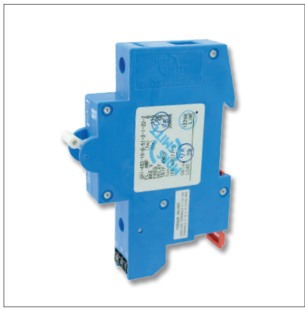
Wabtec
CORPORATION



Prioritizing safety in protection & control

# Miniature circuit breakers

Mors Smitt
A Wabtec Company


# Miniature circuit breakers

Mors Smitt offers a wide range of railway hydraulic magnetic circuit breakers. The circuit breakers are fully configurable to meet individual requirements.

Circuit breakers are used to protect electronic equipment and components against unintended high currents. Mors Smitt circuit breakers can be used in all railway applications where protection against overload and short circuit is necessary, for example HVAC systems, (door) control systems, braking systems, passenger information systems, etc.

An overload situation can occur, when under strained or heavy use a motor or other load-generating component within the equipment will draw additional current from the power source. High currents cause the wires or components to overheat and ultimately burn up.

Mors Smitt circuit breakers are optional with integrated auxiliary contacts to monitor the circuit. The trip point is always at maximum allowable current, independent of ambient temperature. Mid-trip handle to indicate clearly a breaker operation caused by electrical fault.

## Serving Safety

We highly value our customers and put service first. We are committed to quality excellence to create reliable products and services, serving the stringest relia-bility, availability, maintain-ability, safety, health and environmental demands from our customers. This commitment will result in lower life-cycle-cost.

Mors Smitt is a trusted partner in your supply chain. World wide availability of products is asssured by a network of professional, trained and dedicated subsidiaries, distributors and agents offering local service and support.

Mors Smitt is a total supplier for onboard and trackside safety-critical solutions. Combining electro-mechanical ultra-high dependable relays with safety-critical electronics

All is manufactured to the strictest standards.

Wabtec CORPORATION

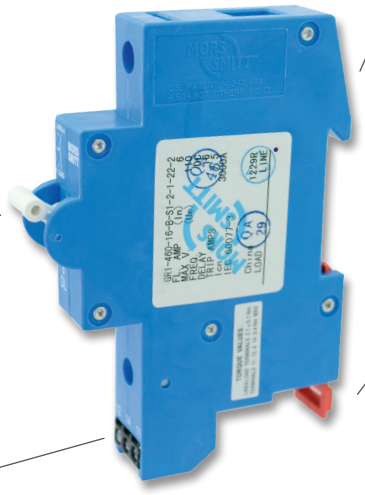
**Mors Smitt is part of Wabtec Corporation. A global provider of value-added, technology-based products and services for railway, transit, freight and other industrial markets, with facilities world wide.**

**Time delays**
A wide range of time delays is available for optimal application compatibility.

**Hydraulic magnetic**
Operation is precise and not affected by changes in ambient temperatures.

**Mid trip (handle options)**
The handle of a tripped circuit breaker remains in the middle position for easy visual inspection.

**Auxiliary contacts**
The auxiliary switch presents the status of the circuit breaker and can be connected to external electronics, e.g. annunciators on a drivers desk.



**Trip-free mechanism**
This safety feature makes it impossible to manually hold the contacts closed during overcurrent or fault conditions.

**Circuit options**
Several circuit options are available for easy adaption in any application.

**Connection terminals**
All Mors Smitt circuit breakers can be equipped with a terminal of your choice, to save installation time.

**Accessories**
A wide range of accessories is availible for flexible connectivity. E.G. busbars and feeding terminals.

**> 10**
**million in use in rolling stock applications world wide**

## Advantages

- Precise, temperature stable mechanism, due to hydraulic magnetic technology
- Overcurrent sensing mechanism reacts only to changes of current
- No ‘warm-up’ period to slow down its response to overload. No ‘cooldown’ period after overload before it can be reset. Derating considerations due to temperature variations are not normally required and heat-induced nuisance tripping is avoided
- A common trip linkage between all poles, another safety feature, ensures that an overload in one pole will trip all adjacent poles
- A trip-free mechanism, a safety feature, makes it impossible to manually hold the contacts closed during overcurrent or fault conditions
- Standard dimensions, mounting and current ratings provide maximum application versatility
- Wide range: current ratings to 700 Amps and rated voltages to 600 VAC and 110 VDC are available
- Options: series trip, mid-trip, switch only (with or without auxiliary switch), remote shutdown, shunt trip, and dual coil circuit options are available

### Standards

| | |
|---|---|
| IEC 60077 | Electrical equipment for rolling stock in railway applications |
| EN 50155 | Electronic equipment used on rolling stock for railway applications |
| EN 45545-2 | Fire protection on railway vehicles |
| NF F16-101/-102 | Fire behavior - Railway rolling stock |
| IEC 61373 | Shock & vibration resistance - Railway rolling stock |

# What makes a magnetic circuit breaker trip?

### Standard configuration

The most common magnetic circuit breaker configuration is called ‘Series trip’. It consists of a current sensing coil connected in series with a set of contacts (figure 1.1).

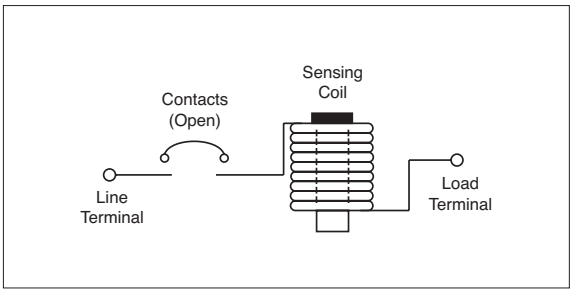



Figure 1.1 - Standard configuration

### Rated current of less

Inside the coil is a non-magnetic delay tube, housing a springbiased, moving, magnetic core. An armature links the contacts to the coil mechanism, which functions as an electro magnet. When the contacts are open, there is no current flow through the circuit breaker, and no electro-magnetic energy is developed by the coil. When the contacts are closed, current flow begins (figure 1.2).

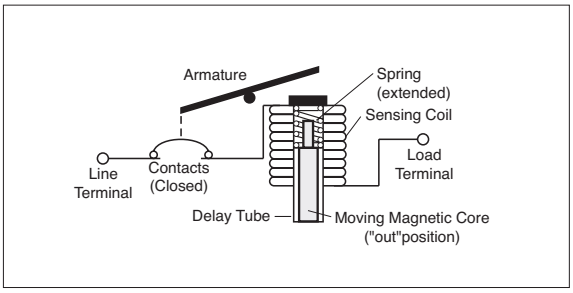



Figure 1.2 - Rated current or less

### Moderate overload with induced delay

As the normal operating or ‘rated’ current flows through the sensing coil, a magnetic field is created around that coil. When the current flow increases, the strength of the magnetic field increases, drawing the springbiased, movable, magnetic core toward the pole piece. As the core moves inward, the efficiency of the magnetic circuit is increased, creating an even greater electro-magnetic force. When the core is fully ‘in’, maximum electro-magnetic force is attained, the armature is attracted to the pole piece, unlatching a trip mechanism, thereby opening the contacts (figure 1.3).

