- Wide adjustment range 0.1 to 100A
- IEC breaking capacity Icu 50kA (400V) up to 100A
- Suitable for isolation
- Certified UL Type E and Type F
- Comprehensive line of accessories
- Magnetic-only version
- Automatic trip indicators
- High reliability and accuracy of tripping.

Motor protection circuit breakers

- Type E and Type F combination motor controllers .......................................................... 1 - 4
- Motor protection circuit breakers SM1... up to 40A. Magnetic and thermal protection ........................................... 1 - 6
- Motor protection circuit breakers SM1RM... up to 40A. Magnetic protection ....................... 1 - 6
- Motor protection circuit breakers SM2... and SM3... from 34 up to 100A. Magnetic and thermal protection .............. 1 - 7
- SM1PF... breakers. Fuse monitoring function ........................................................................... 1 - 7
- Add-on blocks and accessories for SM1... ............................................................................. 1 - 8
- Add-on blocks and accessories for SM2... and SM3... ........................................................................... 1 - 10

Dimensions ........................................................................................................................................ 1 - 15
Wiring diagrams ................................................................................................................................. 1 - 18
Technical characteristics .................................................................................................................... 1 - 19
SM1P...
- Motor protection
- Push button control
- Ranges 0.1...40A (16 choices)
- IEC breaking capacity Icu at 400V: from 100 to 10kA
- Suitable for mounting in modular panels.

SM1R...
- Motor protection
- Rotary knob type
- Ranges 0.1...40A (16 choices)
- IEC breaking capacity Icu at 400V: from 100 to 20kA
- Thermal and magnetic trip indicator
- UL 60947-4-1 Type E, Type F.

SM1RM...
- Starter protection (magnetic only)
- Rotary knob type
- Rated current from 0.16 to 40A
- IEC breaking capacity Icu at 400V: from 100 to 20kA.

SM1PF...
- Fuse monitoring function
- Push button control
- Fixed thermal protection: 0.2A
- Magnetic trip threshold: 1.2A.

SM2R...
- Motor protection
- Rotary knob type
- Ranges 34...63A (2 choices)
- IEC breaking capacity Icu at 400V: 50kA
- UL 60947-4-1 Type E.

SM3R...
- Motor protection
- Rotary knob type
- Ranges 55...100A (3 choices)
- IEC breaking capacity Icu at 400V: 50kA
- Thermal and magnetic trip indicator
- UL 60947-4-1 Type E via accessory.

LOVATO Electric motor protection circuit breakers are suitable for new motors with high IE3 efficiency values.
### Motor protection circuit breakers

#### IEC ratings

**Motor protection (magnetic and thermal protection)**

<table>
<thead>
<tr>
<th>Choice</th>
<th>Rated current</th>
<th>Thermal protection</th>
<th>Magnetic protection</th>
<th>TRIP position</th>
<th>Phase failure sensitive</th>
<th>Padlockable in O</th>
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</table>

- **Rated current**
  - 0.1...40A
  - 0.1...40A
  - 34...63A
  - 55...100A
  - 0.1...40A

- **Motor protection circuit breakers**
  - Small, cost-effective starters.
  - High short-circuit breaking capacity up to 40A.
  - Small, cost-effective starters.
  - Motor protection circuit breakers

- **Starter protection**
  - Magnetic protection
  - TRIP position
  - Phase failure sensitive
  - Padlockable in O

#### Starter protection (magnetic protection)

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</table>

#### Motor protection (magnetic and thermal protection)

- **SM1P… MODULAR SIZE**
  - Mounting on front of panels or in modular panels for rapid access to buttons, avoiding the opening of the door by non-technical staff.
  - Auxiliary contacts, indicator contacts and releases compatible with modular panels.

- **SM1R… TRIP INDICATION**
  - Thermal and magnetic trip indication with trip position of knob.
  - Specific optical indication for short-circuit tripping; guarantees maximum safety for operators and reliability of the system.
  - Auxiliary trip indication contacts with ability to distinguish overload from short circuit.

- **SM1… HIGH-PERFORMANCE PLASTICS**
  - IECEN 60335-compliant plastics for domestic and similar applications. Can be used in catering equipment.
  - EN 45545-compliant plastics; fire behaviour and emissions of fumes. Suitable for railway applications.

- **DOOR COUPLING HANDLES**
  - Padlockable door coupling handles for the entire rotary knob type. Make systems compliant with safety regulations.
  - Tough, easy and quick to install.

- **40A IN 45mm**
  - From 0.1A to 40A in a device just 45mm wide.
  - High short-circuit breaking capacity up to 40A.
  - Small, cost-effective starters.

- **SM1P… Padlockable in O**
  - Auxiliary contacts, indicator contacts and releases compatible with modular panels.

- **Rated current**
  - 0.1...40A
  - 0.1...40A
  - 34...63A
  - 55...100A
  - 0.1...40A

- **Auxiliary contacts, indicator contacts**
  - Suitable for railway applications.
  - Behaviour and emissions of fumes.
**Motor protection circuit breakers**

**Fuse monitoring**

<table>
<thead>
<tr>
<th>UL508 / UL 60947-4-1</th>
<th>Manual Motor Controller - Short circuit current in kA</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motor Disconnect</strong></td>
<td><strong>Group Motor</strong></td>
</tr>
<tr>
<td><strong>Installation</strong></td>
<td><strong>Protection</strong></td>
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### UL508 ratings (horse power ratings on page 1-5)

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<th>600V</th>
<th>480V</th>
<th>600V</th>
<th>480V/277V</th>
<th>600V/347V</th>
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</table>

- **ENCLOSURES**
  - Various types of plastic enclosures are available for rotating and button-controlled motor protection circuit breakers up to 40A.
  - Surface and flush mount.
  - Ideal for small machines and isolated motors.
  - IP65 (UL Type 4X) protection rating and UV-ray resistant.
  - Very robust plastics, IK07; pass even the strict UL “ball impact” test.
  - UL-certified.

- **SM1...PADLOCKABILITY**
  - Padlockability as standard on the entire rotary knob type and push button-controlled motor protection circuit breaker range. For greater operator safety during maintenance and bypassing of the equipment.

- **UL Type E**
  - The entire rotary knob type is certified UL Type E.
  - Type E is a specific requirement of the UL standards that requires, of short-circuit protection devices, increased terminal isolation distances and strict breaking capacity tests.
  - Eliminates the need for further short-circuit protection devices upstream of the motor protection.

