SafeGear™ Motor Control Center
Arc resistant metal-clad construction
1. Description

Designed for the highest degree of safety and reliability, the arc-resistant metal-clad construction Motor Control Center, SafeGear MCC, provides the greatest case of use on the market.

SafeGear MCC is equipped with mechanical interlocks between the draw-out contactor truck and the front door to increase operation and maintenance safety. For optimal flexibility, the SafeGear MCC is designed to be used in combination with SafeGear® Metal-Clad switchgear so a transition section is not required.
2. SafeGear MCC applications

Suitable for most applications

Utilities and power plants
- Substations
- Power generation stations
- Transformer stations
- Switching stations
- Main and auxiliary switchgear

Infrastructure
- Shops
- Hospitals
- Educational
- Waste water treatment

Industry
- Pulp and paper
- Cement
- Textiles
- Chemicals
- Food
- Automotive
- Oil and gas facilities
- Metallurgy
- Rolling mills
- Mines

Transportation
- Airports
- Ports

3. Electrical features

<table>
<thead>
<tr>
<th>Electrical features</th>
<th>SafeGear MCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure Type</td>
<td>Type 1 Gasketed*</td>
</tr>
<tr>
<td>Arc resistance accessibility type</td>
<td>Type 2B</td>
</tr>
<tr>
<td>Rated voltage (kV)</td>
<td>Up to 7.2</td>
</tr>
<tr>
<td>Insulation level / Power Frequency / Lighting impulse BIL (kV)</td>
<td>7.2 / 20 / 60</td>
</tr>
<tr>
<td>Rated frequency (Hz)</td>
<td>60</td>
</tr>
<tr>
<td>Rated main bus current (A)</td>
<td>1200, 2000 or 3000</td>
</tr>
<tr>
<td>Rated contactor current (A)</td>
<td>400</td>
</tr>
</tbody>
</table>

* Also known in Mexico as NEMA 1A

4. Standards

The SafeGear MCC and main apparatus contained in it comply with the following standards:

- UL 347, 5th edition
- UL 50/50E
- IEEE C37.20.2
- IEEE Guide C37.20.7
- CSA C22.2 No. 253-09
- CSA 22.2 No. 14
- NMX-J-564/106-ANCE
- NRF-146
- NRF-048

Medium-Voltage AC contactors, controller and control centers
Enclosure for Electrical Equipment
Standard for Metal-clad switchgear
Guide for test metal-enclosed switchgear for internal arcing faults
Medium-voltage ac contactors, controllers, and control centers
Industrial Control Equipment
Asociación de Normalización y Certificación, A.C
Tableros de Distribución en Media Tensión
Diseño de instalaciones eléctricas
5. Standard service conditions

The rated SafeGear MCC features are guaranteed under the following conditions:

- Minimum ambient temperature: – 5 °C
- Maximum ambient temperature: + 40 °C
- Maximum 24 hour ambient relative humidity: 95% non-condensing
- The normal operational altitude is up to 1000m above sea level. For higher altitude applications, please contact your ABB sales representative
- Non-corrosive and non-contaminated atmosphere
- Transition section is not required for connections with ABB's SafeGear Metal-Clad switchgear of similar rating

6. HCV vacuum contactor

Description

The medium voltage V-Contact HCV contactors are suitable for alternating current operation and are normally used to control customer's requirements for a high number of hourly operations.

The basic contactors consist of:

- Molded polyester resin monoblock containing the vacuum interrupters
- Bistable electromagnet drive
- Multi-voltage feeder
- Auxiliary contacts
- Mechanical status indicator (open/closed).

Reduced maintenance: Vacuum bottle contacts have long life with virtually no maintenance required.

Environment resistant: Ideal for use in high dust areas. Switching arc is contained within the vacuum bottle, shielding the main contacts.

Electronic control drive unit: All contactors include electronic control of the operating coil which offers a wide control voltage of 115/120 or 230/240V ac 50/60Hz (120/125 or 240/250V dc), anti-chopping feature and reduced power consumption.

Designed for safety: High voltage and low voltage parts are totally separated by an insulated barrier (non-flammable molded frame).

Vacuum contactors are rated to perform switching operations before the unit requires maintenance, typically 2.5 millions.

Since vacuum contactors are not designed for interrupting currents higher than a few kiloamperes, a fuse in series is required to protect the distribution system against faults. A contactor requires a holding current in the solenoid coil to keep it in the closed position.

Although the holding current is often quite small, customers are sometimes concerned that the contactor will open during a brief control power outage. Some designs incorporate mechanical latches to keep the contactors in a closed position. However, these latches do not perform all the functions of conventional circuit breakers.