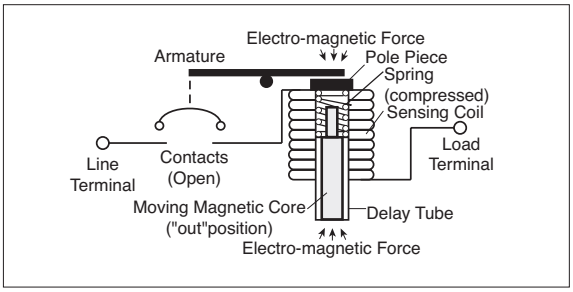



Figure 1.3 - Moderate overload with induced delay

### Short circuit condition no induced delay

Under short circuit conditions, the resultant increase in electro magnetic energy is so rapid, that the armature is attracted without core movement, allowing the breaker to trip without an induced delay. This is called ‘instantaneous trip’. It is a safety feature which results in a very fast trip response when most needed (figure 1.4).

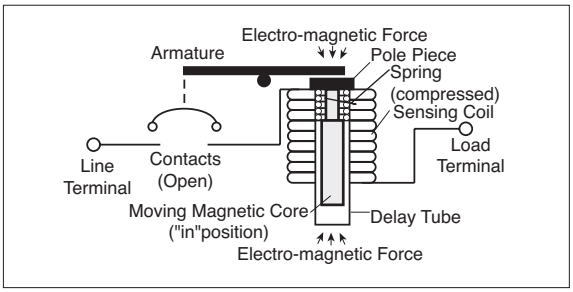



Figure 1.4 - Short circuit condition no induced delay

## Circuit options

### Series trip

A basic two terminal device is usually used as a combination power switch and overload protector. the contacts and current sensing coil are connected in series with the line and load terminals (figure 2.1).

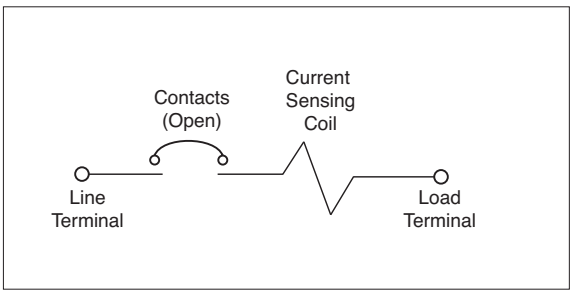



Figure 2.1 - Series trip

### Series trip with auxiliary switch

Same as a series trip except with the addition of a S.P.D.T. snap-action switch, which is electrically isolated, but mechanically linked to the movement of the main breaker contacts. This switch is commonly used to remotely signal the status of the breaker (on or off / tripped) (figure 2.2). Series trip is also available with alarm switch.

# Circuit options

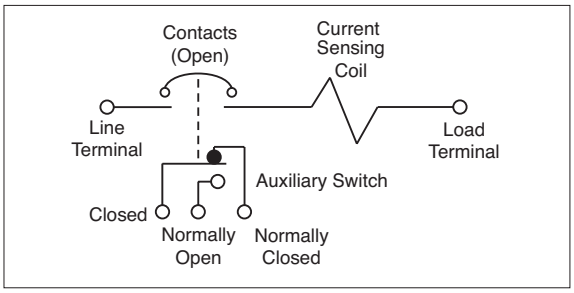



Figure 2.2 - Series trip with auxiliary switch

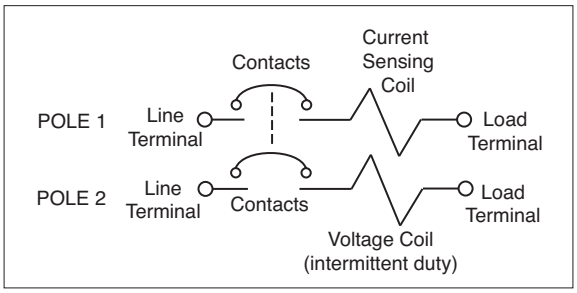



Figure 2.3 - Series trip with rmote shutdown

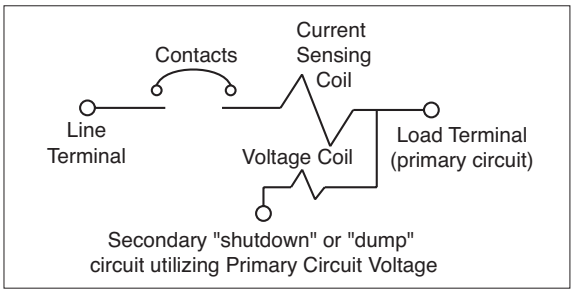



Figure 2.4 - Shunt trip dual coil

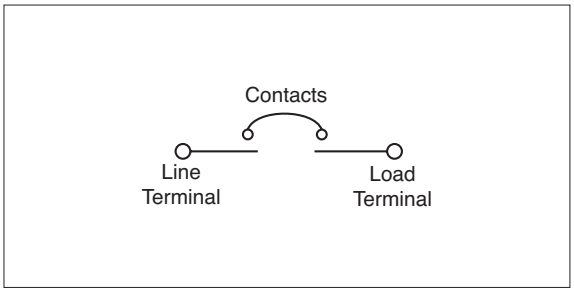



Figure 2.5 - Switch only

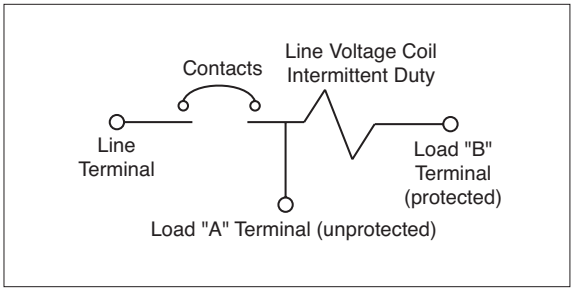



Figure 2.6 - Shunt trip

## Series mid-trip with alarm switch

Similar to 'Series trip with auxiliary switch' except the S.P.D.T. auxiliary switch is actuated only upon electrical trip of the breaker. upon electrical trip, the NO contact closes and the NC contact opens. This can be used to remotely signal the tripped status of the breaker. also, upon electrical trip, the handle moves to the 'mid' position as opposed to the 'full off' position typical of other breakers. This gives a specific visual panel indication of a tripped breaker as compared to one which is merely turned off (figure 2.2). Series mid-trip is also available without auxiliary switch.

## Series trip with remote shutdown

For dump circuit or panic circuit applications. Same as a series trip but with an additional (self-interrupting) voltage coil pole (usually of opposite polarity) for remote shutdown. In the example, a momentary voltage pulse to pole 2 will shut down both pole 1 and pole 2. Because the voltage coil in pole 2 is self-interrupting, no additional components, such as auxiliary switches, are required in that circuit (figure 2.3).

## Dual coil with remote shutdown

Similar to 'Series trip with remote shutdown' except an extra pole is not required. A dual coil breaker has two coils in the space normally occupied by a single coil. A current coil is used for overload protection and the instant trip voltage coil can be used for remote shutdown. The dual coil option is the 'shunt trip dual coil' , a three terminal device with one side of the voltage coil internally connected to the primary circuit (figure 2.4). The other side of the voltage coil is connected to an external third terminal on the bottom of the breaker. This circuit option uses line voltage for dual coil activation, saving wiring costs and resulting in a self-protecting voltage coil.