- **UL Type F**
  - Type F starters are a combination of a motor protection circuit breaker and a contactor tested in specified short circuit conditions to verify their coordination.
  - The SM1R motor protection circuit breakers are certified UL type F in combination with BG and BF contactors.
  - A Type F starter is the most complete and preferred way to control and protect a motor.

- **Values valid for SM1RE... only:**
UL ratings
Type E and Type F combination motor controllers

The UL standard indicates a combination motor controller, also called a combination starter, as equipment consisting of a protected starter incorporating an isolation function. The protection includes both thermal overload and short circuit. In the standard of UL508 (now harmonized with IEC as UL 60947-4-1), we can find different construction types of starters stated as Type A, Type B, etc... composed of different type of devices intended to control, disconnect and protect a motor. Type E and Type F controllers usually provide the best solution to control and protect a motor.

<table>
<thead>
<tr>
<th>Type E</th>
<th>Type F</th>
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<tbody>
<tr>
<td>Phase separation barrier (required)</td>
<td>Phase separation barrier (required)</td>
</tr>
<tr>
<td>Motor protection circuit breaker also known as manual motor protector</td>
<td>Motor protection circuit breaker also known as manual motor protector</td>
</tr>
<tr>
<td>Rigid connection (optional)</td>
<td>Contactor</td>
</tr>
</tbody>
</table>

FUNCTIONS:
- Disconnect
- Branch circuit protection
- Motor control
- Motor overload protection.

FUNCTIONS
- Disconnect (motor protection circuit breaker also known as manual motor protector)
- Branch circuit protection (motor protection circuit breaker also known as manual motor protector)
- Motor control (contactor)
- Motor overload protection (motor protection circuit breaker also known as manual motor protector).

CO-ORDINATION TYPE 1 AND CO-ORDINATION TYPE 2

The concept of co-ordination Type 1 and Type 2 was recently introduced in the UL60947-4-1.
In the co-ordination Type 1, after a short-circuit, the starter shall cause no danger to persons or installation, but may not be suitable for further service and may need parts repair and replacement.
In the co-ordination Type 2, after a short-circuit, the starter shall cause no danger to persons or installation and is suitable for further use.
On the next page the co-ordination tables are provided.

TAP CONDUCTOR PROTECTION

SM... motor protection circuit breakers are also suitable as Tap Conductor Protection for Group Installation.
When manual motor starters are employed in group installations, in specified conditions by the standard, it is possible to reduce the wire sections.
The use of smaller wires reduces the cost of the panel and makes the wiring easier.
Furthermore, these motor protection circuit breakers can be used for control transformers protection instead of fuses or circuit breaker certified as UL 489 usually more expensive.
**Combination Motor Controllers (Type F)**

Coordination Type 1 - In the co-ordination Type 1, after a short-circuit, the starter shall cause no danger to persons or installation, but may not be suitable for further service and may need parts repair and replacement.

<table>
<thead>
<tr>
<th>Motor protection circuit breaker type</th>
<th>Thermal setting range</th>
<th>Contactor types</th>
<th>SCCR in kA</th>
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<td>BG06...BG12, BF08...BF38</td>
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<td>0.16...0.25</td>
<td>BG06...BG12, BF08...BF38</td>
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<tr>
<td>SM1R 0040</td>
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<td>0.4...0.63</td>
<td>BG06...BG12, BF08...BF38</td>
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<tr>
<td>SM1R 0100</td>
<td>0.63...1</td>
<td>BG06...BG12, BF08...BF38</td>
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<tr>
<td>SM1R 0160</td>
<td>1...1.6</td>
<td>BG06...BG12, BF08...BF38</td>
<td>65</td>
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<tr>
<td>SM1R 0250</td>
<td>1.6...2.5</td>
<td>BG06...BG12, BF08...BF38</td>
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<tr>
<td>SM1R 0400</td>
<td>2.5...4</td>
<td>BG06...BG12, BF08...BF38</td>
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<tr>
<td>SM1R 0650</td>
<td>4...6.5</td>
<td>BG06...BG12, BF09...BF38</td>
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<tr>
<td>SM1RE 1000</td>
<td>6.3...10</td>
<td>BF09...BF38</td>
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<tr>
<td>SM1RE 1400</td>
<td>9...14</td>
<td>BF18...BF38</td>
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<tr>
<td>SM1RE 1800</td>
<td>13...18</td>
<td>BF18...BF38</td>
<td>65</td>
</tr>
<tr>
<td>SM1RE 2300</td>
<td>17...23</td>
<td>BF18...BF38</td>
<td>30</td>
</tr>
<tr>
<td>SM1RE 2500</td>
<td>20...25</td>
<td>BF25...BF38</td>
<td>30</td>
</tr>
<tr>
<td>SM1RE 3200</td>
<td>24...32</td>
<td>BF32, BF38</td>
<td>10</td>
</tr>
</tbody>
</table>

* BG06 not for 600V/347V.

Coordination Type 2 - In the co-ordination Type 2, after a short-circuit, the starter shall cause no danger to persons or installation and is suitable for further use.

<table>
<thead>
<tr>
<th>Motor protection circuit breaker type</th>
<th>Thermal setting range</th>
<th>Contactor types</th>
<th>SCCR in kA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>[A]</td>
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<td>240V</td>
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<tr>
<td>SM1R 0016</td>
<td>0.1...0.16</td>
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<td>0.25...0.4</td>
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<td>0.4...0.63</td>
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<tr>
<td>SM1R 0100</td>
<td>0.63...1</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
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<tr>
<td>SM1R 0160</td>
<td>1...1.6</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
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<tr>
<td>SM1R 0250</td>
<td>1.6...2.5</td>
<td>BF26, BF32, BF38</td>
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</tr>
<tr>
<td>SM1R 0400</td>
<td>2.5...4</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
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<tr>
<td>SM1R 0650</td>
<td>4...6.5</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
</tr>
<tr>
<td>SM1RE 1000</td>
<td>6.3...10</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
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<td>SM1RE 1400</td>
<td>9...14</td>
<td>BF26, BF32, BF38</td>
<td>65</td>
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<tr>
<td>SM1RE 1800</td>
<td>13...18</td>
<td>BF26, BF32, BF38</td>
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</tr>
<tr>
<td>SM1RE 2300</td>
<td>17...23</td>
<td>BF26, BF32, BF38</td>
<td>30</td>
</tr>
<tr>
<td>SM1RE 2500</td>
<td>20...25</td>
<td>BF26, BF32, BF38</td>
<td>30</td>
</tr>
<tr>
<td>SM1RE 3200</td>
<td>24...32</td>
<td>BF32, BF38</td>
<td>10</td>
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</table>

