62015I ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

② Use with 63 kA cell kit

15 kV (GMSG) Vacuum circuit breakers



Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDD63015A ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD63015B ②	15 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD63015C ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD63015D ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD63015E ②	15 kV	63 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD63015F ②	15 kV	63 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD63015G ②	15 kV	63 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD63015I ②③	15 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD64F15A ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDD64F15B ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD64F15C ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD64F15D ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD64F15E ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD64F15F ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD64F15I ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

② Use with 63 kA cell kit
③ Siemens GMSG 3000 A draw-out breakers are capable of operation up to 4000 A provided the following conditions are met: Use with MVSGCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

15 kV (GMSG) Vacuum circuit breakers

Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDDC2015A ①	15 kV	500 MVA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDDC2015B ①	15 kV	500 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDC2015C ①	15 kV	500 MVA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDC2015D ①	15 kV	500 MVA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDC2015E ①	15 kV	500 MVA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDC2015F ①	15 kV	500 MVA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDC2015G ①	15 kV	500 MVA	2000 A	120 VAC Motor, Close & Trip
MVSGBRDDC2015I ①	15 kV	500 MVA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDD3015A ①	15 kV	750 MVA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDDD3015B ①	15 kV	750 MVA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDDD3015C ①	15 kV	750 MVA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDDD3015D ①	15 kV	750 MVA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDD3015E ①	15 kV	750 MVA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDDD3015F ①	15 kV	750 MVA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDDD3015G ①	15 kV	750 MVA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDDD3015I ①	15 kV	750 MVA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD43015A ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDD43015B ①	15 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD43015C ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD43015D ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD43015E ①	15 kV	40 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD43015F ①	15 kV	40 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD43015G ①	15 kV	40 kA	3000 A	120 VAC Motor, Close & Trip
MVSGBRDD43015I ①	15 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD43015N ①	15 kV	40 kA	3000 A	48 VDC, Motor, DC Close & Trip (3 cycle)
MVSGBRDD54F15A ①③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDD54F15B ①③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDD54F15C ①③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDD54F15D ①③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDD54F15E ①③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDD54F15F ①③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDD54F15I ①③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

① Use with 50 kA cell kit / skeleton

③ Siemens GMSG 3000 A draw-out breakers are capable of operation up to 4000 A provided the following conditions are met: Use with MVSGCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

Technical data: GMSG

Type GMSG circuit breaker control data ③

Control voltages, ANSI/IEEE C37.06-2009			Close coil	Trip coil	Spring charging motor	
Nominal	Range				A	Charging
	Close	Trip	A ①	A ①	Run (Avg.) ①	Seconds
125 VDC	100-140	70-140	2.1	4.8	4	10
120 VAC	104-127	104-127	2.0	----②	6	10

① Current at nominal voltage.
② Capacitor trip.
③ ---- means this selection is not available at this voltage.

Interrupting capacity auxiliary switch contacts ①

Type switch	Continuous current	Control circuit voltage	
Non-inductive	A	120 VAC	125 VDC
Circuit breaker	10	10	9.6
TOC	15	15	0.5
MOC	20	15	10
Inductive			
Circuit breaker	10	6	6
TOC	15	15	0.5
MOC	20	15	10

① All switch contacts are non-convertible.

Technical data: GMSG

Type GMSG circuit breaker ratings (new "constant kA" ratings basis)

Catalog Number ①	Maximum design voltage (V) ②	Voltage range factor (K) ③	Withstand voltage levels		Continuous current ④	Short-circuit (I) ⑤⑥
	kV rms		Power frequency kV rms	Lightning impulse (BIL) kV crest	A rms	kA rms sym
MVSGBRDD4xx05-	4.76	1.0	19	60	1,200, 2,000, 3,000	40
MVSGBRDD5xx05-	4.76	1.0	19	60	1,200, 2,000, 3,000, 4,000FC	50
MVSGBRDD6xx05-	4.76	1.0	19	60	1,200, 2,000, 3,000, 4,000FC	63
MVSGBRDD2xx15-	15.0	1.0	36	95	1,200, 2,000	25
MVSGBRDD4xx15-	15.0	1.0	36	95	1,200, 2,000, 3,000	40
MVSGBRDD5xx15-	15.0	1.0	36	95	1,200, 2,000, 3,000, 4,000FC	50
MVSGBRDD6xx15-	15.0	1.0	36	95	1,200, 2,000, 3,000, 4,000FC	63

Catalog Number ①	Interrupting time ⑦	Permissible tripping delay (Y)	Maximum symmetrical interrupting (I)	% dc component	Short-time current (I) (three seconds)	Closing and latching (momentary)	
	ms/cycles	Sec	kA rms sym	%	kA rms	Asymmetrical (1.55 x I) kA rms	Peak (2.6 x I) kA peak
MVSGBRDD4xx05-	83/5	2	40	47	40	62	104
MVSGBRDD5xx05-	83/5	2	50	47	50	78	130
MVSGBRDD6xx05-	83/5	2	63	47	63	98	164
MVSGBRDD2xx15-	83/5	2	25	47	25	39	65
MVSGBRDD4xx15	83/5	2	40	47	40	62	104
MVSGBRDD5xx15-	83/5	2	50	47	50	78	130
MVSGBRDD6xx15-	83/5	2	63	47	63	98	164

① "xx" in catalog number refers to the continuous current rating 1,200 A, 2,000 A or 3,000 A, as appropriate. The 4,000 A fan-cooled rating is achieved using a 3,000 A circuit breaker, in combination with fan cooling as indicated in Footnote 4. "-" refers to controls package.
② Maximum design voltage for which the circuit breaker is designed and the upper limit for operation.
③ K is listed for information purposes only. For circuit breakers rated on a "constant kA" ratings basis, the voltage range factor is 1.0.
④ Siemens GMSG 3000A Drawout breakers are capable of operation up to 4000A provided the following conditions are met:
Use with MVSGCKBAXFAN Fan kit in upper cell.
Partner company must perform type testing certified to ANSI standards with their switchgear to 4000A load.
⑤ All values apply to polyphase and line-to-line faults.
⑥ Standard duty cycle is O - 0.3 s - CO - 3 min. - CO.
⑦ Standard rating interrupting time is five-cycles (83 ms). Optional rated interrupting time of three-cycles (50 mg) is available (except with 24 VDC tripping).

These ratings are in accordance with:

- ANSI/IEEE C37.04-1999 Standard Rating Structure for AC High-Voltage Circuit Breakers
- ANSI/IEEE C37.06-2009 AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis - Preferred Ratings and Related Required Capabilities for Voltages Above 1,000 Volts
- ANSI/IEEE C37.09-1999 Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- ANSI/IEEE C37.010-1999 Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

Technical data: GMSG

Type GMSG circuit breaker ratings (historic "constant MVA" ratings basis)

Catalog Number ①	Nominal voltage class	Nominal three-phase MVA class ②	Maximum design voltage (V) ③	Continuous current ④		Voltage range factor (K) ⑤	Withstand voltage levels	
	kV	MVA	kV rms	A rms		----	Power frequency kV rms	Lightning impulse (BIL) kV crest
MVSGBRDDAxx05-	4.16	250	4.76	1,200, 2,000		1.24	19	60
MVSGBRDDBxx05-	4.16	350	4.76	1,200, 2,000, 3,000, 4,000FC		1.19	19	60
MVSGBRDDCxx15-	13.8	500	15.0	1,200, 2,000, 3,000, 4,000FC		1.30	36	95
MVSGBRDDDxx15-	13.8	750	15.0	1,200, 2,000, 3,000, 4,000FC		1.30	36	95
MVSGBRDDExx15-	13.8	1,000	15.0	1,200, 2,000, 3,000, 4,000FC		1.30	36	95
Catalog Number ①	**Short-circuit (at rated maximum design voltage) (I) ⑥-⑧**	**Short-time current (K x I) (three seconds)**	**Rated maximum design voltage (V) divided by K (= V/K)**	**Maximum symmetrical interrupting (K x I) ⑨**	**Permissible tripping delay (Y)**	**Interrupting time ⑩**	**Closing and latching (momentary)**	
	kA rms sym	kA rms	kV rms	kA rms sym	Sec	ms/cycles	Asymmetrical (1.6 x K x I) ⑪ kA rms	Peak (2.7 x K x I) ⑪ kA peak
MVSGBRDDAxx05-	29	36	3.85	36	2	83/5	58	97
MVSGBRDDBxx05-	41	49	4.0	49	2	83/5	78	132
MVSGBRDDCxx15-	18	23	11.5	23	2	83/5	37	62
MVSGBRDDDxx15-	28	36	11.5	36	2	83/5	58	97
MVSGBRDDExx15-	37	48	11.5	48	2	83/5	77	130

① "xxxx" in catalog number refers to the continuous current rating 1,200 A, 2,000 A or 3,000 A, as appropriate. The 4,000 A fan-cooled rating is achieved using a 3,000 A circuit breaker, in combination with fan cooling as indicated in Footnote 4.

② "Nominal three-phase MVA class" is included for reference only. This information is not listed in ANSI C37.06-1987.

③ Maximum design voltage for which the circuit breaker is designed and the upper limit for operation.

④ Siemens GMSG 3000A Drawout breakers are capable of operation up to 4000A provided the following conditions are met: Use with MVSGCKBAXFAN Fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear to 4000A load.

⑤ K is the ratio of the rated maximum design voltage to the lower limit of the range of operating voltage in which the required symmetrical and asymmetrical interrupting capabilities vary in inverse proportion to the operating voltage.

⑥ The following formula shall be used to obtain the required symmetrical interrupting capability of a circuit breaker at an operating voltage between 1/K times rated maximum design voltage and rated maximum design voltage: Required symmetrical interrupting capability = rated short-circuit current (I) x [(rated maximum design voltage)/(operating voltage)]. For operating voltages below 1/K times maximum design voltage, the required symmetrical interrupting capability of the circuit breaker shall be equal to K times rated short-circuit current.

⑦ Within the limitations stated in ANSI/IEEE C37.04-1979, all values apply to polyphase and line-to-line faults. For single phase-to-ground faults, the specific conditions stated in clause 5.10.2.3 of ANSI/IEEE C37.04-1979 apply.

⑧ Standard duty cycle is O - 15s - CO.

⑨ Current values in this row are not to be exceeded even for operating voltage below 1/K times rated maximum design voltage. For operating voltages between rated maximum design voltage and 1/K times rated maximum design voltage, follow Footnote 5.

⑩ Standard rating interrupting time is five-cycles (83ms). Optional rated interrupting time of three-cycles (50 mg) is available (except with 24 VDC tripping).

⑪ Current values in this row are independent of operating voltage up to and including rated maximum voltage.

These ratings are in accordance with:

- ANSI/IEEE C37.04-1979 Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- ANSI C37.06-1987 AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis - Preferred Ratings and Related Required Capabilities
- ANSI/IEEE C37.09-1979 Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- ANSI/IEEE C37.010-1979 Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

Coding Plates (Breakers)

		Max. Voltage	Rated Short Circuit or MVA Class		Cont. Current	Close & Latch	
	Catalog Number	kV	kA	MVA	A	kA, rms	kA, peak
kA Rated Breakers	MVSGCPC054012	4.76	40	-	1200	62	104
	MVSGCPC054020	4.76	40	-	2000	62	104
	MVSGCPC054030	4.76	40	-	3000	62	104
	MVSGCPC055012	4.76	50	-	1200	78	130
	MVSGCPC055020	4.76	50	-	2000	78	130
	MVSGCPC055030	4.76	50	-	3000	78	130
	MVSGCPC074012	8.25	40	-	1200	62	104
	MVSGCPC074020	8.25	40	-	2000	62	104
	MVSGCPC074030	8.25	40	-	3000	62	104
	MVSGCPC152512	15	25	-	1200	39	65
	MVSGCPC152520	15	25	-	2000	39	65
	MVSGCPC154012	15	40	-	1200	62	104
	MVSGCPC154020	15	40	-	2000	62	104
	MVSGCPC154030	15	40	-	3000	62	104
	MVSGCPC155012	15	50	-	1200	78	130
	MVSGCPC155020	15	50	-	2000	78	130
	MVSGCPC155030	15	50	-	3000	78	130
	MVSGCPC056312	4.76	63	-	1200	98	164
	MVSGCPC056320	4.76	63	-	2000	98	164
	MVSGCPC056330	4.76	63	-	3000	98	164
	MVSGCPC076312	8.25	63	-	1200	98	164
	MVSGCPC076320	8.25	63	-	2000	98	164
	MVSGCPC076330	8.25	63	-	3000	98	164
	MVSGCPC156312	15	63	-	1200	98	164
	MVSGCPC156320	15	63	-	2000	98	164
	MVSGCPC156330	15	63	-	3000	98	164
MVA Rated Breakers	MVSGCPC0525012	4.76	29	250	1200	58	97
	MVSGCPC0525020	4.76	29	250	2000	58	97
	MVSGCPC0525030	4.76	29	250	3000	58	97
	MVSGCPC0535012	4.76	41	350	1200	97	132
	MVSGCPC0535020	4.76	41	350	2000	97	132
	MVSGCPC0535030	4.76	41	350	3000	97	132
	MVSGCPC0750012	8.25	33	500	1200	66	111
	MVSGCPC0750020	8.25	33	500	2000	66	111
	MVSGCPC0750030	8.25	33	500	3000	66	111
	MVSGCPC1550012	15	18	500	1200	37	62
	MVSGCPC1550020	15	18	500	2000	37	62
	MVSGCPC1575012	15	28	750	1200	58	97
	MVSGCPC1575020	15	28	750	2000	58	97
	MVSGCPC1575030	15	28	750	3000	58	97
	MVSGCPC1500012	15	37	1000	1200	77	130
	MVSGCPC1500020	15	37	1000	2000	77	130
	MVSGCPC1500030	15	37	1000	3000	77	130

Generator vacuum circuit breakers

Type GMSG-GCB generator circuit breakers

Drawout type generator circuit breakers for use in type GM-SG metal-clad switchgear are available. These circuit breakers are derived from the same type 3AH3 family of circuit breaker operating mechanisms as our standard non-generator circuit breakers. The basic design of the circuit breakers is the same, making maintenance and operation of the generator circuit breakers the same as for non-generator circuit breakers. This means that there is no incremental or additional training needed for your maintenance or operational personnel. The type GMSG-GCB generator circuit breakers exploit the long history of successful service provided by the entire type 3A (including types 3AF and 3AH operators) family of vacuum circuit breakers.

These generator circuit breakers fully conform to the requirements for generator circuit breakers as specified in IEEE Std C37.013, "IEEE Standard for AC High Voltage Generator Circuit Breakers Rated on a Symmetrical Current Basis."

In our discussion of generator circuit breakers, the term "distribution circuit breakers" will be used to refer to ordinary (non-generator) circuit breakers conforming to IEEE Stds. C37.04, C37.06 and C37.09.

The ratings for the type GMSG-GCB generator circuit breakers are listed on page 36.

Generator application differences

What makes the application to a generator different than ordinary distribution circuit breaker applications to feeders, motors, main circuit breakers or other non-generator circuits? Several aspects differ considerably, including:

- Very high X/R ratio
- Higher momentary (close and latch) currents
- Faster rate of rise of transient recovery voltage (TRV)
- Delayed current zeros
- No reclosing duty
- Out-of-phase switching duty.

Very high X/R ratio

The standards for distribution circuit breakers are based on a circuit X/R ratio of 17 (at 60 Hz), which results in a 45 ms time constant of decay of the dc component of a short-circuit current. This determines the amount of dc current that is added to the ac component of the short-circuit current during type or design testing. A circuit breaker with rated interrupting time of 50 ms (historically termed a "three-cycle breaker") requires a %dc component of 47 percent (at contact part), which is equivalent to the historic "S-factor" of 1.2. The S-factor was defined in IEEE Std C37.04-1979 as the ratio of the total rms asymmetrical current to the symmetrical current. While the S-factor is no longer in the standards, it provides a simple way to grasp the difference between a generator circuit breaker and a distribution circuit breaker.

Generator vacuum circuit breakers

In contrast, IEEE Std C37.013 specifies that tests be conducted based on an X/R ratio of 50 (at 60 Hz), which corresponds to a time constant of decay of the dc component of the short-circuit current of 133 ms. This results in a much higher dc current at a given contact part time than for a distribution circuit breaker. Using the example of a generator circuit breaker with rated interrupting time of 50 ms, the %dc component at contact part would be 78 percent and the required S-factor would be 1.48.

If a circuit breaker is rated 50 kA symmetrical, the corresponding required asymmetrical interrupting capability would be 50 x 1.2 = 60 kA for the distribution circuit breaker, and 50 x 1.48 = 72 kA for the generator circuit breaker. This demonstrates that a generator circuit breaker is subjected to much heavier interrupting requirements than a distribution circuit breaker.

Higher momentary duty

The higher X/R ratio of a generator application also affects the required peak withstand capability of the circuit breaker. This is due to the much slower rate of decay of the dc component of the short-circuit current. For a distribution circuit breaker, the peak withstand current rating is 260 percent of the symmetrical interrupting rating of the circuit breaker. For the generator circuit breaker, the peak withstand current rating is 274 percent of the symmetrical interrupting rating of the circuit breaker. The peak withstand current is related to the historic concept of a momentary current, sometimes referred to as "bus bracing," and is the current that the circuit breaker must withstand during a fault closing operation, as well as the current that the switchgear must withstand without damage.

This current is also commonly called the closing and latching current. The difference between 274 percent and 260 percent may seem slight, but it results in a mechanical duty over 10 percent higher on a generator circuit breaker than on a distribution circuit breaker.

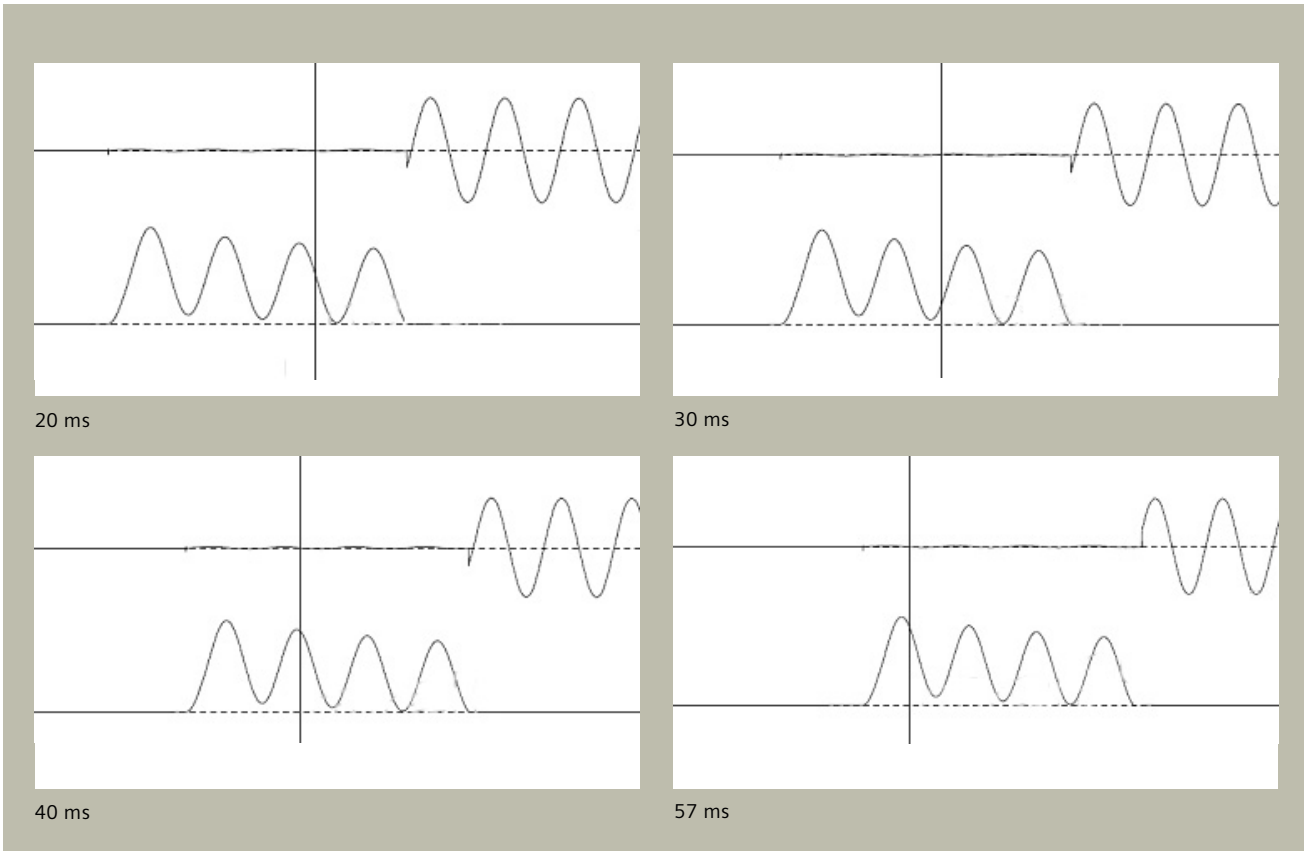
Faster rate of TRV

TRV is the result of interrupting current flow in a load circuit. When a short-circuit current is interrupted, the current and voltage are almost 90 degrees out-of-phase. Thus, when the current goes through zero, the system voltage is nearly at a maximum instantaneous value. When the interruption occurs, the capacitance of the load circuit is charged to the maximum voltage, and electrical energy stored in the capacitance begins to transfer to magnetic energy stored in the inductances. In a generator circuit breaker application, the generator (or the step-up transformer if the fault source is from the generator) is a highly inductive component with very low capacitance. As a result, the natural frequency of this circuit (consisting of high inductance and low capacitance) is very high.

