Thermal Overcurrent Circuit Breakers 104/105/106-...

**Description**

Miniaturised single pole thermal circuit breaker with push-to-reset, teast- free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Available in versions for PCB or panel mounting, snap-in or threadneck, or as an integral type. Manual release facility optional for type 105. Approved to CBE standard EN 60934 (IEC 60934). For higher current ratings see type 1140.

**Typical applications**

Motors, transformers, solenoids, printed circuit boards, hand-held machines and appliances, marine applications, caravans.

**Ordering information**

- **Type No.**
  - 104: PCB mounting type (-PR), or integral type (-P30/P10)
  - 105: snap-in panel mounting
  - 106: threadneck panel mounting with hex and knurled nut
  - 106-M2: threadneck panel mounting 3/8-27UNS with collar, hex nut and knurled nut

**Terminal design**

- **P10**: blade terminals A6.3-0.8 (QC .250)
- **P30**: blade terminals A2.8-0.8 (QC .110)
- **PR**: solder terminal pins for PCB mounting (type 104 only)
- **PR2**: PCB mounting (vertical), type 104 only up to 6 A
- **PR3**: PCB mounting (vertical), type 104 only

**Shunt terminal (optional)**

- **A3**: same as main terminals (up to Iₙ 6 A/3 A max. load)

**Manual release facility (optional)**

- **H**: only with type 105

**Auxiliary contacts (optional)**

- **Si51**: type 104 only

**Current ratings**

- 0.05...10 A

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

* mounting hardware bulk shipped

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>285</td>
<td>1.8</td>
<td>0.28</td>
</tr>
<tr>
<td>0.08</td>
<td>134</td>
<td>2</td>
<td>0.25</td>
</tr>
<tr>
<td>0.1</td>
<td>81</td>
<td>2.5</td>
<td>0.18</td>
</tr>
<tr>
<td>0.2</td>
<td>22</td>
<td>3</td>
<td>0.11</td>
</tr>
<tr>
<td>0.3</td>
<td>8.7</td>
<td>3.5</td>
<td>0.076</td>
</tr>
<tr>
<td>0.4</td>
<td>5.5</td>
<td>4</td>
<td>0.067</td>
</tr>
<tr>
<td>0.5</td>
<td>3.3</td>
<td>4.5</td>
<td>0.051</td>
</tr>
<tr>
<td>0.6</td>
<td>2.45</td>
<td>5</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>0.7</td>
<td>1.6</td>
<td>6</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>0.8</td>
<td>1.45</td>
<td>7</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>8</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>1.2</td>
<td>0.6</td>
<td>10</td>
<td>≤ 0.05</td>
</tr>
<tr>
<td>1.5</td>
<td>0.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Technical data**

**For further details please see chapter: Technical Information**

- **Voltage rating**: AC 240 V; DC 48 V (UL: AC 250 V; DC 48 V)
- **Current ratings**: 0.05...10 A
- **Auxiliary circuit**: 0.5 A, AC 240 V; DC 28 V
- **Typical life**
  - AC 240 V: 0.05...8 A 2,000 operations at 1 x Iₙ, inductive
  - DC 48 V: 0.05...8 A 2,000 operations at 1 x Iₙ, inductive
  - 6...8 A: 500 operations at 2 x Iₙ, inductive
  - 10 A: 200 operations at 1 x Iₙ, inductive
  - 10 A: 50 operations at 2 x Iₙ, inductive
- **Ambient temperature**: -20...+60 °C (-4...+140 °F) T 60
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity Icn**
  - 0.05...8 A 6 x Iₙ AC
  - > 8...10 A 5 x Iₙ AC
  - 6...8 A: 500 operations at 2 x Iₙ, inductive
  - 10 A: 200 operations at 1 x Iₙ, inductive
  - 10 A: 50 operations at 2 x Iₙ, inductive
- **Degree of protection (IEC 60664 and 60664 A)**
  - operating area: AC 3,000 V
  - terminal area: IP00
- **Vibration**
  - 10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 6068-2-6, test Fc, 10 frequency cycles/axis
  - 25 g (11 ms) to IEC 6068-2-27, test Ea
- **Humidity**
  - 96 hours at 95 % RH, to IEC 6068-2-7, test Cab
- **Mass**
  - approx. 10 g

**Approvals**

- **Authority**: VDE, SEV, CSA, UL
- **Voltage ratings**: AC 240 V, DC 48 V
- **Current ratings**: 0.05...10 A

Circuit breakers with -Si51 not approved.
This is a metric design and millimeter dimensions take precedence (mm)inch.
**Installation drawings**

104-...

105-...

106-...

**Internal connection diagrams**

Types 104-105-106

Types 104-...-A3

Type 104-...-A3-Si51

**Typical time/current characteristics at +23 °C/+73.4 °F**

![Time/Current Characteristic Curve]

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm) inch.

Accessories

Water splash cover (transparent)/knurled nut assembly (type 106-... only)
X 201 285 01
Degree of protection IP64

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Overcurrent Circuit Breaker 127-...-

Description

Single pole thermal circuit breaker with push-to-reset, tear-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934; M-type when fitted with optional manual release feature). Available in versions for plug-in or integral mounting, track mounting, or with a frame for snap-in panel mounting. The optional -KF housing is particularly suited to high humidity and other damp conditions. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, battery chargers, extra low voltage systems.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Mounting options</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>127</td>
<td>leave blank for integral/plug-in option</td>
<td>AC 250 V; DC 28 V (UL: AC 250 V; DC 50 V)</td>
<td>0.05...25 A</td>
</tr>
<tr>
<td></td>
<td>F for snap-in mounting</td>
<td>Current ratings</td>
<td>0.05...25 A</td>
</tr>
<tr>
<td></td>
<td>T11 track mounting with captive stud terminals M4</td>
<td>0.05...25 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>T12 track mounting with screw terminals M4</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Terminal design (for use with and without flange -F)</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>P10 blade terminals A6.3-0.8 (QC:250)</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K10 screw terminals M4x6</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manual release (optional)</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H manual release facility</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Special housing (optional)</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>KF for tropical and high humidity conditions</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(not for -T11 and -T12)</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td>127 - F - P10 - H</td>
<td>Current ratings</td>
<td>0.1...20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.05...25 A</td>
<td>0.1...20 A</td>
<td></td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Technical data

For further details please see chapter: Technical Information

Voltage rating: AC 250 V; DC 28 V

Current ratings: 0.05...25 A

Typical life: 0.05...16 A

5,000 operations at 2 x I N, inductive

17...25 A

5,000 operations at 2 x I N, resistive

Ambient temperature: -20...+60 °C (-4...+140 °F)

Insulation co-ordination: rated impulse withstand voltage

2.5 kV

Degree of protection: reinforced insulation in operating area

Operating area

Dielectric strength

(IEC 60664 and 60664A)

Dielectric strength

(IEC 60664 and 60664A)

Test voltage

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity: Icn

Type -F:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...12 A

200 A

13...25 A

400 A

Type -T:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...25 A

400 A

Dielectric strength

(IEC 60664 and 60664A)

Test voltage

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity: Icn

Type -F:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...12 A

200 A

13...25 A

400 A

Type -T:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...25 A

400 A

Dielectric strength

(IEC 60664 and 60664A)

Test voltage

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity: Icn

Type -F:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...12 A

200 A

13...25 A

400 A

Type -T:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...25 A

400 A

Dielectric strength

(IEC 60664 and 60664A)

Test voltage

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity: Icn

Type -F:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...12 A

200 A

13...25 A

400 A

Type -T:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...25 A

400 A

Dielectric strength

(IEC 60664 and 60664A)

Test voltage

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity: Icn

Type -F:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...12 A

200 A

13...25 A

400 A

Type -T:

0.05...2.5 A

8 x I N

3...5 A

20 x I N

6...25 A

400 A

Degree of protection

(IEC 60529/DIN 40050)

Operating area

IP40

Terminal area

IP00

Vibration

8 g (57-500 Hz) ± 0.61 mm (10-57 Hz)

to IEC 6068-2-6, test Fc, 10 frequency cycles/axis

Shock

25 g (11 ms), to IEC 6068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist,
to IEC 6068-2-11, test Ka

Humidity

240 hours at 95 % RH,
to IEC 6068-2-78, test Cab

Mass

127-F-... approx. 24 g

127-T..- approx. 35 g

Approvals

Authority | Voltage ratings | Current ratings
--------- |-----------------|----------------|
VDE (EN 60934) | AC 250 V; DC 28 V | 0.05...25 A
CSA, UL | AC 250 V | 0.1...20 A
| DC 50 V | 0.1...25 A
CCC | AC 250 V | 0.05...25 A
Type 127-T..- without approvals
Thermal Overcurrent Circuit Breaker 127-...