* BG06...BG12, BF09...BF38

**MAXIMUM UL/CSA HORSEPOWER RATINGS**

<table>
<thead>
<tr>
<th>Single-phase</th>
<th>Three-phase, 3-pole</th>
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<tbody>
<tr>
<td>110V-120V</td>
<td>220V-240V</td>
</tr>
<tr>
<td>200V-208V</td>
<td>220-240V</td>
</tr>
<tr>
<td>440-480V</td>
<td>550V-600V</td>
</tr>
<tr>
<td>[HP]</td>
<td>[HP]</td>
</tr>
<tr>
<td></td>
<td>[HP]</td>
</tr>
<tr>
<td>SM1R 0016</td>
<td>SM1P 0016</td>
</tr>
<tr>
<td>SM1R 0025</td>
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<td>SM1R 1400</td>
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<td>SM1R 1800</td>
<td>SM1P 1800</td>
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<td>SM1R 2500</td>
<td>SM1P 2500</td>
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<td>SM1R 3200</td>
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<td>SM1R 4000</td>
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<td>SM2R 5000</td>
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<td>SM2R 6300</td>
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<tr>
<td>SM3R 7500</td>
<td></td>
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<tr>
<td>SM3R 9000</td>
<td></td>
</tr>
<tr>
<td>SM3R 9900</td>
<td></td>
</tr>
</tbody>
</table>

1. SM1R... and SM1RE... only

2. BFG not for 600V/347V.
Motor protection circuit breakers SM1... up to 40A.

Magnetic and thermal protection

**Order code**  | **Thermal trip adjustment range** | **Short circuit breaking capacity at 400V** | **Qty per pkg** | **Wt**
---|---|---|---|---
SM1P 00016 | 0.1...0.16 | 100 | 100 | 1 | 0.280 kg
SM1P 0025 | 0.16...0.25 | 100 | 100 | 1 | 0.280 kg
SM1P 0040 | 0.25...0.4 | 100 | 100 | 1 | 0.280 kg
SM1P 0063 | 0.4...0.63 | 100 | 100 | 1 | 0.280 kg
SM1P 0100 | 0.63...1 | 100 | 100 | 5 | 0.280 kg
SM1P 0160 | 1...1.6 | 100 | 100 | 5 | 0.280 kg
SM1P 0250 | 1.6...2.5 | 100 | 100 | 5 | 0.350 kg
SM1P 0400 | 2.5...4 | 100 | 100 | 5 | 0.350 kg
SM1P 0650 | 4...6.5 | 100 | 100 | 5 | 0.350 kg
SM1P 1000 | 6.3...10 | 100 | 100 | 5 | 0.350 kg
SM1P 1400 | 9...14 | 25 | 12.5 | 5 | 0.350 kg
SM1P 1800 | 13...18 | 25 | 12.5 | 5 | 0.350 kg
SM1P 2300 | 17...23 | 15 | 5 | 5 | 0.350 kg
SM1P 2500 | 20...25 | 15 | 5 | 5 | 0.350 kg
SM1P 3200 | 24...32 | 10 | 5 | 5 | 0.350 kg
SM1P 4000 | 30...40 | 10 | 5 | 5 | 0.350 kg

Rotary knob type.

**Order code**  | **Rated and magnetic trip current** | **Short circuit breaking capacity at 400V** | **Qty per pkg** | **Wt**
---|---|---|---|---
SM1R 00016 | 0.1...0.16 | 100 | 100 | 1 | 0.320 kg
SM1R 0025 | 0.16...0.25 | 100 | 100 | 1 | 0.320 kg
SM1R 0040 | 0.25...0.4 | 100 | 100 | 1 | 0.320 kg
SM1R 0063 | 0.4...0.63 | 100 | 100 | 1 | 0.320 kg
SM1R 0100 | 0.63...1 | 100 | 100 | 5 | 0.320 kg
SM1R 0160 | 1...1.6 | 100 | 100 | 5 | 0.320 kg
SM1R 0250 | 1.6...2.5 | 100 | 100 | 5 | 0.390 kg
SM1R 0400 | 2.5...4 | 100 | 100 | 5 | 0.390 kg
SM1R 0650 | 4...6.5 | 100 | 100 | 5 | 0.390 kg
SM1R 1000 | 6.3...10 | 100 | 100 | 5 | 0.390 kg
SM1R 1400 | 9...14 | 25 | 12.5 | 5 | 0.390 kg
SM1R 1800 | 13...18 | 25 | 12.5 | 5 | 0.390 kg
SM1R 2300 | 17...23 | 15 | 5 | 5 | 0.390 kg
SM1R 2500 | 20...25 | 15 | 5 | 5 | 0.390 kg
SM1R 3200 | 24...32 | 10 | 5 | 5 | 0.390 kg
SM1R 4000 | 30...40 | 10 | 5 | 5 | 0.390 kg

**Motor protection circuit breakers SM1RM... up to 40A. Magnetic protection**
Motor protection circuit breakers SM2... and SM3... up to 100A. Magnetic and thermal protection

<table>
<thead>
<tr>
<th>Order code</th>
<th>Thermal trip adjustment range</th>
<th>Short circuit breaking capacity at 400V</th>
<th>Qty per pkg</th>
<th>Wt</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM2R 5000</td>
<td>34...50</td>
<td>50</td>
<td>1</td>
<td>1.000</td>
</tr>
<tr>
<td>SM2R 6300</td>
<td>45...63</td>
<td>50</td>
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<td>1.000</td>
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<tr>
<td>SM3R 7500</td>
<td>55...75</td>
<td>50</td>
<td>1</td>
<td>2.200</td>
</tr>
<tr>
<td>SM3R 9000</td>
<td>70...90</td>
<td>50</td>
<td>1</td>
<td>2.200</td>
</tr>
<tr>
<td>SM3R 9900</td>
<td>80...100</td>
<td>50</td>
<td>1</td>
<td>2.200</td>
</tr>
</tbody>
</table>

Rotary knob type. For UL ratings see page 1-14.