Therefore, the TRV produced by the load circuit upon interruption of a short-circuit current has a very high rate of rise, much higher than that of a distribution circuit.

For comparison, for a distribution circuit breaker rated 15 kV, the rate of rise of TRV (RRRV) for short-circuits is 0.39 kV/µs for a traditional indoor circuit breaker (now termed a class S1 circuit breaker in IEEE Std C37.06-2009). In contrast, the RRRV of a generator circuit breaker, in accordance with IEEE Std C37.013 for a system source fault is 4.0 kV/µs, for a machine of 101-200 MVA.

Generator vacuum circuit breakers



Delayed current zero tests example

While this difference is severe, the vacuum circuit breaker is ideally suited to fast RRRV applications. The dielectric strength between the contacts recovers extremely rapidly following interruption.

Delayed current zeros

Generator applications may be subject to a phenomenon frequently referred to as "missing current zeros," but which is properly termed "delayed current zeros."Generally, it is assumed that the symmetrical current during a short-circuit has a constant magnitude and does not decline with the duration of the fault. Of course, the dc component of a short circuit does decline, but the ac component (the symmetrical current) is considered constant.

However, in a generator application, it may be that the symmetrical current magnitude does not remain constant. It may decline as the generator slows down during the fault.

Generator vacuum circuit breakers

If the time constant of decay of the ac component (the symmetrical current) is faster than the time constant of decay of the dc component, then the summation of the ac and dc components will move the resultant current away from the zero axis.

For this reason, IEEE Std C37.013 requires that tests be conducted in which the test circuit is intentionally adjusted to delay the first current zero for an extended time. The delayed current zero tests example shown on page 29 shows test currents in which the first current zero was intentionally delayed in the power test laboratory. The delay from circuit breaker contact parting to first current zero was delayed progressively from about 20 ms to over 57 ms in the tests shown. Further delay was not possible due to limitation in the laboratory.

No reclosing duty

One difference between a generator circuit breaker and a distribution circuit breaker is actually less severe. In a generator application, reclosing is never used. While the circuit breaker could probably deal with the duty, the need to establish synchronism between machine and system makes reclosing impractical.

Out-of-phase switching duty

Generator applications also have to consider the potential for the circuit breaker to interrupt short-circuit currents when the generator is out-of-phase with the power system. During such conditions, the voltage across the open contacts is much higher than during normal interruptions. In the worst case of machine and system 180 degrees out-of-phase, the voltage across the contacts would be twice that of normal interruptions.

However, IEEE Std C37.013 considers 90 degrees to be the upper limit to avoid damage to the machine. IEEE considers out-of-phase switching as an optional capability. The type GMSG-GCB generator circuit breakers are tested for out-of-phase switching capability.

Standards

Requirements for generator circuit breakers are given in IEEE Std C37.013. Originally created to cover circuit breakers for machines of 100 MVA and higher, it was amended in 2007 to extend requirements to encompass machines as small as 10 MVA. The standards for distribution circuit breakers (including IEEE Stds C37.04, C37.06, C37.09 and C37.010) do not apply to generator circuit breakers.

In the case of a drawout type circuit breaker for use in metal-clad switchgear, the circuit breaker design, construction and type testing must be coordinated with IEEE Std C37.20.2. In particular, drawout interlocks, temperature rise and other aspects peculiar to metal-clad switchgear must be met.

Some may wonder why it was necessary to create new standards for generator circuit breakers. After all, the standards for distribution circuit breakers have served us well for many decades in such applications. This is certainly a reasonable statement, as distribution circuit breakers have been used in generator applications for over 50 years with good success. However, the use of distributed generation is increasing, and the size of the machines involved is also increasing. In addition, prime movers (such as aero-derivative gas turbines) with relatively low rotating inertia are now common.

Generator vacuum circuit breakers

A low inertia machine introduces more significant concerns with respect to delayed current zeros.

In addition, the testing protocols in the standards have improved dramatically in recent years, in part due to increased data gathering capabilities in the power test laboratories, as well as due to the improved ability of the laboratories to control the point-on-wave at contact parting. These improvements have made it possible to explore the capabilities of circuit breakers to a level never imagined some decades ago.

Design testing considerations

The short-circuit tests required for generator circuit breakers are extreme and only a few laboratories can conduct such tests. Siemens insists on testing our generator circuit breakers using direct power tests, in which the short-circuit current and recovery voltage are both supplied by the short-circuit generator. This limits the number of power laboratories in the world capable of such tests to a mere handful.

One of the major difficulties that laboratories have is the high RRRV requirements for the TRV during tests. Most laboratories have a relatively high amount of stray capacitance inherent in the laboratory itself, making it impossible for them to produce RRRV values in the range of 3.0 kV/µs to 4.5 kV/µs. Siemens tests have been conducted with direct power tests on each of the ratings available in the type GMSG-GCB circuit breakers.

In addition, all tests have been conducted as three-phase tests, except for out-of-phase and delayed current zero tests, where laboratory limits force the tests to be made on a single-phase basis.

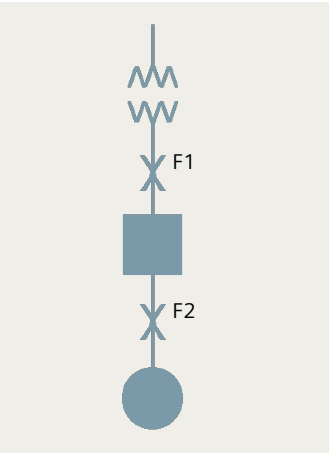
Unlike some other companies, Siemens does not use synthetic test methods, in which short-circuit current is provided by the generator, but recovery voltage is provided by a separate low-power, high-voltage source. While the standards allow synthetic testing, Siemens prefers direct testing.

Rating structure

One of the confusing aspects of a generator application is that the generator circuit breaker has different ratings for a system-source fault than for a generator-source fault. Consider, for example, the simplified one-line diagram shown to the right.

For a fault at F1 in the diagram, the fault receives current both from the step-up transformer and from the generator. However, only the current from the generator passes through the generator circuit breaker. The generator has a relatively low short-circuit capability and a relatively high sub-transient reactance, and thus the short-circuit current through the generator circuit breaker with fault at location F1 is relatively low.

In contrast, for a fault at location F2, the total current into the fault is the same but this time, only the contribution from the step-up transformer passes through the generator circuit breaker. The short-circuit capability for the system (transformer) source fault is very high since the transformer is normally connected to a robust high voltage system. In addition, the transformer impedance is relatively low compared to the sub-transient reactance of a generator. The result is that the short-circuit current originating from the system (the transformer) is usually at least twice the short-circuit current that can originate from the generator.



Simplified one-line diagram

Generator vacuum circuit breakers

This explains why generator circuit breakers have a short-circuit interrupting rating that is based on a system-source fault condition. This rating is used as the nominal rating of the circuit breaker. Standards require the generator-source interrupting rating to be 50 percent of the system-source rating.

Mechanical endurance

The mechanical endurance required by IEEE Std C37.013 (clause 6.2.10) is a mere 1,000 operations. The type GMSG-GCB generator circuit breaker operators share the design heritage of the rest of the type 3AH3 operator family, and have been tested to demonstrate mechanical endurance of 10,000 operations, exceeding the endurance required by the standards for generator circuit breakers.

Generator (GMSG) drawout circuit breakers

Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDG41215A ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDG41215B ①	15 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG41215C ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG41215D ①	15 kV	40 kA	1200 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG41215E ①	15 kV	40 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG41215F ①	15 kV	40 kA	1200 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG41215I ①	15 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG42015A ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDG42015B ①	15 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG42015C ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG42015D ①	15 kV	40 kA	2000 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG42015E ①	15 kV	40 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG42015F ①	15 kV	40 kA	2000 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG42015I ①	15 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG43015A ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDG43015B ①	15 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG43015C ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG43015D ①	15 kV	40 kA	3000 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG43015E ①	15 kV	40 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG43015F ①	15 kV	40 kA	3000 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG43015I ①	15 kV	40 kA	3000 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG51215A ②④	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDG51215B ②④	15 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG51215C ②④	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG51215D ②④	15 kV	50 kA	1200 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG51215E ②④	15 kV	50 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG51215F ②④	15 kV	50 kA	1200 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG51215I ②④	15 kV	50 kA	1200 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG52015A ②④	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDG52015B ②④	15 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG52015C ②④	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG52015D ②④	15 kV	50 kA	2000 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG52015E ②④	15 kV	50 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG52015F ②④	15 kV	50 kA	2000 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG52015I ②④	15 kV	50 kA	2000 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG52015M	15 kV	50 kA	2000 A	125 VDC, Motor, Close & Trip with Second Trip Coil (1st coil is 3 cycle) - 137 kA close & latch
MVSGBRDG53015A ②④	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDG53015B ②④	15 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG53015C ②④	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip With Second Trip Coil
MVSGBRDG53015D ②④	15 kV	50 kA	3000 A	125 VDC Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG53015E ②④	15 kV	50 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG53015F ②④	15 kV	50 kA	3000 A	125 VDC Close & Trip With Separate 125 VDC Motor
MVSGBRDG53015I ②④	15 kV	50 kA	3000 A	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG54F15A ②③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDG54F15B ②③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG54F15C	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil - 137 kA close & latch

Generator (GMSG) drawout circuit breakers

Catalog Number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDG54F15D ②③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG54F15E ②③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, & Close, 125 VDC Trip
MVSGBRDG54F15F ②③	15 kV	50 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDG54F15I ②③	15 kV	50 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG61215A ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip
MVSGBRDG61215B ②	15 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG61215C ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDG61215D ②	15 kV	63 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG61215E ②	15 kV	63 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG61215F ②	15 kV	63 kA	1200 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDG61215I ②	15 kV	63 kA	1200 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDG62015A ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip
MVSGBRDG62015B ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG62015C ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDG62015D ②	15 kV	63 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG62015E ②	15 kV	63 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG62015F ②	15 kV	63 kA	2000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDG62015I ②	15 kV	63 kA	2000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDG63015A ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip
MVSGBRDG63015B ②	15 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG63015C ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDG63015D ②	15 kV	63 kA	3000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG63015E ②	15 kV	63 kA	3000 A	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG63015F ②	15 kV	63 kA	3000 A	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDG63015I ②	15 kV	63 kA	3000 A	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDG64F15A ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip
MVSGBRDG64F15B ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip
MVSGBRDG64F15C ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Second Trip Coil
MVSGBRDG64F15D ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG64F15E ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor & Close, 125 VDC Trip
MVSGBRDG64F15F ②③	15 kV	63 kA	4000 A Fan-Cooled	125 VDC Close & Trip with Separate 125 VDC Motor
MVSGBRDG64F15I ②③	15 kV	63 kA	4000 A Fan-Cooled	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip

① Use with 50 kA cell kit / skeleton
② Use with 63 kA cell kit
③ Siemens GMSG 3000A Drawout breakers are capable of operation up to 4000A provided the following conditions are met: Use with MVSGCKBAXFAN Fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.
④ 50 kA generator breakers require 63 kA rated MOC / TOC.

Coding plates (Generator breakers)

kA Rated Breakers

Catalog Number	Max. Voltage kV	Rated Short Circuit kA	or MVA Class MVA	Cont. Current A	Close & Latch kA, rms	Close & Latch kA, peak
MVSGCPC055012	4.76	40	-	1200	-	110
MVSGCPC055020	4.76	40	-	2000	-	110
MVSGCPC055030	4.76	40	-	3000	-	110
MVSGCPC056312	4.76	50	-	1200	-	137
MVSGCPC056320	4.76	50	-	2000	-	137
MVSGCPC056330	4.76	50	-	3000	-	137
MVSGCPC155012	15	40	-	1200	-	110
MVSGCPC155020	15	40	-	2000	-	110
MVSGCPC155030	15	40	-	3000	-	110
MVSGCPC156312	15	50	-	1200	-	137
MVSGCPC156320	15	50	-	2000	-	137
MVSGCPC156330	15	50	-	3000	-	137
MVSGCPC056312	4.76	63	-	1200	-	173
MVSGCPC056320	4.76	63	-	2000	-	173
MVSGCPC056330	4.76	63	-	3000	-	173
MVSGCPC156312	15	63	-	1200	-	173
MVSGCPC156320	15	63	-	2000	-	173
MVSGCPC156330	15	63	-	3000	-	173

Technical data: GMSG-GCB

Type GMSG-GCB circuit breaker ratings

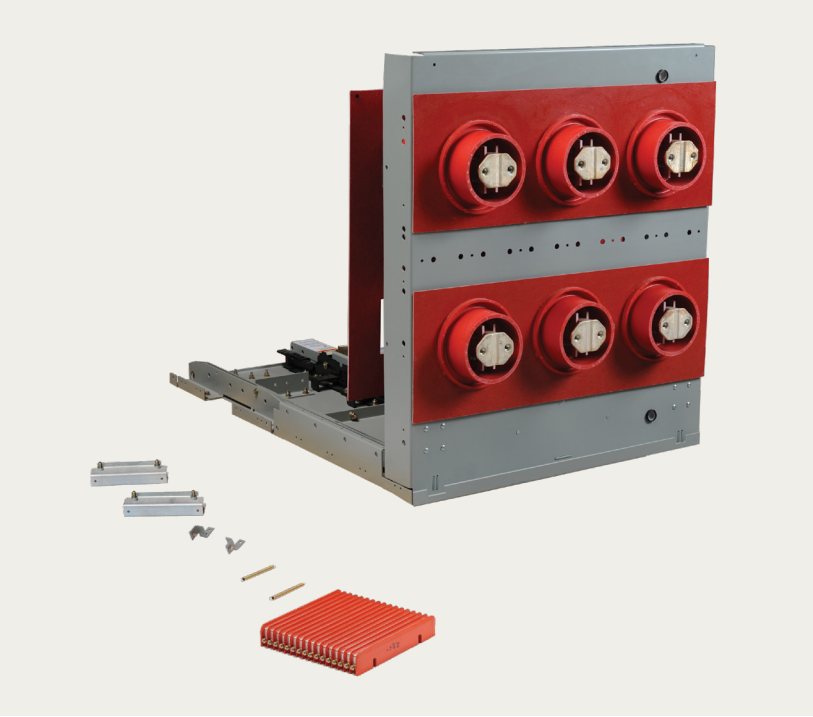
Rated values and related capabilities	IEEE C37.013 clause	Units	Catalog Number ③		
			MVSGBRDG4xx15-	MVSGBRDG5xx15-	MVSGBRDG6xx15-
Rated maximum voltage (V)	5.1	kV	15.0	15.0	15.0
Power frequency	5.2	Hz	60	60	60
Rated continuous current	5.3	A	1,200, 2,000, 3,000, 4,000FC	1,200, 2,000, 3,000, 4,000FC	1,200, 2,000, 3,000, 4,000FC
Rated dielectric strength (withstand voltage) 1. Power frequency, one minute 2. Impulse	5.4.2 C37.013a, Table 4	 kV kV peak	 38 95	 38 95	 38 95
Rated short-circuit duty cycle	5.5		CO-30 min-CO	CO-30 min-CO	CO-30 min-CO
Rated interrupting time ①②	5.6	ms	< 80 ms	< 80 ms	< 80 ms
Rated short-circuit current 1. System source (100%) (I) 2. Generator source (50%)	 5.8.1 5.8.2.3	 kA sym kA sym	 40 20	 50 25	 63 31.5
dc component		%	75	64	61
Asymmetry ratio (historical "S" factor)		----	1.46	1.35	1.32
Asymmetrical interrupting (ref)		kA rms	57.9	67.5	83
Delayed current zero capability		ms	40	30	30
Close and latch capability (274% I)		kA peak	110	137	173
Short-time current carrying capability (100% I)	5.8.2.7	kA sym	40	50	63
Short-time current duration	5.8.2.7	s	3	3	3
Transient recovery voltage (TRV) rating System source 1. E_2 peak voltage 2. RRRV (TRV rate) 3. T_2 time-to-peak	 5.9 C37.013a, Table 5	 kV kV / µs µs	 27.6 (1.84 V) 3.5 9.3 (0.62 V)	 27.6 (1.84 V) 4.5 7.2 (0.48 V)	 27.6 (1.84 V) 4.5 7.2 (0.48 V)
Generator source 1. E_2 crest voltage 2. RRRV (TRV rate) 3. T_2 time-to-peak	 C37.013a, Table 6	 kV kV / µs µs	 27.6 (1.84 V) 1.6 20.25 (1.35 V)	 27.6 (1.84 V) 1.8 18.0 (1.20 V)	 27.6 (1.84 V) 1.8 18.0 (1.20 V)
Generator source 1. E_2 crest voltage 2. RRRV (TRV rate) 3. T_2 time-to-peak	 C37.013a, Table 9	 kV kV / µs µs	 39.0 (2.6 V) 3.3 13.4 (0.89 V)	 39.0 (2.6 V) 4.1 10.8 (0.72 V)	 39.0 (2.6 V) 4.1 10.8 (0.72 V)
Rated load-current switching capability	5.10	A	1,200, 2,000, 3,000	1,200, 2,000, 3,000, 4,000FC	1,200, 2,000, 3,000, 4,000FC
Out-of-phase current switching capability	5.12	kA	20	25	31.5
Mechanical endurance		operations	10,000	10,000	10,000

① Interrupting time is based on the first current zero occurring no later than 66 ms after fault initiation, for example, %dc component <100.

② Interrupting time of 50 ms available, provided that the first current zero occurs no later than 50 ms after fault initiation.

③ "xxxx" in type designation refers to the continuous current rating 1,200 A, 2,000 A or 3,000 A, as appropriate. Siemens GMSG 3000A Drawout breakers are capable of operation up to 4000A provided the following conditions are met:
Use with MVSGCKBAXFAN Fan kit in upper cell.
Partner company must perform type testing certified to ANSI standards with their switchgear for 4000 A.

Circuit breaker cell kits: GMSG



Universal circuit breaker cell kit

Circuit breaker cell kit includes:

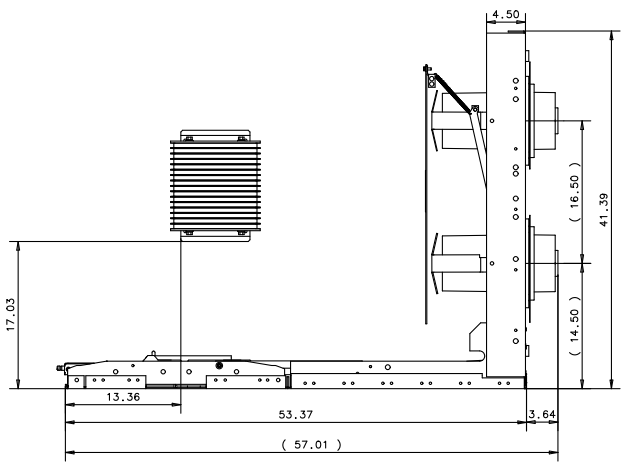
- Racking mechanism
- Shutter barrier
- Secondary disconnect
- Primary bushings
- Rear and bottom pan
- Fixed-contact pad.

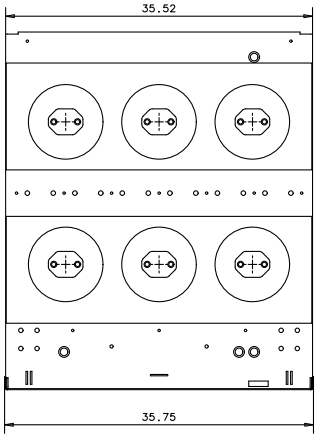
Circuit breaker cell kit excludes:

- Drawout type GMSG circuit breaker (must be selected separately).

Note: Reduced content cell kits are designed to allow VIP partners to equip their structures with SIEMENS hardware to accept our GMSG circuit breakers. These kits are suitable to partners who have been using legacy ANSI style components in the past.

