

SIEMENS



Selection and Application Guide

Medium Voltage OEM Components and Skeletons

Version 1



MV OEM components and skeletons

This catalog presents Siemens GMSG and GM38 medium-voltage offering of OEM skeletons and OEM components for partners ANSI/IEEE switchgear to building standards.

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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 38-3AH3 (commonly referred to as GM38) circuit breakers are available in 31.5 kA and 40 kA interrupting classes, or 1,500 MVA on the older "constant MVA" rating basis. Continuous current ratings include 1,200 A and 2,000 A self-cooled and 3,000 A forced air cooled. 3,000 A is available using a 2,000 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 GM38 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:

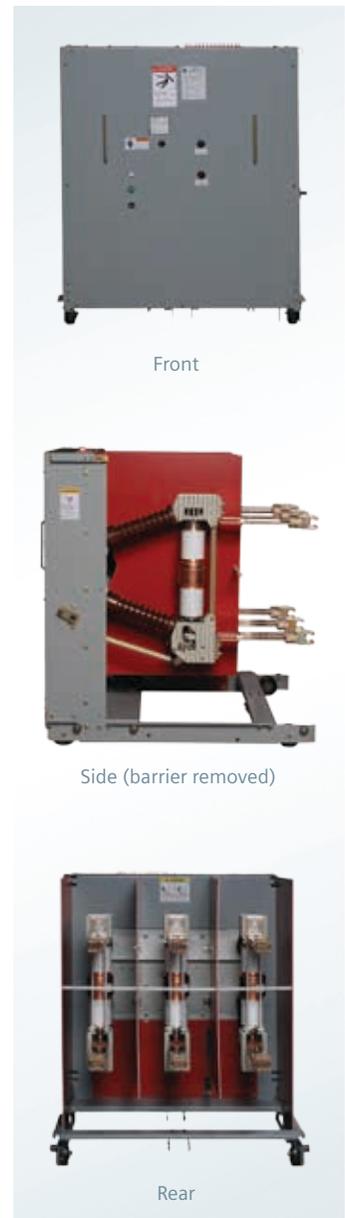
- Low maintenance vacuum interrupter
- Ten-year maintenance interval (assuming ANSI "usual service" conditions)
- Floor rollout depending on partner design
- Front-mounted operator
- Common operator family
- Simple outer-phase barriers
- "Universal" spare circuit breaker concept
- Non-sliding current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

Ten-year maintenance interval on GMSG and GM38 circuit breakers

When applied under normal ANSI operating conditions (ANSI "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.



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
- GM38 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 (GM38) 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

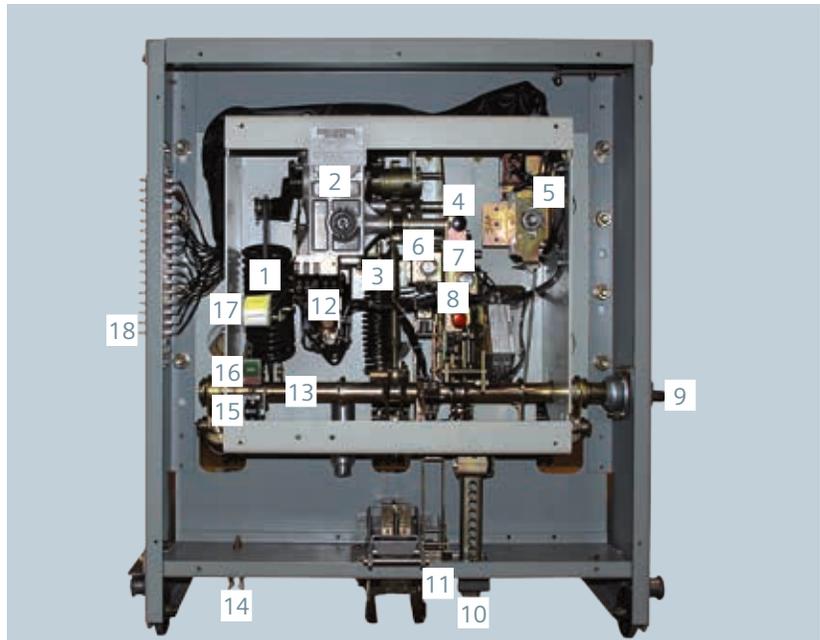
can be visibly observed, if desired, allowing positive verification of secondary integrity. This feature is not possible with designs employing a disconnect underneath or behind the circuit breaker.

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



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

Type GMSG circuit breaker key components

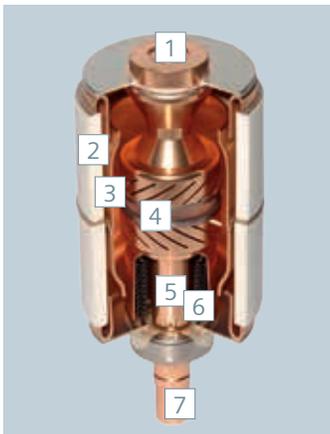
Vacuum circuit breakers

Front view of GM38 vacuum circuit breaker with front panel removed

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



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 GM38 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 GM38 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 GM38 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.

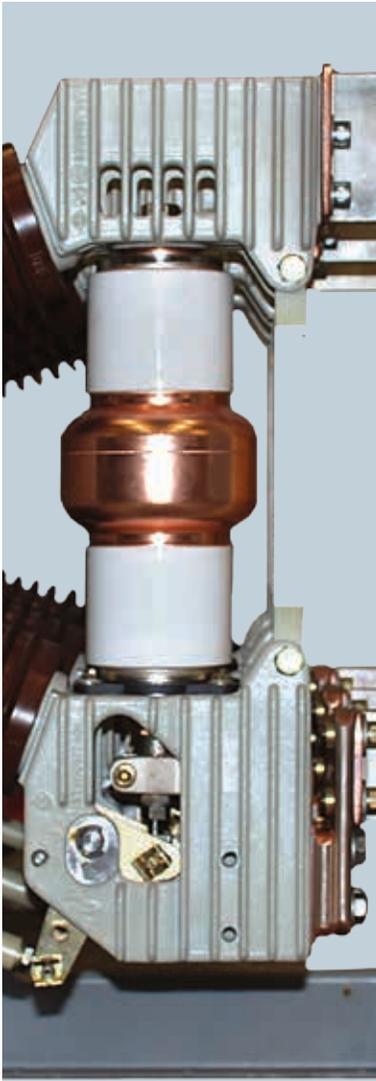
Lower force requirements

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 interrupter 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.