Dimensions

127-F-P10-H

<table>
<thead>
<tr>
<th>mm</th>
<th>inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5</td>
<td>0.453</td>
</tr>
<tr>
<td>31</td>
<td>1.22</td>
</tr>
<tr>
<td>19.8</td>
<td>0.776</td>
</tr>
<tr>
<td>9.4</td>
<td>0.370</td>
</tr>
<tr>
<td>46</td>
<td>1.811</td>
</tr>
<tr>
<td>2.5</td>
<td>0.100</td>
</tr>
</tbody>
</table>

blade terminal
DIN 46244-A6.3-0.8 (QC .250)

127-T11

<table>
<thead>
<tr>
<th>mm</th>
<th>inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5</td>
<td>0.453</td>
</tr>
<tr>
<td>31</td>
<td>1.22</td>
</tr>
<tr>
<td>12.2</td>
<td>0.480</td>
</tr>
<tr>
<td>6</td>
<td>0.240</td>
</tr>
</tbody>
</table>

lightening torque for M4 max. 1.2 Nm
G profile EN 50035-G...

127-T12

<table>
<thead>
<tr>
<th>mm</th>
<th>inch</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.5</td>
<td>0.453</td>
</tr>
<tr>
<td>31</td>
<td>1.22</td>
</tr>
<tr>
<td>12.2</td>
<td>0.480</td>
</tr>
<tr>
<td>6</td>
<td>0.240</td>
</tr>
</tbody>
</table>

lightening torque for M4 max. 1.2 Nm
G profile EN 50035-G...

Installation drawings

127-F

operating area
mounting area

127-T11

operating area
mounting area

127-T12

operating area
mounting area

Terminal design 127-F-K10

Flat head screw M4x6 ISO 1580
tightening torque max. 1.2 Nm
Thermal Overcurrent Circuit Breaker 127-...

Internal connection diagram

Typical time/current characteristics at +23 °C/73.4 °F

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+23</th>
<th>+40</th>
<th>+50</th>
<th>+60</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>23</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
<td></td>
</tr>
</tbody>
</table>

Accessories

Mounting sockets
10F-P10 (up to 16 A max. load)

10F-K10 (up to 20 A max. load)

10F-A10 (up to 16 A max. load)

Accessories for sockets (up to 20 A max. load)
2-way bus bar Y 301 166 02
4-way bus bar Y 301 166 01

Connector bus links -K10
X 210 589 01/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 589 02/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)

Connector bus links -P10
X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism and separate manual release (M-type TO CBE to EN 60934). Designed for bolt-on mounting with terminal block type B3-P10.

**Typical applications**

Extra low voltage wiring systems on all types of vehicles and marine craft.

**Ordering information**

**Type No.**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism and separate manual release (M-type TO CBE to EN 60934). Designed for bolt-on mounting with terminal block type B3-P10.</td>
</tr>
</tbody>
</table>

**Type No.**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>129</td>
<td>Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism and separate manual release (M-type TO CBE to EN 60934). Designed for bolt-on mounting with terminal block type B3-P10.</td>
</tr>
</tbody>
</table>

**Ordering example**

129 - L11 - H - KF - 10 A

**Technical data**

**Voltage rating**

DC 28 V

(UL: AC 250 V; DC 50 V)

**Current ratings**

3...25 A

**Typical life**

5,000 operations at 2 x I N

**Ambient temperature**

-40...+75 °C (-40...167 °F)

**Insulation co-ordination**

rated impulse withstand voltage 2.5 kV

**Dielectric strength**

(IEC 60664 and 60664A)

operating area AC 1,500 V

**Insulation resistance**

> 100 MΩ (DC 500 V)

**Interruption capacity I On**

3...5 A x I N

6...25 A x I N A

**Degree of protection**

operating area IP32

terminal area IP00

**Vibration**

10 g (55-2,000 Hz) ± 0.76 mm (10-55 Hz)

to VG 95210 part 28

**Shock**

50 g (11 ms)

to VG 95210 part 28

**Corrosion**

96 hours at 5 % salt mist, to VG 95210 part 2

**Humidity**

240 hours at 95 % RH to VG 95210 part 7

**Mass**

approx. 25 g

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0.1</td>
<td>8</td>
<td>0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.06</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>4</td>
<td>0.06</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>4.5</td>
<td>0.05</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>5</td>
<td>0.05</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>6</td>
<td>0.02</td>
<td>25</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>7</td>
<td>0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Approvals**

**Authority**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSA, UL</td>
<td>AC 250 V</td>
<td>3...20 A</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>3...25 A</td>
</tr>
<tr>
<td>BWB (VG 95345 part 9)</td>
<td>DC 28 V</td>
<td>6...25 A</td>
</tr>
</tbody>
</table>

**Ordering example**

129 - L11 - H - KF - 10 A
Thermal Automotive Circuit Breaker 129-L11-H-KF

Dimensions

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>11.5</td>
</tr>
<tr>
<td>Height</td>
<td>8.5</td>
</tr>
<tr>
<td>Depth</td>
<td>1.22</td>
</tr>
<tr>
<td>Total Height</td>
<td>1.77</td>
</tr>
</tbody>
</table>

Accessories

Mounting block 83-P10

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>11.5</td>
</tr>
<tr>
<td>Height</td>
<td>8.5</td>
</tr>
<tr>
<td>Depth</td>
<td>1.22</td>
</tr>
<tr>
<td>Total Height</td>
<td>1.77</td>
</tr>
</tbody>
</table>

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

<table>
<thead>
<tr>
<th>Timing (s)</th>
<th>2</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>15</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>90</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>2A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>5A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.6</td>
</tr>
<tr>
<td>10A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>16A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.4</td>
</tr>
<tr>
<td>25A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.5</td>
</tr>
</tbody>
</table>

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temp. °F</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40</td>
<td>0.60</td>
</tr>
<tr>
<td>-30</td>
<td>0.76</td>
</tr>
<tr>
<td>-20</td>
<td>0.84</td>
</tr>
<tr>
<td>-10</td>
<td>0.92</td>
</tr>
<tr>
<td>0</td>
<td>1.00</td>
</tr>
<tr>
<td>10</td>
<td>1.08</td>
</tr>
<tr>
<td>20</td>
<td>1.16</td>
</tr>
<tr>
<td>30</td>
<td>1.24</td>
</tr>
<tr>
<td>40</td>
<td>1.32</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole thermal circuit breaker with push-to-reset, teaser-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Available in versions for threadneck panel mounting, plug-in or integral mounting. The optional -KF housing is particularly suited to high humidity and other damp conditions. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, extra low voltage wiring systems.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
<th>Voltage rating</th>
<th>Current ratings</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>157</td>
<td>threadneck panel mounting*</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05…25 A</td>
<td>UL: AC 250 V; DC 50 V</td>
<td></td>
</tr>
<tr>
<td>158</td>
<td>integral or plug-in mounting</td>
<td></td>
<td>0.1…16 A</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Terminal design

| P10 | blade terminals A6.3-0.8 (QC .250) |
| K10 | screw terminals M4x6 |

Special housing (optional)

- KF for tropical and high humidity conditions

Current ratings:

- 0.05…25 A

Typical current ratings and internal resistance values:

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>280</td>
<td>0.1</td>
<td>3</td>
</tr>
<tr>
<td>0.08</td>
<td>100</td>
<td>0.06</td>
<td>3.5</td>
</tr>
<tr>
<td>0.1</td>
<td>110</td>
<td>0.06</td>
<td>4</td>
</tr>
<tr>
<td>0.2</td>
<td>29</td>
<td>0.05</td>
<td>4.5</td>
</tr>
<tr>
<td>0.3</td>
<td>14</td>
<td>0.05</td>
<td>5</td>
</tr>
<tr>
<td>0.4</td>
<td>7</td>
<td>0.02</td>
<td>6</td>
</tr>
<tr>
<td>0.5</td>
<td>4.9</td>
<td>0.02</td>
<td>7</td>
</tr>
<tr>
<td>0.6</td>
<td>3.4</td>
<td>0.02</td>
<td>8</td>
</tr>
<tr>
<td>0.7</td>
<td>2.5</td>
<td>&lt; 0.02</td>
<td>10</td>
</tr>
<tr>
<td>0.8</td>
<td>1.8</td>
<td>&lt; 0.02</td>
<td>12</td>
</tr>
<tr>
<td>1.0</td>
<td>1.2</td>
<td>&lt; 0.02</td>
<td>13</td>
</tr>
<tr>
<td>1.2</td>
<td>0.8</td>
<td>&lt; 0.02</td>
<td>15</td>
</tr>
<tr>
<td>1.5</td>
<td>0.6</td>
<td>&lt; 0.02</td>
<td>16</td>
</tr>
<tr>
<td>1.8</td>
<td>0.2</td>
<td>&lt; 0.02</td>
<td>20</td>
</tr>
<tr>
<td>2.0</td>
<td>0.3</td>
<td>&lt; 0.02</td>
<td>22</td>
</tr>
<tr>
<td>2.5</td>
<td>0.2</td>
<td>&lt; 0.02</td>
<td>25</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

- Voltage rating: AC 250 V; DC 28 V
- Current ratings: 0.05…25 A
- Typical life: 0.05…16 A
- Ambient temperature: -20…+60 °C (~-4…+140 °F)
- Insulation co-ordination: rated impulse withstand voltage 2.5 kV, pollution degree 2
- Reinforced insulation in operating area
- Dielectric strength: AC 3,000 V
- Insulation resistance: > 100 MΩ
- Interrupting capacity: 0.05…2.5 A, 8 x IN, 3…5 A, 20 x IN, 6…12 A, 200 A, 13…25 A, 400 A
- Degree of protection: operating area IP40, terminal area IP00
- Vibration: 8 g (57-500 Hz) ± 0.61 mm (10-57 Hz)
- Shock: 25 g (11 ms)
- Corrosion: 96 hours at 5 % salt mist
- Humidity: 240 hours at 95 % RH
- Mass: approx. 24 g

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05…25 A</td>
</tr>
<tr>
<td>CSA, UL</td>
<td>AC 250 V</td>
<td>0.1…16 A</td>
</tr>
<tr>
<td>CCC</td>
<td>AC 250 V</td>
<td>0.05…25 A</td>
</tr>
</tbody>
</table>
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.76</td>
</tr>
<tr>
<td>+14</td>
<td>0</td>
<td>0.84</td>
</tr>
<tr>
<td>+32</td>
<td>+20</td>
<td>0.92</td>
</tr>
<tr>
<td>+73.4</td>
<td>+40</td>
<td>1.08</td>
</tr>
<tr>
<td>+104</td>
<td>+60</td>
<td>1.16</td>
</tr>
<tr>
<td>+122</td>
<td>+80</td>
<td>1.24</td>
</tr>
<tr>
<td>+140</td>
<td>+100</td>
<td></td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm) inch.
### Accessories

**Mounting sockets**

10F-P10 (up to 16 A max. load)

![Mounting socket 10F-P10](image)

10F-K10 (up to 20 A max. load)

![Mounting socket 10F-K10](image)

10F-A10 (up to 16 A max. load)

![Mounting socket 10F-A10](image)

**Accessories for sockets** (up to 20 A max. load)

2-way bus bar Y 301 166 02

![2-way bus bar Y 301 166 02](image)

4-way bus bar Y 301 166 01

![4-way bus bar Y 301 166 01](image)

**Connector bus links -K10**

X 210 589 01/1.5 mm² (AWG 14), black (up to 20 A max. load)

X 210 589 02/1.5 mm² (AWG 16), brown (up to 13 A max. load)

![Connector bus links -K10](image)

**Connector bus links -P10**

X 210 588 01/1.5 mm² (AWG 16), brown (up to 13 A max. load)

X 210 588 02/2.5 mm² (AWG 14), black (up to 20 A max. load)

X 210 588 03/2.5 mm² (AWG 14), red (up to 20 A max. load)

X 210 588 04/2.5 mm² (AWG 14), blue (up to 20 A max. load)

![Connector bus links -P10](image)

This is a metric design and millimeter dimensions take precedence (mm)

---

### Accessories for type 157...

**Front panel water splash cover, transparent**

Y 300 538 01 and knurled nut Y 300 628 01

X 200 799 01 (bonded to nut) (IP64)

![Front panel water splash cover, transparent](image)

**Front panel water splash cover, transparent with special knurled nut**

X 200 798 02 (bonded to nut) (IP64)

![Front panel water splash cover, transparent with special knurled nut](image)

**Splash cover (black) with hex nut**

X 210 739 01

![Splash cover (black) with hex nut](image)

---

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single pole switch/thermal circuit breaker with push-push or push-to-reset actuation (S-type TO or R-type TO CBE to EN 60934) and tease-free, trip-free, snap action mechanism. Designed for snap-in panel mounting utilising round hole or industry standard fuse-holder cut-out dimensions. Featuring an ergonomically styled two colour actuator with indicator band clearly showing the tripped/OFF position. Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Motors, transformers, solenoids, extra low voltage systems, household and office machines, instrumentation, marine applications, mobile homes.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>snap in panel mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>panel thickness 0.8...1.6 mm (.031... .063 in)</td>
</tr>
<tr>
<td>F2</td>
<td>panel thickness 1.8...3 mm (.071... .118 in)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of poles</th>
<th>1-pole protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator style</td>
<td>2 black push button/white indicator ring, standard push-push function</td>
</tr>
<tr>
<td></td>
<td>B black push button/white indicator ring, standard push-to-reset function</td>
</tr>
<tr>
<td>Terminal design</td>
<td>P1 blade terminals A6.3-0.8 (QC .250)</td>
</tr>
<tr>
<td></td>
<td>M1 medium delay</td>
</tr>
<tr>
<td>Current ratings</td>
<td>0.05...16A</td>
</tr>
</tbody>
</table>

**Technical data**

For further details please see chapter: Technical Information

**Voltage rating**

AC 250 V; DC 28 V  
(UL: AC 250 V; DC 50 V)

**Current rating**

0.05...16 A

**Typical life**

for S-type

AC + DC

0.05...10 A 10,000 operations at 1 x I_N, inductive

12...16 A 6,000 operations at 1 x I_N, inductive

for actuator style B:

0.05...10 A 200 operations at 2 x I_N, inductive

**Ambient temperature**

-20...+60 °C (-4...+140 °F)

**Insulation co-ordination**

rated impulse pollution withstand voltage degree

2.5 kV 2 reinforced insulation in operating area

**Dielectric strength**

(test voltage)

AC 3,000 V

**Insulation resistance**

> 100 MΩ (DC 500 V)

**Interrupting capacity I_on**

AC 250 V: 0.05...16 A 8 x I_N

DC 28 V: 0.05...6 A 10 x I_N

7...10 A 200 A

12...16 A 300 A

**Degree of protection**

operating area IP40

terminal area IP00

**Vibration**

8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), 10 frequency cycles/axis

**Shock**

30 g (11 ms) to IEC 6068-2-27, test Ea

**Corrosion**

96 hours at 5 % salt mist, to IEC 6068-2-11, test Ka

**Humidity**

240 hours at 95 % RH to IEC 6068-2-78, test Cab

**Mass**

approx. 12 g

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>AC 250 V</td>
<td>0.05...6 A</td>
</tr>
<tr>
<td></td>
<td>AC 125 V</td>
<td>7...16 A</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>CSA</td>
<td>AC 250 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>VDE</td>
<td>AC 250 V</td>
<td>0.05...16 A</td>
</tr>
</tbody>
</table>

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>442</td>
<td>2</td>
<td>0.25</td>
</tr>
<tr>
<td>0.08</td>
<td>173</td>
<td>2.5</td>
<td>0.19</td>
</tr>
<tr>
<td>0.1</td>
<td>110</td>
<td>3</td>
<td>0.12</td>
</tr>
<tr>
<td>0.2</td>
<td>27.8</td>
<td>3.5</td>
<td>0.09</td>
</tr>
<tr>
<td>0.3</td>
<td>12.4</td>
<td>4</td>
<td>0.07</td>
</tr>
<tr>
<td>0.4</td>
<td>7.0</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>0.5</td>
<td>4.5</td>
<td>6</td>
<td>0.04</td>
</tr>
<tr>
<td>0.6</td>
<td>3.1</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>0.7</td>
<td>2.3</td>
<td>8</td>
<td>0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>1.7</td>
<td>10</td>
<td>0.02</td>
</tr>
<tr>
<td>1</td>
<td>1.1</td>
<td>12</td>
<td>0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.71</td>
<td>15</td>
<td>0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.41</td>
<td>16</td>
<td>0.02</td>
</tr>
<tr>
<td>1.8</td>
<td>0.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
When installing the circuit breaker apply pressure on bezel only.