Circuit breaker cell kits: GMSG

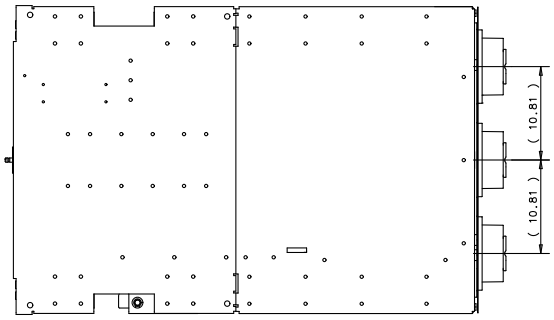


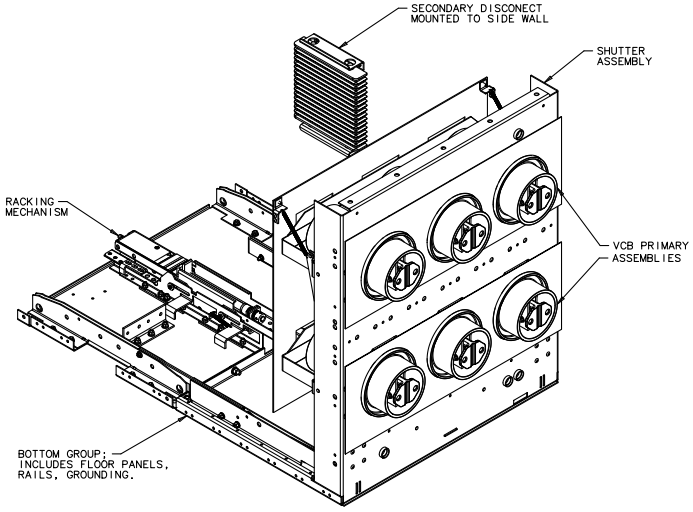




TYPICAL BUS
BOLT PATTERN

STABS SET-UP
FOR 1/2"-13
HARD WARE



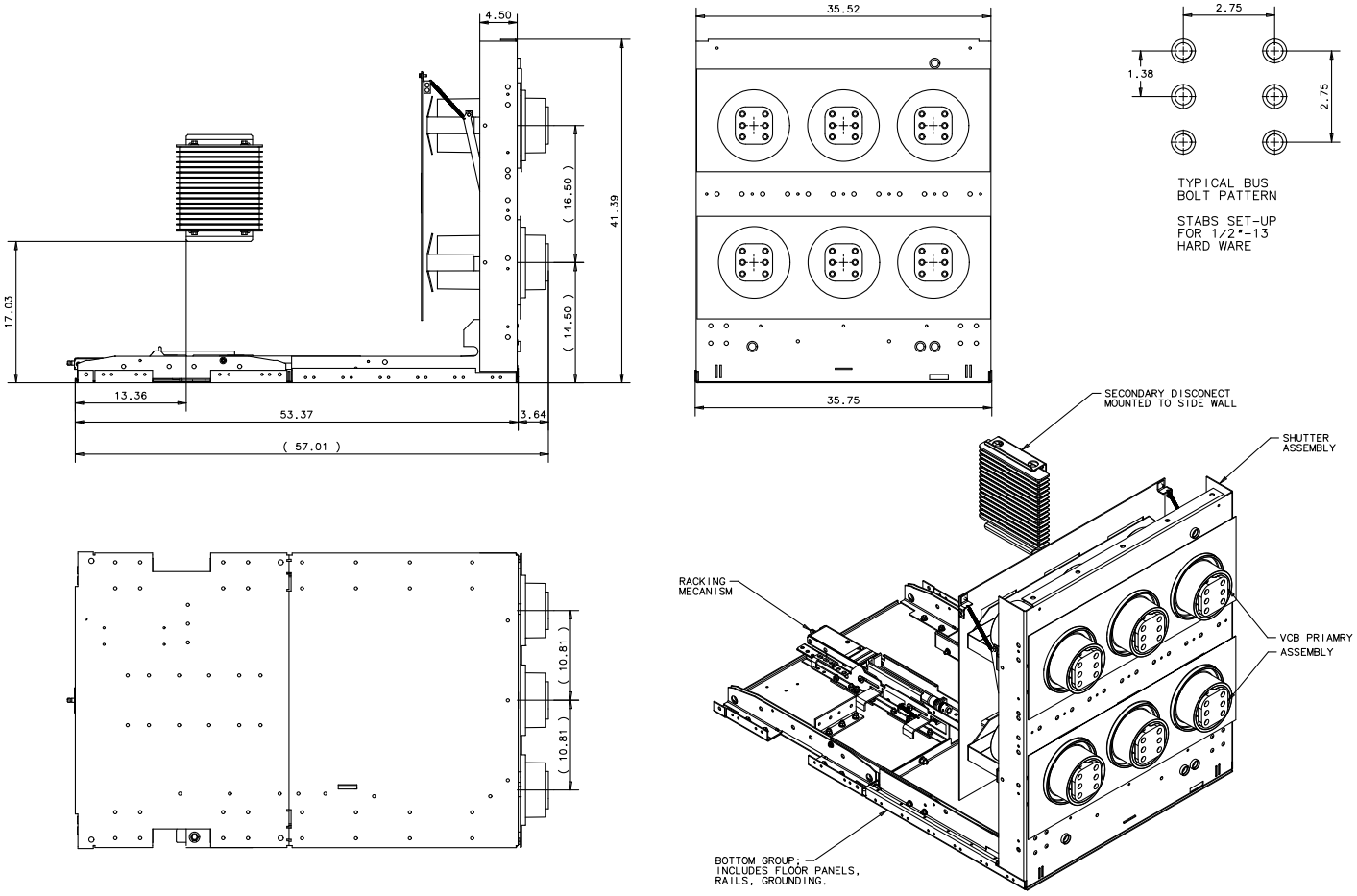


REFERENCES
For shutter frame/primaries assembly to floor panels installation refer to document GX-901-000-402.
For drilling pattern of side walls for breaker cell kits refer to drawing GX-901-001-405.
For ordering instrucitons of the coding plates refer to drawing GX-901-012-400.

Note: Interpret drawing tolerances per GX-900-001-501.

Description	Catalog Number
GMSG 50kA 1200A Universal Breaker cell kit	MVSGCKBU512
GM-SG 1200A 50kA Lower Breaker Cell Kit (Reduced Content)	MVSGCKBU512P

Circuit breaker cell kits: GMSG

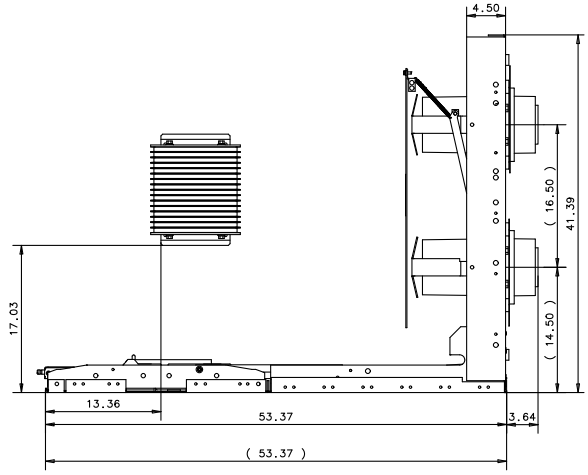


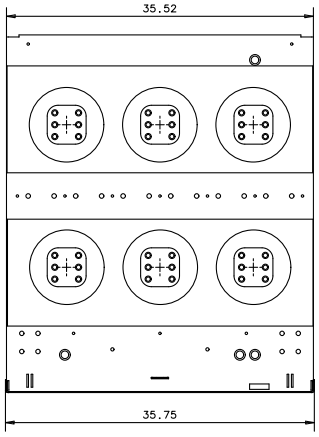
REFERENCES
For shutter frame/primaries assembly to floor panels installation refer to document GX-901-000-402.
For drilling pattern of side walls for breaker cell kits refer to drawing GX-901-001-405.
For ordering instrucitons of the coding plates refer to drawing GX-901-012-400.

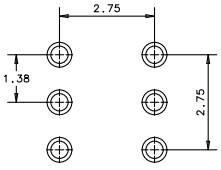
Note: Interpret drawing tolerances per GX-900-001-501.

Description	Catalog Number
GMSG 50kA 2000A Universal Breaker cell kit	MVSGCKBU520

Circuit breaker cell kits: GMSG

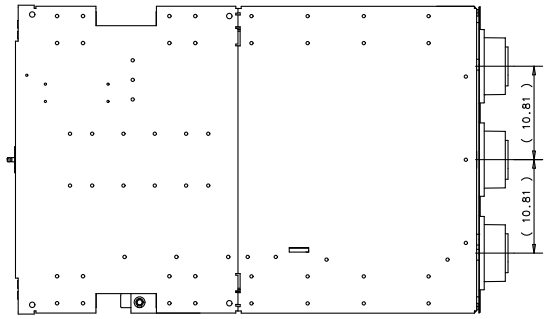


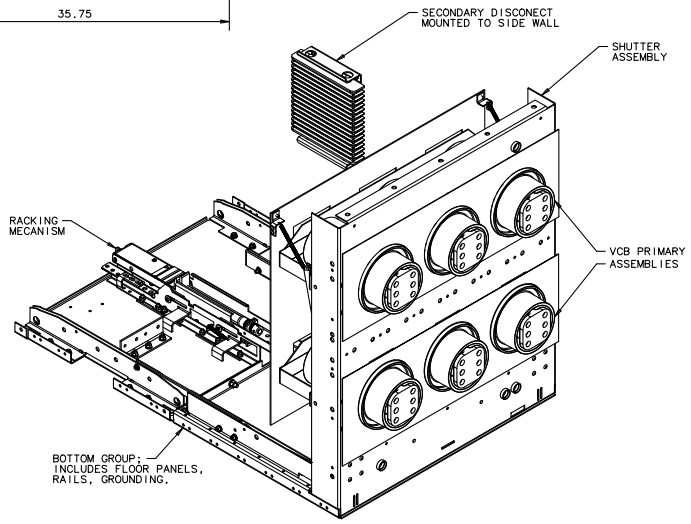




TYPICAL BUS
BOLT PATTERN

STABS SET-UP
FOR 1/2"-13
HARD WARE



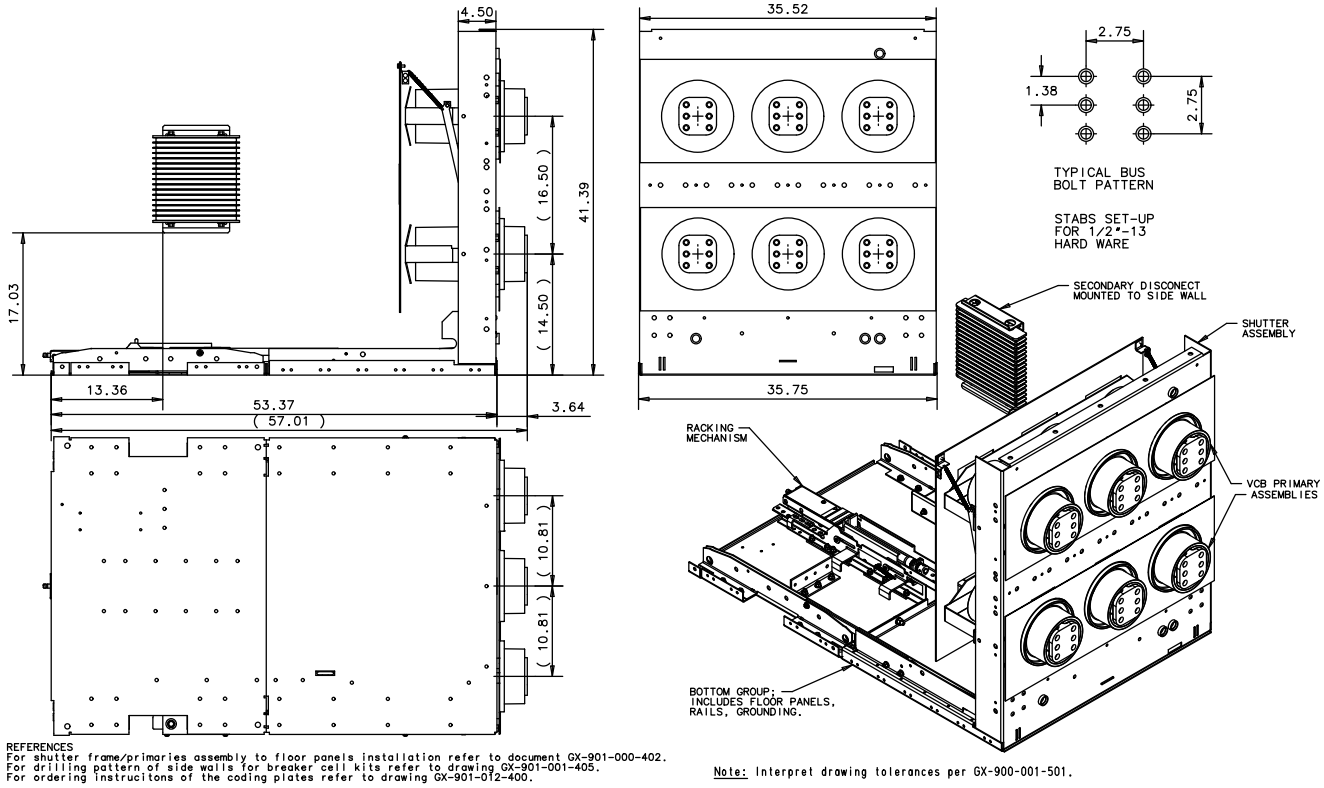


REFERENCES
For shutter frame/primaries assembly to floor panels installation refer to document GX-901-000-402.
For drilling pattern of side walls for breaker cell kits refer to drawing GX-901-001-405.
For ordering instrucitons of the coding plates refer to drawing GX-901-012-400.

Note: Interpret drawing tolerances per GX-900-001-501.

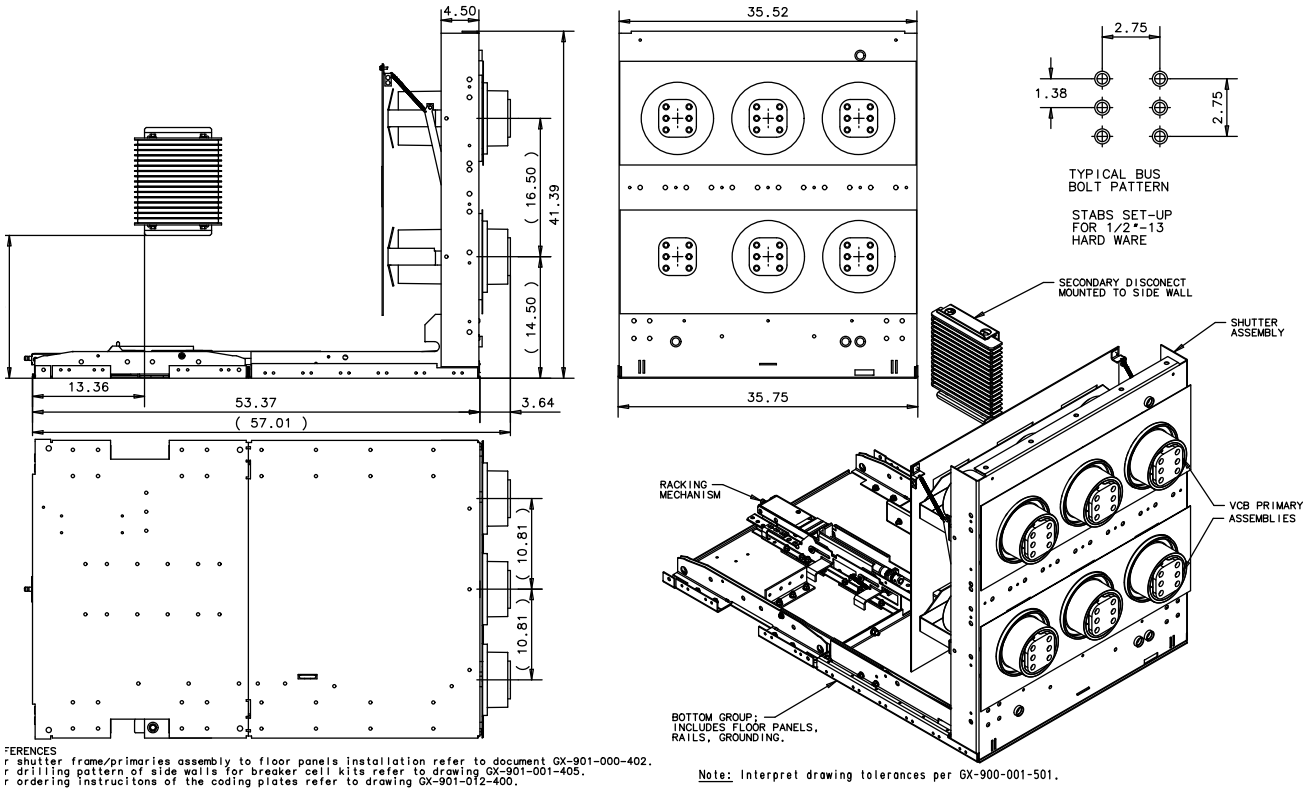
Description	Catalog Number
GMSG 50kA 3000A Universal Breaker Cell Kit	MVSGCKBU530
GM-SG 3000A 50kA Lower Breaker Cell Kit (Reduced Content)	MVSGCKBU530P

Circuit breaker cell kits: GMSG



Description	Catalog Number
GMSG 63kA 1200/2000A Universal Breaker Cell Kit	MVSGCKBU620
GM-SG 1200/2000A 63kA Lower Breaker Cell Kit (Reduced Content)	MVSGCKBU620P

Circuit breaker cell kits: GMSG



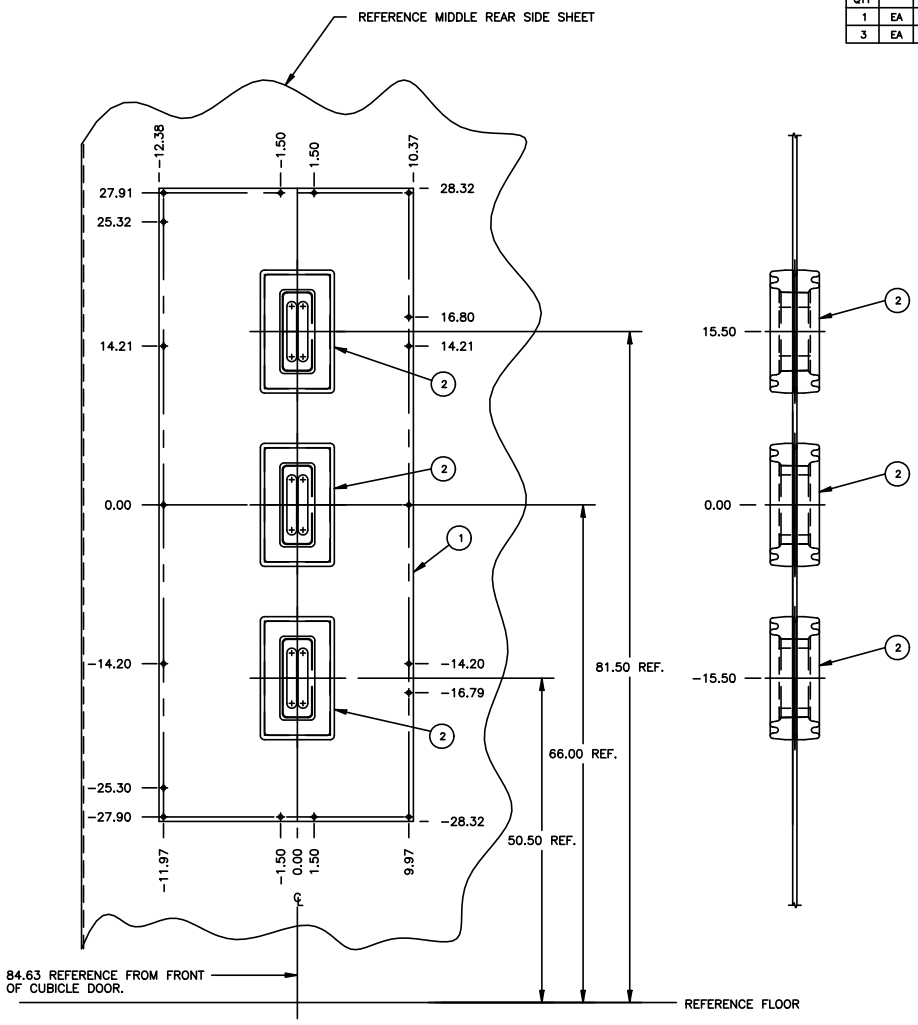
FERENCES
r shutter frame/primaries assembly to floor panels installation refer to document GX-901-000-402.
r drilling pattern of side walls for breaker cell kits refer to drawing GX-901-001-405.
r ordering instrucitons of the coding plates refer to drawing GX-901-012-400.

Description	Catalog Number
GMSG 63kA 3000A Universal Breaker Cell Kit	MVSGCKBU630
GMSG Fan Kit, required for use with breakers in 4000 A Ventilation Fan Kit ①	MVSGCKBAXFAN

① Required for 4000 A rating

Circuit breaker cell kits: GMSG

QTY	U/M	ITEM	DESCRIPTION	PART NO.	REMARKS
1	EA	1	BUS SUPPORT / 2PCS MAKE 1 SET	18-750-669-002	
3	EA	2	INSL. ASSY. CYCLO 3000	18-757-889-003	



NOTE:
1.) (2) 0.50 X 5.00 COPPER 3000A RATING.