## Switch only

Same as a series trip, but without a sensing coil. Provides low cost, heavy-duty switch capability when overload protection is not needed. 'Switch only' is available with and without an auxiliary switch (figure 2.5).

## Shunt trip

A three terminal device similar to 'Series trip', but with the addition of a third terminal between the contacts and the coil. This circuit is usually used to control two separate loads (a&b) from the same power source, while sensing overload current in only one load (b). It should be noted that overload protection is not provided in the load (a) circuit, and if needed, must be provided by other means. Also, the sum of the current in circuit a & b must not exceed the contact rating of the device (figure 2.6).

# Time delays

**The trip time of a hydraulic magnetic circuit breaker is directly related to the length of time it takes for the moving metal core to move to the full 'in' position.**

If the delay tube is filled with air, the core will move rather quickly, and the breaker will trip quickly. This is characteristic of the ultrashort delay curves (figure 3.1).

Solid state devices, which cannot tolerate even short periods of current overload, should use Instantaneous curves (figure 3.2).

These curves have no intentional time delay. When the delay tube is filled with a light viscosity (temperature stable) fluid, the core's travel to the full 'in' position will be intentionally delayed. This results in the slightly longer medium delays (figure 3.3), which are used for general purpose applications.

When a heavy viscosity fluid is used, the result will be a long delay, such as figure 3.4. These curves are commonly used in motor applications to minimize the potential for nuisance tripping during lengthy motor start-ups.

By use of magnetic 'shunt' plates within the magnetic circuit, it is possible to divert magnetic flux resulting in higher 'inrush withstanding capability' (or high inrush delays). These delays disregard short duration, high pulse surges (typically 8ms or less and up to 25x rated current), characteristic of transformers, switching power supplies and capacitive loads (figure 3.5).

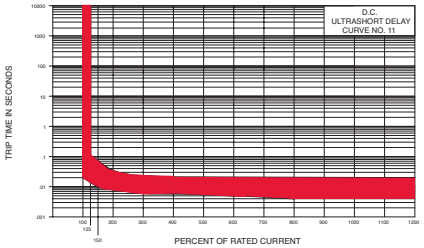



Figure 3.1 - Ultrashort delay curve

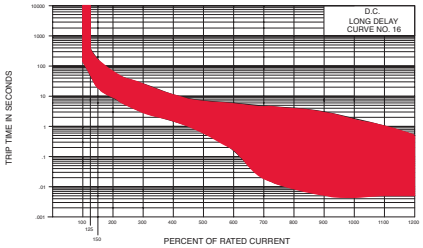



Figure 3.4 - Long delay curve

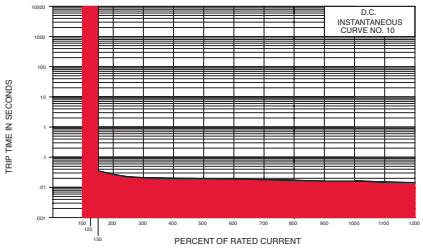



Figure 3.2 - Instantaneous curve

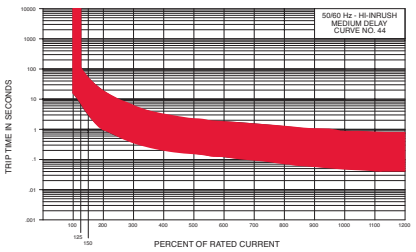



Figure 3.5 - Hi-inrush medium delay curve

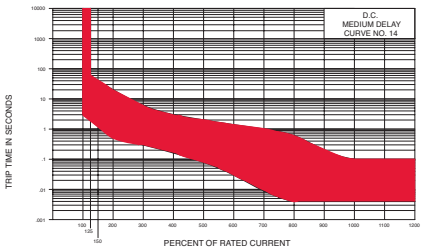



Figure 3.3 - Medium delay curve

## Portfolio

| |  AR |  CR |  ER |  FR |  GR |  RBR |
|---|---|---|---|---|---|---|
| Overcurrent protection | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Rated current | 0.1 to 50 A | 0.02 to 100 A | 0.1 to 120 A | 100 to 700 A | 0.2 to 63 A | 0.02 to 100 A |
| Remote operated | | | | | | ✓ |
| Panel mounting | ✓ | ✓ | ✓ | ✓ | | ✓ |
| Wall mouning | | | ✓ | | | |
| 35 mm rail mounting | | | | | ✓ | |
| Max. operating voltage DC | 90 | 137.5 | 160 | 137.5 | 137.5 | 137.5 |
| Max. operating voltage AC | 277 | 484 | 625 | 277 | 484 | 484 |
| Max. number of poles | 6 | 6 | 6 | 3 | 4 | 3 |
| Auxiliary or alarm contact | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Breaking capacity up to | 5000 A | 10000 A | 6000 A | 50000 A | 5000 A | 10000 A |

# Customized solutions

**New built or retro-fit Mors Smitt will deliver a perfect and competitive on time solution for any onboard challenge of space limitations and technical requirement. In close co-operation with customers, the best configuration of power distribution, protection components such as miniature circuit breakers, relays and contactors will be selected to get the optimum result.**

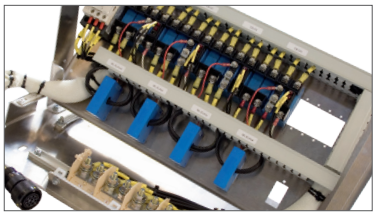
## GFI (Ground fault detection)

For the London Sub Surface Line (SSL) Mors Smitt designed a GFI unit (Ground fault indicator).

The GFI unit works together with a circuit breaker equipped with an additional voltage coil and detects unbalances between the 3 phases and ground.

The GFI unit is connected to the voltage coil of the circuit breaker.

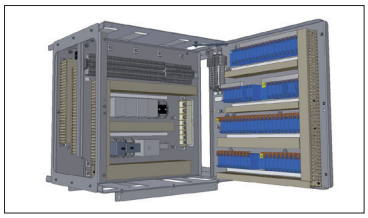
- When the voltage coil is energized the breaker will trip
- When the GFI senses an unbalance the unit will trip the circuit breaker to disconnect application from the power supply to prevent any damage to the application from the power supply to prevent any damage to the application



## Septa Philadelphia


For SEPTA Philadelphia Mors Smitt designed a solution with key points like low maintenance, plug and play installation and two sides accessible.

Hyundai Rotem and Mors Smitt selected a configuration with circuit breakers, D-U relays and contactors in a square electrical distribution panel.



## Sub Surface Line - London

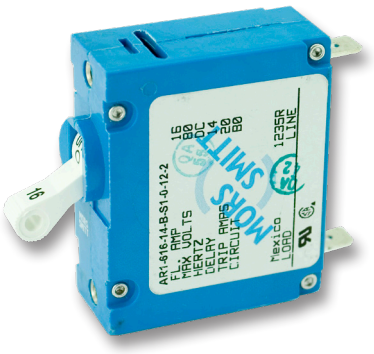
Project together with Bombardier Transportation special electric power distribution panels (AC & DC) have been developed.