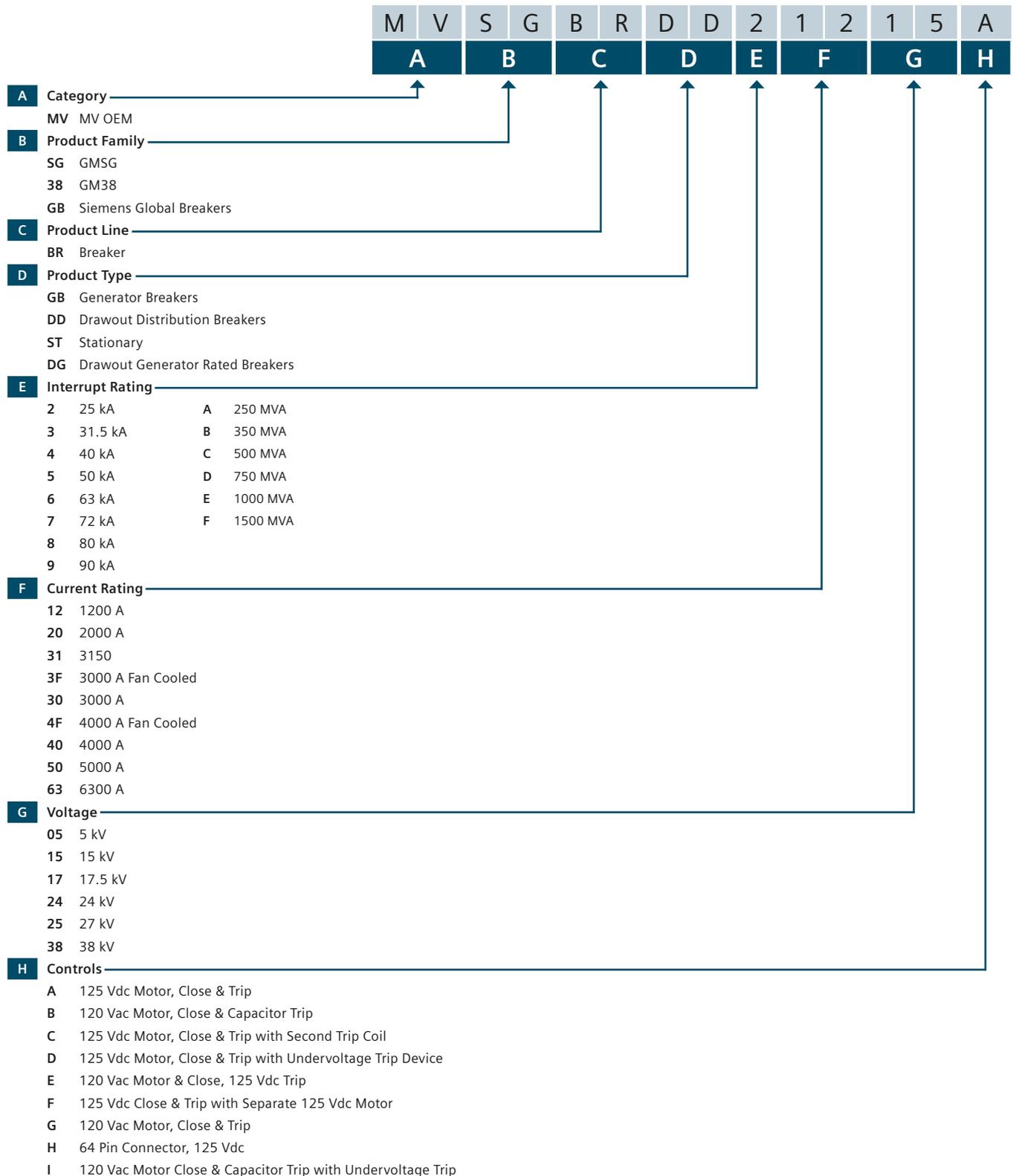
The arc drawn in the vacuum interrupter is not cooled. The metal vapor plasma is highly conductive and the resulting arc voltage is only 20 to 200 volts. This low arc voltage, combined with very short arcing times, produces only a very small arc energy in the vacuum interrupter, accounting for the long 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 GM38 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



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
MVSGBRDDA1205A ①	5 kV	250 MVA	1200 A	125 Vdc Motor, Close & Trip
MVSGBRDDA1205B ①	5 kV	250 MVA	1200 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDA1205C ①	5 kV	250 MVA	1200 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDA1205D ①	5 kV	250 MVA	1200 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDA1205E ①	5 kV	250 MVA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDA1205F ①	5 kV	250 MVA	1200 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDA1205G ①	5 kV	250 MVA	1200 A	120 Vac Motor, Close & Trip
MVSGBRDDA1205I ①	5 kV	250 MVA	1200 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDA2005A ①	5 kV	250 MVA	2000 A	125 Vdc Motor, Close & Trip
MVSGBRDDA2005B ①	5 kV	250 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDA2005C ①	5 kV	250 MVA	2000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDA2005D ①	5 kV	250 MVA	2000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDA2005E ①	5 kV	250 MVA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDA2005F ①	5 kV	250 MVA	2000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDA2005G ①	5 kV	250 MVA	2000 A	120 Vac Motor, Close & Trip
MVSGBRDDA2005I ①	5 kV	250 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDA3005A ①	5 kV	250 MVA	3000 A	125 Vdc Motor, Close & Trip
MVSGBRDDA3005B ①	5 kV	250 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDA3005C ①	5 kV	250 MVA	3000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDA3005D ①	5 kV	250 MVA	3000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDA3005E ①	5 kV	250 MVA	3000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDA3005F ①	5 kV	250 MVA	3000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDA3005G ①	5 kV	250 MVA	3000 A	120 Vac Motor, Close & Trip
MVSGBRDDA3005I ①	5 kV	250 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDB1205A ①	5 kV	350 MVA	1200 A	125 Vdc Motor, Close & Trip
MVSGBRDDB1205B ①	5 kV	350 MVA	1200 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDB1205C ①	5 kV	350 MVA	1200 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDB1205D ①	5 kV	350 MVA	1200 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDB1205E ①	5 kV	350 MVA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDB1205F ①	5 kV	350 MVA	1200 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDB1205G ①	5 kV	350 MVA	1200 A	120 Vac Motor, Close & Trip
MVSGBRDDB1205I ①	5 kV	350 MVA	1200 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDB2005A ①	5 kV	350 MVA	2000 A	125 Vdc Motor, Close & Trip
MVSGBRDDB2005B ①	5 kV	350 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDB2005C ①	5 kV	350 MVA	2000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDB2005D ①	5 kV	350 MVA	2000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDB2005E ①	5 kV	350 MVA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDB2005F ①	5 kV	350 MVA	2000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDB2005G ①	5 kV	350 MVA	2000 A	120 Vac Motor, Close & Trip
MVSGBRDDB2005I ①	5 kV	350 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDDB3005A ①	5 kV	350 MVA	3000 A	125 Vdc Motor, Close & Trip
MVSGBRDDB3005B ①	5 kV	350 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDDB3005C ①	5 kV	350 MVA	3000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDDB3005D ①	5 kV	350 MVA	3000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDDB3005E ①	5 kV	350 MVA	3000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDDB3005F ①	5 kV	350 MVA	3000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDDB3005G ①	5 kV	350 MVA	3000 A	120 Vac Motor, Close & Trip
MVSGBRDDB3005I ①	5 kV	350 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDD41205A ①	5 kV	40 kA	1200 A	125 Vdc Motor, Close & Trip

5 kV (GMSG) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
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
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
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
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
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
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

5 kV (GMSG) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
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
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
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

Footnotes:

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.

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
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
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
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
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
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

15 kV (GMSG) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MVSGBRDE2015A ①	15 kV	1000 MVA	2000 A	125 Vdc Motor, Close & Trip
MVSGBRDE2015B ①	15 kV	1000 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDE2015C ①	15 kV	1000 MVA	2000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDE2015D ①	15 kV	1000 MVA	2000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDE2015E ①	15 kV	1000 MVA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDE2015F ①	15 kV	1000 MVA	2000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDE2015G ①	15 kV	1000 MVA	2000 A	120 Vac Motor, Close & Trip
MVSGBRDE2015I ①	15 kV	1000 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
MVSGBRDE3015A ①	15 kV	1000 MVA	3000 A	125 Vdc Motor, Close & Trip
MVSGBRDE3015B ①	15 kV	1000 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDE3015C ①	15 kV	1000 MVA	3000 A	125 Vdc Motor, Close & Trip with Second Trip Coil
MVSGBRDE3015D ①	15 kV	1000 MVA	3000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDE3015E ①	15 kV	1000 MVA	3000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDE3015F ①	15 kV	1000 MVA	3000 A	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDE3015G ①	15 kV	1000 MVA	3000 A	120 Vac Motor, Close & Trip
MVSGBRDE3015I ①	15 kV	1000 MVA	3000 A	120 Vac Motor, Close & Capacitor Trip with Undervoltage Trip
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
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
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
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
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

15 kV (GMSG) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
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
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
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
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
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
MVSGBRDD62015A ②	15 kV	63 kA	2000 A	125 Vdc Motor, Close & Trip

15 kV (GMSG) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
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
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

Footnotes:

- 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.