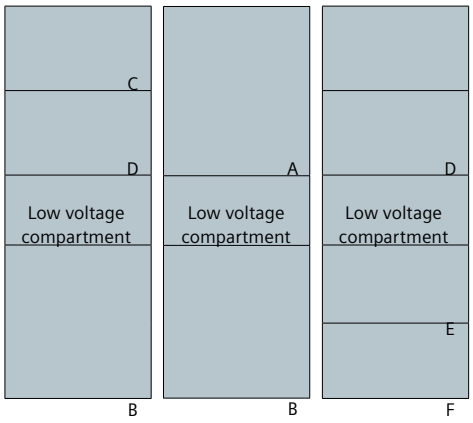
Description	Catalog Number
GMSG Fan Kit, required for use with breakers in 4000 A Ventilation Fan Kit ①	MVSGCKBAXFAN

① Required for 4000 A rating

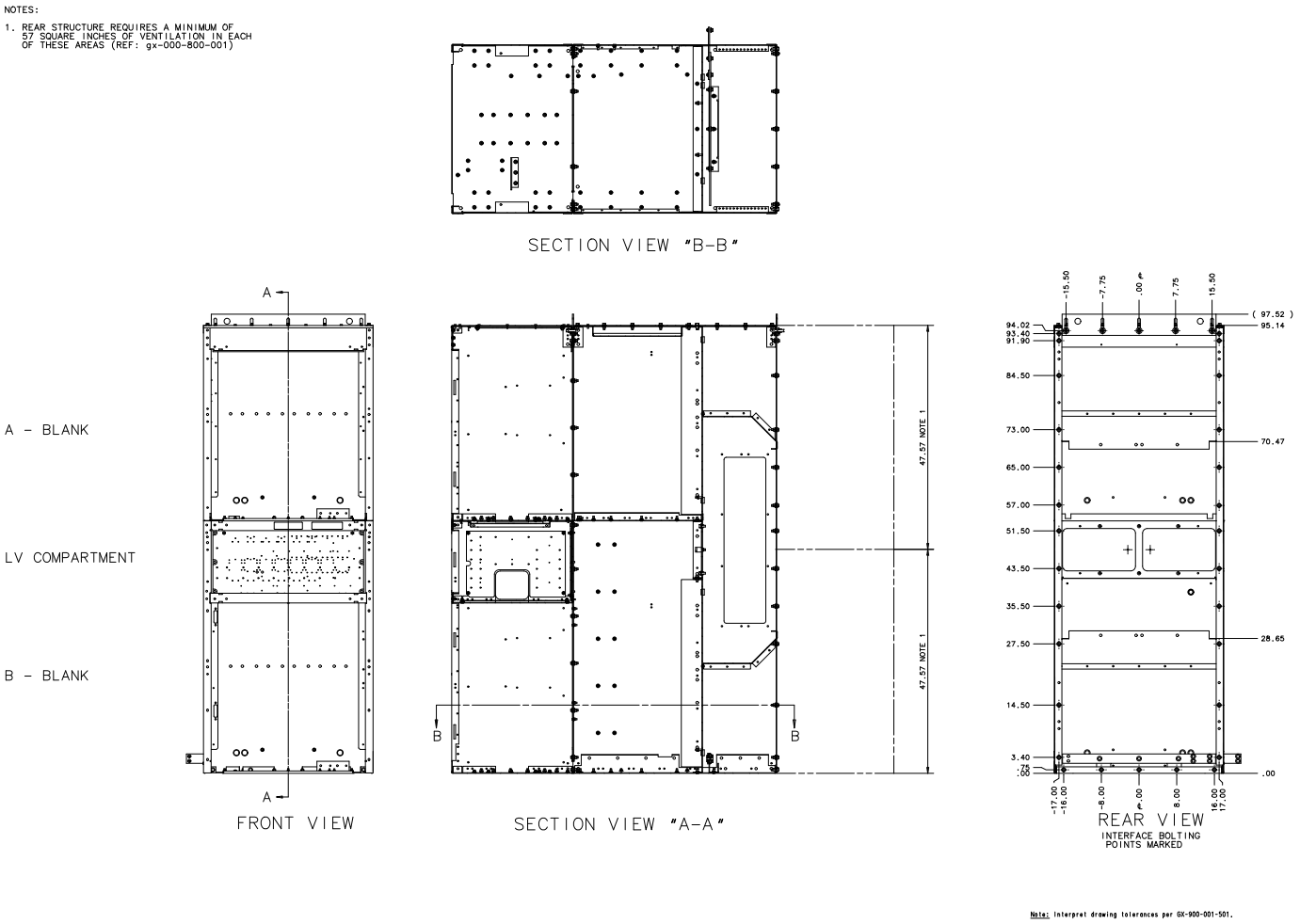
Skeletons: GMSG



GMSG 50 kA C-D Auxiliary Cell over Breaker Skeleton



Skeletons: GMSG

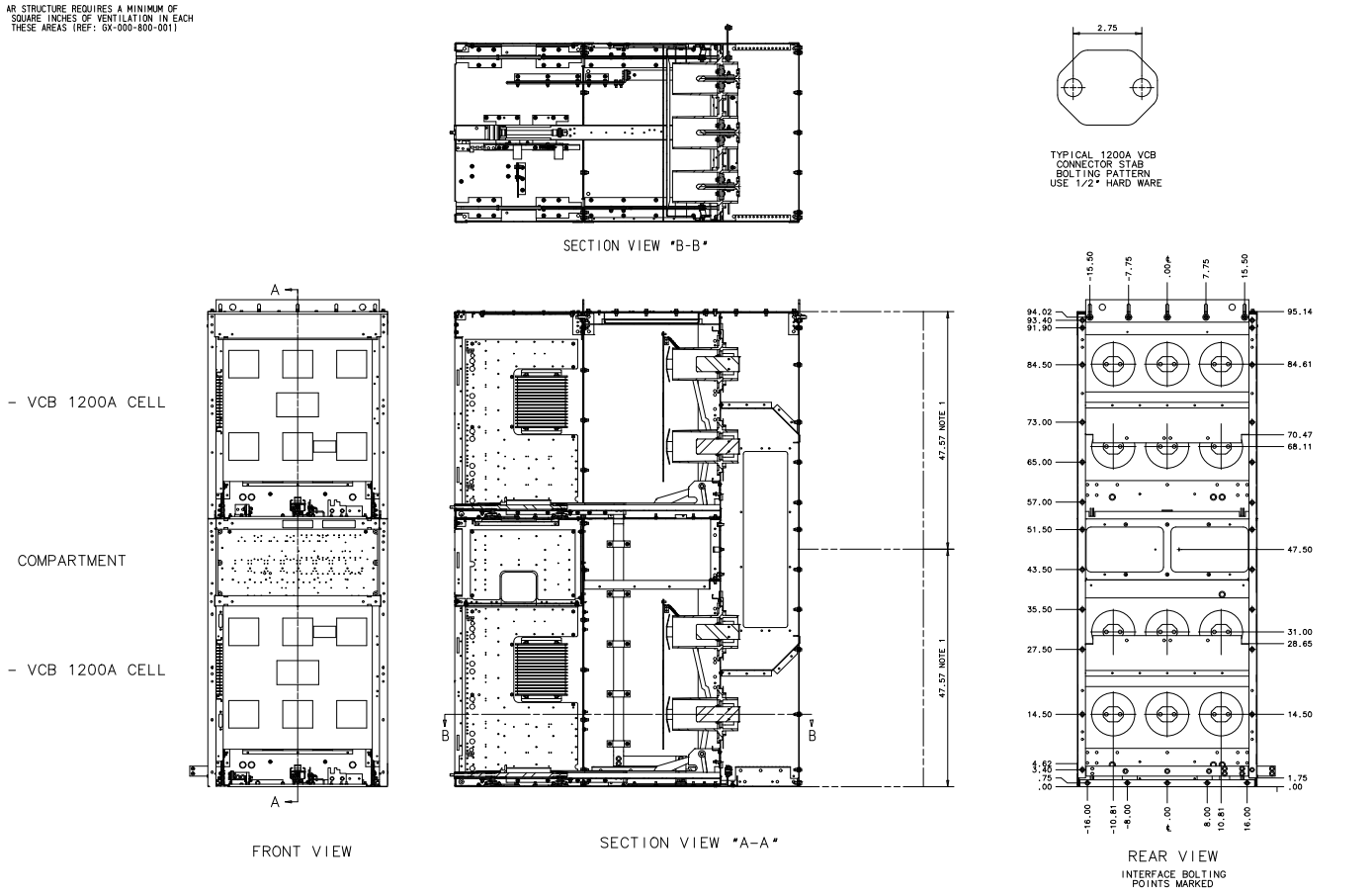


Description	Catalog Number
GMSG OEM 50 kA Skeleton A-Blank Over B-Blank	MVSGSKBL00BL00
GMSG OEM 50 kA Skeleton A-Blank Over B-1200	MVSGSKBL001200
GMSG OEM 50 kA Skeleton A-Blank Over B-2000	MVSGSKBL002000
GMSG OEM 50 kA Skeleton A-Blank Over B-3000	MVSGSKBL003000
GMSG OEM 50 kA Skeleton A-Blank Over B-4000	MVSGSKBL004000

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

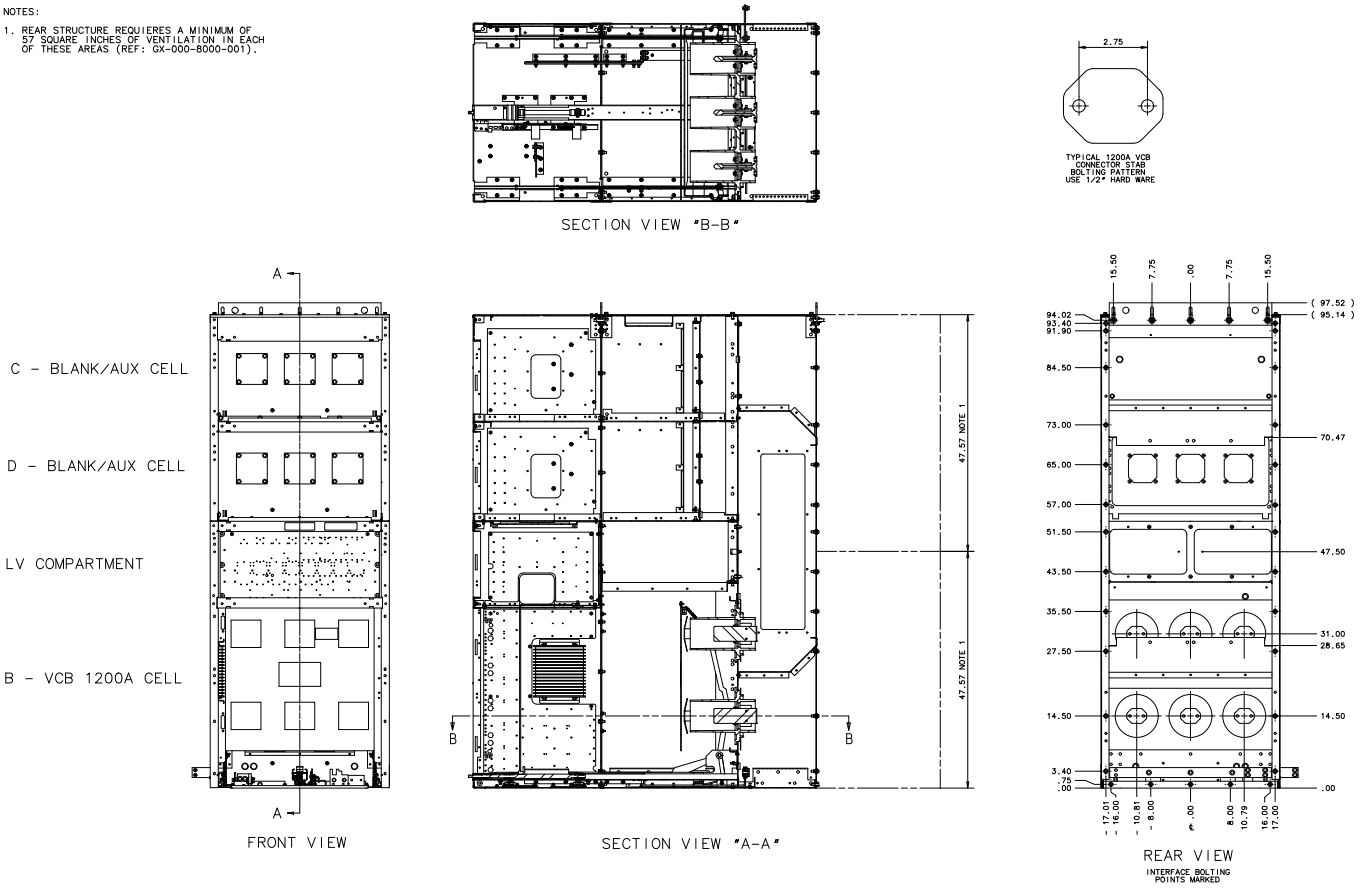
Skeletons: GMSG



Description	Catalog Number
GMSG OEM 50 kA Skeleton A-1200 Over B-1200	MVSGSK12001200

Note:
- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG

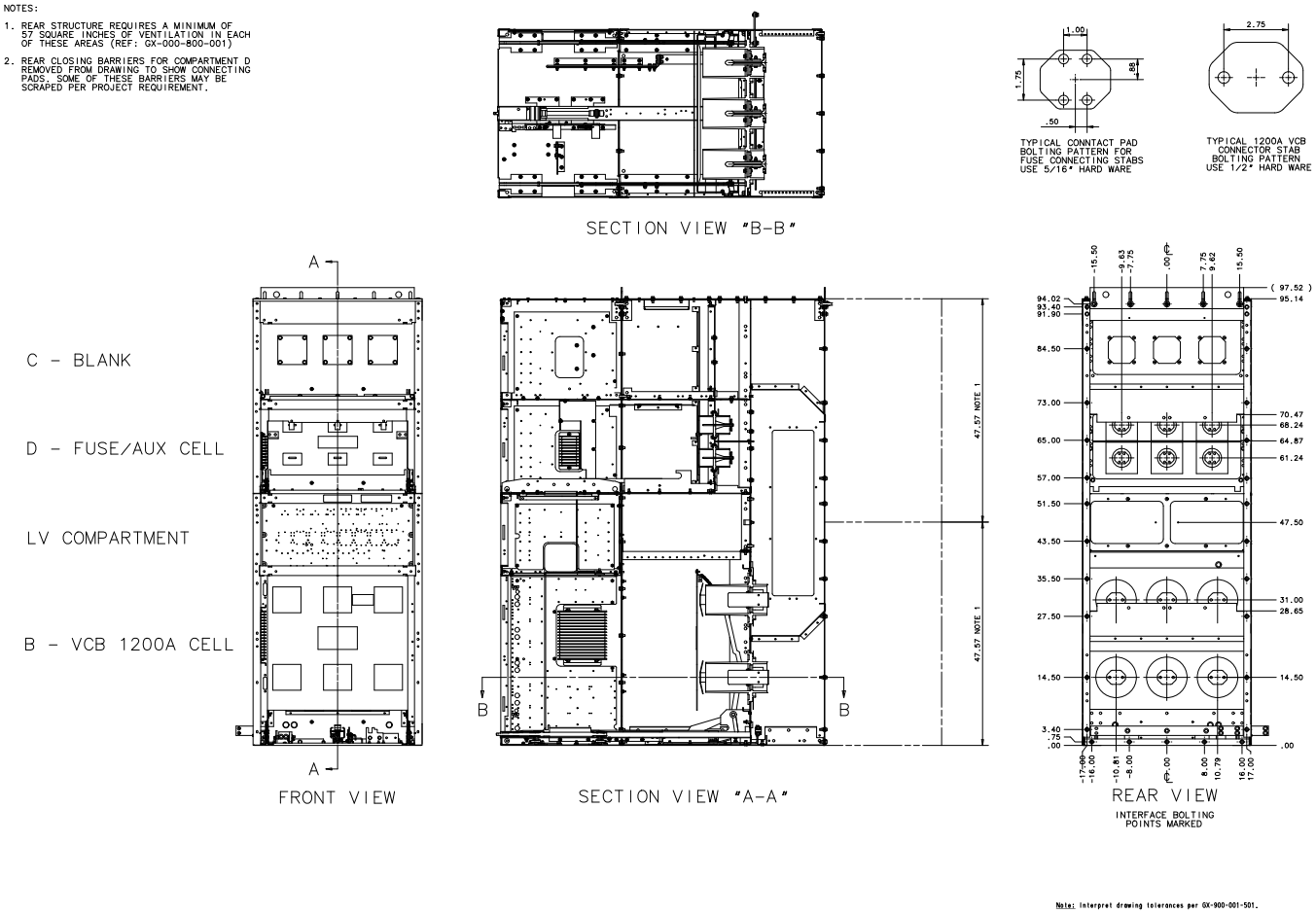


Description	Catalog Number
GMSG OEM 50 kA Skeleton C-Blank D-Blank B-1200	MVSGSKBLBL1200

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG

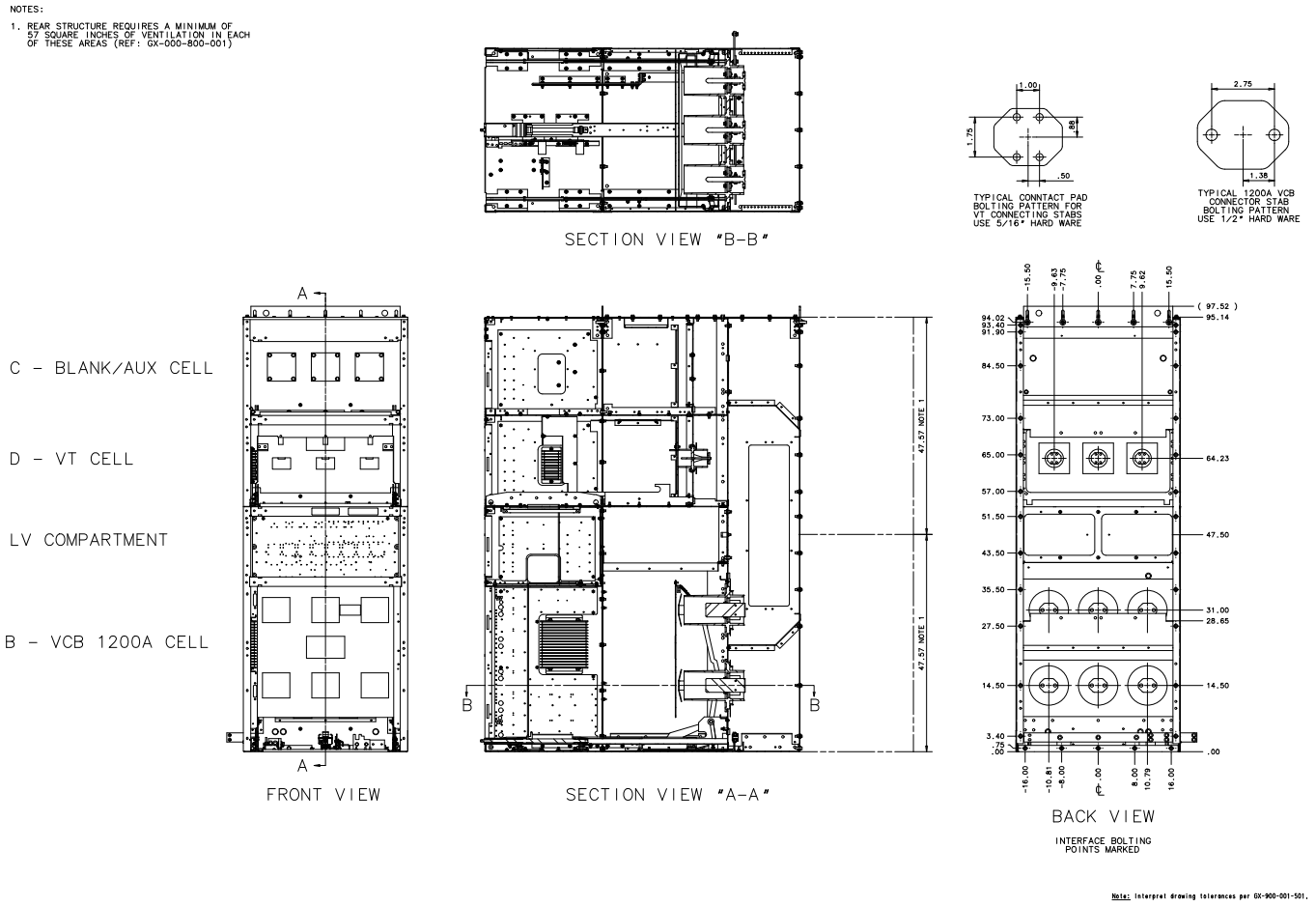


Description	Catalog Number
GMSG OEM 50 kA Skeleton C-Blank D-FT B-1200	MVSGSKBLFT1200