A smart mechanical construction was designed for easy assembly and access under the seats in the train to optimize use of limited space.

A construction was selected where the earth leakage module is combined with circuit breakers to guarantee optimum user safety.

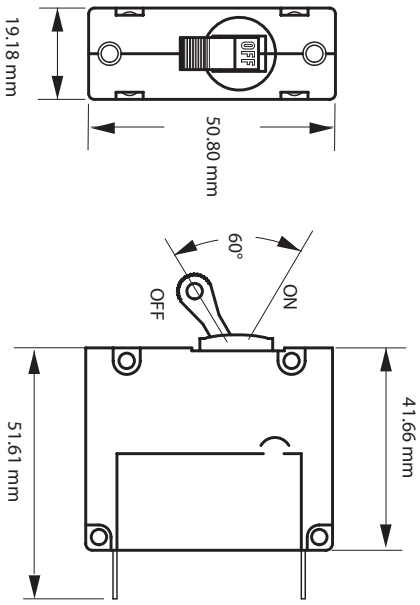
# AR

# Panel mounting
# up to 6 poles



- Compact design
- Unique arc chute method which results in higher interrupting capacities
- Thermoset glass filled polyester halfshell construction for increased mechanical strength, electrical strength and to achieve highest level / rating on fire and smoke tests
- Standard blue housing and white handle to improve visibility
- Precise, temperature independent, operation
- Wide choice of time delays, terminal options and actuator colors
- The breakers can also be equipped with an optional mid-trip handle style actuator

## Dimensions




## Electrical characteristics

| | | |
|---|---|---|
| *Application voltage* | *DC for 1-6 poles* | *AC for 1-6 poles* |
| Rated voltage | 12...72 VDC | 12...251 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VAC |
| Max. operating voltage | 90 VDC | 277 VAC |
| | Remark: 8.4...80 VDC, max 50 A, 80...90 VDC, max 40 A | |
| Current rating | 0.1...50 A (other ratings on request) | |
| Standard voltage coils | 6...65 VDC & 6...240 VAC | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | |
| Dielectric strength | 1500 V 60 Hz for one minute between all electrically isolated terminals | |
| Max. interrupting capacity | UL 10077 | 7500 A @ 80 VDC, 0.1 - 50 A |
| | | 3000 A @ 250 VAC, 0.1 - 50 A |
| | | 5000 A @ 250 VAC, 0.1 - 50 A* |
| | | 5000 A @ 277 VAC, 0.1 - 30 A* |
| | IEC 60934 | 3000 A @ 65 VDC, 0.1 - 50 A |
| | | 5000 A @ 65 VDC, 0.1 - 50 A* |
| | | 1500 A @ 80 VDC, 0.1 - 50 A |
| | | 3000 A @ 80 VDC, 0.1 - 50 A* |
| | | 3000 A @ 250 VAC, 0.1 - 50 A |
| | | 5000 A @ 250 VAC, 0.1 - 30 A* |

* with backup fuse

## Mechanical characteristics

| | |
|---|---|
| Endurance | 10.000 On-off operations wity rated current & voltage |
| Trip free mechanism | All AR series circuit breakers will trip on overload, even when the actuator is forcibly held in the on position |
| Mid trip indication (optional) | The operating actuator moves positively to the off-position when an overload causes the circuit breaker to trip.<br>When mid-trip handle is specified, the handle moves to the mid position on electrical trip of the circuit breaker.<br>When mid-trip handle with alarm is specified, the handle moves to the mid position & the alarm actuates when the circuit breaker is electrically tripped. |

## Terminals

Faston / tab 6.3 mm

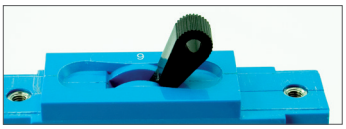
Double faston / tab 6.3 mm
+ aux. switch

Stud M6

*Other terminals availale.*
*See AR circuit breakers datasheet.*

## Handles

On and off switch



Black handle

Red handle

*Other colours available.*
*See AR circuit breaker datasheet.*

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2, 3, 4, 5 or 6 poles<br>For DC and AC applications:<br>1-2 poles ≤ 50 A, 3-6 poles ≤ 30 A |
| Internal circuit | Series trip, shunt trip & switch only |
| Weight | Approx. 65 g/pole |
| Colours | Housing: blue<br>Actuator: white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94 V0<br>Terminals: Brass with acid tin plate |

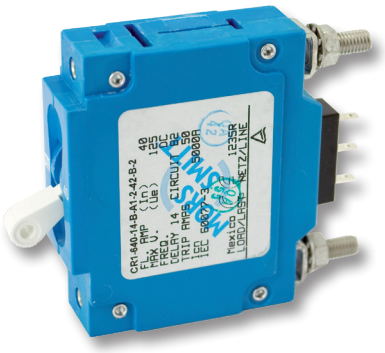
## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-STD G method 107 D, test condition A |
| Salt mist | IEC 60068-2-52 severity level 3 |
| Damp heat | IEC 60068-2-3D test method Db variant 1 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker |
| Moisture resistance / humidity | MIL-STD 202G method 106 D |

**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

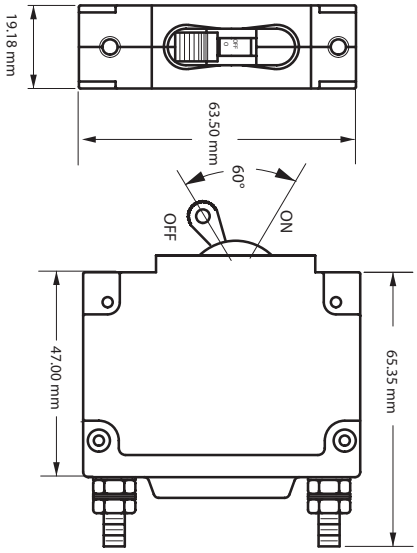
# CR

# Panel mounting
# up to 6 poles



- Unique arc chute design which results in higher interrupting capacities
- Thermoset glass filled polyester halfshell construction for increased mechanical strength, electrical strength and to achieve highest level/rating on fire and smoke tests
- Wiping contacts - mechanical linkage with two-step actuation – cleans contacts, provides high, positive contact pressure & longer contact life
- Standard blue housing and white handle to improve visibility
- Available with metric threaded stud terminals and american standard terminals
- The breakers can also be equipped with an optional mid-trip handle style actuator
- 0.02 - 100 amps
- Precise, temperature independant, operation