Order code | Fixed thermal release current | Short circuit breaking capacity at 400V | Qty per pkg | Wt |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SM1PF 0020</td>
<td>0.20</td>
<td>100</td>
<td>5</td>
<td>0.280</td>
</tr>
</tbody>
</table>

Push button control. For UL ratings see page 1-14.

General characteristics
SM2R... and SM3R... are modern circuit breakers with thermal and magnetic trip releases and high breaking capacity. Motor control and protection, up to 55kW (400V) are possible by choosing the suitable adjustment range, up to 100A.

The SM2R... and SM3R... breakers are Type E-certified according to UL 60947-4-1.

The SM2R... and SM3R... types are suitable for isolation according to IEC/EN 60947 standards and can be padlocked in OFF position without using accessories.

SM3... has a trip function which indicates thermal and magnetic tripping.

Their high breaking capacity consents to exclude protection fuses on the majority of the installations.

SM1PF... circuit breakers
Fuse monitoring function

General characteristics
SM1PF... are breakers with magnetic-thermal tripping intended specifically for monitoring the status of fuses.

By connecting every phase of the breaker to a fuse, when it blows, the motor protection breaks.

Through the auxiliary contacts fitted on the motor protection, the blown fuses are signalled electrically.

Operational characteristics
– IEC rated insulation voltage Ui: 690V
– IEC rated impulse withstand voltage: 6kV
– IEC rated frequency: 50/60Hz
– Maximum rated current:
  63A (for SM2...); 100A (for SM3...)
– Adjustment ranges: 2 (for SM2...); 3 (for SM3...)
– IEC breaking capacity: See table on page 1-2 and 1-3
– Max. heat dissipation per phase: 7W
– Magnetic tripping: 13In max.
– Tripping class: 10A
– Phase failure sensitive
– Mechanical life: 50,000 cycles
– Electrical life: 25,000 cycles
– Mounting on 35mm DIN rail (IEC/EN 60715)
– Mounting position: Any
– IEC utilisation category: A
– Padlocking in OFF: Ø4mm/0.16”
– IEC degree of protection: IP20 on front.

Certifications and compliance
Certifications obtained: cULus, EAC.

Certifications pending: CCC.

Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-2, IEC/EN 60947-4-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

Motor protection circuit breakers
Add-on blocks and accessories for SM1...

Order code | Characteristics | Qty per pkg | Wt [kg]
---|---|---|---
Add-on auxiliary contacts.
SM1X11 20 | Front mount 2NO | 10 | 0.016
SM1X11 11 | Front mount 1NO+1NC | 10 | 0.016
SM1X12 20 | Side mount 2NO | 1 | 0.036
SM1X12 11 | Side mount 1NO+1NC | 10 | 0.016
SM1X12 02 | Side mount 2NC | 1 | 0.036
SM1X13 11 | Side mount. Contacts for thermal and magnetic tripping indication 1NO+1NC | 1 | 0.036
SM1X13 11M | Side mount. Contacts for magnetic tripping indication 1NO+1NC | 1 | 0.036

Under-voltage trip releasers.
SM1X14 024 | 240VAC 50Hz | 1 | 0.130
SM1X14 110 | 110VAC 50Hz; 120VAC 60Hz | 1 | 0.130
SM1X14 230 | 230VAC 50Hz | 1 | 0.130
SM1X14 400 | 400VAC 50Hz; 440VAC 60Hz | 1 | 0.130
SM1X15 024 | With early-make contacts 240VAC 50Hz | 1 | 0.140
SM1X15 110 | With early-make contacts 110VAC 50Hz; 120VAC 60Hz | 1 | 0.140
SM1X15 230 | With early-make contacts 230VAC 50Hz | 1 | 0.140
SM1X15 400 | With early-make contacts 400VAC 50Hz | 1 | 0.140

Shunt releasers.
SM1X16 024 | 240VAC 50/60Hz | 1 | 0.130
SM1X16 110 | 110VAC 50/60Hz | 1 | 0.130
SM1X16 230 | 230VAC 50/60Hz | 1 | 0.130
SM1X16 400 | 400VAC 50/60Hz | 1 | 0.130

Adjuster sealing kit.
SM1X18 12 | With wire and lead included | 1 | 0.006

IP65 (4X) padlockable door coupling handle for SM1R...
SM1X18 200R | Red/yellow complete with rod length 200mm/7.87" | 1 | 0.115
SM1X18B 200R | Black complete with rod length 200mm/7.87" | 1 | 0.115
SM1X18 ST | Support for rod >145mm/5.71" | 1 | 0.030

Phase separation barriers for SM1R...
SM1X9000R | For Type E and Type F as UL 60947-4-1 | 5 | 0.016

Three-phase connection busbars 45mm/1.77” spacing.
T1 SMX90 32 | For 2 breakers | 10 | 0.028
T1 SMX90 33 | For 3 breakers | 10 | 0.050
T1 SMX90 34 | For 4 breakers | 10 | 0.071
T1 SMX90 35 | For 5 breakers | 10 | 0.092

Three-phase connection busbars 54mm/2.13” spacing.
T1 SMX90 42 | For 2 breakers | 10 | 0.031
T1 SMX90 43 | For 3 breakers | 10 | 0.056
T1 SMX90 44 | For 4 breakers | 10 | 0.081
T1 SMX90 45 | For 5 breakers | 10 | 0.090

Terminal block for busbar supply.
T1 SMX90 30 | For all busbar types | 10 | 0.048

Safety cover.
T1 SMX90 31 | For unused terminals | 10 | 0.004

Accessories for motor protection breaker fixing.
SM1X9 02 | Metal bracket for fixing SM1... motor protection with screws | 10 | 0.006
BFX9 01 | Universal plastic base for screw-fixing SM1... motor protection circuit breaker | 2 | 0.016

General and operational characteristics

- Add-on auxiliary contacts
  - Connectable to the left side of the breaker or on the front
  - Maximum combinations: 3 SM1X... blocks with 6 auxiliary contacts in total of which 1 front block and 2 side blocks
  - IEC conventional free air thermal current lift: 10A (5A for SM1X1...)
  - IEC rated insulation voltage Ui: 690V (300V for SM1X1...)
  - Rated impulse withstand voltage Uimp 6kV (4kV for SM1X1...)
  - UL/CSA and IEC/EN 60947-5-1 designation: A600 - Q600 (C300 - R300 for SM1X1...)
  - Maximum tightening torque: 1Nm / 9bin
  - Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
  - Screw tightening tool: Phillips 2
  - Maximum tightening torque: 1Nm / 9bin
  - Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules

- Under-voltage trip releasers
  - Snap on to the right side of the breaker
  - Consumption inrush/holding: 120VA
  - Release voltage: 0.35...0.7Us
  - Operating voltage: 0.65...1Us
  - Maximum tightening torque: 1Nm / 9bin
  - Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
  - Screw tightening tool: Phillips 2
  - Maximum tightening torque: 1Nm / 9bin
  - Width of side-mount auxiliary contacts equal to 1 DIN 46880 module

- Shunt releasers
  - Snap on to the right side of the breaker
  - Inrush consumption: 20VA
  - Operating voltage: 0.7...1.1Us
  - Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
  - Screw tightening tool: Phillips 2
  - Maximum tightening torque: 1Nm / 9bin
  - Width of side-mount auxiliary contacts equal to standard DIN 46880 module

- Shunt releasers
  - Snap on to the right side of the breaker
  - IEC degree of protection: IP65
  - Degree of protection according to UL: Type 1, 2, 3R, 12, 12K, 4, 4X, external use
  - Adjustable rod from 48 to 212mm (1.89” to 8.35”)
  - Ring-fixing in 22mm/0.87” hole

- Three-phase connection busbars
  - IEC rated insulation voltage Ui: 690V (300V for SM1X1...)
  - IEC conventional free air thermal current Ith: 10A (5A for SM1X1...)
  - Maximum combinations: 3 SM1X... blocks with 6 auxiliary contacts in total of which 1 front block and 2 side blocks
  - Connectable to the left side of the breaker or on the front
  - UL/CSA and IEC/EN 60947-5-1 designation: A600 - Q600 (C300 - R300 for SM1X1...)
  - Maximum tightening torque: 1Nm / 9bin
  - Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
  - Screw tightening tool: Phillips 2
  - Maximum tightening torque: 1Nm / 9bin
  - Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules

- Terminal blocks for busbar supply
  - IEC rated insulation voltage Ui: 690V (300V for SM1X1...)
  - IEC conventional free air thermal current Ith: 10A (5A for SM1X1...)
  - Maximum tightening torque: 1Nm / 9bin
  - Conductor cross section minimum-maximum: 4...25mm² or 10...4AWG

Certifications and compliance

Certifications obtained: cULus (except terminal block for busbar supply), EAC.
Certifications pending: CCC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
Motor protection circuit breakers
Add-on blocks and accessories for SM1...

<table>
<thead>
<tr>
<th>Order code</th>
<th>Characteristics</th>
<th>Qty per pkg</th>
<th>Wt (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM1Z17 02P</td>
<td>Rigid SM1 breaker-actor connections.</td>
<td>10</td>
<td>0.019</td>
</tr>
<tr>
<td>SM1Z17 15R</td>
<td>For motor protection breaker SM1R...</td>
<td>10</td>
<td>0.035</td>
</tr>
<tr>
<td>SM1Z17 25R</td>
<td>SM1R... with BF09.25A contacts (max 32A)</td>
<td>10</td>
<td>0.045</td>
</tr>
<tr>
<td>SM1Z17 10R</td>
<td>SM1R... with BF90.25A contacts</td>
<td>10</td>
<td>0.009</td>
</tr>
<tr>
<td>SM1Z17 10P</td>
<td>SM1R... with BF90.25A contacts</td>
<td>10</td>
<td>0.035</td>
</tr>
<tr>
<td>SM1Z17 15R</td>
<td>For motor protection breaker SM1R...</td>
<td>10</td>
<td>0.044</td>
</tr>
<tr>
<td>SM1Z17 10R</td>
<td>SM1R... with BF90.25A contacts</td>
<td>10</td>
<td>0.045</td>
</tr>
<tr>
<td>SM1Z17 01P</td>
<td>Surface mount enclosures IP65 (4X) for SM1P...</td>
<td>1</td>
<td>0.225</td>
</tr>
<tr>
<td>SM1Z17 02P</td>
<td>Width 80mm/3.15&quot; for emergency stop</td>
<td>1</td>
<td>0.275</td>
</tr>
<tr>
<td>SM1Z17 01P</td>
<td>With button for emergency stop</td>
<td>1</td>
<td>0.315</td>
</tr>
<tr>
<td>SM1Z17 02P</td>
<td>With button for emergency stop</td>
<td>1</td>
<td>0.345</td>
</tr>
<tr>
<td>SM1Z17 05P</td>
<td>Flush mount enclosure IP65 (4X) for SM1P...</td>
<td>1</td>
<td>0.205</td>
</tr>
<tr>
<td>SM1Z17 15R</td>
<td>Width 80mm/3.15&quot; for emergency stop</td>
<td>1</td>
<td>0.350</td>
</tr>
<tr>
<td>SM1Z17 10R</td>
<td>With black rotary actuator Width 100mm/3.94&quot;</td>
<td>1</td>
<td>0.350</td>
</tr>
<tr>
<td>SM1Z17 10R</td>
<td>With black rotary actuator Width 100mm/3.94&quot;</td>
<td>1</td>
<td>0.345</td>
</tr>
<tr>
<td>SM1Z17 25R</td>
<td>Rotary actuator yellow/red Width 87mm/3.42&quot;</td>
<td>1</td>
<td>0.245</td>
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<tr>
<td>SM1Z17 26R</td>
<td>With rotary actuator black Width 87mm/3.42&quot;</td>
<td>1</td>
<td>0.245</td>
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<td>SM1Z17 26R</td>
<td>Lockable block. IP65 (4X)</td>
<td>1</td>
<td>0.300</td>
</tr>
<tr>
<td>SM1Z17 04G</td>
<td>LED pilot lights IP65.</td>
<td>1</td>
<td>0.040</td>
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<tr>
<td>SM1Z17 04R</td>
<td>Green 24VAC/DC</td>
<td>1</td>
<td>0.007</td>
</tr>
<tr>
<td>SM1Z17 04R</td>
<td>Red 400VAC</td>
<td>1</td>
<td>0.007</td>
</tr>
<tr>
<td>SM1Z17 04G</td>
<td>Green 110...400VAC</td>
<td>1</td>
<td>0.007</td>
</tr>
<tr>
<td>SM1Z17 04R</td>
<td>Red 110...400VAC</td>
<td>1</td>
<td>0.007</td>
</tr>
<tr>
<td>SM1Z17 04R</td>
<td>Plastic M25 to 1/8&quot; NPT entry adapter.</td>
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<tr>
<td>SM1Z17 02R</td>
<td>For enclosures SM1Z17 01P and SM1Z17 02P</td>
<td>10</td>
<td>0.009</td>
</tr>
</tbody>
</table>