Dimensions

Panel cut out

Installation drawing

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

Accessories - Water splash covers (transparent)

This is a metric design and millimeter dimensions take precedence (mm).
Thermal Circuit Breaker 1120

**Description**

Double pole combined circuit breaker and ON/OFF switch with rocker actuation. Specially suited to single-phase applications. Snap-in front panel mounting. Thermal positively trip free mechanism ensures reliable overcurrent protection and safe physical isolation of the load circuit. Attractively styled, with rocker illumination optional. The status of the switching contacts is shown by the position of the rocker actuator.

For high volume requirements customer-specific designs can be offered for the front bezel and the rocker.

It meets the requirements of the CBE standard EN 60934 (IEC 60934): S type, TO.

Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

Minimum ordering quantities apply!

**Typical applications**

Electrical motors, household appliances, office equipment, garden and hobby tools, power supplies, charging rectifiers, cable extension reels, multiple socket outlets.

**Variants/Options**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1120</td>
<td>thermal circuit breaker</td>
</tr>
</tbody>
</table>

**Configuration**

- F: snap-in panel mounting
- P: blade terminals
- T: terminal area
- U: rocker (momentary switch)
- W: rocker (latching switch)

**Size of frame**

- 0: double pole without protection
- 1: double pole, one pole thermally protected

**Number of poles**

- 0: standard
- 1: with water splash protection

**Terminal design**

- P1: blade terminals 6.3x0.8
- P2: blade terminals 6.3x0.8, 90° angled

**Characteristic curve**

- Q0: without thermal
- T1: thermal

**Actuator style**

- U: rocker (momentary switch)
- W: rocker (latching switch)

**Actuator colour**

- A: black opaque
- B: white opaque
- C: red translucent
- D: green translucent
- E: blue translucent
- F: blue translucent
- other colours upon request

**Actuator markings**

- 00: "I" and "O" moulded in

**Illumination**

- 0: without illumination
- B: filament bulb

**Illumination voltage range**

- 0: without illumination
- 3: AC 90 V - 140 V
- 4: AC 185 V - 275 V
- DC illumination upon request

**Current ratings**

- 3...16 A

**Technical data**

**Voltage rating**

- AC 240 V; DC 32 V
- DC 50 V (only double pole)

**Current ratings**

- 3...16 A

**Typical life**

- 20,000 operations at \( I_{\text{in}} \), inductive

**Ambient temperature**

- -20 °C...+60 °C

**Insulation co-ordination**

(IEC 60664-1) 2,5 kV/2 reinforced insulation in operating area

**Dielectric strength**

- operating area test voltage AC 3,000 V
- terminal area test voltage AC 1,500 V
- pole/pole test voltage AC 1,500 V

**Insulation resistance**

- > 100 MΩ (DC 500 V)

**Switching capacity**

- AC 240 V: 200 A, 1 and 2 pole
- DC 50 V: 200 A, 2 pole
- DC 32 V: 200 A, 1 and 2 pole

**Switching capacity (UL 1077)**

- AC 277 V: 3,500 A, 1 and 2 pole
- DC 50 V: 2,000 A, 2 pole
- DC 32 V: 2,000 A, 1 and 2 pole

**Degree of protection**

(IEC 60529) operating area IP40 with water splash protection IP66

**Vibration**

- 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)
- test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis

**Shock**

- 20 g (11 ms)
- test to IEC 60068-2-27, test Ea

**Corrosion**

- 48 hrs in 5% salt mist, test to IEC 60068-2-11, test Ka

**Humidity**

- 96 hrs in 95% RH, test to IEC 60068-2-3, test Cab

**Mass**

- approx. 20 g

**Illumination voltage/power consumption**

**operating voltage**

- filament/neon

**AC 115 V**

- < 1.5 mA

**AC 230 V**

- < 1.5 mA

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V, DC 32 V</td>
<td>3...16 A 1 + 2 pole</td>
</tr>
<tr>
<td>UL, CSA, CCC</td>
<td>AC 277 V, DC 32 V</td>
<td>3...16 A 1 + 2 pole</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Circuit Breaker 1120

Dimensions single pole

1120-F1.0-P1..

- Blade terminals 6.3x0.8 to EN 60934

Dimensions double pole

1120-F..-P2

- Blade terminals 6.3x0.8 to EN 60934 with locating pin

Applicable for nominal dimensions without direct tolerance indication:
DIN ISO 286 + IT13

Installation drawing

- Operating area
- Mounting area
Cut-out dimensions

<table>
<thead>
<tr>
<th>Version</th>
<th>Dimension &quot;a&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1120-F1, F2, -F3</td>
<td>1 - 2.5 mm/.039-.098</td>
</tr>
</tbody>
</table>

Applicable for nominal dimensions without direct tolerance indication: DIN ISO 286 a IT13

Internal connection diagrams

**Single pole connection**
AC 240 V, DC 32 V

**Double pole**
One pole thermally protected

**Double pole without protection**

<table>
<thead>
<tr>
<th>T1 - thermal characteristic curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip time in seconds</td>
</tr>
</tbody>
</table>

---

Continuous load: 100%
Overload: 150%

<table>
<thead>
<tr>
<th>Ambient temperature °C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-20</td>
<td>0,84</td>
</tr>
<tr>
<td>-10</td>
<td>0,88</td>
</tr>
<tr>
<td>0</td>
<td>0,92</td>
</tr>
<tr>
<td>+23</td>
<td>1</td>
</tr>
<tr>
<td>+40</td>
<td>1,08</td>
</tr>
<tr>
<td>+50</td>
<td>1,14</td>
</tr>
<tr>
<td>+60</td>
<td>1,23</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence ( mm ).
Thermal Overcurrent Circuit Breaker 1140-...

Description

Miniaturised single pole thermal circuit breaker with push-to-reset tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Available in versions for panel mounting, snap-in or threadneck, or as an integral type. For lower current ratings see types 104, 105, 106. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, hand-held machines and appliances.

Ordering information

Type No. 1140 single pole thermal circuit breaker
Mounting
E2 integral mounting
F1 snap-in panel mounting
G1 threadneck panel mounting 3/8-27UNS with hex nut and knurled nut*
G4 threadneck panel mounting 3/8-27UNS with knurled nut*
Number of poles 1-pole protected
Actuator style 1 black push button (standard)
Terminal design P1 blade terminals A6.3-0.8 (QC .250)
Characteristic curve M1 medium delaye
Current ratings
3.5,...16 A

1140 - F1 1 1 - P1 M1 - 10 A = ordering example

*mouting hardware bulk shipped

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>0.06</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>4</td>
<td>0.04</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>5</td>
<td>0.03</td>
<td>13</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>6</td>
<td>0.02</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>7</td>
<td>&lt; 0.02</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE</td>
<td>AC 240 V; DC 48 V</td>
<td>3.5...16 A</td>
</tr>
<tr>
<td>CSA, UL</td>
<td>AC 250 V; DC 50 V</td>
<td>3.5...16 A</td>
</tr>
<tr>
<td>Kema (EN 60934)</td>
<td>AC 240 V; DC 48 V</td>
<td>3.5...16 A</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information
Voltage rating AC 240 V; DC 48 V
(UL: AC 250 V; DC 50 V)
Current ratings 3.5...16 A
Typical life
AC + DC 3.5...8 A 200 operations at 2 x I N, inductive
1,000 operations at 2 x I N, resistive
9...16 A 100 operations at 2 x I N, inductive
Ambient temperature -20...+60 °C (-4...+140 °F) T 60
Insulation co-ordination
IEC 60664 and 60664 A rated impulse withstand voltage 2.5 kV
Withstand voltage degree 2 reinforced insulation in operating area
Dielectric strength
IEC 60664 and 60664A test voltage AC 3,000 V
Operating area
Insulation resistance > 100 MΩ (DC 500 V)
Interruption capacity Icn 3.5...8 A 8 x I N
10...16 A 120 A