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

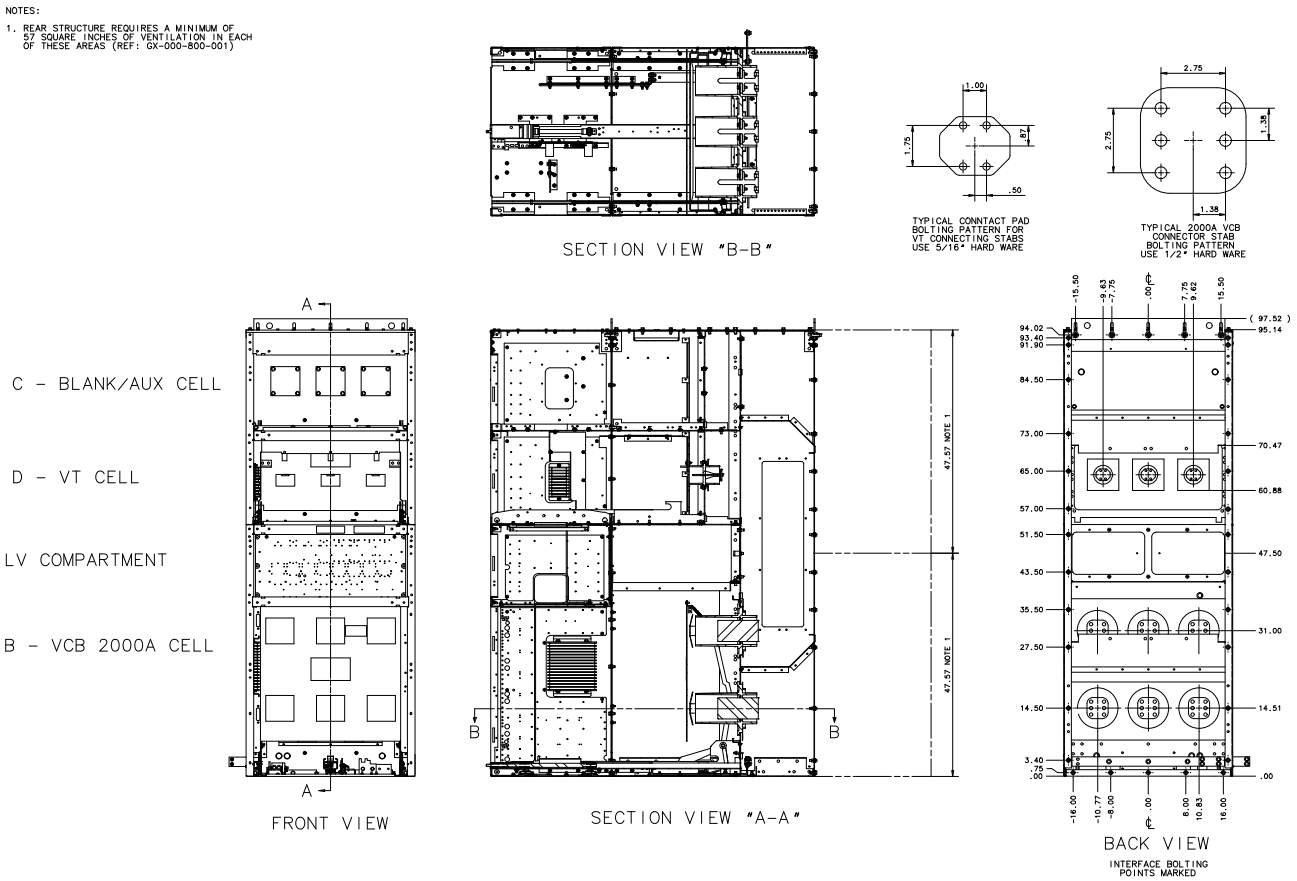
Skeletons: GMSG



Description	Catalog Number
GMSG OEM 50 kA Skeleton C-Blank D-VT B-1200	MVSGSKBLVT1200

Note:
- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG

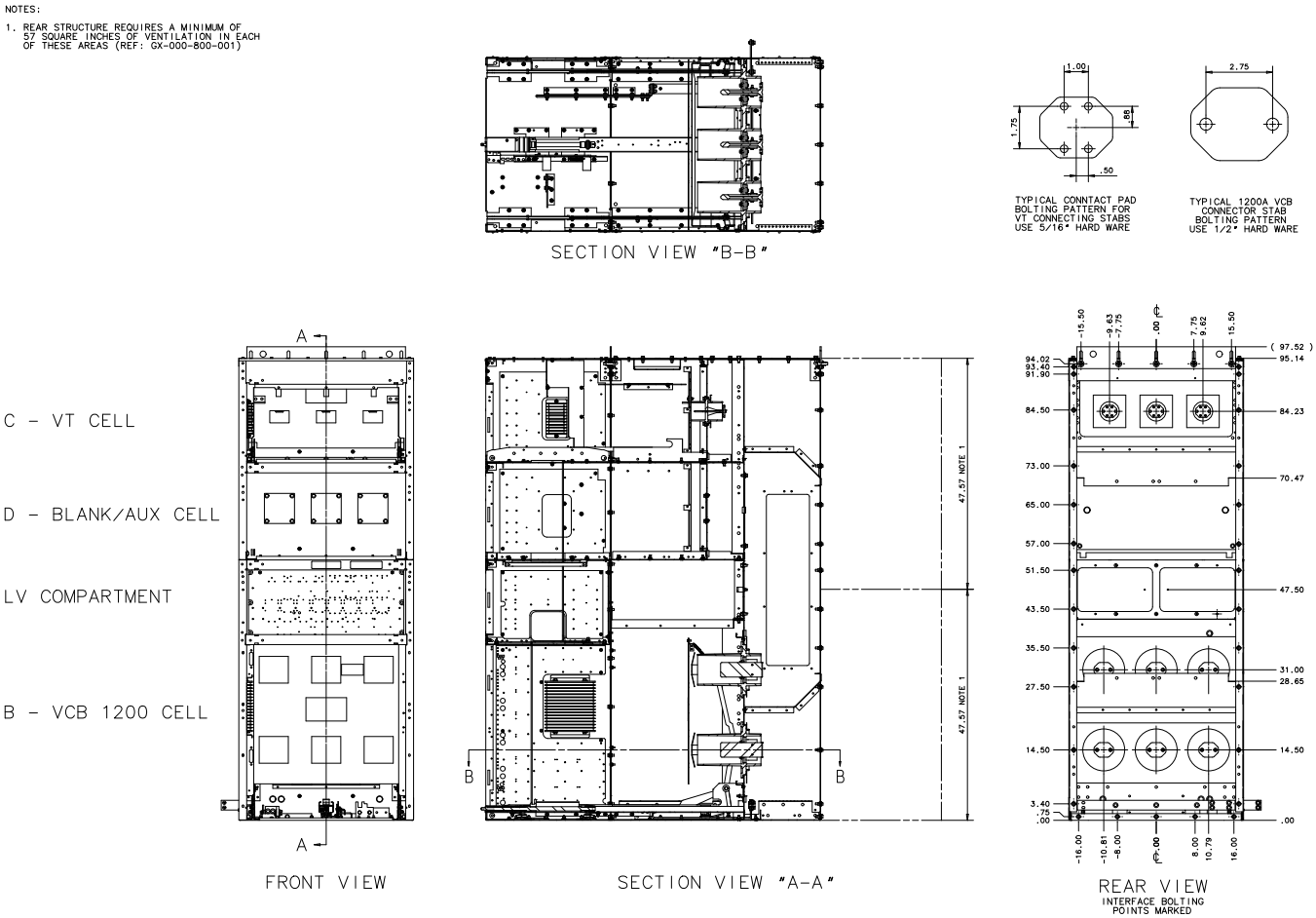


Description	Catalog Number
GMSG OEM 50 kA Skeleton C-Blank D-VT B-2000	MVSGSKBLVT2000

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG

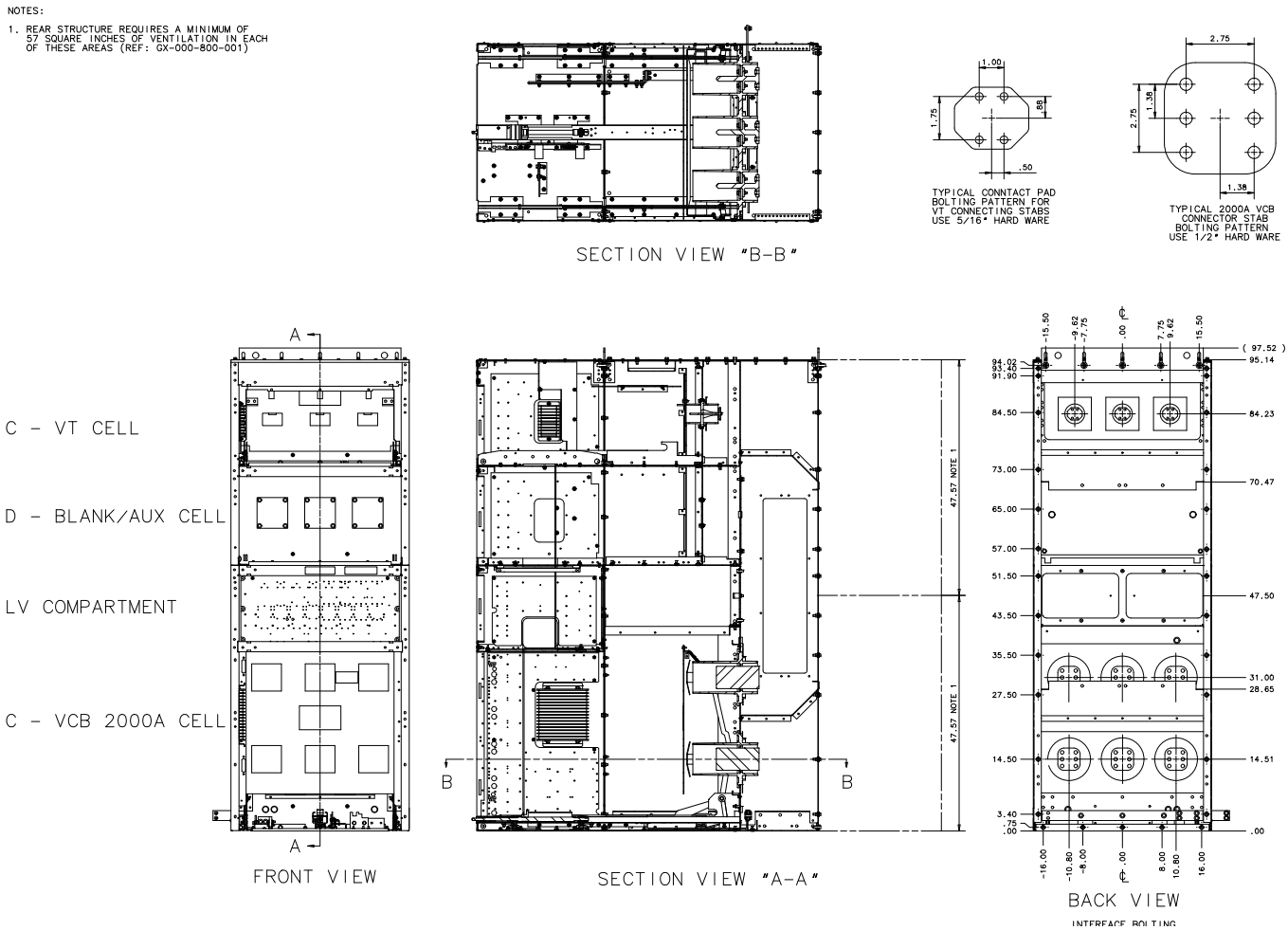


Description	Catalog Number
GMSG OEM 50 kA Skeleton C-VT D-Blank B-1200	MVSGSKVTBL1200

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

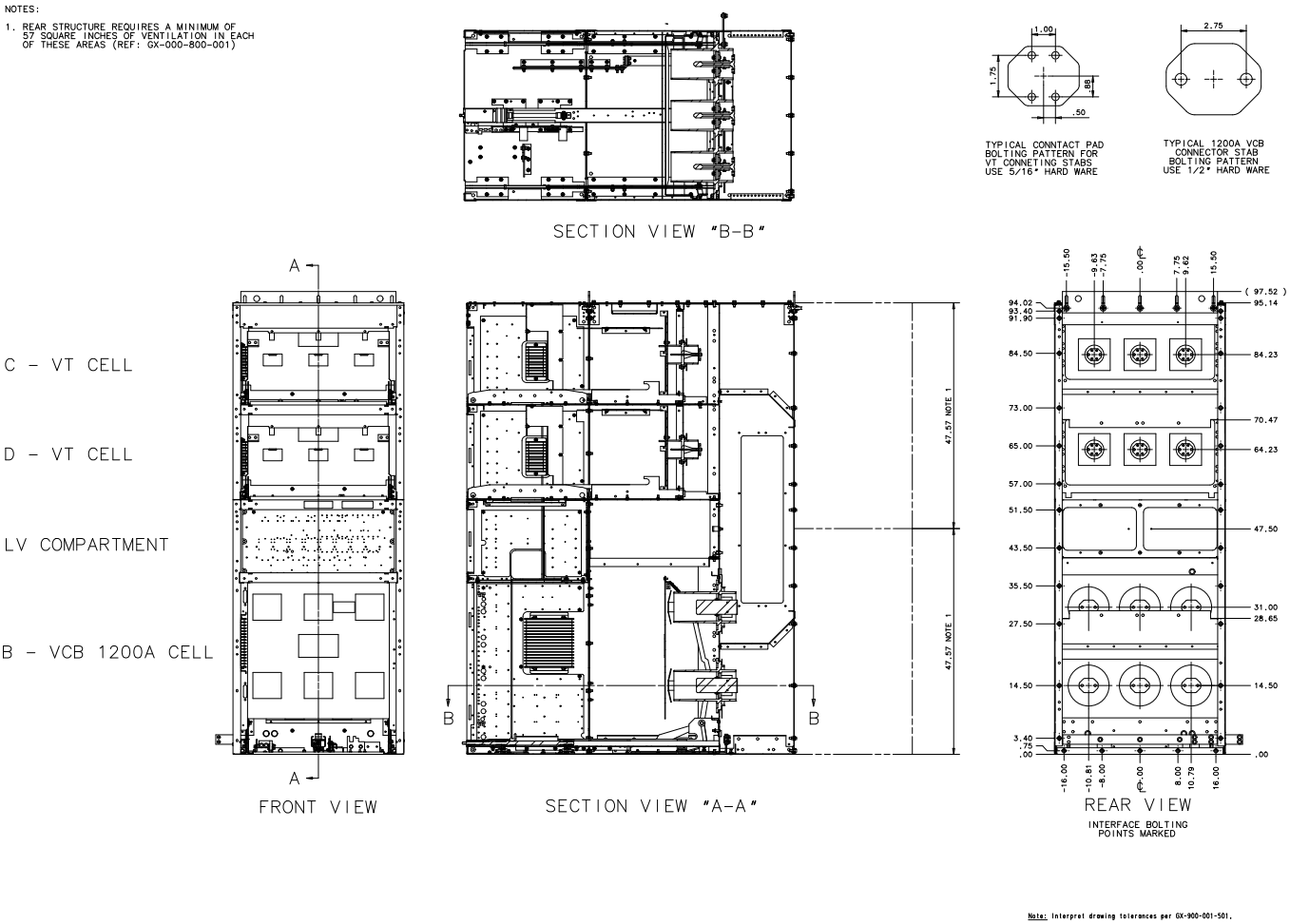
Skeletons: GMSG



Description	Catalog Number
GMSG OEM 50 kA Skeleton C-VT D-Blank B-2000	MVSGSKVTBL2000

Note:
- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG



Description	Catalog Number
GMSG OEM 50 kA Skeleton C-VT D-VT B- over 1200	MVSGSKVTVT1200

Note:

- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Skeletons: GMSG

Description	Catalog Number
GMSG OEM 50 kA Skeleton 4000A W/Kit	MVSGSKBL4000F
GMSG OEM 50 kA Skeleton 1200 Over Blank	MVSGSK1200BL00
GMSG OEM 50 kA Skeleton A-1200 Over B-2000	MVSGSK12002000
GMSG OEM 50 kA Skeleton A-2000 Over B- 1200	MVSGSK20001200
GMSG OEM 50 kA Skeleton A-2000 Over B-2000	MVSGSK20002000
GMSG OEM 50 kA Skeleton C-VT D-VT B-2000	MVSGSKVTVT2000
GMSG OEM 50 kA Skeleton C-Blank D-Blank B-2000	MVSGSKBLBL2000
GMSG OEM 50 kA Skeleton C-VT D-Blank B-Blank	MVSGSKVTBLBL00
GMSG OEM 50 kA Skeleton C-Blank D-VT B-Blank	MVSGSKBLVTBL00
GMSG OEM 50 kA Skeleton C-VT D-VT B-Blank	MVSGSKVTVTBL00
GMSG OEM 50 kA Skeleton C-Blank D-CPT B-1200	MVSGSKBLCP1200
GMSG OEM 50 kA Skeleton C-Blank D-CPT B-2000	MVSGSKBLCP2000
GMSG OEM 50 kA Skeleton C-VT D-CPT B-1200	MVSGSKVTCP1200
GMSG OEM 50 kA Skeleton C-VT D-CPT B-2000	MVSGSKVTCP2000
GMSG OEM 50 kA Skeleton C-Blank D-CPT B-Blank	MVSGSKBLCPBL00
GMSG OEM 50 kA Skeleton C-VT D-CPT B-Blank	MVSGSKVTCPBL00
GMSG OEM 50 kA Skeleton C-VT D-VT E-VT and F-VT	MVSGSKVTVTVTVT
GMSG OEM 50 kA Skeleton C-VT D-Blank E-Blank and F-VT	MVSGSKVTBLBLVT
GMSG OEM 50 kA Skeleton A-3000 E-Ventilation F-VT	MVSGSK3000VNVT
GMSG OEM 50 kA Skeleton C-VT D-Fuse B-Blank	MVSGSKVTFTBLXX

Note:
- Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).

Rollout Trays: GMSG



Auxiliary voltage transformer rollout cell kit less voltage transformers

Rollout trays without transformers or fuses

Description	Catalog Number
Aux rollout Fuse 5 kV;	MVSGCKR67
Aux Rollout Fuse 15kV	MVSGCKR68
15kV 3Ø Fuse Rollout compmt F	MVSGCKR69
15kV 3VT Rollout Tray	MVSGCKR70
5kV 3VT Rollout Tray	MVSGCKR71
15kV 2VT Rollout Tray	MVSGCKR72
5kV 2VT Rollout Tray	MVSGCKR73
15kV CPT Rollout Tray for 15kV Fuses	MVSGCKR74
10/15kVA CPT Rollout for 5kV fuses	MVSGCKR75
5kVA CPT Rollout for 15kV fuses	MVSGCKR76
5kVA CPT Rollout for 5kV fuses	MVSGCKR77

Rollout trays with transformers, fuses

Description	Catalog Number
Aux Rollout 3 VT Wye-Wye 5kV; 4800:120V	MVSGCKR54
Aux Rollout 2 VT Open Delta - Open Delta 5kV; 4800:120V	MVSGCKR55
Aux Rollout 3 VT Wye-Wye 5kV, 4200:120V	MVSGCKR56
Aux Rollout 2 VT Open Delta - Open Delta 5kV, 4200:120V	MVSGCKR57
Aux Rollout 3 VT Wye-Wye 15kV; 12470:120V	MVSGCKR58
Aux Rollout 3 VT Wye-Wye 15kV; 13200:120V	MVSGCKR59
Aux Rollout 3 VT Wye-Wye 15kV; 14400:120V	MVSGCKR60
Aux Rollout 2 VT Open Delta - Open Delta 15kV; 12470:120V	MVSGCKR61
Aux Rollout 2 VT Open Delta - Open Delta 15kV; 13200:120V	MVSGCKR62
Aux Rollout 2 VT Open Delta - Open Delta 15kV; 14400:120V	MVSGCKR63
Aux Rollout CPT 5kV; 4200:120V 10 kVA	MVSGCKR64
Aux Rollout CPT 15kV; 12470:120V 10 kVA	MVSGCKR65
Aux Rollout CPT 15kV; 13200:120V 10 kVA	MVSGCKR66

Voltage transformers (VTs)

Up to three single-fused VTs with their integrally mounted current-limiting fuses may be mounted on each rollout tray. The upper and lower cells can each accommodate up to two rollout trays. When moving to the DISCONNECT position, the primary fuses are automatically disconnected and grounded to remove any static charge from the windings. The secondary connections are also disconnected when the rollout tray is moved to the DISCONNECT position. When the rollout tray is withdrawn, insulated shutters cover the primary disconnects helping to protect personnel from exposure to energized components.

Control power transformers (CPTs)

One single-phase CPT of up to 15 kVA capacity with its primary current-limiting fuses and secondary molded-case circuit breaker may be mounted on the rollout tray of an auxiliary cell. The secondary molded-case circuit breaker must be open before the CPT primary can be disconnected or connected. This prevents load-current interruption on the main primary contacts. With the secondary molded-case circuit breaker open and latch released, the tray can be rolled easily to the DISCONNECT position. As the tray rolls out, the primary fuses are automatically grounded to remove any static charge and insulated shutters close to shield energized conductors.

Rollout tray excludes:

- Secondary wiring.