General and operational characteristics
RIGID SM1 BREAKER-CONTACTOR CONNECTIONS
The SM1X3... connections electrically and mechanically fasten the motor protection breaker together with the contactor. This forms a highly compact single-unit starter for quick installation on a single 35mm DIN rail. The SM1X3... connections can also be mounted in combination with reversing switches and star-delta starters made with the rigid connections indicated in section 2.

SURFACE MOUNT ENCLOSURES
- Top or bottom cable entry:
  - UL Type 4K
- Holds a breaker, one front-mount auxiliary contact block either one shunt or undervoltage release and one pilot light; only for SM1Z17 10R and SM1Z17 15R, 2 side-mount auxiliary contact blocks can be fitted as well
- The SM1Z17 10R and SM1Z17 15R rotary actuators can be padlocked with a maximum of 3 padlocks Ø4...8mm/0.16...0.31"
- Earth/ground terminal included
- Operating temperature: -25...+60°C
- Storage temperature: -50...+80°C

FLUSH MOUNT ENCLOSURES FOR SM1P AND SM1R
- Holds a SM1P breaker, one front-mount auxiliary contact block and either one shunt or undervoltage release
- UL Type 4K
- Earth/ground terminal included
- Operating temperature: -25...+60°C
- Storage temperature: -50...+80°C

ENCLOSURE ACCESSORIES
Emergency stop button:
- Turn to release
- Red button Ø25mm/1.38"
- Lockable block:
  - Prevents closing operation; 3 padlocks maximum Ø4...8mm/0.16...0.31"

STARTER ASSEMBLY ADAPTER PLATES
These accessories permit the assembly of starters, making slim and compact equipment that’s easy and quick to install. The starter adapter plates install on DIN rail 35mm/1.38".

Certifications and compliance
Certifications obtained: cULus except SM1X17 024..., SM1X17 400..., SMX90..., and 11 LM M25 PG16), EAC.
Certifications pending: CCC for rigid connections and enclosures (maximum current enclosures for cULus: 25A).
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.
For cULus pilot lights, please contact Technical Support (Tel. 035 4282422; E-mail: service@LovatoElectric.com).

Dimensions:
- page 1-15, 16 and 17

Wiring diagrams:
- page 1-18

Technical characteristics:
- page 1-19
Motor protection circuit breakers
Add-on blocks and accessories for SM2... and SM3...

ADD-ON AUXILIARY CONTACTS
– Insert on the top front or snap on the left side of the breaker
– Maximum combinations: 3 SM2X... blocks with 6 auxiliary contacts in total of which 1 front block and 2 side blocks
– IEC conventional free air thermal current Ith: 10A (5A for SM2X11...)
– IEC rated insulation voltage Ui: 690V (250V for SM2X11...)
– UL/CSA and IEC/EN 60947-5-1 designation: A600 – Q300 (B300 - R300 for SM1X11...)
– Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
– Screw tightening tool: Pz 2
– Maximum tightening torque: 1.2Nm / 10lbin
– Width of side-mount auxiliary contacts equal to 0.5 DIN 46880 modules.

UNDERVOLTAGE RELEASES
– Snap on to the right side of the breaker for motor protection
– Consumption in-rush/holding: 8.5/3VA
– Release voltage: 0.35...0.7Us
– Operating limits: 0.85...1.1Us
– Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
– Screw tightening tool: Pz 2
– Maximum tightening torque: 1.2Nm / 10lbin
– Width of side-mount auxiliary contacts equal to 1 DIN 46880 module.

SHUNT TRIP RELEASES
– Snap on to the right side of the breaker
– In-rush consumption: 20VA
– Operating limits: 0.85...1.1Us
– Conductor cross section minimum-maximum (1 or 2 wires): 0.75...2.5mm² or 18...14AWG
– Screw tightening tool: Pz 2
– Maximum tightening torque: 1.2Nm / 10lbin
– Width of side-mount auxiliary contacts equal to 1 standard DIN 46880 module.

Padlockable IP65 (4X) door coupling handle for SM2R and SM3R.
– IEC degree of protection: IP65
– Degree of protection according to UL: Type 1, 2, 3R, 12, 12K, 4, 4X; external use
– Adjustable rod from 48 to 212mm (1.89” to 8.35”)
– Ring-fixing in 22mm/0.87” hole.

Certifications and compliance
Certifications obtained: cULus, EAC.
Compliant with standards: IEC/EN 60947-1, IEC/EN 60947-5-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