Interrupting capacity
(UL 10777) I N U N 3.5...16 A DC 50 V 200 A
3.5...7A AC 250 V 1,000 A
0...16 A AC 250 V 2,000 A
Degree of protection
IEC 60529/DIN 40 050 operating area IP40
terminal area IP00
Vibration
10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc,
10 frequency cycles/axis
Shock
25 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion
96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity
240 hours at 96 % RH to IEC 60068-2-78, test Cab
Mass
approx. 10 g
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F  | -4 | +14 | +32 | +73.4 | +104 | +122 | +140
| °C   | -20| -10 | 0   | +23  | +40  | +50  | +60
Derating factor          | 0.76 | 0.84 | 0.92 | 1     | 1.08 | 1.16 | 1.24

This is a metric design and millimeter dimensions take precedence.
Description

Miniaturised double pole thermal circuit breaker with push-to-reset tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Threadneck panel mounting. Suitable for line and neutral switching - the thermal actuator operating on one pole simultaneously opens both poles under overload conditions. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, hand-held machines and appliances. Especially suited to AC duties where the correct orientation of line/neutral is not known/cannot be guaranteed.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>1140</th>
<th>double pole threadneck panel mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>G1</td>
<td>threadneck panel mounting 3/8-27UNS, with hex nut and knurled nut*</td>
</tr>
<tr>
<td></td>
<td>G4</td>
<td>threadneck panel mounting 3/8-27UNS, with knurled nut*</td>
</tr>
<tr>
<td>Number of poles</td>
<td>5</td>
<td>double pole, 1-pole protected</td>
</tr>
<tr>
<td>Actuator style</td>
<td>1</td>
<td>black push button (standard)</td>
</tr>
<tr>
<td></td>
<td>P7</td>
<td>blade terminals DIN 46244-C (QC 2x.110)</td>
</tr>
<tr>
<td>Characteristic curve</td>
<td>M1</td>
<td>medium delay</td>
</tr>
</tbody>
</table>

1140-G.5

*mounting hardware bulk shipped

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>345</td>
<td>1.8</td>
<td>0.3</td>
</tr>
<tr>
<td>0.06</td>
<td>240</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>0.08</td>
<td>142</td>
<td>2.5</td>
<td>0.2</td>
</tr>
<tr>
<td>0.1</td>
<td>88</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>3.5</td>
<td>0.08</td>
</tr>
<tr>
<td>0.3</td>
<td>9.9</td>
<td>4</td>
<td>0.07</td>
</tr>
<tr>
<td>0.4</td>
<td>5.9</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>0.5</td>
<td>3.7</td>
<td>6</td>
<td>0.04</td>
</tr>
<tr>
<td>0.6</td>
<td>2.2</td>
<td>7</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.7</td>
<td>1.9</td>
<td>8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>1.4</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.6</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.5</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE</td>
<td>AC 240 V; DC 48 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>CSA, UL</td>
<td>AC 250 V; DC 50 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>Kema (EN 60934)</td>
<td>AC 240 V; DC 48 V</td>
<td>0.05...16 A</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

Voltage rating

AC 240 V; DC 48 V
(UL: AC 250 V; DC 50 V)

Current ratings

0.05...16 A

Typical life

AC + DC
0.05...3 A
300 operations at 2 x I N, inductive
3,000 operations at 2 x I N, resistive
3.5...8 A
200 operations at 2 x I N, inductive
1,000 operations at 2 x I N, resistive
9...16 A
100 operations at 2 x I N, inductive

Ambient temperature

-20...+60 °C (-4...+140 °F) T 60

Insulation co-ordination

Rated impulse withstand voltage
2.5 kV
2 reinforced insulation in operating area

Dielectric strength

Test voltage
AC 3,000 V
AC 1,500 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity

I_{on} 0.05...3 A 6 x I N
3.5...8 A 8 x I N
9...16 A 120 A

Interrupting capacity

(UL 1077)

I_{N} 0.05...16 A
DC 50 V
200 A
0.05...7 A
AC 250 V
1,000 A
8...16 A
AC 250 V
2,000 A

Degree of protection

Operating area IP40
Terminal area IP60

Vibration

10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60668-2-6, test Fc, 10 frequency cycles/axis

Shock

25 g (11 ms) to IEC 60068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist, to IEC 60668-2-11, test Ka

Humidity

240 hours at 95 % RH to IEC 60668-2-78, test Cab

Mass

approx. 13 g

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Overcurrent Circuit Breaker 1140-... (2-pole)

Dimensions

1140-G15...

- Tightening torque max. 0.8 Nm
- Blade terminal
- DIN 46244-A6.3-0.8 (QC .110)
- Mounting hole ø4.2
- Mounting area

Installation drawing

- Operating area
- Mounting area

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

Water splash cover/knurled nut assembly, transparent X 201 285 01 (IP64)

Accessories

This is a metric design and millimeter dimensions take precedence (in mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description
Thermal circuit breaker, with controlled self-resetting mechanism, specially suited to installation in inaccessible locations. Under overload conditions the circuit breaker contacts will open to protect the load circuit. A low current excitation circuit ensures that the contacts remain open thereby avoiding the hazards of automatic reset operation. The circuit breaker is reset by switching off the supply circuit for a short period. Class 2 device, contacts stay open until voltage is removed. Type II to SAE J 553.

Typical applications
Automotive and marine extra low voltage wiring systems and components, battery powered appliances.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Design standard</th>
<th>Current ratings</th>
<th>Voltage rating</th>
<th>Current ratings</th>
<th>Typical life</th>
<th>Ambient temperature</th>
<th>Holding current</th>
<th>Reset time at 23°C after 5 s of load with ( U_{N} )</th>
<th>Interrupting capacity</th>
<th>Degree of protection</th>
<th>Vibration</th>
<th>Shock</th>
<th>Corrosion</th>
<th>Humidity</th>
<th>Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>1160</td>
<td>02</td>
<td>12, 15, 20, 30 A</td>
<td>DC 12 V</td>
<td>12...30 A</td>
<td>300 operations at ( 2 \times I_{N} )</td>
<td>-30...+60 °C (-22...+140 °F)</td>
<td>&lt; 0.6 A</td>
<td>&lt; 35 sec</td>
<td>200 A, ( L/R = 2.5 \text{ ms} )</td>
<td>housing area IP54</td>
<td>5 g (57-500 Hz) ± 0.38 mm (10-57 Hz), 10 frequency cycles/axis</td>
<td>25 g (11 ms)</td>
<td>96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka</td>
<td>240 hours at 95 % RH, to IEC 60068-2-78, test Cab</td>
<td>approx. 6 g</td>
</tr>
<tr>
<td>1160 - 02</td>
<td>- 12 A</td>
<td>ordering example</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Typical current ratings and typical voltage drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 150</td>
</tr>
</tbody>
</table>
**Thermal Automotive Circuit Breaker 1160-...**

**Dimensions**

![Dimensions diagram]

**Accessories**

Sockets available to special order.

**Internal connection diagram**

![Connection diagram]

**Typical time/current characteristics at +23 °C/+73.4 °F**

![Time/Current characteristics graph]

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.76</td>
</tr>
<tr>
<td>+14</td>
<td>-10</td>
<td>0.84</td>
</tr>
<tr>
<td>+32</td>
<td>0</td>
<td>0.92</td>
</tr>
<tr>
<td>+73.4</td>
<td>+23</td>
<td>1.08</td>
</tr>
<tr>
<td>+104</td>
<td>+40</td>
<td>1.16</td>
</tr>
<tr>
<td>+122</td>
<td>+50</td>
<td>1.24</td>
</tr>
<tr>
<td>+140</td>
<td>+60</td>
<td></td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Compact single pole thermal circuit breaker with push-to-reset, tease free, trip free, snap action mechanism and separate (colour coded) manual release. Combining full feature circuit breaker protection and convenience with low cost of ownership benefits. Fitted with blade terminals for plug-in mounting.

Type III to SAE J 553.