Technical data: GMSG

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

Type GMSG circuit breaker control data^③

Footnotes:

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

Type switch	Continuous current	Control circuit voltage	
		120 Vac	125 Vdc
Non-inductive			
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

Interrupting capacity auxiliary switch contacts^①

Footnotes:

- 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

Footnotes:

- 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 ms) 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) ^⑫ 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

For footnotes, please refer to page 22.

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.

Technical data: GMSG



Type GMSG vacuum circuit breaker

Footnotes:

- 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 MMSGCKBAXFAN 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) × [(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 (83 ms). Optional rated interrupting time of three-cycles (50 ms) 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.

Technical data: GMSG-GCB

Type GMSG-GCB circuit breaker ratings

Rated values and related capabilities	IEEE C37.013 clause	Units	Catalog number [®]		
			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 ^②	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 Generator source 1. E ₂ crest voltage 2. RRRV (TRV rate) 3. T ₂ time-to-peak Generator source 1. E ₂ crest voltage 2. RRRV (TRV rate) 3. T ₂ time-to-peak	5.9 C37.013a, Table 5 C37.013a, Table 6 C37.013a, Table 9	kV kV / μs μs kV kV / μs μs kV kV / μs μs	27.6 (1.84 V) 3.5 9.3 (0.62 V) 27.6 (1.84 V) 1.6 20.25 (1.35 V) 39.0 (2.6 V) 3.3 13.4 (0.89 V)	27.6 (1.84 V) 4.5 7.2 (0.48 V) 27.6 (1.84 V) 1.8 18.0 (1.20 V) 39.0 (2.6 V) 4.1 10.8 (0.72 V)	27.6 (1.84 V) 4.5 7.2 (0.48 V) 27.6 (1.84 V) 1.8 18.0 (1.20 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

Footnotes:

- 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.

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 25.

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 $50 \times 1.2 = 60$ kA for the distribution circuit breaker, and $50 \times 1.48 = 72$ 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.

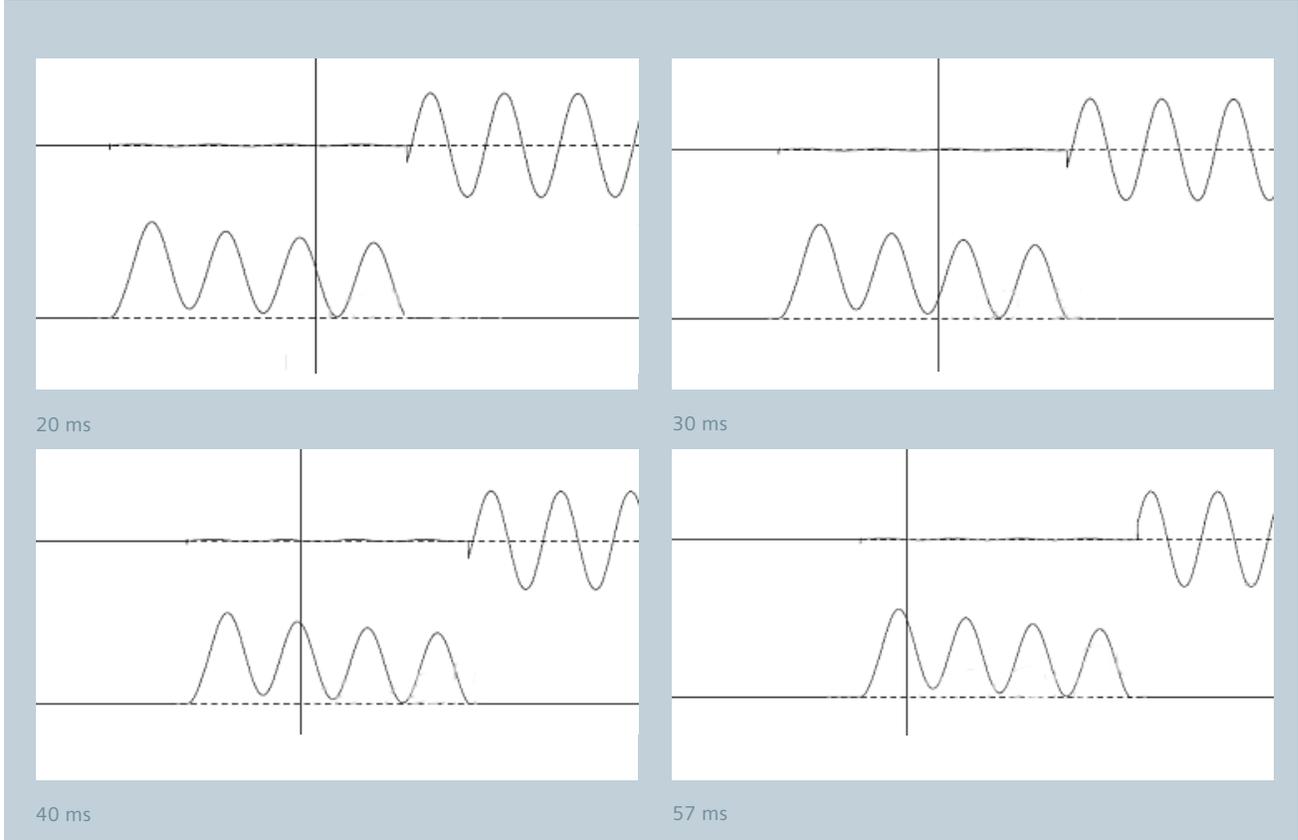
Faster rate of TRV

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 $0.39 \text{ kV}/\mu\text{s}$ 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 $4.0 \text{ kV}/\mu\text{s}$, 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/ μ s to 4.5 kV/ μ s. 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.

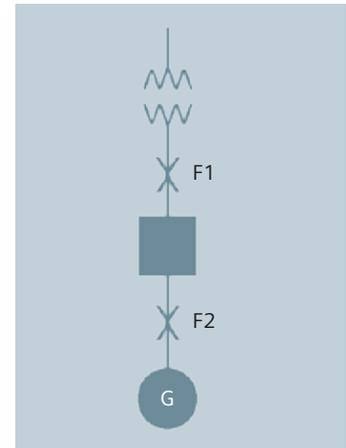
Unlike some other companies, Siemens does not use synthetic test methods, in which short-circuit current is provided by the generator, but recovery voltage is provided by a separate low-power, high-voltage source. While the standards allow synthetic testing, Siemens prefers direct testing.

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 ①④	15 kV	50 kA	1200 A	125 Vdc Motor, Close & Trip
MVSGBRDG51215B ①④	15 kV	50 kA	1200 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDG51215C ①④	15 kV	50 kA	1200 A	125 Vdc Motor, Close & Trip With Second Trip Coil
MVSGBRDG51215D ①④	15 kV	50 kA	1200 A	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG51215E ①④	15 kV	50 kA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDG51215F ①④	15 kV	50 kA	1200 A	125 Vdc Close & Trip With Separate 125 Vdc Motor
MVSGBRDG51215I ①④	15 kV	50 kA	1200 A	120 Vac Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG52015A ①④	15 kV	50 kA	2000 A	125 Vdc Motor, Close & Trip
MVSGBRDG52015B ①④	15 kV	50 kA	2000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDG52015C ①④	15 kV	50 kA	2000 A	125 Vdc Motor, Close & Trip With Second Trip Coil
MVSGBRDG52015D ①④	15 kV	50 kA	2000 A	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG52015E ①④	15 kV	50 kA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDG52015F ①④	15 kV	50 kA	2000 A	125 Vdc Close & Trip With Separate 125 Vdc Motor
MVSGBRDG52015I ①④	15 kV	50 kA	2000 A	120 Vac Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG53015A ①④	15 kV	50 kA	3000 A	125 Vdc Motor, Close & Trip
MVSGBRDG53015B ①④	15 kV	50 kA	3000 A	120 Vac Motor, Close & Capacitor Trip
MVSGBRDG53015C ①④	15 kV	50 kA	3000 A	125 Vdc Motor, Close & Trip With Second Trip Coil
MVSGBRDG53015D ①④	15 kV	50 kA	3000 A	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MVSGBRDG53015E ①④	15 kV	50 kA	3000 A	120 Vac Motor & Close, 125 Vdc Trip
MVSGBRDG53015F ①④	15 kV	50 kA	3000 A	125 Vdc Close & Trip With Separate 125 Vdc Motor
MVSGBRDG53015I ①④	15 kV	50 kA	3000 A	120 Vac Motor, Close & Capacitor Trip With Undervoltage Trip
MVSGBRDG54F15A ①③	15 kV	50 kA	4000 A Fan-Cooled	125 Vdc Motor, Close & Trip
MVSGBRDG54F15B ①③	15 kV	50 kA	4000 A Fan-Cooled	120 Vac Motor, Close & Capacitor Trip
MVSGBRDG54F15D ①③	15 kV	50 kA	4000 A Fan-Cooled	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MVSGBRDG54F15E ①③	15 kV	50 kA	4000 A Fan-Cooled	120 Vac Motor, & Close, 125 Vdc Trip
MVSGBRDG54F15F ①③	15 kV	50 kA	4000 A Fan-Cooled	125 Vdc Close & Trip with Separate 125 Vdc Motor
MVSGBRDG54F15I ①③	15 kV	50 kA	4000 A Fan-Cooled	120 Vac Motor, Close & Capacitor Trip With Undervoltage Trip