<table>
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<tr>
<th>Order code</th>
<th>Characteristics</th>
<th>Qty per pkg</th>
<th>Wt [kg]</th>
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<tr>
<td>Add-on auxiliary contacts.</td>
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<tr>
<td>SM2X11 20</td>
<td>Front mount 2NO</td>
<td>10</td>
<td>0.020</td>
</tr>
<tr>
<td>SM2X11 11</td>
<td>Front mount 1NO+1NC</td>
<td>10</td>
<td>0.020</td>
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<tr>
<td>SM2X11 02</td>
<td>Front mount 2NC</td>
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<td>0.020</td>
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<tr>
<td>SM2X12 20</td>
<td>Side mount 2NO</td>
<td>2</td>
<td>0.040</td>
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<tr>
<td>SM2X12 11</td>
<td>Side mount 1NO+1NC</td>
<td>10</td>
<td>0.040</td>
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<tr>
<td>SM2X12 02</td>
<td>Side mount 2NC</td>
<td>2</td>
<td>0.040</td>
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<tr>
<td>SM2X13 11</td>
<td>Side mount. Indicator contacts for thermal and magnetic tripping 1NO+1NC</td>
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<td>Undervoltage trip releases.</td>
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<td>SM2X14 230</td>
<td>230VAC 50/60Hz</td>
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<td>0.100</td>
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<td>SM2X14 400</td>
<td>400VAC 50/60Hz</td>
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<td>0.100</td>
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<tr>
<td>SM2X14 440</td>
<td>440VAC 50/60Hz</td>
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<td>Shunt trip releases.</td>
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<tr>
<td>SM2X16 024</td>
<td>24VAC 50/60Hz</td>
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<td>0.100</td>
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<td>SM2X16 110</td>
<td>110VAC 50/60Hz</td>
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<td>0.100</td>
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<td>SM2X16 230</td>
<td>230VAC 50/60Hz</td>
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<td>0.100</td>
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<tr>
<td>SM2X16 400</td>
<td>400VAC 50/60Hz</td>
<td>5</td>
<td>0.100</td>
</tr>
<tr>
<td>SM2X16 440</td>
<td>440VAC 50/60Hz</td>
<td>5</td>
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<tr>
<td>Padlockable IP65 (4X) door coupling handle for SM2R and SM3R.</td>
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<tr>
<td>SM2X18 200R</td>
<td>Red/yellow complete with rod length 200mm/7.87”</td>
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<tr>
<td>SM2X18 B200R</td>
<td>Black complete with rod with rod length 200mm/7.87”</td>
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<td>0.115</td>
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</table>

| Phase separation barriers set for SM3R | | |
| SM3X90 00R | For Type E as per UL60947-4-1 | 1 | 0.175 |

Dimensions
page 1-18
Wiring diagrams
page 1-18
Motor protection circuit breakers
Add-on blocks and accessories for SM1...

Three-phase connection busbars.

Combinations

Three-phase connection busbar, 45mm/1.77” spacing (breakers without add-on blocks).

Three-phase connection busbar, 54mm/2.13” spacing (breakers with add-on blocks).
**Combinations**

Rigid SM1P... breaker – contactor connections.

- SM1P...
- SM1X30 40P
- BG...

- SM1P...
- SM1X31 41P
- BF09A...BF25A

- SM1P...
- SM1X32 41P
- BF26A...BF38A

Rigid SM1R... breaker – contactor connections.

- SM1R...
- SM1X30 40R
- BG...

- SM1R...
- SM1X31 41R
- SM1X31 42R

- SM1R...
- SM1X32 41R
- BF09...BF25

- SM1R...
- SM1X32 41R
- BF26A...BF38A

For BF09A...BF25A contactors.

For BF09D...BF25D and BF09L...BF25L contactors.

Padlockable door coupling handle.

- SM1X18 S

- SM1X18 200R
- SM1X18B 200R

Mounting also possible with side-mount auxiliary contacts SM1X12... and SM1X13...
Motor protection circuit breakers
Add-on blocks and accessories for SM1...

**Combinations**
Surface mount enclosures for SM1P... Width 80mm.

Surface mount enclosures for SM1P... Width 100mm.

Flush mount enclosures for SM1P... Width 87mm/3.42”.

Flush mount enclosures for SM1R... Width 87mm/3.42”.

Contacts for magnetic tripping indication SM1X13 11M when mounted in SM1Z17 11P and SM1Z17 12P, can’t be mounted alone, but shall be mounted in combination with SM1X12... on SM1X 1311.

Flush mount enclosures for SM1R... width 87mm/3.42”.

Surface mount enclosures for SM1R... Width 100mm/3.94”.

Dimensions page 1-15, 16 and 17
Wiring diagrams page 1-18
Motor protection circuit breakers
Add-on blocks and accessories for SM2... and SM3...

Combinations
Combinations of SM2... and SM3... motor protection circuit breakers

MAXIMUM UL/CSA HORSEPOWER RATINGS

<table>
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<tr>
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<th>Single-phase</th>
<th>Three-phase, 3-pole</th>
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<tr>
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<td>220V-240V</td>
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<td>[HP]</td>
<td>[HP]</td>
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<td>SM1R 0016</td>
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<td>–</td>
</tr>
<tr>
<td>SM1R 0025</td>
<td>–</td>
<td>–</td>
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<tr>
<td>SM1R 0040</td>
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<td>–</td>
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<tr>
<td>SM1R 0063</td>
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<td>SM1R 0160</td>
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<td>SM1R 0250</td>
<td>–</td>
<td>1/4</td>
</tr>
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<td>SM1R 0400</td>
<td>1/4</td>
<td>1/2</td>
</tr>
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<td>SM1R 0650</td>
<td>1/4</td>
<td>1/2</td>
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<td>SM1R 1000</td>
<td>1/2</td>
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<td>SM1R 1400</td>
<td>3/4</td>
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<td>SM1R 1800</td>
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<td>3</td>
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<tr>
<td>SM1R 2300</td>
<td>1.5</td>
<td>3</td>
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<td>SM1R 2500</td>
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<td>3</td>
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<tr>
<td>SM1R 3200</td>
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<td>SM1R 4000</td>
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<td>7.5</td>
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<td>3</td>
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<td>1.5</td>
<td>3</td>
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<td>3</td>
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<td>SM1P 2500</td>
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<td>5</td>
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<td>SM1P 3200</td>
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<td>7.5</td>
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<td>SM2R 5000</td>
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<td>SM2R 6300</td>
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<td>15</td>
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<td>SM3R 7500</td>
<td>7/10</td>
<td>20</td>
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<tr>
<td>SM3R 9000</td>
<td>10</td>
<td>20</td>
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</table>

Dimensions
page 1-15
Wiring diagrams
page 1-15
Motor protection circuit breakers
Dimensions [mm (in)]

- SM1P... with side-mount auxiliary contacts

- SM1R... with side-mount auxiliary contacts

- SM1P... with BG... mini-contactors and connection SM1X30 40P

- SM1P... with BF09 A...BF25 A... contactors and connection SM1X31 41P

- SM1P... with BF26 A...BF38 A... contactors and connection SM1X32 41P

- SM1R... with BG... mini-contactors and connection SM1X30 40R

- SM1R... with BF09 A...BF25 A... contactors and connection SM1X31 41R

- SM1R... with BF09 D...BF25 D... contactors BF09 L...BF25 L... and connection SM1X31 42R

- SM1R... with BF26 A...BF38 A... contactors and connection SM1X32 41R

- SM1R... padlockable door coupling handle SM1X18 200R or SM1X18B 200R
Motor protection circuit breakers