## Dimensions




## Electrical characteristics

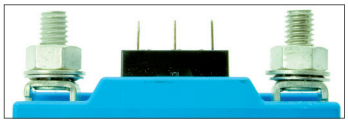
| | | | |
|---|---|---|---|
| *Application voltage* | *DC for 1-6 poles* | *AC for 1 pole* | *AC for 2-6 poles* |
| Rated voltage | 12...110 VDC | 12...230 VAC | 12...400 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VAC | 10.8 VAC |
| Max. operating voltage | 137.5 VDC | 253 VAC | 484 VAC |
| | Remark: 8.4...125 VDC, max 100 A, 125...137.5 VDC, max 70 A | | |
| Current rating | 0.2...100 A (other ratings on request) | | |
| Standard voltage coils | 6...65 VDC & 6...240 VAC (other ratings on request) | | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | | |
| Dielectric strength | 5000 V 50/60 Hz for one minute between all electrically isolated terminals | | |
| Max. interrupting capacity | UL 489 | 10.000 A @ 80 VDC, 0.1 - 100 A | |
| | IEC 60077 | 5000 A @ 125 VDC, 1 - 70 A<br>4500 A @ 415 VAC, 1 - 60 A<br>4000 A @ 415 VAC, 61 - 100 A | |
| | IEC 60934 | 5000 A @ 80 VDC, 0.1 - 100 A<br>5000 A @ 125 VDC, 1 - 60 A<br>5000 A @ 250 VAC, 0.1 - 100 A | |
| | IEC 60947-2 | 6000 A @ 240 VAC, 1 - 70 A<br>4500 A @ 240 VAC, 71 - 100 A<br>6000 A @ 415 VAC, 1 - 30 A<br>4500 A @ 415 VAC, 31 - 70 A | |

## Mechanical characteristics

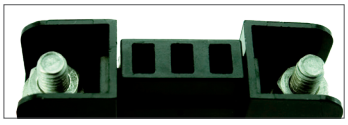
| | |
|---|---|
| Endurance | 20.000 On-off operations @ 6 per minute without current & voltage and 10,000 On-off operations with rated current & voltage |
| Trip free mechanism | All CR series circuit breakers will trip on overload, even when the actuator is forcibly held in the on position |
| Mid trip indication (optional) | The operating handle moves positive to the mid position and an auxiliary switch is actuated when an overload causes the circuit breaker to trip. |

## Terminals

Stud M5 or M6



Stud M5 or M6 + aux. switch



Shrouds

Optional: special terminal hardware acc. NFF 61030

*See CR circuit breaker datasheet.*

## Handles

Short handle

Black handle

Red handle

*Other colours available.*
*See CR circuit breaker datasheet.*

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2, 3, 4, 5 or 6 poles<br>For DC and AC applications:<br>1-2 poles ≤ 100 A, 3-6 poles ≤ 70 A |
| Internal circuit | Series trip, shunt trip & switch only |
| Weight | Approx. 101 g/pole |
| Colours | Housing: blue<br>Actuator: white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94 V0<br>Terminals: Brass with acid tin plate |

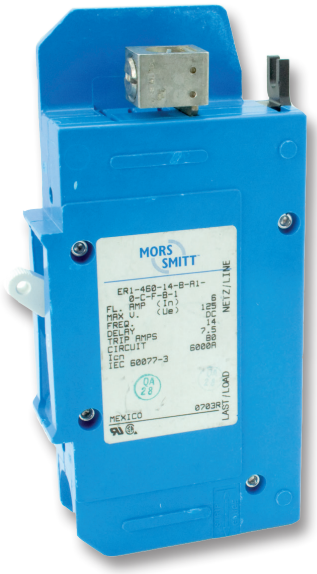
## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-STD 107 D, test condition A |
| Salt mist | IEC 60068-2-52 severity level 3 |
| Damp heat | IEC 60068-2-30 test method Db variant 1 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker, when no panel is mounted IP 20 |
| Moisture resistance / humidity | MIL-STD 202G method |

**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

# ER

## Higher voltage & current up to 6 poles



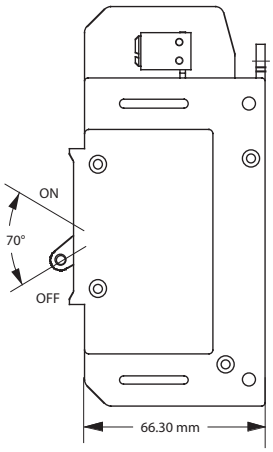

- Ideal for higher amperage applications
- Available with front and back mounting
- Heavy duty box wire connector for solid wire and a pressure plate connector for stranded wire
- Unique arc chute design, which results in higher interrupting capacities
- Thermoset glassfilled polyester halfshell construction for increased mechanical strength, electrical strength and to achieve highest level / rating on fire and smoke tests
- Wiping contacts, mechanical linkage with two-step actuation, cleans contacts, provides high, positive contact pressure & longer contact life
- Standard blue housing and white handle to improve visibility
- Precise, temperature independent, operation
- Large choice of time delays

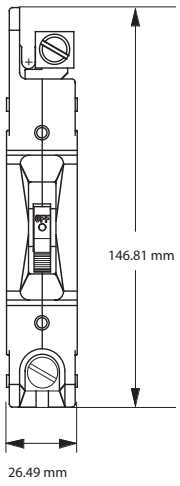
### Electrical characteristics

| *Application voltage* | *DC for 1-6 poles* | *AC for 1 pole* | *AC for 2-6 poles* |
|---|---|---|---|
| Rated voltage | 12...128 VDC | 12...251 VAC | 12...568 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VAC | 10.8 VAC |
| Max. operating voltage | 160 VDC | 277 VAC | 625 VAC |
| | Remark: 8.4...125 VDC, max 120 A, 125...160 VDC, max 100 A | | |
| Current rating | 0.1...120 A (other ratings on request)<br>Remark: 4-6 poles max. 100 A | | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | | |
| Dielectric strength | 2200 VAC 50/60 Hz for one minute between all electrically isolated terminals | | |
| Max. interrupting capacity | UL 1007 | 5000 A @ 160 VDC, 0.1 - 100 A<br>5000 A @ 277 VAC, 0.1 - 100 A<br>10.000 A @ 277 VAC, 0.1 - 100 A<br>10.000 A @ 600 VAC, 0.1 - 100 A | |
| | IEC 60934 | 5000 A @ 125 VDC, 0.1 - 100 A<br>5000 A @ 240 VAC, 0.1 - 100 A<br>4000 A @ 415 VAC, 0.1 - 100 A | |
| | IEC 6007 | 6000 A @ 125 VDC, 0.1 - 100 A | |
| | IEC 60947-2 | 6000 A @ 240 VAC, 0.1 - 100 A | |

* with backup fuse

### Dimensions

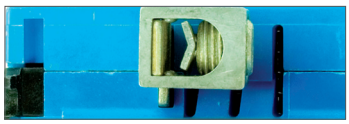


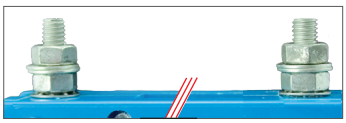

### Mechanical characteristics

| | |
|---|---|
| Endurance | 10.000 On-off operations with rated current & voltage |
| Trip free mechanism | All ER series circuit breakers will trip on overload, even when the actuator is forcibly held in the on position |
| Trip indication | Standard trip indication, the operating actuator moves positively to the off position when an overload causes the breaker to trip. |

## Terminals



Box terminals



Stud M6

*Other colours available.*
*See ER circuit breaker datasheet.*

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2, 3, 4, 5 or 6 poles |
| Mounting | A 7.62 mm (3”) minimum spacing must be provided between the circuit breaker arc venting area on back connecting ER series circuit breakers and grounded obstructions. ER series circuit breakers must be mounted on a vertical surface. |
| Connectors, box type | Front connected ER series circuit breakers are supplied with box type pressure connectors that accept copper or aluminium conductors as follow: 1/0 - 14 copper, 1/0 - 12 aluminium. |
| Internal circuit | Series trip, shunt trip, relay trip & switch only |
| Weight | Approx. 252 g/pole |
| Colours | Housing: blue<br>Actuator: white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94 V0<br>Terminals: Brass with acid tin plate |

## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-STD 202G, method 107D, test condition A |
| Salt mist | IEC 60068-2-52 severity level 3 |
| Damp heat | IEC 60068-2-30 test method Db variant 1 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker |
| Moisture resistance / humidity | MIL-STD 202G method |

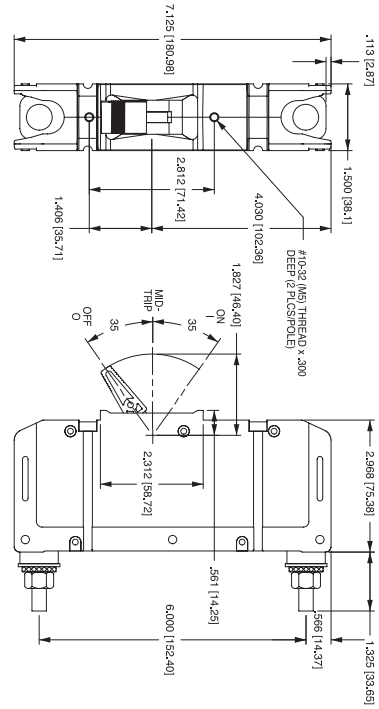
**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

# FR

# Panel mounting up to 3 poles

- Unique arc chute design which results in higher interrupting capacities
- Thermoset glass filled polyester halfshell construction for increased mechanical strength, electrical strength and to achieve highest level/rating on fire and smoke tests
- Wiping contacts - mechanical linkage with two-step actuation – cleans contacts, provides high, positive contact pressure & longer contact life
- Standard blue housing and white handle to improve visibility
- The breakers can also be equipped with an optional mid-trip handle style actuator
- 100-700 amps
- Precise, temperature independant, operation

## Dimensions




## Electrical characteristics

| | | |
|---|---|---|
| *Application voltage* | *DC for 1-3 poles* | *AC for 1-3 pole* |
| Rated voltage | 12...110 VDC | 12...251 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VAC |
| Max. operating voltage | 137.5 VDC | 277 VAC |
| | Remark: DC applications: max. 250 A for 1 pole, 300 A - 450 A for 2 poles (parallel pole construction), 500 A - 700 A for 3 poles (parallel pole construction) AC applications: max. 250 A for 1-3 poles | |
| Current rating | 100...700 A (other ratings on request) | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | |
| Dielectric strength | 1960 VAC 50/60 Hz for one minute between all electrically isolated terminals | |
| Max. interrupting capacity | UL 489 | 50000 A @ 125 VDC, 50 - 250 A<br>10000 A @ 277 VDC, 100 - 250 A |
| | UL 489A | 50.000 A @ 125 VDC, 251 - 700 A |
| | IEC 60947-2 | 25.000 A @ 125 VDC, 50 - 250 A |

## Mechanical characteristics

| | |
|---|---|
| Endurance | Single or multipole: 8.000 operations @ 5 per minute (4.000 'On-Off' operations with rated current and voltage + 4.000 operations with no load).<br>Parallel pole construction: 1.000 operations with rated current and voltage @ 5 per minute. |
| Trip free mechanism | Trips on short circuit overload, even when actuator is forcibly held in the 'On' position. |
| Trip indication | The operating handle moves positive to the mid position and an auxiliary switch is actuated when an overload causes the circuit breaker to trip. |

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2 or 3 poles |
| Internal circuit | Series trip |
| Weight | Approx. 950 g/pole |
| Colours | Housing: blue<br>Actuator: black or white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94V0<br>Terminals: Brass with acid tin plate |

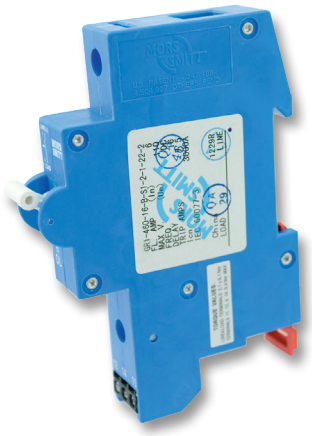
## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-PRD-55629, MIL-STD 202 |
| Salt mist | MIL-PRD-55629, MIL-STD 202 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker |
| Moisture resistance / humidity | MIL-PRD-55629, MIL-STD 202 |

**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

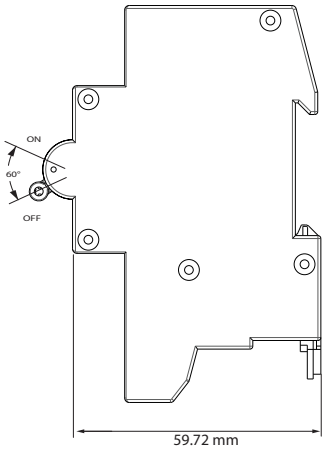
# GR

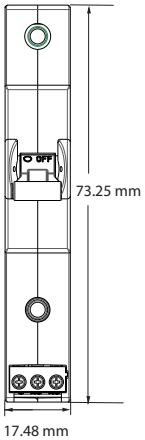
## 35 mm rail mounting
## up to 4 poles



- Integrated auxiliary change over contacts are optional (pre-mounted)
- 0.2 - 63 Amps
- Optional mid-trip handle style actuator
- Precise, temperature independant, operation
- Wiping contacts - mechanical linkage with two-step actuation – cleans contacts, provides high, positive contact pressure & longer contact life
- Standard blue housing and white handle to improve visibility

### Dimensions



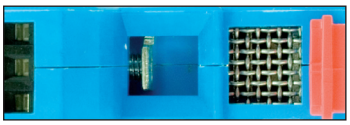

### Electrical characteristics

| | | | |
|---|---|---|---|
| *Application voltage* | *DC for 1-4 poles* | *AC for 1-2 poles* | *AC for 3-4 poles* |
| Rated voltage | 12...110 VDC | 12-240 VAC | 12...440 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VDC | 10.8 VDC |
| Max. operating voltage | 137.5 VDC | 264 VAC | 484 VAC |
| Current rating | 0.2 - 63 A, polarity insensitive (except 1-pole DC) | | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | | |
| Dielectric strength | 3000 V 50/60 Hz for one minute between all electrically isolated terminals | | |
| Max. interrupting capacity | IEC 60077 | 3000 A @ 137.5 VDC, 63 A (1-pole)<br>5000 A @ 137.5 VDC, 63 A (2-pole)<br>5000 A @ 264 VAC, 63 A (1- or 2-pole)<br>4000 A @ 484 VAC, 63 A (3- or 4-pole) | |
| | IEC 60947-2 | 10000 A @ 63 VDC, 63 A (1-pole)<br>2500 A @ 116 VDC, 63 A (1-pole)<br>8200 A @ 116 VDC, 63 A (2-pole)<br>5000 A @ 252 VAC, 63 A (1-pole)<br>4000 A @ 462 VAC, 63 A (3- or 4-pole)<br>4000 A @ 572 VAC, 10 A (2-pole) | |