A latched vacuum contactor is not a circuit breaker in terms of functionality or in terms of its rating. However, properly utilized it can provide long service and trouble-free operation.
## Electrical Characteristics of HCV

<table>
<thead>
<tr>
<th>Description</th>
<th>HCV-5HA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated Voltage</td>
<td>7200 Volts</td>
</tr>
<tr>
<td>Rated Current</td>
<td>400 Amps</td>
</tr>
<tr>
<td>Interrupting Capacity</td>
<td>7000A RMS Symmetrical @5000V Max.</td>
</tr>
<tr>
<td></td>
<td>4500A RMS Symmetrical @7200V Max.</td>
</tr>
<tr>
<td>Permissible Switching Frequency</td>
<td>1200/Hour</td>
</tr>
<tr>
<td>Mechanical Life</td>
<td>2,500,000 Operations</td>
</tr>
<tr>
<td>Electrical Life</td>
<td>250,000 Operations</td>
</tr>
<tr>
<td>Closing Time</td>
<td>75-100 ms</td>
</tr>
<tr>
<td>Opening Time*</td>
<td>20-30 ms</td>
</tr>
<tr>
<td>Arcing Time</td>
<td>10 ms or less</td>
</tr>
<tr>
<td>Pick-Up Voltage AC or DC</td>
<td>85% Rated (Hot) - 70% Rated (Cold)</td>
</tr>
<tr>
<td>Drop-Out Voltage AC or DC</td>
<td>50% Rated (Hot) - 40% Rated (cold)</td>
</tr>
<tr>
<td>Rated Control Voltage AC</td>
<td>115/120 or 230/240 V 50/60 Hz</td>
</tr>
<tr>
<td>Rated Control Voltage DC</td>
<td>120/125 or 240/250 V</td>
</tr>
<tr>
<td>Coil Circuit Inrush</td>
<td>670 VA AC (700 W DC)</td>
</tr>
<tr>
<td>Coil Circuit Holding</td>
<td>85 VA AC (85 W DC)</td>
</tr>
<tr>
<td>Auxiliary Contact Arrangement</td>
<td>3 N.O. - 3 N.C.</td>
</tr>
<tr>
<td>Auxiliary Contact Rating</td>
<td>10 A, 600 V (NEMA Class A600)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Description</th>
<th>HCV-5HAL (Latched Type Only)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permissible Switching Frequency</td>
<td>300/Hour</td>
</tr>
<tr>
<td>Mechanical Life</td>
<td>250,000 Operations</td>
</tr>
<tr>
<td>Tripping Voltage</td>
<td>40-60% Rating DC</td>
</tr>
<tr>
<td>Tripping Current</td>
<td>4.8 A DC Max</td>
</tr>
</tbody>
</table>

*DC switching, opening terminals 3 & 4.

### Fuse technology

There are two kinds of power fuses: standard (general purpose) and current limiting fuses.

Ratings of standard fuses depend on (1) the normal continuous current and (2) the time it takes for the fuses to respond to the different magnitudes of overcurrent. Fusible links, the principle elements of every fuse, can have different lengths and thickness and can be made of different metals or alloys.

The interrupting medium of a fuse also influences its operating characteristics. This characteristic of the standard fuse is an inversely proportional time-overcurrent curve, as shown schematically in the figure.

Proper selection of a fuse for an induction motor is very important. An improperly selected fuse can permanently damage the motor and other equipment in the system. Both starting inrush and normal load currents have to be considered.
### 7. Cubicle features

**Contactor truck assembly**

The vacuum contactor and power fuses are mounted on a fully withdrawable rackable truck. This truck assembly eliminates the need of an isolation switch, therefore reducing the number of moving parts and simplifying the handling, maintenance and safety.

**Single phase protection**

A blown fuse trip system can actuate a limit switch that will trip the contactor and energize an indicating lamp located on the instrument compartment cell door.

**Shutters**

A metallic shutter blocks access to primary contacts when the contactor is in the Disconnected/Test position or withdrawn from the SafeGear MCC. The motion of the withdrawable contactor opens and closes the shutter automatically.

**Exhaust plenum**

In the event of an internal arc, the exhaust plenum will safely vent the gases outside the building.

### Ampere rated fuses

<table>
<thead>
<tr>
<th>Application</th>
<th>Voltage</th>
<th>Type of fuses</th>
<th>Rated Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Protection</td>
<td>5.5</td>
<td>Bolt-In</td>
<td>70, 100, 130, 170, 200, 230, 315, 390</td>
</tr>
<tr>
<td>Transformer Protection</td>
<td>7.2</td>
<td>Bolt-In</td>
<td>10, 15, 20, 25, 30, 40, 50, 65, 80, 100, 125, 150, 175, 200, 250, 300, 350</td>
</tr>
<tr>
<td>Motor Protection</td>
<td>5.5</td>
<td>Bolt-In</td>
<td>70, 100, 130, 150, 170, 200, 230, 390</td>
</tr>
</tbody>
</table>

**Main bus and supports**

The available main bus ratings are 1200, 2000 and 3000A.

Bus supports and insulation materials are flame-retardant, track-resistant and non-hygroscopic.

Bus bars are made of cooper and have fully round edges. Bus insulation is heat-shrinkable tubing as standard (solid epoxy coating available as an option).

Connection joints, as well as bus bars, are silver-plated (tin plated as an option).

**Power fuses**

Current limiting power fuses are installed with the withdrawable contactor and are suitable for use with motor, capacitor or transformer applications.

Power fuses for motor protection (type R) will be equipped with bolted type connection. Optional power fuses for feeder or transformer protection (type E) equipped with bolted type connection are also available.
8. SafeGear MCC section view

1. Lower contactor compartment
2. Low voltage compartment
3. Vent chamber
4. Upper contactor compartment or PT compartment
5. Plenum
6. Power cables compartment
7. Bus compartment

9. General dimensions
Contact us

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More product information:
www.abb.com/productguide

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