Dimensions [mm (in)]

These elements mounted with SM1… breakers without side-mount auxiliary contacts

These elements mounted with SM1… breakers with side-mount auxiliary contacts SMX12… or SMX13 11

SMX90 32 - SMX90 33 - SMX90 34 - SMX90 35
Connection busbars – 45mm/1.77” spacing

SMX90 42 - SMX90 43 - SMX90 44 - SMX90 45
Connection busbars – 54mm/2.13” spacing

Enclosures SM1Z17 01P

Enclosures SM1Z17 02P

Enclosures SM1Z17 11P

Enclosures SM1Z17 12P

SM1X90 03R
Motor protection circuit breakers
Dimensions [mm (in)]

Enclosures SM1Z17 05P

Enclosures SM1Z17 15R and SM1Z17 10R

Enclosures SM1Z17 20R and SM1Z17 25R
Motor protection circuit breakers
Dimensions [mm (in)]

**SM2... with side-mount auxiliary contacts**

**SM3... with side-mount auxiliary contacts**

**ADD-ON BLOCKS**

For SM1... types

Front mount auxiliary contacts

- SMX11 11
  - 1 - 18

Side mount auxiliary contacts

- SMX12 11
  - 1 - 18

- SMX12 12
  - 1 - 18

- SMX12 02
  - 1 - 18

- SMX13 11
  - 1 - 18

- SMX13 11M
  - 1 - 18

Side mount undervoltage trip releases

- SMX14... D1
  - 1 - 18

- SMX15... D1
  - 1 - 18

Side mount shunt trip release

- SMX16...
  - 1 - 18

For SM2... and SM3...

- Side mount auxiliary contacts
  - SMX18 200R or SMX18B 200R

- Padlockable door coupling handle
  - SMX23 200R or SMX23B 200R

**Wiring diagrams**

**Motor Protection Circuit Breakers**

SM1P...

- Three-phase
  - L1, L2, L3

- T1, T2, T3

- LOAD

SM1R... - SM2R... - SM3R... - SM1RE...

- Three-phase
  - L1, L2, L3

- T1, T2, T3

- LOAD

**Circuit Breakers**

For all motor protection circuit breakers

- Single-phase and DC
  - L1, L2, T1, T2

**ADD-ON BLOCKS**

For SM1... types

- Front mount auxiliary contacts
  - SMX11 11
    - 1 - 18

- SMX12 11
  - 1 - 18

- SMX12 12
  - 1 - 18

- SMX12 02
  - 1 - 18

- SMX13 11
  - 1 - 18

- SMX13 11M
  - 1 - 18

- Side mount undervoltage trip releases
  - SMX14... D1
    - 1 - 18

- SMX15... D1
  - 1 - 18

- Side mount shunt trip release
  - SMX16...
    - 1 - 18

For SM2... and SM3...

- Front mount auxiliary contacts
  - SMX21 11
    - 1 - 18

- SMX21 12
  - 1 - 18

- SMX21 02
  - 1 - 18

- Side mount auxiliary contacts
  - SMX22 11
    - 1 - 18

- SMX22 12
  - 1 - 18

- SMX22 02
  - 1 - 18

- SMX23 11
  - 1 - 18

- Side mount undervoltage trip release
  - SMX24...
    - 1 - 18

- Side mount shunt trip release
  - SMX26...
    - 1 - 18

Note: Consult our Technical support for DC use.
### Motor protection circuit breakers

#### Technical characteristics

<table>
<thead>
<tr>
<th>TYPE</th>
<th>SM1P...</th>
<th>SM1R...</th>
<th>SM2R...</th>
<th>SM3R...</th>
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<tbody>
<tr>
<td>Rated insulation voltage $U_i$</td>
<td>V</td>
<td>690</td>
<td>1000</td>
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<tr>
<td>Rated impulse withstand voltage</td>
<td>kV</td>
<td>6</td>
<td></td>
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<tr>
<td>Rated frequency: 50/60Hz</td>
<td></td>
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<tr>
<td>Maximum rated current</td>
<td>A</td>
<td>5...15</td>
<td>63</td>
<td>10...38</td>
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<tr>
<td>Magnetic tripping</td>
<td>A</td>
<td>$13 \times I_e$</td>
<td>$13 \times I_n$</td>
<td>$13 \times I_n$</td>
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<td>Mechanical life</td>
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<td>100,000</td>
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<td>50,000</td>
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<tr>
<td>Electrical life (le max AC3)</td>
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<td>25,000</td>
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<td>Terminal tightening torque</td>
<td>lb</td>
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<td>Tool</td>
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<td>Flexible without lug</td>
<td>mm²</td>
<td>16...8</td>
<td>16...8</td>
<td>18...3</td>
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<tr>
<td>Fixing</td>
<td></td>
<td></td>
<td>On 35mm DIN rail or screw via accessory</td>
<td>On 35mm DIN rail or screw</td>
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</tbody>
</table>

#### AMBIENT CONDITIONS

| Temperature | °C | -20...+60 | -20...+60 | -20...+70 | -20...+70 |
| Storage | °C | -50...+80 | -50...+80 | -50...+80 | -50...+80 |
| Compensation | °C | -20...+50 | -20...+50 | -5...+40 | -5...+40 |
| Maximum altitude | m | 3000 | | |
| Mounting position | | Any | | |
| Fixing | | On 35mm DIN rail or screw via accessory | | On 35mm DIN rail or screw |

E.g. PH = Phillips; P2 = Pozidriv; Allen is metric type.

1. SM1PF00 20 has a single 0.2A thermal adjustment and magnetic tripping at $6 \times I_n (1.2A)$.
2. When fitting more than one breaker side by side, without leaving space between each to consent free air circulation on the breaker sides, and have simultaneous operation, the thermal trip adjuster must be positioned at a value 15% higher than the rated motor current.

#### THERMAL TRIPPING CURVE (AVERAGE TIMES)

**Three-phase balanced operation**

<table>
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<th>Opening time [s]</th>
<th>10000</th>
<th>1000</th>
<th>100</th>
<th>10</th>
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<th>0.1</th>
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<tbody>
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<td>HOT</td>
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<td>HOT</td>
<td>HOT</td>
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</table>

Tripping times can have a ±20% deviation with respect to the average tripping curve value above.