Version 1176 is available especially for the automotive industry (current ratings correspond to those of blade fuses).

**Typical applications**

Extra low voltage wiring systems on all types of vehicles and marine craft.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>1170 plug-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design standard</td>
<td>21 blade terminals for automotive fuse blocks (standard) with retaining clips</td>
</tr>
<tr>
<td>22 blade terminals for automotive fuse blocks, without retaining clips</td>
<td></td>
</tr>
</tbody>
</table>

**Current ratings**

3...25 A, ordering example

**Standard current ratings, typical voltage drop values and actuator colours (manual release)**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
<th>Actuator colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>&lt; 300</td>
<td>violet</td>
</tr>
<tr>
<td>4</td>
<td>&lt; 300</td>
<td>pink</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 300</td>
<td>orange-brown</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 150</td>
<td>mossy-green</td>
</tr>
<tr>
<td>7.5</td>
<td>&lt; 150</td>
<td>hazel</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 150</td>
<td>red</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 150</td>
<td>blue</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 150</td>
<td>yellow</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 150</td>
<td>pearl</td>
</tr>
</tbody>
</table>

**Technical data**

- **Voltage rating**: DC 28 V
- **Current ratings**: 3...25 A (30 A upon request)
- **Typical life** at rated current: 3...25 A 6,000 operations at I_N, 3...20 A 3,000 operations at 2 x I_N, 25 A 1,000 operations at 2 x I_N
- **Ambient temperature**: -40...+85 °C (-40...+185 °F)
- **Interrupting capacity I_{on}**: 400 A
- **Ultimate short-circuit breaking capacity**: ≥ 1 break operation at 2,000 A
- **Degree of protection**:
  - Operating area: IP40
  - Terminal area: IP00
- **Vibration**: 10 g (57-500 Hz)± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
- **Shock**: 50 g (11 ms) to IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist, to IEC 60608-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH, to IEC 60608-2-78, test Cab
- **Mass**: approx. 13 g
Dimensions

Internal connection diagram

Typical time/current characteristics at +23 °C / 73.4 °F

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-40</th>
<th>-22</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td>0.77</td>
<td>0.80</td>
<td>0.84</td>
<td>0.89</td>
<td>0.94</td>
<td>0.96</td>
</tr>
<tr>
<td>Ambient temperature °C</td>
<td>-40</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+10</td>
</tr>
<tr>
<td>Derating factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
<th>+158</th>
<th>+185</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td></td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
<td>1.33</td>
<td>1.42</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature °C</th>
<th>+23</th>
<th>+40</th>
<th>+60</th>
<th>+70</th>
<th>+85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm) vs. inch.
Accessories

Socket 12-P10

Socket 12-J20

Socket 12-A10

Dimensions for surface mounting

Other sockets available to special order
Labels: Weidmüller, D-33102 Paderborn

Ordering information Mounting socket 12

Type No.
12 Mounting socket

Terminal design
P10 blade terminals A6.3-0.8 (QC .250)
J20 screw terminals 6-32 UNC
A10 1 blade terminal A6.3-0.8 (QC .250)/1 screw terminal 6-32 UNC

Version
(blank) single socket
20 two-way
30 three-way
40 four-way
60 six-way

12 - P10 - 20 ordering example

Connector bus links -P10
X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

Bus bar (supplied as a complete package)
(up to 100 A max. load)
X 211 157 01 with terminal
X 211 157 02 without terminal

This is a metric design and millimeter dimensions take precedence (inches).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved.Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Ordering stationery, bus links and bus bars are available from stock in a variety of colors. Please contact your local distributor for more information.

Note: This product is not suitable for use in installations where the mechanical strength of the bus bar is utilized. The lightning protection is not provided by this product. In areas where high temperature conditions or high humidity may affect the insulation properties of the product, special precautionary measures must be taken. This product is not intended for use in nuclear facilities.
Description

Miniaturised single pole thermal circuit breaker with switching function optional (push-push actuation). Reliable snap-acting and trip-free mechanism. Approved to CBE standard EN/IEC 60934. S-type, TO. Blade terminals fitting into sockets for rail mounting.

Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 250 V; DC 65 V (UL, UL Canada: AC 250 V; DC 72 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...10 A</td>
</tr>
<tr>
<td>Typical life</td>
<td>6,000 operations at 1 x I_N (low-inductance)</td>
</tr>
<tr>
<td></td>
<td>3,000 operations at 1 x I_N (inductive)</td>
</tr>
<tr>
<td></td>
<td>500 operations at 2 x I_N (inductive)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20...+60 °C (T 60) -4...+140 °F</td>
</tr>
<tr>
<td>Insulation co-ordination withstand voltage degree</td>
<td>2.5 kV 2 reinforced insulation in operating area</td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>test voltage</td>
</tr>
<tr>
<td>Rated impulse</td>
<td>AC 3,000 V</td>
</tr>
<tr>
<td>Pollution degree</td>
<td>AC 1,500 V</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Interrupting capacity I_{on}</td>
<td>0.1...5 A 6 x I_N</td>
</tr>
<tr>
<td>(UL 1077)</td>
<td>6...10 A 8 x I_N</td>
</tr>
<tr>
<td>Interrupting capacity</td>
<td>AC 250 V: 2,000 A</td>
</tr>
<tr>
<td>(UL 06529/DIN 40050)</td>
<td>DC 65 V: 200 A</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>operating area IP40</td>
</tr>
<tr>
<td>(IEC 60068-2-6, test Fc, 10 frequency cycles/axis and to EN 50155)</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)</td>
</tr>
<tr>
<td>Shock without terminal block</td>
<td>to IEC 60068-2-27, test Ea</td>
</tr>
<tr>
<td>Corrosion</td>
<td>96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka</td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH to IEC 60068-2-78, test Cab</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 15 g</td>
</tr>
</tbody>
</table>
Thermal Overcurrent Circuit Breaker 1180-...

**Dimensions**

![Diagram of dimensions](image)

- Slot for fitting labels (see accessory 1)

**Internal connection diagram**

![Diagram of connection](image)

**Shock directions**

![Diagram of shock directions](image)

**Typical time/current characteristics at +23 °C +73.4 °F**

![Graph of time/current characteristics](image)

- The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient Temperature °F</th>
<th>+22</th>
<th>+26</th>
<th>+30</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating Factor</td>
<td>0.8</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
</tr>
</tbody>
</table>

**Note:** When several devices are mounted together, each device should only carry 80% of its rating or it must be overrated accordingly.
Accessories - Terminal block with screw terminals

1 **Label** for circuit breaker 1180, surface for marking 4.5 x 5 mm  
   (packaging quantity 120 pcs)  
   Y 307 374 01

2 **Terminal block** for DIN rail mounting, with screw terminals  
   up to 6 mm² conductor, width 8.2 mm,  
   dimensions 64 x 42.5 x 8.2 mm,  
   headroom over the upper rail edge with circuit breaker fitted  
   (OFF position) 84 mm.  
   Approvals: UL 300 V / 30 A / AWG 26-8  
   X 222 233 01

3 **Terminal block** for DIN rail mounting see item 2,  
   but with LED DC 24 V (lighted after tripping);  
   current rating LED 2 mA  
   X 222 233 02

4 **Bus connection** for potential bridging of several terminal blocks  
   see item 2 and 3 (10-pole, separable, mounting hardware included), max. current rating 34 A  
   X 222 232 01

5 **Insulation barriers** for insertion between two circuits  
   (packaging quantity 10 pcs)  
   Y 307 373 01

6 **Label** for terminal block, see item 2 and 3,  
   surface for marking 8 x 10 mm  
   (packaging quantity 10 pcs)  
   Y 307 375 01

**Dimensions X 222 233 02**

- Vibration with terminal block X 222 233 01  
  and X 222 233 02  
  5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)  
  to IEC 60068-2-6, test Fc,  
  10 frequency cycles/axis  
  and EN 50155

- Shock with terminal block X 222 233 01  
  and X 222 233 02  
  25 g (11 ms)  
  to IEC 60068-2-27, test Ea

This is a metric design and millimeter dimensions take precedence.  