### Mechanical characteristics

| | |
|---|---|
| Endurance | 10.000 On-off operations wity rated current & voltage |
| Trip free mechanism | Trips on short circuit, overload, even when actuator is forcibly held in the On-position |
| Mid trip indication (optional) | The operating handle moves possitivity to the mid position and an auxiliary switch is actuated when an overload causes the circuit breaker to trip |

## Terminal



Box terminals with pressure plate

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2, 3 or 4 poles |
| Auxiliary contacts | Captive screws or with combicon connection |
| Mounting | 35 mm rail. Lock is located at bottom of circuit breaker (load terminal side) when mounted vertical. |
| Weight | Approx. 135 g |
| Colours | Housing: blue<br>Actuator: white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94 V0<br>Terminals: Brass with acid tin plate |

## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-STD 202G, method 107D, test condition A |
| Salt mist | IEC 60068-2-52 severity level 3 |
| Damp heat | IEC 60068-2-30 test method Db variant 1 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker, IP 20 when no panel is mounted |
| Moisture resistance / humidity | MIL-STD 202G method 106D |

**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

# RBR

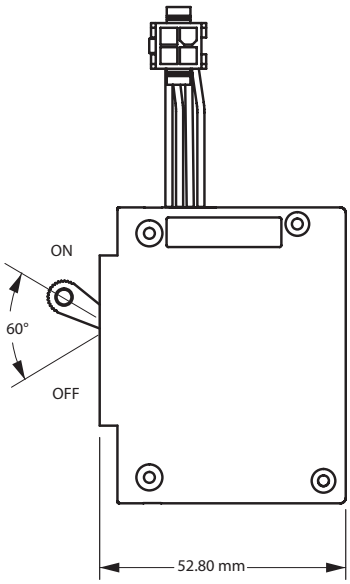
# Remote operated up to 3 poles

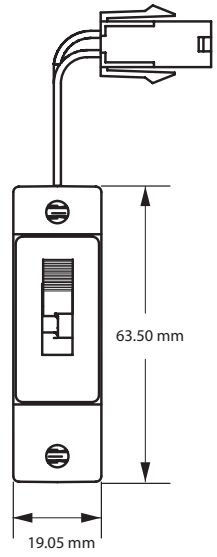
- On / off and trip indication
- Load shedding
- Energy management
- Compact size
- Automatic reset capable
- Choice of interface styles
- Panel mounting
- Manual operation override
- Fits into industry standard cut-out

The RBR remote operated circuit breaker combines the convenience of remote on, off and reset capability with the safety and accuracy of a standard magnetic current sensing device.

Allowing operation of the breaker from various locations in a system, facility or site (while not sacrificing the ability to manually operate the breaker if required). With the RBR service, diagnostics, load shedding and power distribution control functions can now be performed in areas that were previously unattended, inaccessible or unsafe.

## Dimensions




The RBR module allows remote operation of CR series panelmount breakers, (up to 3 poles) through hard wiring with a single pole, double throw switch connected to a standard power source, or more sophisticated relay and modem networks.

## Electrical characteristics

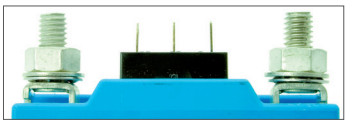
| | | | |
|---|---|---|---|
| *Application voltage* | *DC for 1-4 poles* | *AC for 1-2 poles* | *AC for 3-4 poles* |
| Rated voltage | 12...110 VDC | 12-240 VAC | 12...440 VAC |
| Min. operating voltage | 8.4 VDC | 10.8 VDC | 10.8 VDC |
| Max. operating voltage | 137.5 VDC | 264 VAC | 484 VAC |
| | *Remark: 8.4...125 VDC max 100 A, 125...137.5 VDC max 70 A* | | |
| Current rating | 0.2 - 100 A (other ratings on request) | | |
| Standard voltage coils | 6...65 VDC / 6... 240 VAC (other ratings on request) | | |
| Insulation resistance | Minimum 100 MΩ at 500 VDC | | |
| Dielectric strength | 5000 V 50/60 Hz for one minute between all electrically isolated terminals | | |
| Max. interrupting capacity | UL 489 | 10000 A @ 80 VDC, 1 - 100 A | |
| | IEC 60077 | 5000 A @ 125 VDC, 1 - 70 A<br>4500 A @ 415 VAC, 1 - 60 A<br>4000 A @ 415 VAC, 61 - 100 A | |
| | IEC 60934 | 5000 A @ 80 VDC, 0.1 - 100 A<br>5000 A @ 125 VDC, 1 - 60 A<br>5000 A @ 250 VAC, 0.1 - 100 A | |
| | IEC 60947-2 | 6000 A @ 240 VAC, 1 - 70 A<br>4500 A @ 240 VAC, 71 - 100 A<br>6000 A @ 415 VAC, 1 - 30 A<br>4500 A @ 415 VAC, 31 - 70 A | |

## Mechanical characteristics

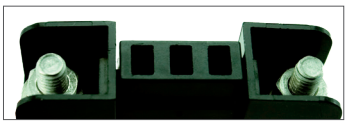
| | |
|---|---|
| Endurance | 20,000 On-off operations @ 6 per minute without current & voltage and 10,000 On-off operations with rated current & voltage |
| Trip free mechanism | Trips on short circuit, overload, even when actuator is forcibly held in the On-position |
| Mid trip indication (optional) | The operating handle moves possitivity to the mid position and an auxiliary switch is actuated when an overload causes the circuit breaker to trip |

## Terminals

Stud M5 or M6

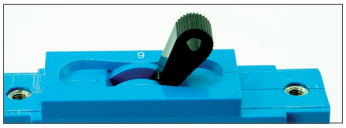


Stud M5 or M6 + aux. switch



Shrouds

## Handles



Black handle

Red handle

*Other colours available.*
*See RBR circuit breaker datasheet.*

## RBR motor specifications

| | |
|---|---|
| Interface options | - Flying leads<br>- Integral connector<br>- Flying lead with 4 pin dual row connector |
| Voltage input | 12 VDC, 20-40 VDC, 41-80 VDC |
| Start current | < 1 A |
| Switching time | < 2 s |

## Physical characteristics

| | |
|---|---|
| Number of poles | 1, 2, or 3 poles |
| Internal circuit | Series trip, switch only, shunt trip |
| Colours | Housing: blue<br>Actuator: white with dual legends |
| Material | Half shell: BMC605<br>Handle: Valox 420SEO UL94 V0<br>Terminals: Brass with acid tin plate |

## Environmental characteristics

| | |
|---|---|
| Environmental | EN 50125-1, IEC 60077-1 |
| Operating temperature | -50 °C...+85 °C |
| Vibration | IEC 61373, Category 1, class B body mounted |
| Shock | IEC 61373, Category 1, class A & B body mounted |
| Thermal shock | MIL-STD 202G, method 107D, test condition A |
| Salt mist | IEC 60068-2-52 severity level 3 |
| Damp heat | IEC 60068-2-30 test method Db variant 1 |
| Fire and smoke | NF F16-101, NF F16-102, EN 45545-2 |
| Protection | IEC 60529, IP 40 when a panel is mounted over the circuit breaker, IP 20 when no panel is mounted |
| Moisture resistance / humidity | MIL-STD 202G |