Generator (GMSG) Drawout Circuit Breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
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

Footnotes:

- 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.

Circuit breaker cell kits: GMSG

Circuit breaker cell kits

Description	Catalog number
GMSG 50kA 1200A Universal Breaker cell kit	MVSGCKBU512
GMSG 50kA 2000A Universal Breaker cell kit	MVSGCKBU520
GMSG 50kA 3000A Universal Breaker cell kit	MVSGCKBU530
GMSG 63kA 1200/2000A Universal Breaker cell kit	MVSGCKBU620
GMSG 63kA 3000A Universal Breaker cell kit	MVSGCKBU630
GMSG Fan kit, required for use with breakers in 4000 A Ventilation Fan Kit (required for 4000 A rating) [Ⓢ]	MVSGCKBAXFAN

Footnotes:

- Ⓢ 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 3000 A.

Circuit breaker cell kit includes:

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

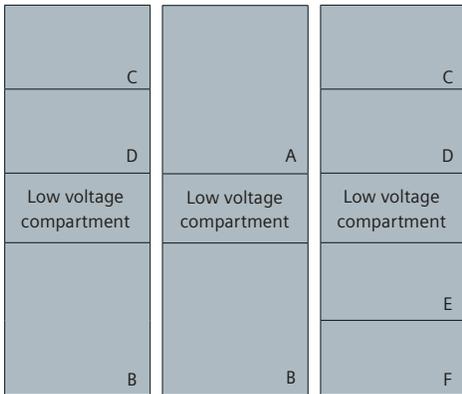
Circuit breaker cell kit excludes:

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



Universal circuit breaker cell kit

Skeletons: MSG



Skeletons: MSG

Description	Catalog number
GMSG OEM 50 kA Skeleton A-BLANK Over B-BLANK	MVSGSKBL00BLOO
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
GMSG OEM 50 kA Skeleton A-1200 Over B-1200	MVSGSK12001200
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-BLANK B-1200	MVSGSKVTBL1200
GMSG OEM 50 kA Skeleton C-VT D-BLANK B-2000	MVSGSKVTBL2000
GMSG OEM 50 kA Skeleton C-BLANK D-VT B-1200	MVSGSKBLVT1200
GMSG OEM 50 kA Skeleton C-VT D-VT B- over 1200	MVSGSKVTVT1200
GMSG OEM 50 kA Skeleton C-BLANK D-VT B-2000	MVSGSKBLVT2000
GMSG OEM 50 kA Skeleton C-VT D-VT B-2000	MVSGSKVTVT2000
GMSG OEM 50 kA Skeleton C-BLANK D-BLANK B-1200	MVSGSKBLBL1200
GMSG OEM 50 kA Skeleton C-BLANK D-BLANK B-2000	MVSGSKBLBL2000
GMSG OEM 50 kA Skeleton C-VT D-BLANK B-BLANK	MVSGSKVTBLBLOO
GMSG OEM 50 kA Skeleton C-BLANK D-VT B-BLANK	MVSGSKBLVTBLOO
GMSG OEM 50 kA Skeleton C-VT D-VT B-BLANK	MVSGSKVTVTBLOO
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	MVSGSKBLCPBLOO
GMSG OEM 50 kA Skeleton C-VT D-CPT B-BLANK	MVSGSKVTCPBLOO
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

Footnotes:

- ① Skeleton structures are offered for use with distribution breakers up to 50 kA and generator breakers up to 40 kA.
- ② Siemens type GMSG skeleton assemblies include the circuit breaker cell kit (if applicable).



GMSG 50 kA C-D Auxiliary Cell over Breaker Skeleton

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 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.

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.

Auxiliary rollout tray cell kits: GMSG

Auxiliary rollout tray cell kit includes:

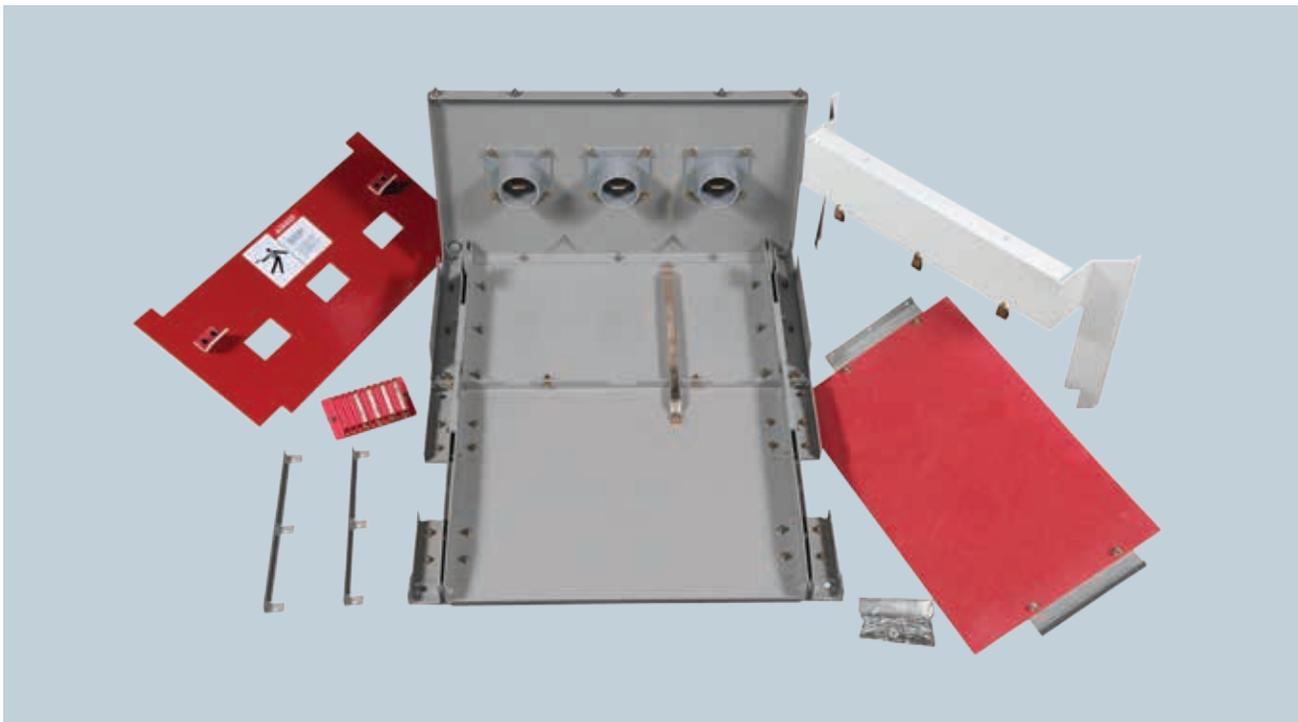
- Shutter barrier
- Secondary disconnect
- Auxiliary bushings
- Rear and bottom pan
- Fixed-contact pad.