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
1 Label for circuit breaker 1180, surface for marking 4.5 x 5 mm (packaging quantity 120 pcs)
Y 307 374 01

7 Terminal block for DIN rail mounting, with spring-loaded terminals up to 4 mm² conductor, width 8.2 mm, dimensions 68.5 x 36.5 x 8.2 mm, headroom over the upper rail edge with circuit breaker fitted (OFF position) 82 mm. UL approval pending.
X 222 316 01

8 Terminal block for DIN rail mounting see item 7, but with LED DC 24 V (lighted after tripping); current rating LED 2 mA
X 222 315 02

9 Jumper 2pole, max. current rating 32 A for terminal blocks items 7 and 8 and feed supply terminal item 11.
X 222 318 01

10 Jumper 3pole, max. current rating 32 A for terminal blocks items 7 and 8 and feed supply terminal item 11.
X 222 318 02

11 Feed supply terminal with spring-loaded terminals up to 6 mm² conductor, width 8.2 mm, suitable for use with jumpers items 9 and 10 (power distribution).
X 222 317 01

12 Cover for feed supply terminal item 11 for closing the open side at the end of an assembly.
Y 307 507 01

13 Label for terminal block items 7 and 8, and feed supply terminal item 11, surface for marking 7.5 x 5 mm (packaging quantity 50 pcs)
Y 307 508 01

Dimensions X 222 316 01

Vibration with terminal blocks X 222 316 01 and X 222 315 02
vibration axis 3-4:
3 g (57-500 Hz), ± 0.38 mm (10-57 Hz)
other axes:
5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)
to IEC 60068-2-6, test Fc, 10 frequency cycles/axis and EN 50155

Shock with terminal blocks X 222 316 01 and X 222 315 02
25 g (11 ms) to IEC 60068-2-27, test Ea

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Miniaturised single pole rocker switch/thermal circuit breaker combining ON/OFF switching and extremely fast overload performance in a single component (S-type TO CBE to EN 60934/IEC 934). Under overload conditions an internal neon (filament bulb for low voltages) illuminates to give a clear signal of the tripped status of the mechanism and thereby the cause of power interruption, suffix -B. Alternatively the illumination can be conventionally wired to indicate the ON status of the device, suffix -E. Returning the rocker switch through the OFF position and back ON will reset the mechanism and restore the supply. Largely temperature-insensitive. Complies with CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, PCBs, hand-held machines, appliances, instrumentation.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1410</td>
<td>snap-in panel mounting type</td>
</tr>
</tbody>
</table>

Mounting

- F: snap-in panel mounting

Size of frame

- 1 to fit mounting cut-out 28 x 12.7 mm (1.1 x .5 in)

Number of poles

- 1: single pole, thermally protected

Accessories

- 0: without accessories

Terminal design

- P1: blade terminals 2.8-0.8 (QC .110/2x.110) silver-plated

Characteristic curve

- F1: fast acting

Actuator style

- W: rocker, rounded profile

Actuator colour

- 02: white opaque
- 14: red translucent
- 15: orange translucent
- 19: green translucent

Actuator markings

- Q: I and O

Trip/ON illumination (optional)

- B: illuminated when tripped
- E: illuminated when ON

Voltage ratings

- AC 240 V; DC 28 V (DC 50 V upon request) (UL: AC 250 V; DC 48 )

Current rating range

- 0.63...10 A

Typical life

- circuit 1-3: 30,000 operations for \(I_n \leq 6.3\) A AC/DC
- 10,000 operations for \(I_n > 6.3\) A AC
- 3,000 operations for \(I_n > 6.3\) A DC
- protection circuit 1-2: 300 break operations at 2 x \(I_n\)

Ambient temperature

- -20...+70 °C (-4...+158 °F)

Insulation co-ordination

- Rated impulse withstand voltage 2.5 kV
- Pollution degree 2
- Reinforced insulation in operating area

Dielectric strength

- (IEC 60664 and 60664A) test voltage 3,000 V
- Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity

- Icn 0.63...2 A 12 x \(I_n\)
- 2.5...8 A 8 x \(I_n\), AC max. 50 A
- 3.15...10 A 6 x \(I_n\)
- 2 A 10 x \(I_n\), DC

Degree of protection

- operating area IP30
- terminal area IP00

Vibration

- 8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60688-2-6, test Fc, 10 frequency cycles/axis

Shock

- 20 g (11 ms) to IEC 6068-2-27, test Ea

Corrosion

- 48 hours at 5 % salt mist, to IEC 6068-2-11, test Ka

Humidity

- 96 hours at 95 % RH to IEC 6068-2-78, test Cab

Mass

- approx. 9 g

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.63</td>
<td>1.8</td>
<td>3.15</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>0.8</td>
<td>1.7</td>
<td>4</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1</td>
<td>1.5</td>
<td>5</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1.5</td>
<td>1</td>
<td>6.3</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1.8</td>
<td>1</td>
<td>8</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>2</td>
<td>1.2</td>
<td>10</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>2.5</td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL, CSA</td>
<td>AC 250 V</td>
<td>0.63...10 A</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.63...8 A</td>
</tr>
<tr>
<td>UL</td>
<td>DC 60 V</td>
<td>0.63...5 A</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Overcurrent Circuit Breaker 1410-F1...

Dimensions

Internal connection diagrams

Typical time/current characteristics at +23 °C/+73.4 °F

Installation drawing

This is a metric design and millimeter dimensions take precedence (mm) inch

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole press-to-reset thermal circuit breaker with extremely fast overload switching performance (R-type TO CBE to EN 60934). Miniaturised construction minimises PCB real estate required. PCB mounting or integral mounting. Largely temperature-insensitive.

Typical applications

Motors, transformers, solenoids, PCBs, hand-held machines, appliances, instrumentation.

Ordering information

Type No. 1410 single pole circuit breaker

Configuration

L integral mounting or PCB mounting

Mounting

1 footprint 15.3x4.6
4 footprint 17.5x4.6

Number of poles

1 1-pole, thermally protected
0 without

Terminal design

L1 solder pins 1.8x0.8 silver-plated (-L1 only)
P3 blade terminals DIN 46244-A4.8-0.5 silver-plated (only -L4)
P4 blade terminals DIN 46244-A4.8-0.8 silver-plated (only -L4)

Characteristic curve

F1 fast acting

Actuator

S reset button (1410-L1)
E round reset slide (1410-L4)

Actuator colour

01 black (for -L1)
03 white-yellow (for -L4)
04 red (for -L4)

Current ratings

0.63...10 A

1410 - L 1 0 - L1 F1 - 01 - 0.8 A ordering example

*mounting hardware bulk shipped

Technical data

For further details please see chapter: Technical Information

Voltage rating AC 240 V; DC 28 V
(UL: AC 250 V; DC 50 V)

Current rating range 1-2 0.63...10 A

Typical life

AC 240 V: 0.63...2.25 A 500 break operations at 2 x I N, inductive
2.5...10 A 500 break operations at 2 x I N, resistive

DC 50 V: 0.63...2.25 A 500 break operations at 2 x I N, inductive
DC 28 V: 2.5...10 A 500 break operations at 2 x I N, inductive

Ambient temperature -20...+70 °C (-4...+158 °F)

Insulation co-ordination rated impulse withstand voltage degree
UL, CSA reinforced insulation in operating area

Dielectric strength

operating area AC 1,500 V

Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity Icn 0.63...2 A 12 x I N, AC max. 50 A
2.5...8 A 10 x I N, AC
3.15...10 A 6 x I N, DC

Degree of protection operating area IP40

Corrosion 48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka

Humidity 96 hours at 95 % RH, to IEC 60068-2-78, test Cab

Mass approx. 5 g
Thermal Overcurrent Circuit Breaker 1410-L1/L4

Dimensions

1410-L110-L1F1-S01

1410-L410-P3F1-E...

1410-L410-P4F1-E...

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

Installation drawings

This is a metric design and millimeter dimensions take precedence (mm) inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Thermal Overcurrent Circuit Breaker 1410-L2/G1

Description

Single pole press-to-reset thermal circuit breaker with extremely fast overload switching performance (R-type TO CBE to EN 60934). Single hole threadneck, PCB or integral mounting with a choice of designs. Miniaturised construction minimises PCB real estate required. Type 1410-L2 and 1410-G1 versions feature changeover contacts suitable for providing status output signals. Largely temperature-insensitive.