**More information on the circuit breakers is available in the datasheet on our website. This datasheet also contains the ordering scheme.**

# Accessories CR circuit breakers

**Feeding terminal, external, fork type**

| Art.no. |
|---|
| 631910001 |

**Endcap for busbar, fork and pin, 16 mm²**

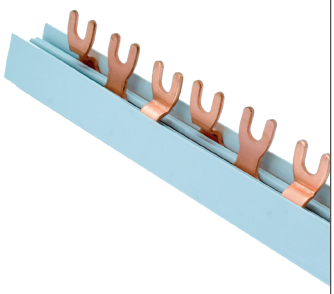
| Art.no. | Phase |
|---|---|
| 631912160 | 1 |
| 631912360 | 2&3 |

**Busbar feeding terminal, stackable**

| Art.no. |
|---|
| 631910006 |

**Handle lock with locking ring**

| Art.no. | Colour |
|---|---|
| 631310001 | Red |
| 631310002 | Black |
| 631312003 | White |

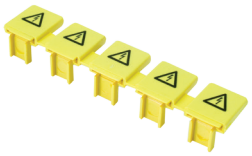


**Busbar up to 80 A, fork type, 1 m**

| Art.no. | Phase | Poles |
|---|---|---|
| 631312152 | 1 | 52 |
| 631312252 | 2 | 52 |
| 631312351 | 3 | 51 |

**Corner shaped busbar, 1 phase, 63 A**

| Art.no. | Poles |
|---|---|
| 631311102 | 2 |
| 631311103 | 3 |
| 631311104 | 4 |
| 631311105 | 5 |
| 631311106 | 6 |
| 631311107 | 7 |
| 631311108 | 8 |
| 631311109 | 9 |
| 631311110 | 10 |
| 631311111 | 11 |
| 631311112 | 12 |
| 631311153 | 53 |



**Touch protection, to cover free busbar connectors, yellow (1004)**

| Art.no. |
|---|
| 631910000 |

**Blanking plate, covering gaps (for future CR circuit breakers)**

| Art.no. |
|---|
| 560300805 |

# Accessories CR circuit breakers

**Feeding terminal, external fork, insulated**

Art.no.
631910001

**Feeding terminal, external pin, insulated**

| Art.no. | |
|---|---|
| 631910002 | short pin |
| 631910003 | long pin |

**Feeding terminal, external pin, insulated**

| Art.no. | |
|---|---|
| 631910004 | side connected |

**Feeding terminal, external pin, insulated**

| Art.no. | |
|---|---|
| 631910005 | screw connected with 3 front connections |

**Busbar feeding terminal, stackable**

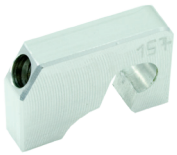
Art.no.
631910006

**Endcap for busbar, fork and pin, 10 mm²**

| Art.no. | Phase |
|---|---|
| 631911260 | 2 |
| 631911360 | 3 |

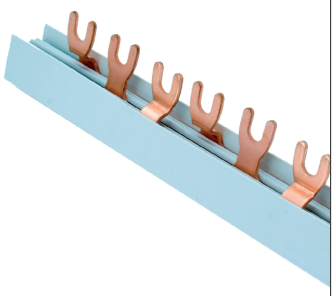
**Endcap for busbar, fork and pin, 16 mm²**

| Art.no. | Phase |
|---|---|
| 631912160 | 1 |
| 631912360 | 2&3 |
| 631912460 | 4 |



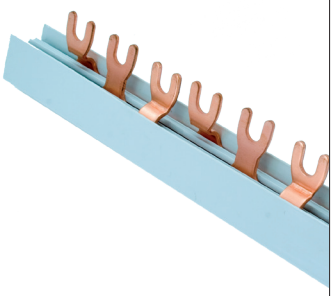
**Handle lock, alluminium colour**

Art.no.
631910007



**Busbar up to 63 A, fork type, 1 m**

| Art.no. | Phase | Poles |
|---|---|---|
| 631911256 | 2 | 56 |
| 631911357 | 3 | 57 |

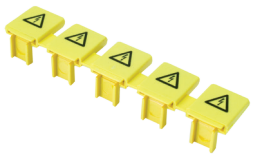


**Busbar up to 80 A, fork type, 1 m**

| Art.no. | Phase | Poles |
|---|---|---|
| 631912157 | 1 | 57 |
| 631912256 | 2 | 56 |
| 631912357 | 3 | 57 |
| 631912456 | 4 | 56 |

**Corner shaped busbar, 1 phase, 63 A**

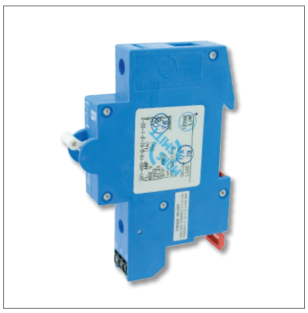
| Art.no. | Poles |
|---|---|
| 631311163 | 3 |
| 631311164 | 4 |
| 631311165 | 5 |
| 631311166 | 6 |
| 631311167 | 7 |
| 631311168 | 8 |
| 631311169 | 9 |
| 631311170 | 10 |
| 631311171 | 11 |
| 631311172 | 12 |



**Touch protection, to cover free busbar connectors, yellow (1004)**

Art.no.
631910000

Wabtec
CORPORATION




**Sales offices & factories:**

**Mors Smitt Asia Ltd.**
26/F, Casey Aberdeen House,
38 Heung Yip Road,
Wong Chuk Hang, Hong Kong
Tel: +852 2343 5555
sales.msa@wabtec.com

**Mors Smitt UK**
Graycar Business Park,
Burton on Trent, DE13 8 EN, UK
Tel: +44 (0)1283 357 263
sales.msuk@wabtec.com

**Mors Smitt France SAS**
2 Rue de la Mandinière
72300 Sablé-sur-Sarthe, France
Tel: +33 (0) 243 92 82 00
sales.msf@wabtec.com

**RMS Mors Smitt**
19 Southern Court
Keysborough, VIC 3173, Australia
Tel: +61 (0)3 8544 1200
sales.rms@wabtec.com

**Mors Smitt Technologies Ltd.**
1010 Johnson Drive,
Buffalo Grove, IL 60089-6918, USA
Tel: +1 847 777 6497
salesmst@wabtec.com

**Wabtec Netherlands B.V.**
Darwinstraat 10,
6718 XR Ede, Netherlands
Tel: +31 (0)88 600 4500
sales.msbv@wabtec.com

**Sales & Support offices:**

**China**
Zhongshan, P.R. China
sales.msa@wabtec.com

**India**
Delhi, India
sales.msa@wabtec.com

**Gulf Region**
Abu Dhabi, United Arab Emirates
sales.rms@wabtec.com

**Malaysia**
Kuala Lumpur, Malaysia
sales.rms@wabtec.com


**www.morssmitt.com**

Mors Smitt
A Wabtec Company


BRO - MCB V2.0 February 2022