Cell kit for auxiliary rollout tray: GMSG

Auxiliary rollout tray cell kit includes:

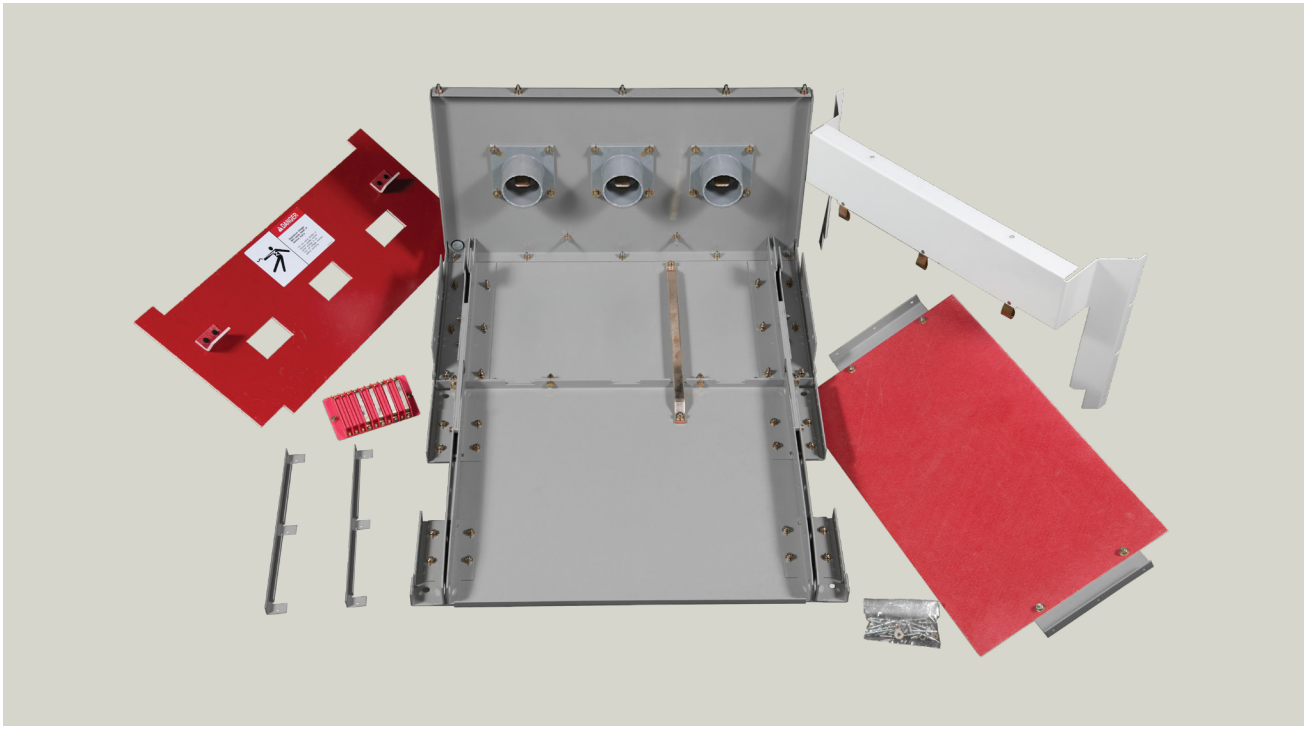
- Shutter barrier
- Secondary disconnect
- Auxiliary bushings
- Rear and bottom pan
- Fixed-contact pad.

Auxilary rollout cell kit excludes:

- VT rollout trays
  (must be selected separately)
- CPT rollout trays
  (must be selected separately).

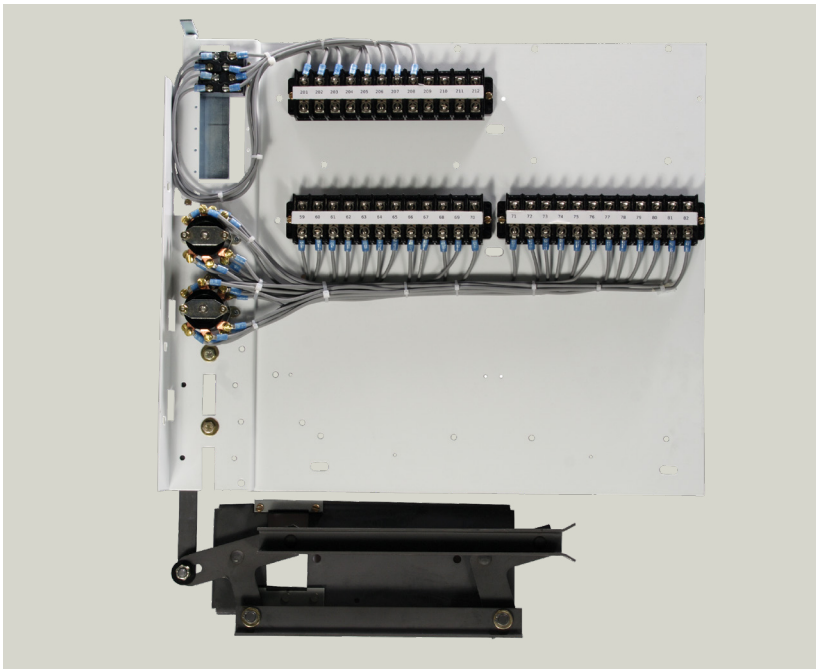
Auxiliary rollout tray cell kits: GMSG

Description	Catalog Number
Cell kit D CPT rollout tray	MVSGCKADCPT
Cell kit F CPT rollout tray	MVSGCKAFCPT
Cell kit D fuse rollout tray	MVSGCKADFUS
Cell kit F fuse rollout tray	MVSGCKAFFUS
Cell kit C VT rollout tray	MVSGCKACVT
Cell kit D VT rollout tray	MVSGCKADVT
Cell kit E VT rollout tray	MVSGCKAEVT
Cell kit F VT rollout tray	MVSGCKAFVT



Voltage transformer cell kit

MOCs and TOCs: GMSG



MOC/TOC assembly (covers removed)

Mechanism-operated cell (MOC) switch

A mechanism-operated cell (MOC) auxiliary switch can be mounted in the circuit breaker cell. This switch is operated by the circuit breaker mechanism, so that the switch contacts change state whenever the circuit breaker is closed or tripped. All spare MOCs are wired to accessible terminal bocks for user connections.

Siemens supplies the TEST and CONNECT MOC actuator as standard. Please consult with Siemens for CONNECT only.

Truck-operated cell (TOC) switch

A truck-operated cell (TOC) switch can be mounted in the circuit breaker cell. The TOC switch contacts change state when the circuit breaker moves into or out of the CONNECTED position. All spare TOC contacts are wired to accessible terminal blocks for user connections.

MOCs and TOCs: GMSG

Description	Catalog Number
6 Stage MOC, 4 Stage TOC	MVSGACMT6X4X ②
12 Stage MOC, 8 Stage TOC	MVSGACMT128X ②
18 Stage MOC, 12 Stage TOC	MVSGACMT1812 ②
24 Stage MOC, 12 Stage TOC	MVSGACMT2412 ②
4 Stage TOC	MVSGACMTXX4X ①③
8 Stage TOC	MVSGACMTXX8X ①③
12 Stage TOC	MVSGACMTXX12 ①③
6 Stage MOC	MVSGACMT6XXX ①③
12 Stage MOC	MVSGACMT12XX ①③
18 Stage MOC	MVSGACMT18XX ①③
24 Stage MOC	MVSGACMT24XX ①③

① 63 kA MOC and TOC are mounted on a separate pan.
② For distribution circuit breakers to 50 kA and generator breakers to 40 kA.
③ For distribution circuit breakers to 63 kA and generator breakers 50 kA or 63 kA.
Note: MOC-TOC assemblies are supplied loose. Siemens MV components does not assemble to skeletons.



Accessories: GMSG

Accessories: GMSG

Description	Catalog Number
GMSG AND GM38 Manual Racking Crank	MVXXACRDHANDLE
GMSG AND GM38 Manual Spring Charge Handle	MVXXACCHMANCHL
Siemens Contact Lubricant	MVXXACLPCONLUB
Split Plug Jumper	MVXXACSPPLGJU
Test cabinet (DC control voltages, single trip coil)	MVXXACTESTCAD
Secondary Disconnect 16 pole breaker part (GM-SG)	MVSGA2DIS16BR
Secondary Disconnect 16 pole Stationary part (GM-SG, GM38)	MVSGA2DIS16ST
Accessories Storage Cabinet ①	MVSGACACCYCAB
Circuit Breaker Test Cabinet for AC Trip, AC Close & AC Charge motor	MVSGACBRTESTAC
Circuit Breaker Test Cabinet for DC Trip, DC Close & DC Charge motor	MVSGACBRTESTDC
Test Cabinet PEPCO	MVSGACBRTESTDP
GMSG CB Test Cab -for GX-403-500-497 bkr WD	MVSGACBRTESTXN
Accessory Bundle: Split Plug Jumper, Racking Crank, Spring Charge Handle for Breaker, and 2 Extension Rails	MVSGACBUNDLE
CT - MDD style – mounting hardware (per CT)	MVSGACMDD
CT - MD style – mounting hardware (per CT)	MVSGACMD
Drawout Extension Rail (Two required)	MVSGACDREXRL
Fifth Wheel Assembly (8")	MVSGACLA5WHEEL
Lift Sling ②	MVSGACLASLING
Circuit Breaker Lift Truck ③	MVSGACLATRUCK
Auxiliary Tray Attachment for Lift Truck	MVSGACLATRYATC
CT Mounting Hardware	MVSGACMDD
GMSG-MOGTD 50kA, Manually Operated (for use in upper or lower cell)	MVSGACMGTD5XUX
Electric Racking Device	MVSGACRDELEC
Door Hardware for Electric Racking Device ④	MVSGACRDELECDH
Push Rod to close and trip the breaker with closed door GMSG AR	MVSGACTRPRODAR
VT and CPT rollout tools to rack in /out Rollout in GMSG AR (1 unit)	MVSGARTAUXRTAR
GMSG Door Hinge	MVSGEQHINGE

① Cabinet is supplied loose for mounting by OEM.
② Sling can be used with customer's crane or hoist.
③ No lift sling is required for truck.
④ Door hardware is sold on a per door basis.



Type GMSG circuit breaker on lift truck



Drawout extension rails



Accessory cabinet

Ground and test devices: GMSG



Type GMSG-MO manually operated ground and test device

Manually operated ground and test device (up to 50 kA), type GMSG-MO

The type GMSG-MO ground and test device (up to 50 kA) is a drawout element that can be inserted into a distribution circuit breaker cell rated for a short-circuit current of 50 kA or lower. The type GMSG-MO opens the shutters, connects to the cell primary disconnecting contacts and so provides a means to make the primary disconnect stabs available for testing. The type GMSG-MO is suitable for high-potential testing of outgoing circuits of the switchgear main bus or for phase sequence checking. The type GMSG-MO also provides a means to connect temporary grounds to de-energized circuits for maintenance purposes.

The manual ground and test incorporates three-position, single-pole switches (upper stabs to ground, neutral and lower stabs to ground), eliminating the need for user-furnished ground cables. The switches are hookstick operable and, in the closed position, are rated for the full momentary and short-time ratings of the associated switchgear. User-furnished grounding cables and commercially available ground clamps seldom have ratings equal to those of the switchgear.

Separate insulated hinged panels cover the upper and lower stabs and include padlock provisions. The type GMSG-MO device also includes individual hookstick-removable barriers between each single-pole switch and the upper stabs and lower stabs.

Electrically operated ground and test device (for up to 50 kA and for 63 kA), type GMSG-EO

An electrical ground and test device includes a power-operated switch (derived from a type GMSG circuit breaker) arranged to allow grounding one set of disconnect stabs. These devices are able to close and latch against short-circuit currents corresponding to the ratings of the equipment.

The electrically operated ground and test device rated for a short-circuit current of

50 kA can be used in any type GMSG distribution circuit breaker compartment rated up to 50 kA.

The 63 kA device can be used only in type GMSG distribution circuit breaker compartments rated 63 kA.

Neither the 50 kA device nor the 63 kA device require any adapters for use in 1,200 A, 2,000 A or 3,000 A cells.

Two devices, one each for the upper and lower stabs, are required if grounding is desired to either side of the unit. The type GMSG-EO device also provides a means of access to the primary circuits for high potential tests or for phase sequence checking.

Due to the unique requirements frequently involved in such devices, all applications of electrically operated ground and test devices should be referred to Siemens for review.

Note: Due to the special nature of ground and test devices, each user must develop definitive operating procedures for incorporating safe operating practices. Only qualified personnel should be allowed to use ground and test devices.

Ground and test devices: GMSG

Note: EOGTDs are offered with standard 125 V DC operating voltage. If a different control voltage is required, please inquire further.

	Device type					
Description	**A**	**B**	**C**	**D**	**E**	**F**
Intended for use in upper or lower cell of switchgear	Upper	Lower	Upper	Lower	Upper or lower	Upper or lower
Number of studs (disconnects)	6	6	6	6	6	6
Number of test probes	6	6	6	6	6	6
Which studs can be grounded?	Upper	Lower	Lower	Upper	Upper	Lower
Upper studs	Conductive	Dummy	Dummy	Conductive	Conductive	Dummy
Upper test ports	Yes	Yes (with key interlock)	Yes (with key interlock)	Yes	Yes	Yes (with key interlock)
Lower studs	Dummy	Conductive	Conductive	Dummy	Dummy	Conductive
Lower test ports	Yes (with key interlock)	Yes	Yes	Yes (with key interlock)	Yes (with key interlock)	Yes



Type GMSG-EO ground and test device

Ground and test devices: GMSG

Description	**Catalog Number**
GMSG EOGTD 50kA Type A, electrically operated, upper cell, grounds run-backs, upper studs	MVSGACEGTD5AAR ①
GMSG EOGTD 50kA Type B electrically operated, lower cell, grounds run-backs, lower studs	MVSGA2EGTD5BBR ①
GMSG EOGTD 50kA Type C electrically operated, upper cell, grounds bus, lower studs	MVSGA2EGTD5CAB ①
GMSG EOGTD 50kA Type D electrically operated, lower cell, grounds bus, upper studs	MVSGACEGTD5DBB ①
GMSG EOGTD 50kA Type E, electrically operated, upper cell, grounds run-backs, upper studs	MVSGACEGTD5EAR ①
GMSG EOGTD 50KA Type E Top Run Backs	MVSGACEGTD5ERP
GMSG EOGTD 50kA Type F electrically operated, lower cell, grounds run-backs, lower studs	MVSGACEGTD5FBR ①
GMSG EOGTD 50KA Type F Bot Run Backs	MVSGACEGTD5FRP
GMSG EOGTD 63kA Type A, electrically operated, upper cell, grounds run-backs, upper studs	MVSGACEGTD6AAR ②
GMSG EOGTD 63kA Type B, electrically operated, lower cell, grounds run-backs, lower studs	MVSGACEGTD6BBR ②
GMSG EOGTD 63kA Type C, electrically operated, upper cell, grounds bus, lower studs	MVSGACEGTD6CAB ②
GMSG EOGTD 63kA Type D, electrically operated, lower cell, grounds bus, upper studs	MVSGACEGTD6DBB ②
GMSG EOGTD 63kA Type E, electrically operated, ground & test device, upper or lower cell, upper studs	MVSGACEGTD6EUS ②
GMSG EOGTD 63kA Type F, electrically operated, ground & test device, upper or lower cell, lower studs	MVSGACEGTD6FUS ②
GMSG MOGTD 50kA, manually operated (for use in upper or lower cell)	MVSGACMGTD5XUX
GMSG EOGTD 50 kA Type A, electrically operated, Con Ed	MVSGACEGTD5ACE
GMSG EOGTD 50 kA Type B, electrically operated, Con Ed	MVSGACEGTD5BCE
GMSG EOGTD 50 kA Type D, electrically operated, Con Ed	MVSGACEGTD5DCE

① For distribution circuit breaker cells to 50 kA and generator breaker cells to 40 kA.
② For distribution circuit breaker cells to 63 kA and generator breaker cells 50 kA or 63 kA.

Bus components: GMSG

Please contact Siemens Application Engineering support for further details on bus components.

Inter-unit bus supports: GMSG

Description	Catalog Number
Inter-Unit Bus Support 1200A 50 kA GlassPolyester	MVSGEQBS12POL5
Inter-Unit Bus Support 2000A 50 kA Glass Polyester	MVSGEQBS20POL5
Inter-Unit Bus Support 3000A 50 kA Glass Polyester	MVSGEQBS30POL5
Inter-Unit Bus Support 4000A 50 kA Glass Polyester	MVSGEQBS40POL5
Inter-Unit Bus Support 1200A 50kA MB4000	MVSGEQBS12MB45
Inter-Unit Bus Support 2000A 50kA MB4000	MVSGEQBS20MB45
Inter-Unit Bus Support 3000A 50kA MB4000	MVSGEQBS30MB45
Inter-Unit Bus Support 4000A 50kA MB4000	MVSGEQBS40MB45
Inter-Unit Bus Support 1200A 63kA Glass Polyester	MVSGEQBS12POL6
Inter-Unit Bus Support 2000A 63kA Glass Polyester	MVSGEQBS20POL6
Inter-Unit Bus Support 3000A 63kA Glass Polyester	MVSGEQBS30POL6
Inter-Unit Bus Support 1200/2000A 63kA High Track Resistant MB4000	MVSGEQBS12MB46
Inter-Unit Bus Support 3000A 63kA High Track Resistant MB4000	MVSGEQBS20MB46
Inter-Unit Bus Support 4000A 63kA High Track Resistant MB4000	MVSGEQBS30MB46
1200 A Bus Clamp - Short Insulator Assembly	MVSGEQBS12INAS
Inter-Unit Bus Support Insulator Bus Clamp (3.63") 50kA Porcelain	MVSGEQBSINPOR5

Boots: GMSG

Description	Catalog Number
GMSG Boot Plug Insert for 1200A Boot	MVSGEQBTINS12
GMSG Boot Plug Close	MVSGEQBTPLGCLS
Boot for Main Bus - 1200A	MVSGEQBTMAIN12
Boot for Primary Stab - 1200/2000A Bus Side-bar direction up	MVSGEQBTPSBU20
Boot for Primary Stab - 2000A Bus Side	MVSGEQBTPSB20
Boot for Primary Stab - 1200A/2000A Line Side-bar direction back	MVSGEQBTPSLB20
Boot for Primary Stab, 3000A	MVSGEQBTPSB30
Boot for Primary Stab, 3000A	MVSGEQBTPSB30A
Boot for Primary Stab, 3/4000A (GMX)	MVSGEQBTPSLB30
GMSG 3000A through Bus Boot	MVSGEQBTTB30
GMSG Boot Plug	MVSGEQBTPLUG
GMSG Boot Insert	MVSGEQBTINSERT
GMSG Boot Insert-Auxiliary	MVSGEQBTINSAU1
GMSG Boot Insert-Auxiliary	MVSGEQBTINSAU2
Boot for AUX BUSHING	MVSGEQBTAUXBSH
GMSG C Bus Boot	MVSGEQBTCBUS
GMSG C Bus Boot 4000A for 4 Bus Bars	MVSGEQBTCBUS40
Boot for Main Bus - 2000A Phase A & C	MVSGEQBTMBAC20
Boot for Main Bus - 2000A Phase B	MVSGEQBTMBB20
GMSG Bus Boot 4000A	MVSGEQBTBUS40
GMSG C Bus Boot 4000A for 3 Bus Bars	MVSGEQBTCBUS4X

Spare Parts: GM-SG

Description	Catalog Number
GM-SG Replacement Charging Motor 110-127VDC	MVSGSPCHMT125D
GM-SG Replacement Charging Motor 48VDC	MVSGSPCHMT48D
GM-SG Replacement Close Solenoid coil 48VDC	MVSGSPCLCOIL4D
GM-SG Replacement Close Solenoid coil 120VAC / 125VDC	MVSGSPCLCOILAD
GMSG Breaker Position Indicating Tape - Breaker	MVSGSPINDTAPEB
GMSG Contact Finger Assy, 1200A	MVSGSPPRDIFG12
GMSG Contact Finger Assy, 2000A	MVSGSPPRDIFG20
GMSG Contact Finger Assy, 3000A	MVSGSPPRDIFG30
GM-SG Replacement Trip Solenoid coil 125VDC/120VAC-3 cycle	MVSGSPTRCOI3AD
GM-SG Replacement Trip Solenoid coil 120VAC	MVSGSPTRCOILAC
GM-SG Replacement Trip Solenoid coil 125VDC	MVSGSPTRCOILDC
GM-SG Replacement Trip Solenoid 48VDC	MVSGSPTRSOL48D

Catalog number logic : MV OEM circuit breakers

M	V	2	7	B	R	D	D	3	1	2	2	7	A
A		B		C		D		E	F		G		H

A Category

MV MV OEM

B Product Family

SG GMSG

27 GM27

C Product Line

BR Breaker

D Product Type

GB Generator Breakers

DD Drawout Distribution Breakers

ST Stationary

DG Drawout Generator Rated Breakers

E Interrupt Rating

2	25 kA	**A**	250 MVA
3	31.5 kA	**B**	350 MVA
4	40 kA	**C**	500 MVA
5	50 kA	**D**	750 MVA
6	63 kA	**E**	1000 MVA
		F	1500 MVA

F Current Rating

12 1200 A

20 2000 A

31 3150 A

3F 3000 A Fan Cooled

30 3000 A

4F 4000 A Fan Cooled

G Voltage

05 5 kV

15 15 kV

27 27 kV

H Controls

A	125 VDC Motor, Close & Trip	**K**	125 VDC Motor, Close & Trip (3 cycle)
B	120 VAC Motor, Close & Capacitor Trip	**L**	120VAC Motor, Close, 125VDC Trip Coil1-3 cyc. 125VDC Trip Coil 2- 5 cyc.
C	125 VDC Motor, Close & Trip with Second Trip Coil	**M**	125 VDC Motor, Close & Trip with Second Trip Coil (1st coil is 3 cycle)
D	125 VDC Motor, Close & Trip with Undervoltage Trip Device	**N**	120VAC Motor, DC Close & Trip Coil 1-3 cyc. DC Trip Coil 2- 5 cyc.
E	120 VAC Motor & Close, 125 VDC Trip	**O**	120VAC Motor, Close, Trip Coil, 120VAC UVTD
F	125 VDC Close & Trip with Separate 125 VDC Motor	**P**	48VDC Motor, Close, Trip, w/ 2nd Trip Coil
G	120 VAC Motor, Close & Trip	**Q**	120VAC/125VDC Motor, DC Close & Trip Coil
H	64 PIN Connect, 125 VDC	**R**	120VAC/125VDC Motor, DC Close & Trip Coil, 2nd DC Trip Coil
I	120 VAC Motor, Close & Capacitor Trip with Undervoltage Trip	**S**	120 VAC Motor & Close, 125 VDC Trip w/ 2nd DC Trip Coil
J	48 VDC Motor, Close & Trip	**T**	48VDC Motor, DC Close & Trip 3 cycle

All parts are subject to availability. If a catalog number is not found that matches the desired application requirements, please contact your Siemens sales representative for more information about possible availability.