Auxiliary 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 parts kit D CPT rollout tray	MVSGCKADCPT
Cell parts kit F CPT rollout tray	MVSGCKAFCPT
Cell parts kit D fuse rollout tray	MVSGCKADFUS
Cell parts kit F fuse rollout tray	MVSGCKAFFUS
Cell parts kit C VT rollout tray	MVSGCKACVT
Cell parts kit D VT rollout tray	MVSGCKADVT
Cell parts kit E VT rollout tray	MVSGCKAEVT
Cell parts 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. 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 TEST positions can be furnished. All spare MOCs are wired to accessible terminal blocks for user connections.

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 ③
8 Stage TOC	MVSGACMTXX8X ③
12 Stage TOC	MVSGACMTXX12 ③
6 Stage MOC	MVSGACMT6XXX ③
12 Stage MOC	MVSGACMT12XX ③
18 Stage MOC	MVSGACMT18XX ③
24 Stage MOC	MVSGACMT24XX ③

Footnotes:

- 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.



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
ANSI 61 Gray Touch-up Paint (Can)	MVXXACLPPAINT
Split Plug Jumper	MVXXACSPPLGJU
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
Accessory Bundle: Split Plug Jumper, Racking Crank, Spring Charge Handle for Breaker, 2 Extension Rails, Contact Lubricant, and Touch-up Paint	MVSGACBUNDLE
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
Electric Racking Device	MVSGACRDELEC
Door Hardware for Electric Racking Device ^④	MVSGACRDELECDH

Footnotes:

- 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

Description	Device type					
	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

Ground and test devices: GMSG



Type GMSG-EO ground and test device

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 F electrically operated, lower cell, grounds run-backs, lower studs	MVSGACEGTD5FBR ①
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

Footnotes:

- 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



Inter-unit bus supports: GMSG

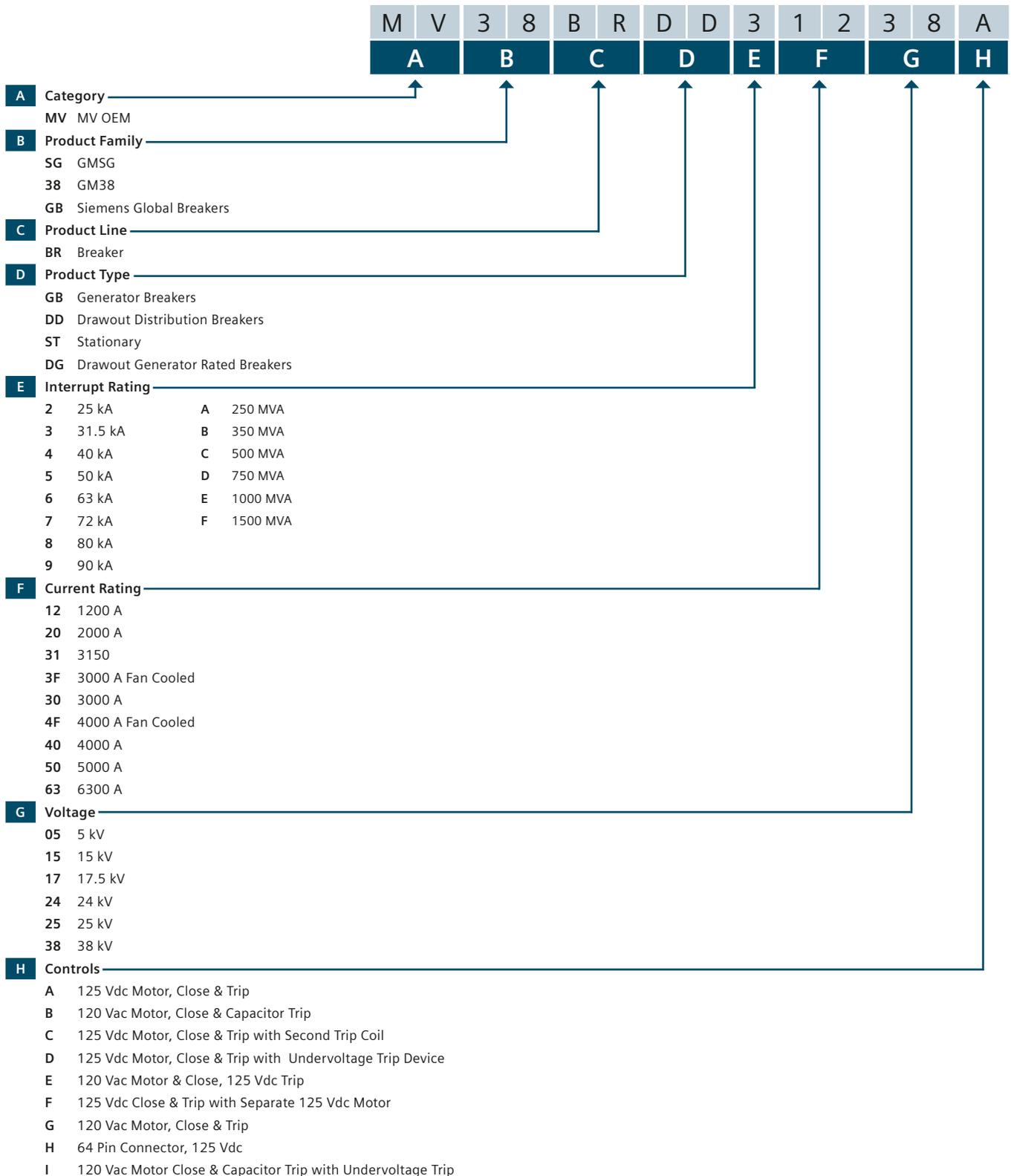
Description	Catalog number
Inter-Unit Bus Support 1200A 50 kA Glass Polyester	MVSGEQBS12POL5
Inter-Unit Bus Support 2000A 50 kA Glass Polyester	MVSGEQBS20POL5
Inter-Unit Bus Support 3000A 50 kA Glass Polyester	MVSGEQBS30POL5
Inter-Unit Bus Support 4000A 50 kA Glass Polyester	MVSGEQBS40POL5
Inter-Unit 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	MVSGEQBTSPBU20
Boot for Primary Stab - 2000A Bus Side	MVSGEQBTSPB20
Boot for Primary Stab - 1200A/2000A Line Side-bar direction back	MVSGEQBTPSLB20
GMSG 3000A through Bus Boot	MVSGEQBTB30
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

Catalog number logic: MV OEM circuit breakers



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.

38 kV (GM38) vacuum circuit breakers

Catalog number	kV Rating	kA / MVA Rating	Continuous Current	Controls
MV38BRDDF1238A ①	38 kV	1500 MVA	1200 A	125 Vdc Motor, Close & Trip
MV38BRDDF1238B ①	38 kV	1500 MVA	1200 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDDF1238D ①	38 kV	1500 MVA	1200 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDDF1238E ①	38 kV	1500 MVA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDDF2038A ②	38 kV	1500 MVA	2000 A	125 Vdc Motor, Close & Trip
MV38BRDDF2038B ②	38 kV	1500 MVA	2000 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDDF2038D ②	38 kV	1500 MVA	2000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDDF2038E ②	38 kV	1500 MVA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDDF3F38A ③	38 kV	1500 MVA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip
MV38BRDDF3F38B ③	38 kV	1500 MVA	3000 A Fan Cooled	120 Vac Motor, Close & Capacitor Trip
MV38BRDDF3F38D ③	38 kV	1500 MVA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDDF3F38E ③	38 kV	1500 MVA	3000 A Fan Cooled	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD31238A ①	38 kV	31.5 kA	1200 A	125 Vdc Motor, Close & Trip
MV38BRDD31238B ①	38 kV	31.5 kA	1200 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDD31238D ①	38 kV	31.5 kA	1200 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDD31238E ①	38 kV	31.5 kA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD32038A ②	38 kV	31.5 kA	2000 A	125 Vdc Motor, Close & Trip
MV38BRDD32038B ②	38 kV	31.5 kA	2000 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDD32038D ②	38 kV	31.5 kA	2000 A	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDD32038E ②	38 kV	31.5 kA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD33F38A ③	38 kV	31.5 kA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip
MV38BRDD33F38B ③	38 kV	31.5 kA	3000 A Fan Cooled	120 Vac Motor, Close & Capacitor Trip
MV38BRDD33F38D ③	38 kV	31.5 kA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip with Undervoltage Trip Device
MV38BRDD33F38E ③	38 kV	31.5 kA	3000 A Fan Cooled	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD41238A ④	38 kV	40 kA	1200 A	125 Vdc Motor, Close & Trip
MV38BRDD41238B ④	38 kV	40 kA	1200 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDD41238D ④	38 kV	40 kA	1200 A	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MV38BRDD41238E ④	38 kV	40 kA	1200 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD42038A ⑤	38 kV	40 kA	2000 A	125 Vdc Motor, Close & Trip
MV38BRDD42038B ⑤	38 kV	40 kA	2000 A	120 Vac Motor, Close & Capacitor Trip
MV38BRDD42038D ⑤	38 kV	40 kA	2000 A	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MV38BRDD42038E ⑤	38 kV	40 kA	2000 A	120 Vac Motor & Close, 125 Vdc Trip
MV38BRDD43F38A ⑥	38 kV	40 kA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip
MV38BRDD43F38B ⑥	38 kV	40 kA	3000 A Fan Cooled	120 Vac Motor, Close & Capacitor Trip
MV38BRDD43F38D ⑥	38 kV	40 kA	3000 A Fan Cooled	125 Vdc Motor, Close & Trip With Undervoltage Trip Device
MV38BRDD43F38E ⑥	38 kV	40 kA	3000 A Fan Cooled	120 Vac Motor & Close, 125 Vdc Trip

Footnotes:

- ① Use cell kit # MV38CKB312
- ② Use cell kit # MV38CKB320
- ③ Use cell kit # MV38CKB33F. Siemens GM38 2000 A draw-out breakers are capable of operation up to 3000 A provided the following conditions are met:
Use with MV38CKBX3FFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.
- ④ Use cell kit # MV38CKB412
- ⑤ Use cell kit # MV38CKB420
- ⑥ Use cell kit # MV38CKB43F. Siemens GM38 2000 A draw-out breakers are capable of operation up to 3000 A provided the following conditions are met:
Use with MV38CKBX3FFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.

Technical data: GM38

GM38 vacuum circuit breaker ratings (new "constant kA" ratings basis)

Parameter		Units	Catalog number ^①				
			MV38BRDD3xx38-	MV38BRDD4xx38-			
Rated values	Rated voltage	Maximum design voltage (V) ^②		kV rms	38.0	38.0	
		Voltage range factor (K) ^③		----	1.0	1.0	
	Insulation levels	Withstand voltage levels	Power frequency		kV rms	80	80
			Lightning impulse (BIL)		kV peak	150	150
	Rated current	Continuous ^④		A rms	1,200, 2,000, 3,000FC	1,200, 2,000, 3,000FC	
		Short circuit (at rated maximum design voltage) (I) ^{⑤⑥}		kA rms sym	31.5	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	38.0	38.0	
		Maximum symmetrical interrupting (K x I)		kA rms sym	31.5	40	
		%dc component		%	47	47	
		Short-time current (K x I) (3 seconds)		kA rms sym	31.5	40	
	Closing and latching (momentary)	Asymmetrical (1.55 x I)		kA rms	49	62	
		Peak (2.6 x I)		kA peak	82	104	

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.

Footnotes:

- 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 GM38 2000A Drawout breakers are capable of operation up to 3000A provided the following conditions are met: Use with MV38CKBX3FFAN 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.

Technical data: GM38

GM38 vacuum circuit breaker ratings (historic "constant MVA" ratings basis)

Parameter			Units	Catalog number		
				MV38BRDDFx38-		
General		Nominal voltage class		kV	34.5	
		Nominal three-phase MVA class ^⑥		MVA	1500	
Rated values	Rated voltage	Maximum design voltage (V) ^②		kV rms	38.0	
		Voltage range factor (K) ^③		----	1.65	
	Insulation levels	Withstand voltage levels	Power-frequency		kV rms	80
			Lightning-impulse (BIL)		kV peak	150
	Rated current	Continuous ^④		A rms	1,200, 2,000, 3,000FC	
		Short-circuit (at rated maximum design voltage) (I) ^{⑤⑥⑩}		kA rms sym	21	
		Interrupting time		cycles/ms	5/83	
Permissible tripping delay (Y)		Sec	2			
Related required capabilities	Current	Rated maximum design voltage (V) divided by K = (V/K)		kV rms	23.0	
		Maximum symmetrical interrupting (K x I) ^⑦		kA rms sym	35	
		Short-time current (K x I) (3-seconds)		kA rms sym	35	
	Closing and latching (momentary)	Asymmetrical (1.6 x I) ^⑧		kA rms	56	
		Peak (2.7 x I) ^⑨		kA peak	95	

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.

Footnotes:

- ① "xxxx" in type designation 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 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.
- ④ Siemens GM38 2000A Drawout breakers are capable of operation up to 3000A provided the following conditions are met: Use with MV38CKBX3FFAN Fan kit in Upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear to 3000A load.
- ⑤ 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, the following formula shall be used: 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.
- ⑥ 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.
- ⑦ 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.
- ⑧ Current values in this row are independent of operating voltage up to and including rated maximum voltage.
- ⑨ "Nominal three-phase MVA class" is included for reference only. This information is not listed in ANSI/IEEE C37.06-1987.
- ⑩ Standard duty cycle is CO - 15s - CO.

Technical data: GM38

Circuit breaker control data

Footnotes:

- 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.

Control voltages, ANSI/IEEE C37.06			Close coil	Trip coil	Spring charging motor		
Nominal	Range				Run (Average) ^①	Inrush (Peak)	Charging
	Close	Trip	A ^①	A ^①	A	A	Seconds
125 Vdc	100 - 140	70 - 140	1.0	4.8/7.4 ^③	4	18	10
120 Vac	104 - 127	---- ^④	0.9	---- ^{②④}	6	---- ^④	10

Interrupting capacity auxiliary switch contacts^②

Footnotes:

- ① All switch contacts are non-convertible.

Type switch	Continuous current	Control circuit voltage	
inductive	A	120 Vac	125 Vdc
Circuit breaker	10	6	6
TOC	15	15	0.5
MOC	20	15	10

Voltage Transformer (VT) data

Voltage class	Ratio	Accuracy class at 120 V sec.		VA thermal rating (55 °C ambient)
		W, X, Y, Z	ZZ	
38 kV one bushing	20,125/115	0.3	1.2	1,000
38 kV two bushings	24,000/120	0.3	1.2	1,000
	27,600/115			
	34,500/115			

Dimensions: GM38

GM38 vacuum circuit breaker weight in lbs (kg)^{①②③}

Continuous current	Catalog number		
	MV38BRDD3xx38-	MV38BRDD4xx38-	MV38BRDDFxx38-
1,200	800 (364)	850 (387)	800 (364)
2,000	900 (409)	950 (432)	900 (409)
3,000	1,000 (455)	1,050 (478)	1,000 (455)

Footnotes:

- 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 44" (1,117 mm) x 46" (1,168 mm) x 51" (1,294 mm)