27 kV (GM27) Vacuum circuit breakers

Catalog Number	kV Rating	kA Rating	Continuous Current	Controls
MV27BRDD21227A	27 kV	25 kA	1200 A	125 VDC Motor, Close & Trip
MV27BRDD21227B	27 kV	25 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD21227D	27 kV	25 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD21227E	27 kV	25 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD21227J	27 kV	25 kA	1200 A	48 VDC, Motor, Close & Trip
MV27BRDD21227K	27 kV	25 kA	1200 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD22027A	27 kV	25 kA	2000 A	125 VDC Motor, Close & Trip
MV27BRDD22027B	27 kV	25 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD22027D	27 kV	25 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD22027E	27 kV	25 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD22027J	27 kV	25 kA	2000 A	48 VDC, Motor, Close & Trip
MV27BRDD22027K	27 kV	25 kA	2000 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD22527A	27 kV	25 kA	2500 A	125 VDC Motor, Close & Trip
MV27BRDD22527B	27 kV	25 kA	2500 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD22527D	27 kV	25 kA	2500 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD22527E	27 kV	25 kA	2500 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD22527J	27 kV	25 kA	2500 A	48 VDC, Motor, Close & Trip
MV27BRDD22527K	27 kV	25 kA	2500 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD23F27A ①	27 kV	25 kA	3000 A Fan Cooled	125 VDC Motor, Close & Trip
MV27BRDD23F27B ①	27 kV	25 kA	3000 A Fan Cooled	120 VAC Motor, Close & Capacitor Trip
MV27BRDD23F27D ①	27 kV	25 kA	3000 A Fan Cooled	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD23F27E ①	27 kV	25 kA	3000 A Fan Cooled	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD23F27J ①	27 kV	25 kA	3000 A Fan Cooled	48 VDC, Motor, Close & Trip
MV27BRDD23F27K ①	27 kV	25 kA	3000 A Fan Cooled	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD41227A	27 kV	40 kA	1200 A	125 VDC Motor, Close & Trip
MV27BRDD41227B	27 kV	40 kA	1200 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD21227D	27 kV	40 kA	1200 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD41227E	27 kV	40 kA	1200 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD41227J	27 kV	40 kA	1200 A	48 VDC, Motor, Close & Trip
MV27BRDD41227K	27 kV	40 kA	1200 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD42027A	27 kV	40 kA	2000 A	125 VDC Motor, Close & Trip
MV27BRDD42027B	27 kV	40 kA	2000 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD42027D	27 kV	40 kA	2000 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD22027E	27 kV	40 kA	2000 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD22027J	27 kV	40 kA	2000 A	48 VDC, Motor, Close & Trip
MV27BRDD42027K	27 kV	40 kA	2000 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD42527A	27 kV	40 kA	2500 A	125 VDC Motor, Close & Trip
MV27BRDD42527B	27 kV	40 kA	2500 A	120 VAC Motor, Close & Capacitor Trip
MV27BRDD42527D	27 kV	40 kA	2500 A	125 VDC Motor, Close & Trip with Undervoltage Trip Device
MV27BRDD42527E	27 kV	40 kA	2500 A	120 VAC Motor & Close, 125 VDC Trip
MV27BRDD42527J	27 kV	40 kA	2500 A	48 VDC, Motor, Close & Trip
MV27BRDD42527K	27 kV	40 kA	2500 A	125 VDC, Motor, Close & Trip (3 cycle)
MV27BRDD43F27A ②	27 kV	40 kA	3000 A Fan Cooled	125 VDC Motor, Close & Trip

① Use cell kit # MV27CKBB23F. Siemens GM27 2500 A draw-out breakers are capable of operation up to 3000 A provided the following conditions are met: Use with MV27GCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.

② Use cell kit # MV27CKBB43F. Siemens GM27 2500 A draw-out breakers are capable of operation up to 3000 A provided the following conditions are met: Use with MV27GCKBAXFFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.

Technical data: GM27

GM27 Vacuum circuit breaker ratings (new "constant kA" ratings basis)

Parameter				Units	Catalog Number ①	
					MV27BRDD2xx27	MV27BRDD4xx27
Rated values	Rated voltage	Maximum design voltage (V) ②		kV rms	27.0	27.0
		Voltage range factor (K) ③		----	1.0	1.0
	Insulation levels	Withstand voltage levels	Power frequency	kV rms	60	60
			Lightning impulse (BIL)	kV peak	125	125
	Rated current	Continuous ④		A rms	1,200, 2,000, 2,500, 3,000FC	1,200, 2,000, 2,500, 3,000FC
		Short circuit (at rated maximum design voltage) (I) ⑤⑥		kA rms sym	25	40
		Interrupting time		cycles/ms	5/83	5/83
		Permissible tripping delay (Y)		Sec	2	2
Related required capabilities	Current	Rated maximum design voltage (V) divided by K = (V/K)		kV rms	27.0	27.0
		Maximum symmetrical interrupting (K x I)		kA rms sym	25	40
		%dc component		%	47	47
		Short-time current (K x I) (3 seconds)		kA rms sym	25	40
	Closing and latching (momentary)	Asymmetrical (1.55 x I)		kA rms	39	65
		Peak (2.6 x I)		kA peak	62	104

① "xxxx" in catalog number refers to the continuous current rating 1,200, 2,000 or 3,000 A, as appropriate. The 3,000 A fan-cooled rating is achieved using fan cooling as indicated in Footnote 4.
② Maximum design voltage the circuit breaker is designed for and the upper limit for operation.
③ K is listed for informational purposes only. For circuit breakers rated on a "constant kA basis," the voltage range factor is 1.0.
④ Siemens GM27 2500A Drawout breakers are capable of operation up to 3000A provided the following conditions are met: Use with MV27GCKBAXFAN fan kit in upper cell.
Partner company must perform type testing certified to ANSI standards with their switchgear to 3000A load
⑤ All values apply to polyphase and line-to-line faults.
⑥ Standard duty cycle is O - 0.3s - CO - 3 min. - CO.

These ratings are in accordance with:

- ANSI/IEEE C37.04-1999 Standard Rating Structure for AC High-Voltage Circuit Breakers
- ANSI/IEEE C37.06-2009 AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis - Preferred Ratings and Related Required Capabilities
- ANSI/IEEE C37.09-1999 Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
- ANSI/IEEE C37.010-1999 Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

Technical data: GM27

Circuit breaker control data

Control voltages, IEEE Std C37.04-2018			Close coil	Trip coil	Spring charging motor	
	Range					Charging
Nominal	Close	Trip	A ①	A ①③	Run (Average) ①	Seconds
24 Vdc	19-28	14-28	15.0	15/--- ①	--- ①	--- ①
48 Vdc	36-56	28-56	11.4	11.4/30	8	10
125 Vdc	100-140	70-140	2.1	4.8/7.4	4	10
250 Vdc	200-280	140-280	2.1	4.2/9.6	2	10
120 Vac	104-127	104-127	2.0	---②	6	10
240 Vac	208-254	208-254	2.0	---②	3	10

① Current at nominal voltage.
② Capacitor trip,
③ Value preceding slash (/) is the current for the standard trip coil with standard rating interrupting time. Value following (/) is current for optional trip coil with three-cycle interrupting time.
④ --- means this selection is not available.

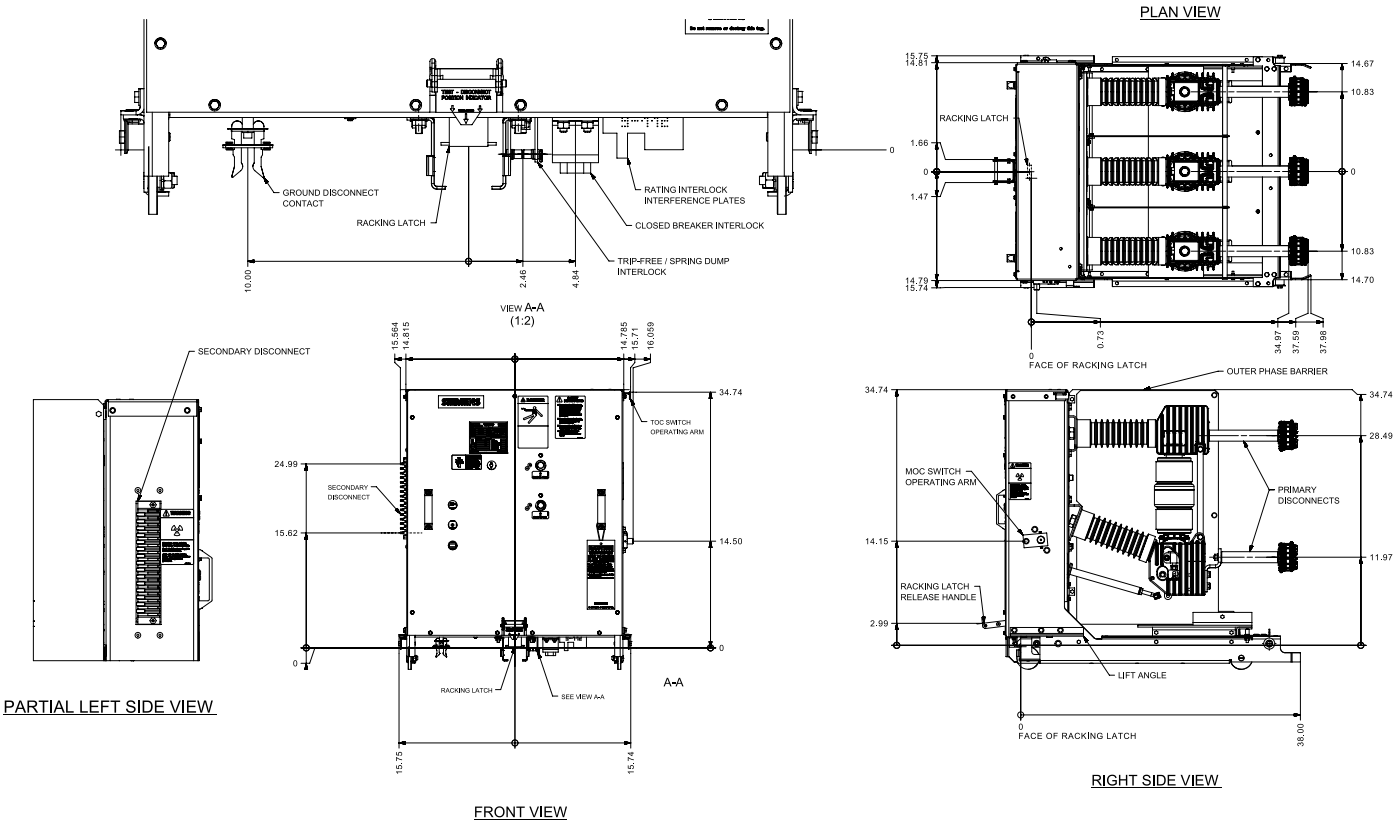
Secondary trip data

Interrupting capacity auxiliary switch contacts ①

Type switch	Continuous current (A)	120 Vac	240 Vac	48 Vdc	125 Vdc	250 Vdc
Circuit breaker	10	10	5	10/30 ②	5	3
TOC	15	15	10	0.5	0.5	0.5
MOC	20	15	10	10	10	5

① All switch contacts are non-convertible.
② Two contacts in series.

Dimensions: GM27



GM27 Vacuum circuit breaker weight in lbs (kg)①②③

ContinuousCurrent	Catalog Number	
A	MV27BRDD2xx27	MV27BRDD4xx27
1,200	628 (285)	635 (288)
2,000	708 (321)	714 (324)
2,500 / 3,000	723 (328)	730 (331)

① Weight estimates are for circuit breaker only. Add 125 lbs (57 kg) for packaging.
② Weight and dimensions are approximate.
③ Approximate circuit breaker dimensions in inches (mm)
(W x D x H): Net 42" (1,067 mm) x 48" (1,219 mm) x 55" (1,397 mm)

Circuit breaker cell kits: GM27

Cell kits: GM27

Description	Catalog Number
1200A Circuit Breaker Cell Kit, B Cell, 25kA	MV27CKBB212
2000A Circuit Breaker Cell Kit, B Cell, 25kA	MV27CKBB220
2500A Circuit Breaker Cell Kit, B Cell, 25kA	MV27CKBB225
3000A Circuit Breaker Cell Kit, B Cell, 25kA①	MV27CKBB23F
1200A Circuit Breaker Cell Kit, B Cell, 40kA	MV27CKBB412
2000A Circuit Breaker Cell Kit, B Cell, 40kA	MV27CKBB420
2500A Circuit Breaker Cell Kit, B Cell, 40kA	MV27CKBB425
3000A Circuit Breaker Cell Kit, B Cell, 40kA①	MV27CKBB43F
1200A Circuit Breaker Cell Kit, A Cell, 25kA	MV27CKBA212
2000A Circuit Breaker Cell Kit, A Cell, 25kA	MV27CKBA220
2500A Circuit Breaker Cell Kit, A Cell, 25kA	MV27CKBA225
1200A Circuit Breaker Cell Kit, A Cell, 40kA	MV27CKBA412
2000A Circuit Breaker Cell Kit, A Cell, 40kA	MV27CKBA420
2500A Circuit Breaker Cell Kit, A Cell, 40kA	MV27CKBA425

① Siemens GM27 2500A Drawout breakers are capable of operation up to 3000A provided the following conditions are met: Use with MV27GCKBAXFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.

Circuit breaker cell kit includes:

- Racking mechanism
- Shutter barrier
- Secondary disconnect
- Primary bushings
- Rear and bottom pan
- Fixed-contact pad.

Circuit breaker cell kit excludes:

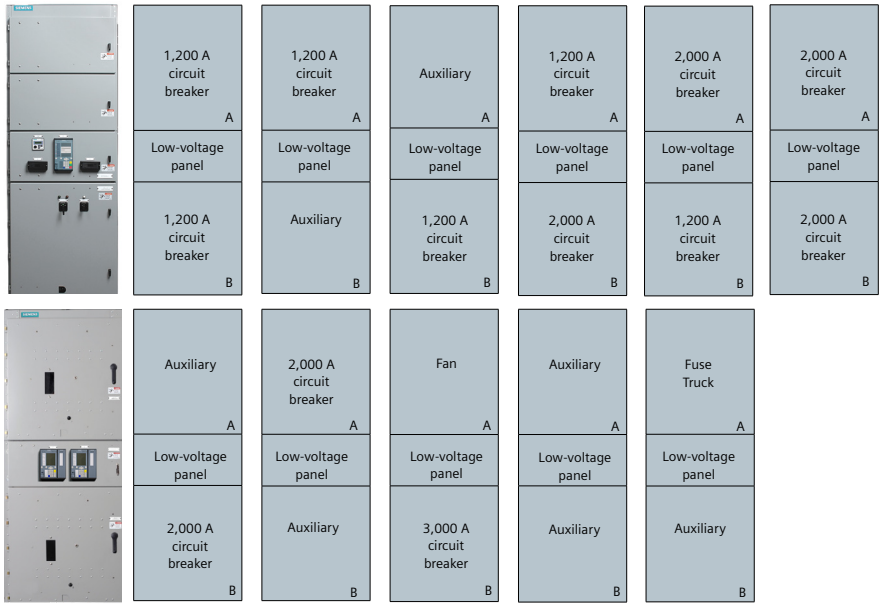
- Drawout type GM27 circuit breaker (must be selected separately).

Skeletons: GM27

Skeletons: GM27

Description	Catalog Number
GM27 Skeleton Blank top/Blank bottom 40kA	MV27SKBL00BL00
GM27 Skeleton Blank top/1200A bottom 40kA	MVSK27BL001200
GM27 Skeleton Blank top/2000A bottom 40kA	MV27SKBL002000
GM27 Skeleton Blank top/2500A bottom 40kA	MV27SKBL002500
GM27 Skeleton Blank top/3000A bottom 40kA ①	MV27SKBL003000
GM27 Skeleton 1200A top/1200A bottom 40kA	MV27SK12001200
GM27 Skeleton 2000A top/2000A bottom 40kA	MV27SK20002000
GM27 Skeleton 1200A top/2000A bottom 40kA	MV27SK12002000
GM27 Skeleton 2000A top/1200A bottom 40kA	MV27SK20001200
GM27 Skeleton VT Upper Load Aux top/1200A bottom 40kA	MV27SKVTUL1200
GM27 Skeleton VT Upper Bus Aux top/1200A bottom 40kA	MV27SKVTUB1200
GM27 Skeleton VT Upper Load Aux top/2000A bottom 40kA	MV27SKVTUL2000
GM27 Skeleton VT Upper Bus Aux top/2000A bottom 40kA	MV27SKVTUB2000
GM27 Skeleton FT A,B, & C Aux top/1200A bottom 40kA	MV27SKFT1200
GM27 Skeleton FT A & C Aux top/1200A bottom 40kA	MV27SKFTAC1200
GM27 Skeleton FT A,B, & C Aux top/2000A bottom 40kA	MV27SKFT2000
GM27 Skeleton FT A & C Aux top/2000A bottom 40kA	MV27SKFTAC2000
GM27 Skeleton 1200A top/VT Lower Load Aux bottom 40kA	MV27SK1200VTLL
GM27 Skeleton 1200A top/VT Lower Bus Aux bottom 40kA	MV27SK1200VTLB
GM27 Skeleton 2000A top/VT Lower Load Aux bottom 40kA	MV27SK2000VTLL
GM27 Skeleton 2000A top/VT Lower Bus Aux bottom 40kA	MV27SK2000VTLB
GM27 Skeleton 1200A top/FT A, B, & C Aux bottom 40kA	MV27SK1200FT
GM27 Skeleton 1200A top/FT A & C Aux bottom 40kA	MV27SK1200FTAC
GM27 Skeleton 2000A top/FT A, B, & C Aux bottom 40kA	MV27SK2000FT
GM27 Skeleton 2000A top/FT A & C Aux bottom 40kA	MV27SK2000FTAC

① For fan-cooled, 3000A rating circuit breaker may be located in lower (B) cell with fan coiling in cell (A).



GM-SG 27 kV non-arc-resistant (up to 40 kA) ①-⑦

① Main bus sizes 1,200 A, 2,000 A, 3,000 A (self-cooled).
② No rollout auxiliaries in upper cell (A) if lower cell (B) has 2,500 A circuit breaker.
③ Auxiliary cells (A or B) may each contain one rollout (except as indicated in Footnotes 2 and 7).
④ Fuse rollout for stationary CPT must be in lower rollout cell B, if CPT is in rear or is remote.
⑤ Fuse rollout may be included in upper cell if stationary CPT is in front lower compartment.
⑥ Stacking arrangements are available as shown for type GM-SG equipment rated 27kV. Total circuit breaker loading in a vertical unit may not exceed main bus rating.
⑦ For fan-cooled 3,000 A rating, circuit breaker is in lower cell (B) with fan cooling in cell A.

Auxiliary rollout tray cell kits and trays: GM27

Voltage transformers (VTs)

Up to three single-fused VTs with their integrally mounted current-limiting fuses may be mounted pm each rollout tray. The upper and lower cells can each accommodate up to two rollout trays. When moving to the DISCONNECT position, the primary fuses are automatically disconnected and grounded to remove any static charge from the windings. The secondary connections are also disconnected when the rollout tray is moved to the DISCONNECT position. When the rollout tray is withdrawn, insulated shutters cover the primary disconnects helping to protect personnel from exposure to energized components.

Rollout trays without transformers or fuses: GM27

Description	Catalog Number
27kV 2VT Upper Load Rollout Tray	MV27CKRUL2PT
27kV 3VT Upper Load Rollout Tray	MV27CKRUL3PT
27kV 2VT Upper Bus Connected Rollout Tray	MV27CKRUB2PT
27kV 3VT Upper Bus Connected Rollout Tray	MV27CKRUB3PT
27kV 2VT Lower Load Rollout Tray	MV27CKRLL2PT
27kV 3VT Lower Load Rollout Tray	MV27CKRLL3PT
27kV 2VT Lower Bus Connected Rollout Tray	MV27CKRLB2PT
27kV 3VT Lower Bus Connected Rollout Tray	MV27CKRLB3PT
27kV Fuse Truck Upper - A & C terminals	MV27CKRUFTAC
27kV Fuse Truck Upper - A, B, & C terminals	MV27CKRUFTABC
27kV Fuse Truck Lower - A & C terminals	MV27CKRLFTAC
27kV Fuse Truck Lower - A, B, & C terminals	MV27CKRLFTABC

MOCs and TOCs: GM27



MOCs (12 stages shown) and TOCs (8 stages shown)

Mechanism-operated cell (MOC) switch
A mechanism-operated cell (MOC) auxiliary switch can be mounted in the circuit breaker cell. This switch is operated by the circuit breaker mechanism, so that the switch contacts change state whenever the circuit breaker is closed or tripped. All spare MOCs are wired to accessible terminal bocks for user connections.

Siemens supplies the TEST and CONNECT MOC actuator as standard. Please consult with Siemens for different options.