Circuit breaker cell kits: GM38

Circuit breaker cell kits

Description	Catalog number
1200A circuit breaker lower cell kit	MV38CKB312
2000A circuit breaker lower cell kit	MV38CKB320
3000A application lower cell kit (fan cooling kit separate)	MV38CKB33F
1200A circuit breaker lower cell kit 40kA	MV38CKB412
2000A circuit breaker lower cell kit 40kA	MV38CKB420
3000A application lower cell kit 40kA (fan cooling kit separate)	MV38CKB43F
3000A Ventilation Fan Kit (Required for 3000A Rating) ^①	MV38CKBX3FFAN
1200A circuit breaker lower cell kit	MV38CKB312A ^②
2000A circuit breaker lower cell kit	MV38CKB320A ^②
3000A application lower cell kit (fan cooling kit separate)	MV38CKB33FA ^②
1200A circuit breaker lower cell kit 40kA	MV38CKB412A ^②
2000A circuit breaker lower cell kit 40kA	MV38CKB420A ^②
3000A application lower cell kit 40kA (fan cooling kit separate)	MV38CKB43FA ^②

Footnotes:

- ① Siemens GM38 2000A Drawout breakers are capable of operation up to 3000A provided the following conditions are met: Use with MV38CKBX3FFAN fan kit in upper cell. Partner company must perform type testing certified to ANSI standards with their switchgear for 3000 A.
- ② These circuit breaker cell kits use an alternative bushing to the original. Be sure to understand which circuit breaker the cell kit is being used with. Ask about availability of these parts. Please inquire about availability of these cell kits.

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 GM38 circuit breaker (must be selected separately).

Skeletons: GM38

Skeletons: GM38

Description	Catalog number
GM38 skeleton, blank top/blank bottom, 31.5 kA or 1500 MVA	MV38SK3BLXBLXX
GM38 skeleton, blank top/1200A bottom cell, 31.5 kA or 1500 MVA	MV38SK3BLX1200
GM38 skeleton, blank top/2000A bottom cell, 31.5 kA or 1500 MVA	MV38SK3BLX2000
GM38 skeleton, fan top cell /3000A bottom cell includes fan & controls, 31.5 kA or 1500 MVA	MV38SK3FAN3000
GM38 skeleton, blank top/1200A bottom cell, 40kA	MV38SK4BLX1200
GM38 skeleton, blank top/2000A bottom cell, 40kA	MV38SK4BLX2000
GM38 skeleton, fan top cell/3000A bottom cell includes fan & controls, 40kA	MV38SK4FAN3000
GM38 skeleton, VT set-up top/1200A bottom cell, 31.5 kA or 1500 MVA	MV38SK3VTX1200 ①
GM38 skeleton, VT set-up top/2000A bottom cell, 31.5 kA or 1500 MVA	MV38SK3VTX2000 ①
GM38 skeleton, VT set-up top/1200A bottom cell, 40 kA	MV38SK4VTX1200 ①
GM38 skeleton, VT set-up top/2000A bottom cell, 40 kA	MV38SK4VTX2000 ①
GM38 skeleton, VT set-up top/blank bottom cell, 31.5 kA or 1500 MVA	MV38SK3VTXBLXX ①
GM38 Skeleton w/provision for (3) VTX in upper cell and CPT Fuse Truck Roll-out in lower cell.	MV38SK3VT3CPTT ①
GM38 Skeleton with CPT Fuse Truck in upper cell and Blank bottom cell.	MV38SK3CPTBLXX ①

Footnotes:

① Fuse Truck Sold separately.

② Siemens type GM38 skeleton assemblies include the circuit breaker cell kit (if applicable).

Auxiliary rollout tray cell kits and trays: GM38

Auxiliary rollout tray cell kit includes: Auxiliary rollout tray cell kits and trays: GM38

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

Auxiliary rollout cell kit excludes:

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

Description	Catalog Number
GM38 CPT part kit (without GM38 CPT & Fuse : phase A: 17" fuse, upper compartment)	MV38CKARCPTUA
GM38 CPT part kit (without GM38 CPT & Fuse : phase B: 17" fuse, upper compartment)	MV38CKARCPTUB
GM38 CPT part kit (without GM38 CPT & Fuse : phase C: 17" fuse, upper compartment)	MV38CKARCPTUC
GM38 CPT part kit (without GM38 CPT & Fuses : phase AB: 17" fuse, upper compartment)	MV38CKARCPTUAB
GM38 CPT part kit (without GM38 CPT & Fuses : phase BC: 17" fuse, upper compartment)	MV38CKARCPTUBC
GM38 CPT part kit (without GM38 CPT & Fuses : phase AC: 17" fuse, upper compartment)	MV38CKARCPTUAC
GM38 CPT part kit (without GM38 CPT & Fuses : phase ABC: 17" fuse, upper compartment)	MV38CKARCPTUABC
GM38 CPT part kit (without GM38 CPT & Fuse : phase A: 17" fuse, lower compartment)	MV38CKARCPTLA
GM38 CPT part kit (without GM38 CPT & Fuse : phase B: 17" fuse, lower compartment)	MV38CKARCPTLB
GM38 CPT part kit (without GM38 CPT & Fuse : phase C: 17" fuse, lower compartment)	MV38CKARCPTLC
GM38 CPT part kit (without GM38 CPT & Fuses : phase AB: 17" fuse, lower compartment)	MV38CKARCPTLAB
GM38 CPT part kit (without GM38 CPT & Fuses : phase BC: 17" fuse, lower compartment)	MV38CKARCPTLBC
GM38 CPT part kit (without GM38 CPT & Fuses : phase AC: 17" fuse, lower compartment)	MV38CKARCPTLAC
GM38 CPT part kit (without GM38 CPT & Fuses : phase ABC: 17" fuse, lower compartment)	MV38CKARCPTLABC
GM38 VT part kit (without single bushing VT & Fuse : phase A: upper compartment)	MV38CKARVT1UA
GM38 VT part kit (without single bushing VT & Fuse : phase B: upper compartment)	MV38CKARVT1UB
GM38 VT part kit (without single bushing VT & Fuse : phase C: upper compartment)	MV38CKARVT1UC
GM38 VT part kit (without single bushing VT & Fuses : phase AB: upper compartment)	MV38CKARVT1UAB
GM38 VT part kit (without single bushing VT & Fuses : phase BC: upper compartment)	MV38CKARVT1UBC
GM38 VT part kit (without single bushing VT & Fuses : phase AC: upper compartment)	MV38CKARVT1UAC
GM38 VT part kit (without single bushing VT & Fuses : phase ABC: upper compartment)	MV38CKARVT1U3P
GM38 VT part kit (without double bushing VT & Fuses : phase AB: upper compartment)	MV38CKARVT2UAB
GM38 VT part kit (without double bushing VT & Fuses : phase BC: upper compartment)	MV38CKARVT2UBC
GM38 VT part kit (without double bushing VT & Fuses : phase AC: upper compartment)	MV38CKARVT2UAC
GM38 VT part kit (without double bushing VT & Fuses : phase ABC: upper compartment)	MV38CKARVT2U3P
GM38 VT part kit (without single bushing VT & Fuse : phase A: lower compartment)	MV38CKARVT1LA
GM38 VT part kit (without single bushing VT & Fuse : phase B: lower compartment)	MV38CKARVT1LB
GM38 VT part kit (without single bushing VT & Fuse : phase C: lower compartment)	MV38CKARVT1LC
GM38 VT part kit (without single bushing VT & Fuses : phase AB: lower compartment)	MV38CKARVT1LAB
GM38 VT part kit (without single bushing VT & Fuses : phase BC: lower compartment)	MV38CKARVT1LBC
GM38 VT part kit (without single bushing VT & Fuses : phase AC: lower compartment)	MV38CKARVT1LAC
GM38 VT part kit (without single bushing VT & Fuses : phase ABC: lower compartment)	MV38CKARVT1L3P
GM38 VT part kit (without double bushing VT & Fuses : phase AB: lower compartment)	MV38CKARVT2LAB
GM38 VT part kit (without double bushing VT & Fuses : phase BC: lower compartment)	MV38CKARVT2LBC
GM38 VT part kit (without double bushing VT & Fuses : phase AC: lower compartment)	MV38CKARVT2LAC
GM38 VT part kit (without double bushing VT & Fuses : phase ABC: lower compartment)	MV38CKARVT2L3P

Auxiliary rollout tray cell kits and trays: GM38

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.

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 is 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.

Rollout trays without transformers or fuses: GM38

Description	Catalog number
38kV CPT 17" Fuse Truck for Upper Compartment, Phase A (without fuses)	MV38CKRACPTA
38kV CPT 17" Fuse Truck for Upper Compartment, Phase B (without fuses)	MV38CKRACPTB
38kV CPT 17" Fuse Truck for Upper Compartment, Phase C (without fuses)	MV38CKRACPTC
38kV CPT 17" Fuse Truck for Upper Compartment, Phase AB (without fuses)	MV38CKRACPTAB
38kV CPT 17" Fuse Truck for Upper Compartment, Phase BC (without fuses)	MV38CKRACPTBC
38kV CPT 17" Fuse Truck for Upper Compartment, Phase AC (without fuses)	MV38CKRACPTAC
38kV CPT 17" Fuse Truck for Upper Compartment, Phase ABC (without fuses)	MV38CKRACPTABC
38kV CPT 17" Fuse Truck for Lower Compartment, Phase A (without fuses)	MV38CKRBCPTA
38kV CPT 17" Fuse Truck for Lower Compartment, Phase B (without fuses)	MV38CKRBCPTB
38kV CPT 17" Fuse Truck for Lower Compartment, Phase C (without fuses)	MV38CKRBCPTC
38kV CPT 17" Fuse Truck for Lower Compartment, Phase AB (without fuses)	MV38CKRBCPTAB
38kV CPT 17" Fuse Truck for Lower Compartment, Phase BC (without fuses)	MV38CKRBCPTBC
38kV CPT 17" Fuse Truck for Lower Compartment, Phase AC (without fuses)	MV38CKRBCPTAC
38kV CPT 17" Fuse Truck for Lower Compartment, Phase ABC (without fuses)	MV38CKRBCPTABC

Rollout trays with transformers, fuses: GM38

Description	Catalog number
38kV VT Fuse Truck for Upper Compartment, Phase A (with fuses)	MV38CKRAVTXA
38kV VT Fuse Truck for Upper Compartment, Phase B (with fuses)	MV38CKRAVTXB
38kV VT Fuse Truck for Upper Compartment, Phase C (with fuses)	MV38CKRAVTXC
38kV VT Fuse Truck for Upper Compartment, Phase AB (with fuses)	MV38CKRAVTXAB
38kV VT Fuse Truck for Upper Compartment, Phase BC (with fuses)	MV38CKRAVTXBC
38kV VT Fuse Truck for Upper Compartment, Phase AC (with fuses)	MV38CKRAVTXAC
38kV VT Fuse Truck for Upper Compartment, Phase ABC (with fuses)	MV38CKRAVTXABC
38kV VT Fuse Truck for Lower Compartment, Phase A (with fuses)	MV38CKRBVTXA
38kV VT Fuse Truck for Lower Compartment, Phase B (with fuses)	MV38CKRBVTXB
38kV VT Fuse Truck for Lower Compartment, Phase C (with fuses)	MV38CKRBVTXC
38kV VT Fuse Truck for Lower Compartment, Phase AB (with fuses)	MV38CKRBVTXAB
38kV VT Fuse Truck for Lower Compartment, Phase BC (with fuses)	MV38CKRBVTXBC
38kV VT Fuse Truck for Lower Compartment, Phase AC (with fuses)	MV38CKRBVTXAC
38kV VT Fuse Truck for Lower Compartment, Phase ABC (with fuses)	MV38CKRBVTXABC

MOCs and TOCs: GM38



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. 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 TEST positions can be furnished. All spare MOCs are wired to accessible terminal blocks for user connections.

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: GM38

Description	Catalog number
6-stage MOC(3a,3b)/4-stage TOC(2a,2b) test & connect position	MV38ACMT6X4X
12-stage MOC(6a,6b)/8-stage TOC(4a,4b) test & connect position	MV38ACMT128X
18-stage MOC(9a,9b)/8-stage TOC(4a,4b) test & connect position	MV38ACMT188X
24-stage MOC(12a,12b)/12-stage TOC(6a,6b) test & connect position	MV38ACMT2412

Accessories: GM38

Accessories

Description	Catalog number
GMSG AND GM38 Manual Racking Crank	MVXXACRDHANDLE
GMSG AND GM38 Manual Spring Charge Handle	MVXXACCHMANCHL
Siemens Contact Lubricant	MVXXACLPCONLUB
ANSI 61 Gray Touch-up Paint (Can)	MVXXACLPPAINT
Split Plug Jumper	MVXXACSPPLGJU
Electric Racking Device	MV38ACRDELEC
Door Hardware for Electric Racking Device	MV38ACRDELECDH
Racking Lock Assembly 38kV (Trip Free)	MV38ACRDLOCK
Racking Mechanism Assembly 38kV Rollout	MV38ACRDASSYRO
Racking Mechanism Assembly 38kV Upper Cpt Fuse Rollout	MV38ACRDASSYFR
Racking Mechanism Assembly 38kV Breaker	MV38ACRDASSYBR
Indicating tape for Racking Mechanism	MV38ACRDINDTAP
Spring Charging Motor 125 Vdc/120 Vac	MV38ACCHSPCHMT
Fifth Wheel Assembly (8")	MV38ACLA5WHEEL
Lift Sling ^①	MV38ACLASLING
Lift Truck ^②	MV38ACLATRUCK
Drawout Extension Rail (Two required)	MV38ACDREXRL

Footnotes:

- ① Sling can be used with customer's crane or hoist.
- ② No lift sling is required for truck.

Ground and test devices: GM38



Manually operated ground and test device with doors open and closed

Manually operated ground and test device

This is a drawout element that can be inserted into a circuit breaker cell. It opens the shutters, connects to the cell primary disconnecting contacts, and so provides a means to make the primary disconnect stabs available for testing. It is suitable for high-potential testing of outgoing circuits of the switchgear main bus or for phase-sequence checking. It also provides a means to connect temporary grounds to de-energized circuits for maintenance purposes. Either three-stud or six-stud devices are available.

Electrically operated ground and test device

An electrically operated ground and test device includes a power operated switch (derived from a type 38-3AH3 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.

GTDs: GM38

Description	Catalog number
Ground & Test Device - Manual Type-Upper and Lower Stud connections	MV38ACMOGTDSTD
Ground & Test Device - Manual Type-Upper and Lower Stirrup connections	MV38ACMOGTDSTR
Ground & Test Device - Electrically Operated upper stabs	MV38ACEOGTDUPS
Ground & Test Device - Electrically Operated lower stabs	MV38ACEOGTDLWS



Electrically operated ground and test device

Bus components: GM38

Inter-unit bus supports: GM38

Description	Catalog number
Inter-unit bus support 1200A	MV38EQBUSPT12
Inter-unit bus support 2000A	MV38EQBUSPT20
Inter-unit bus support 3000A	MV38EQBUSPT30
Insulator bus clamp 7.63 inch	MV38EQINSBUSCL

Boots: GM38

Description	Catalog number
Cover boot left hand breaker bushing bus joint - upper	MV38EQCBLBRA
Cover boot left hand breaker bushing bus joint - lower	MV38EQCBLBRB
Cover boot right hand breaker bushing bus joint - upper	MV38EQCBBRA
Cover boot right hand breaker bushing bus joint - lower	MV38EQCBBRBB
Cover boot center breaker bushing bus joint - upper	MV38EQCBCBRA
Cover boot center breaker bushing bus joint - lower	MV38EQCBCBRB
Cover boot upper VT bushings connection - rear for cable connection	MV38EQCBRTB
Cover boot primary	MV38EQCBPRIMAR

Notes:

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