Truck-operated cell (TOC) switch
A truck-operated cell (TOC) switch can be mounted in the circuit breaker cell. The TOC switch contacts change state when the circuit breaker moves into or out of the CONNECTED position. All spare TOC contacts are wired to accessible terminal blocks for user connections.

MOCs and TOCs: GM27

Description	Catalog Number
12-stage MOC(6a,6b)/8-stage TOC(4a,4b) test & connect position	MV27ACMT128X
24-stage MOC(12a,12b)/12-stage TOC(6a,6b) test & connect position	MV27ACMT2412

Note: Listed catalog numbers are the standard Siemens MV Components offering. For other options, contact Siemens.

Accessories: GM27

Accessories

Description	Catalog Number
GMSG AND GM27 Manual Racking Crank	MVXXACRDHANDLE
GMSG AND GM27 Manual Spring Charge Handle	MVXXACCHMANCHL
Siemens Contact Lubricant	MVXXACLPCONLUB
Split Plug Jumper	MVXXACSPPLGJU
Accessories Storage Cabinet	MV27ACACCYCAB
Circuit Breaker Test Cabinet for AC Trip, AC Close and AC Charge Motor	MV27ACBRTESTAC
Circuit Breaker Test Cabinet for AC Trip, DC Close and DC Charge Motor	MV27ACBRTESTDC
Accessory Bundle (includes extension rail x2, racking crank assembly, split plug jumper	MV27ACACCBUNDL
Drawout Extension Rail (contains quantity 2)	MV27ACDREXRL
Fifth Wheel Assembly	MV27ACLA5WHEEL
Lift Sling	MV27ACLASLING
Circuit Breaker Lift Truck	MV27ACLATRUCK
GMSG Door Hinge	MV27EQHINGE

Ground and test devices: GM27



Electrically operated ground and test device

GTDs: GM27 Electronically Operated

Description	Catalog Number
Ground & Test Device - Electrically Operated upper stabs	MV27ACEGTD5EAR
Ground & Test Device - Electrically Operated lower stabs	MV27ACEGTD5FBR

Electrically operated ground and test device

An electrically operated ground and test device includes a power operated switch (derived from a type 27-3AH3 circuit breaker) arranged to allow grounding one set of disconnect stabs. Two devices, one each for the upper and lower stabs, are required if grounding is desired to either side of the unit. The device includes test ports to allow for testing for presence of voltage on both the line side and the load side of the cell. The device also provides a means of access to the primary circuits for high-potential tests or for phase-sequence checking. These devices are able to close and latch against short-circuit currents corresponding to the ratings of the equipment. Due to the unique requirements frequently involved in such devices, all applications of electrically operated ground and test devices should be referred to Siemens for review.

Note: Each user must develop definitive operating procedures for incorporating safe operating practices. Only qualified personnel should be allowed to use ground and test devices.

Bus components: GM27

Please contact Siemens Application Engineering support for further details on bus components.

Inter-unit bus supports: GM27

Bus Components	Catalog Number
Inter-unit bus support 1200A	MV27ACIUBS1200
Inter-unit bus support 2000A	MV27ACIUBS2000
Inter-unit bus support 3000A	MV27ACIUBS3000
1200A bus clamp	MV27EBS12INS
2000A bus clamp	MV27EBS20INS
3000A bus clamp	MV27EBS30INS

Boots: GM27

Description	Catalog Number
Boot for AUX Bushing	MV27EQBAUXBUSH
Main Bus Boot Insert 1200A	MV27EQBINS1200
Main Bus Boot Insert 2000A	MV27EQBINS2000
GM-SG Boot Insert-Auxiliary PH-A	MV27EQBINSAUXA
GM-SG Boot Insert-Auxiliary PH-B	MV27EQBINSAUXB
GM-SG Boot Insert-Auxiliary PH-C	MV27EQBINSAUXC
Boot Riser Primary 1200A	MV27EQBLINE1200
Boot Riser Primary 2000A	MV27EQBLINE2000
Boot Riser Primary 3000A	MV27EQBLINE3000
Boot Load 1200A	MV27EQBLOAD12
Boot Load 2000A	MV27EQBLOAD20
Boot Load 3000A	MV27EQBLOAD30
Boot for Main Bus 1200A	MV27EQBMAIN12
Boot for Main Bus 2000A	MV27EQBMAIN20
Boot for Main Bus 3000A	MV27EQBMAIN30
Boot Plug Solid	MV27EQBPLUG

Coding plates

Description	Catalog Number
Coding Plate, 27kV, 25kA, 1200A	MV27ACPC2512
Coding Plate, 27kV, 25kA, 2000A	MV27ACPC2520
Coding Plate, 27kV, 25kA, 2500A	MV27ACPC2525
Coding Plate, 27kV, 25kA, 3000A	MV27ACPC2530
Coding Plate, 27kV, 40kA, 1200A	MV27ACPC4012
Coding Plate, 27kV, 40kA, 2000A	MV27ACPC4020
Coding Plate, 27kV, 40kA, 2500A	MV27ACPC4025
Coding Plate, 27kV, 40kA, 3000A	MV27ACPC4030

SIPROTEC 5:

The Siemens SIPROTEC 5 platform modernizes your substations with more secure protection and compact technology, designed to reduce human performance errors, add superior safety, and reduce the cost of operation.

When you choose SIPROTEC with your OEM equipment, your benefits are significant.

- **Maintain Less Devices That Do More and Save Space.**
  SIPROTEC Dual-Core CPU and a modern design allows custom Function Groups to serve custom analog inputs, for simpler and more secure designs than ever before.
  Examples:
  - Protect up to 9 feeders or motors, with only one device, or get total redundancy with two.
  - Small or large busbars with up to 25 bays, require only one device. Saving lots of wiring, needing only half a panel, instead of three or four panels, for 3 or more wired relays.
  - Protect two parallel transformers with a single relay, or provide redundancy to protect a line as well, all with one transformer protection device.
- **Faster Protection Improves Performance.**
  USA Customer multi-vendor tests, reproducing real transformer and busbar faults demonstrated superior SIPROTEC tripping speeds.
- **Safer Technology Saves Lives.**
  - SIPROTEC Arc Flash Mitigation is superior, using both current and light to determine when there is an internal fault to save lives.
  - SIPROTEC connections are designed with no exposed metals on wire connections, and no open CTs are possible.
  - CTs automatically short when disconnected.
- **Self-Shorting Smart Secondary CTs.**
  All secondary CTs and PTs can be removed from the relay without rewiring, or recalibrating, for testing or device changes.
- **Field Upgradable & Scalable.**
  Do not return devices to the factory, to change or expand the relay hardware or functions. Simply do it yourself with easy plug modules, and use your DIGSI software to complete the update.
- **Larger MIMIC.**
  Programmable displays can represent entire substation, or specific bays, optimize field awareness and minimize human errors.

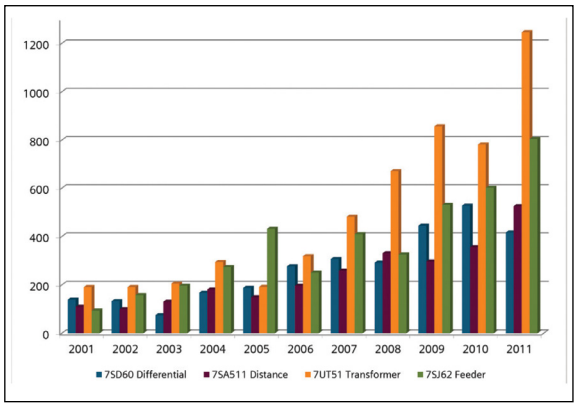


- **Fault Recording Included.**
  All protection devices record faults sampling at 8kHz and provide SCADA access via IEC 61850 MMS or FTP. Our dedicated fault recorder samples up to 16 KHz with 16 GB of memory.
- **Reduce Human Errors with Graphical DIGSI Software.**
  - DIGSI configures protection and communications, tests logic, communications, and protection functions with your custom test sequences, and lets you analyze complex fault records.
  - Test your design even before injecting currents.
  - A self-discovery feature even sniffs the station relays to retrieve the project from scratch, with proper cyber security.
- **Committed Local Support.**
  We offer 24/7 hotline with our own expert USA application engineers, and a team of local technical consultants.

SIPROTEC 5:

Faster Protection. Less Devices. Lower Cost of Operation.

- **Forget Hardware Miss Operations.**
  Redundant A/D converters guarantee the device detects if its own A/D converter fails, to avoid operating on bad digital data.
- **Most Stable Firmware.**
  SIPROTEC relays reduce total ownership cost and engineering for firmware upgrades – only one critical upgrade has been required in 12 years.
- **Higher Measured Reliability.**
  SIPROTEC relays average a 600-year mean time between failures (MTBF), meaning for every 600 relays, you can expect one or fewer failures per year. This measurement is the result of over 1.2 million relays installed worldwide, including "initial" failures.



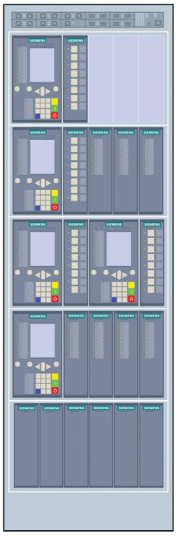
- **Cyber Security.**
  Siemens helps you navigate regulatory requirements and implement cyber security for the future. The platform is designed with:
  - Factory FW keys avoid unauthorized downloads
  - Complex passwords, with role administration
  - Cyber secure log records in non-volatile memory
  - Secure remote engineering access with DIGSI
  - IPSec for communication to Control Center
  - Monthly security updates

Optional System Integration

- **Integration to SCADA.**
  Protocols for connection to higher level systems are available for commissioning or future connectivity (Modbus, IEC 61850, DNP 3.0, etc).
- **SEL/GE Legacy Device Integration.**
  Siemens integrates protection and automation technology with current and legacy SEL/GE equipment in dozens of local USA projects per year, using SICAM technologies.
- **Fiber to all Circuit Breakers.**
  Eliminate re-wiring or re-trenching of copper wires, and install fiber from the panel to each breaker, with IEC 61850 process bus, also known as "yard digitalization."
- **Renewable Connections.**
  SIPROTEC relays are capable of dynamically change its settings when load and source change in your grid.

Centralized Protection and Remote Terminal Unit

The Siemens (P)RTU panel is the simplest way to modernize a station with SIPROTEC.



- **Savings On Installation Costs.**
  Eliminate the extensive engineering. Simply plug, test and play.
- **Functional Testing Included.**
  Save the cost of testing functions with a repeatable panel.
- **Pre-Tested From IO To SCADA.**
  Eliminate surprises knowing it is pre-configured and pre-tested.
- **Higher Input Density Serves Protection and RTUs.**
  Hundreds of binary inputs, transducer inputs, up to 20 3-ph analog inputs per protection device and the fault recorder.



Contact: support.siprotec.us@siemens.com
24/7 Technical Hotline: 1-877-217-4943

Digital Grid, Energy Management
7000 Siemens Drive
Wendell, NC 27591
USA

Siemens Protective Relays and Automation

Why Siemens?

Siemens has been in business for almost **175 years**. As a pioneer in all areas of power automation and protection, we prioritize and strive for:

- Resilience - resilient and most secure power grids
- Efficiency - fast and consistent engineering
- Sustainability - technology to achieve climate goals and create a sustainable company

Siemens starts everything with **YOU** at its core, whether that's ensuring **your** assets are protected with industry leading **cyber security, personnel safety** with optical arc flash systems, **CAPEX/OPEX** optimization, or simple to use software systems.

Siemens is, and always will be, here to support you.

SIPROTEC 5 Protection Relays



Siemens is the global leader for protection and automation. With over 2.5 million of the latest generation of protection relays installed, the world runs on Siemens.

- **MTBF > 400 years**
- **Cyber security** – multi-layered and integrated
- Protect up to **9 breakers** with 1 relay
- **Modular** hardware
- **Scalable** redundancy
- **Multiple** communication channels
- SIPROTEC DigitalTwin for **virtually testing** in the cloud

SIPROTEC 7SX85

Universal Protection Relay



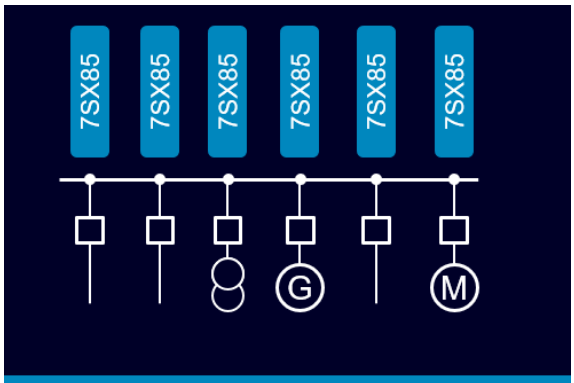
One device type covers all protection, control and automation tasks across all voltage levels.

The SIPROTEC 7SX85 elegantly supports the versatile operating processes in the power supply chain, whether in utilities, industry or infrastructure.

With the new SIPROTEC 7SX85 universal protection device, you leverage the full power of the complete SIPROTEC 5 system platform.

Functions from one and three-pole tripping devices covered by the SIPROTEC 7SX85:

- Distance protection **(7SA86 / 7SA87)**
- Feeder and capacitor bank protection **(7SJ85 / 7SJ86)**
- Transformer protection **(7UT85 / 7UT86 / 7UT87)**
- Line differential protection **(7SD86 / 7SD87)**
- Motor protection **(7SK85)**
- Machine protection **(7UM85)**
- Paralleling device **(7VE85)**
- Line differential and distance protection **(7SL86 / 7SL87)**
- Bay controller **(6MD85 / 6MD86)**
- Merging Unit **(6MU85)**
- Circuit breaker management **(7VK87)**



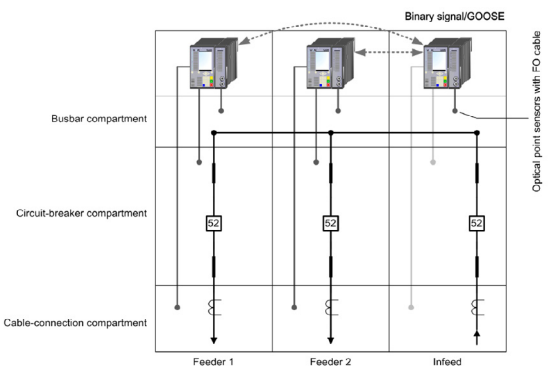
Benefits

- Device **variety** can be significantly **reduced**
- **Reduced** number of spare **parts**
- Minimum devices on stock – **reduces capital** employed
- Design and configuration **flexibility**

Arc Flash Protection

At the core of any protection relay system is safety. This includes both equipment and personnel. Siemens Siprotec 5 offers a host of methods and technologies to improve safety above and beyond the competition.

This starts with arc flash incident energy mitigation strategies. The Siprotec 5 protection relay can have up to 15 optical arc flash sensors and can detect an arc flash, confirm it with overcurrent, and send the trip signal in less than 2ms.



Another great way of reducing arc flash incident energy is through the use of a virtual main. A virtual main allows you to eliminate a LV main breaker while improving the protection and arc flash incident energy. By using a Siemens Siprotec 5 relay on the secondary side of the transformer we can trip the upstream MV breaker far faster than it will take for the transformer fuse to blow. This allows us to use a much shorter arc duration time in out arc flash incident energy calculations drastically reducing the arc flash rating.

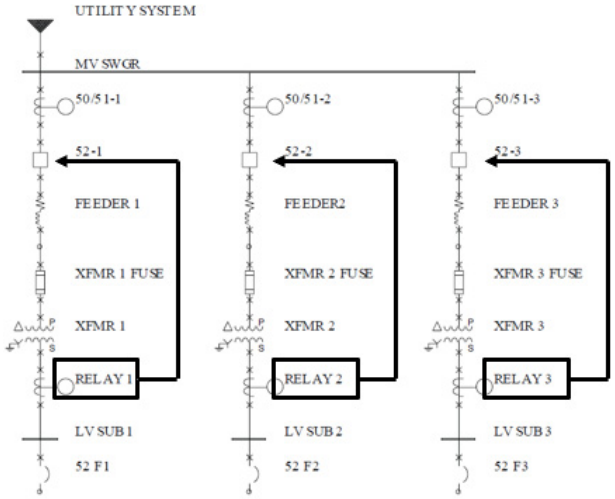


Table 1: Arc Flash Hazard Analysis Results, No Virtual Main Relays

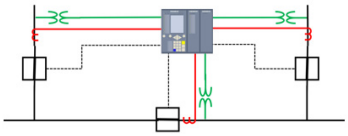
Location	Arcing Fault Current, kA	Arc Duration, seconds	Arc Flash Incident Energy, Cal/cm²	Hazard Level, NFPA 70E Category
LV SUB 1	8.68	2	36	4
LV SUB 2	14.25	2	62	>4
LV SUB 3	19.77	2	88	>4

Table 5: Arc Flash Hazard Analysis with Virtual Main Relays

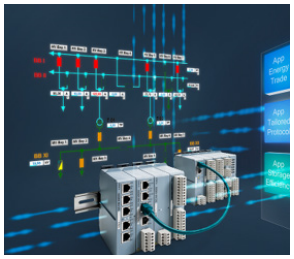
Location	Arcing Fault Current, kA	Arc Duration, seconds	Arc Flash Incident Energy, Cal/cm²	Hazard Level, NFPA 70E Category
LV SUB 1	8.68	0.183	3.3	1
LV SUB 2	14.25	0.183	5.7	2
LV SUB 3	19.77	0.183	8.1	3

Centralized Protection

Most of us in the industry have seen, or even worked on electromechanical protection relays. These single function, single phase protection devices served their purpose and served it well. These have, for the most part, been replaced with digital relays. Digital relays provide for multi-function multi-phase protection in one relay all while providing a smaller form factor. Siemens Siprotec 5 relays have taken this a step further and can provide multi-function, multi-phase, and multi-breaker protection. A great application example is a main-tie-main automatic transfer scheme. With the Siemens Siprotec 5 protection relay all of the breaker protection and the automatic transfer can occur in a single device. This reduces the overall device count in your gear, reduces wiring, reduces complexity, and saves you money all with the same protection.



SICAM 8 Automation



SICAM 8 provides a universal, hardware and software based, all-in-one platform which combines cyber security, protocol conversion, automation, and data concentration into a comprehensive scalable package.

- Single, **secure connection** point for all downstream and upstream devices
- **PLC logic** for automation
- High performance
- Modular architecture
- Unified hardware and software platform
- Power Management Applications such as Load Shedding, Automatic Transfer Schemes, Generator Paralleling, Dynamic Load Balancing, Microgrid Control … and more!

System Visualization and HMI



Siemens offers an HMI solution tailored for your needs and requirements while bridging the gap between human operators and complex substation processes. With its user-centric design and advanced functionalities, the HMI Substation Automation System marks a transformative shift towards streamlined operations and optimized performance.

- Operator **control** and **monitoring**
- **Reporting**, acknowledging, and archiving of events
- **Collecting**, consolidating and archiving measured values
- **Logging** and **documenting** of process and configuration data
- **Redundant** and **Reliable**
- User administration
- Universally **scalable** and **expandable**

SICAM Power Quality Metering



Siemens offers a comprehensive power quality solution to increase power availability, reliability, and quality by enabling continuous measurement and analysis.

- **Compliance** with international power quality **standards**
- **Embedded** and **Centralized** visualization and evaluation tools
- Class A **Accuracy**
- Improved **Energy efficiency** / CO_2 reduction
- Standard and protocol **interoperability**

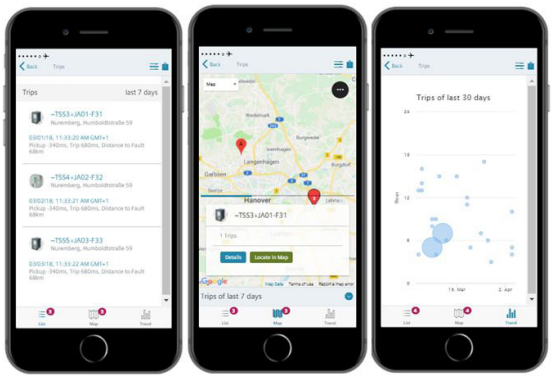
Embedded Cyber Security



Cybersecurity is a highly sensitive area that demands a trustworthy partner. A technology partner who understands how products, systems, and solutions integrate with the processes and people behind them and how people interact with them.

- **Cybersecurity** in the **system** architecture and in the **products**
- **IEC62443** Certifications
- **Secure** development process and system **engineering**
- **Secure communication** and security controls
- Cybersecurity in the **supply chain**
- Siemens **ProductCERT**

Siprotec Dashboard



The SIPROTEC Dashboard simplifies this process. It enables service engineers to get insights immediately on their mobile devices - for a smarter way of working!

- Increased **asset transparency**
- Optimized **planning** of **maintenance** activities
- **Map view** to show the fault location and device alarm / status in the field
- Device **Logs** and **fault record** visualization
- Protection **settings monitoring**
- Optimized for mobile use on **smartphones** and **tablets**
- Breaker operation **condition** and **performance monitoring**

Siemens Support

We offer field-proven protection systems, world-class support and tools catering to you, our partner.

We have 24/7 support and stand ready to support you on your schedule.

Technical Support – 24/7: 877-217-4943

Email: *support.siprotec.us@siemens.com*

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Legal Manufacturer

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Order No. SIEA-T40013-01-4AUS
10/2025

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