Typical applications

Motors, transformers, solenoids, PCBs, hand-held machines, appliances, instrumentation.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>1410 single pole circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L PCB mounting or integral mounting</td>
</tr>
<tr>
<td></td>
<td>G threadneck panel mounting or PCB mounting</td>
</tr>
<tr>
<td>Mounting</td>
<td>1 threadneck 3/8-27UNS-2A (1410-G)</td>
</tr>
<tr>
<td>Number of poles</td>
<td>1 - 1-pole, thermally protected</td>
</tr>
<tr>
<td>Hardware</td>
<td>0 with</td>
</tr>
<tr>
<td>1 with hexnut and knurled nut (only 1410-G)  &gt; 5 pcs hexnut and knurled nut bulk shipped</td>
<td></td>
</tr>
<tr>
<td>2 without hexnut and knurled nut and without shunt terminal (only 1410-G)</td>
<td></td>
</tr>
<tr>
<td>3 with hexnut and knurled nut, without shunt terminal (only 1410-G)</td>
<td></td>
</tr>
<tr>
<td>4 with actuator guard and marking CB, (only 1410-G)</td>
<td></td>
</tr>
<tr>
<td>Terminal design</td>
<td>L2 solder pins 1x0.8 silver-plated</td>
</tr>
<tr>
<td>P2 blade terminals DIN 46244-A2.8-0.8 silver-plated (only -G)</td>
<td></td>
</tr>
<tr>
<td>P3 blade terminals DIN 46244-A4.8-0.5 silver-plated (only -G)</td>
<td></td>
</tr>
<tr>
<td>Characteristic curve</td>
<td>F1 fast acting</td>
</tr>
<tr>
<td>Actuator</td>
<td>B flat reset-slide (only 1410-G)</td>
</tr>
<tr>
<td>S reset slide/button</td>
<td></td>
</tr>
<tr>
<td>Actuator colour</td>
<td>G1 black (for -G1-), G2 white (for -L2-)</td>
</tr>
<tr>
<td>P4 red (for 1410-G,--B)</td>
<td></td>
</tr>
<tr>
<td>Current ratings</td>
<td>0.63...10 A</td>
</tr>
</tbody>
</table>

*1410 - L 2 1 0 - L2 F1 - S 02 - 0.8 A ordering example

Mounting hardware bulk shipped

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.63</td>
<td>1.8</td>
<td>3.15</td>
<td>&lt; 0.12</td>
</tr>
<tr>
<td>0.8</td>
<td>1.7</td>
<td>4</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1</td>
<td>1.3</td>
<td>5</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1.5</td>
<td>&lt; 1</td>
<td>6.3</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>1.8</td>
<td>&lt; 1</td>
<td>8</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>2</td>
<td>&lt; 1</td>
<td>10</td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>2.5</td>
<td>&lt; 0.15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

Voltage rating: AC 240 V; DC 28 V

Current rating range: 1-2 0.63...10 A

Auxiliary circuit: 0.2 x I_N max. 1 A, AC 250 V

Typical life:
- AC 240 V: 0.63...2.25 A 500 break operations at 2 x I_N, inductive
- 2.5...10 A 500 break operations at 2 x I_N, resistive
- DC 50 V: 0.63...2.25 A 500 break operations at 2 x I_N, inductive
- DC 28 V: 2.5...10 A 500 break operations at 2 x I_N, inductive

Ambient temperature: -20...+70 °C (-4...+158 °F)

Insulation co-ordination rated impulse withstand voltage degree:
- reinforced insulation in operating area

Dielectric strength (IEC 60664 and 60664 A) test voltage:
- operating area AC 1,500 V

Insulation resistance: > 100 MΩ (DC 500 V)

Interrupting capacity (o-o-o) (UL 1077):
- 0.63...2 A 12 x I_N
- 2.5...8 A 8 x I_N, AC max. 50 A
- 10 A 6 x I_N, AC
- 3.15...10 A 10 x I_N, DC

Interrupting capacity (UL 1077):
- 0.63...10 A 2,000 A AC 250 V
- 0.63...10 A 200 A DC 50 V

Degree of protection (IEC 60529/DIN 40050) operating area:
- IP40 terminal area IP00

Vibration:
- 8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis

Shock:
- 20 g (11 ms) to IEC 60068-2-27, test Ea

Corrosion:
- 48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka

Humidity:
- 96 hours at 95 % RH to IEC 60068-2-78, test Cab

Mass:
- approx. 5 g

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE</td>
<td>AC 240 V</td>
<td>0.63...10 A</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>AC 250 V; DC 50 V</td>
<td>0.63...10 A</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com
Thermal Overcurrent Circuit Breaker 1410-L2/G1

Dimensions

1410-L20-L2F1-S02

1410-G111-P2F1-S01

1410-G114-P3F1-B04-...

1410-G118-L2F1-B04-...

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

Installation drawings

Installation behind a cover which can only be removed by means of a tool

This is a metric design and millimeter dimensions take precedence.

Errors and omissions excepted.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes.
Description

Miniaturised single pole press-to-reset cycling trip free thermal circuit breaker designed for automotive fuse block installation.
Extends the benefits of circuit breaker performance and convenience to applications which are cost critical. Colour-coded housing caps or manual release buttons available.

Version 1616 is available especially for the automotive industry (current ratings correspond to those of blade fuses).

Typical applications

Extra low voltage wiring systems on all types of vehicles and marine craft.

Ordering information

Type No. 1610 single pole automotive circuit breaker

Voltage rating
- 21 DC 28 V
- H2 DC 28 V, with manual release facility (type III to SAE J 553)
- 92 DC 12 V, autoreset (type I to SAE J 553)

Current ratings
- 5
- 6
- 8
- 10
- 15
- 20
- 25
- 30 A

Voltage rating (A) Actuator colour manual release (1610-H2) or housing cap colour (1610-21)
- 5 < 150 light-brown
- 6 < 150 green
- 8 < 150 honey
- 10 < 150 red
- 15 < 150 blue
- 20 < 150 yellow
- 25 < 150 pearl
- 30 < 150 light-green

Homologations

Homologation
- UL 1500 Ignition Protected

Technical data

Voltage rating
- 1610-92: DC 12 V
- 1610-21/1610-H2: DC 32 V

Current ratings
- 5...30 A

Service short-circuit breaking capacity
- 300 operations at ≤ 50 A

Reset period for 1610-92 (at 23 °C) ≤ 15 s

Ambient temperature
- -40...+85 °C (-40...+185 °F)

Degree of protection
- operating area IP30 (-21/-H2)
- operating area IP54 (-92)
- terminal area IP00

Ultimate short-circuit breaking capacity
- ≥ 3 break operations at 150 A, or
- ≥ 1 break operation at 2,000 A

Vibration (with mounting socket 12)
- 10 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
- 10 frequency cycles/axis

Shock (with mounting socket 12)
- 50 g (11 ms)
- to IEC 6068-2-27, test Ea

Corrosion
- 96 hours at 5 % salt mist,
- to IEC 60068-2-11, test Ka

Humidity
- 240 hours at 95 % RH,
- to IEC 60068-2-78, test Cab

Mass
- approx. 5 g

N.B.

It is good practice to switch off the vehicle’s ignition system before re-setting the circuit breaker.
Free travel of the actuator must be ensured.
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>5°F</th>
<th>10°F</th>
<th>15°F</th>
<th>20°F</th>
<th>25°F</th>
<th>30°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td>0.75</td>
<td>0.78</td>
<td>0.82</td>
<td>0.86</td>
<td>0.91</td>
<td>0.95</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature °C</th>
<th>+23°C</th>
<th>+40°C</th>
<th>+50°C</th>
<th>+60°C</th>
<th>+70°C</th>
<th>+80°C</th>
<th>+90°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td>1.09</td>
<td>1.16</td>
<td>1.25</td>
<td>1.33</td>
<td>1.43</td>
<td>1.51</td>
<td>1.60</td>
</tr>
</tbody>
</table>
Accessories

**Socket 12-P10**
- Weidmüller style label (not supplied)
- Blade terminal DIN 46244-A6.3-0.8 (QC .250)
- Symmetrical hat rail EN 50022-35x7.5

**Socket 12-J20**
- Weidmüller style label (not supplied)
- Terminal screw 6-32 UNC tightening torque max. 1.2 Nm
- Spring washer

**Socket 12-A10**
- Terminal screw 6-32 UNC tightening torque max. 1.2 Nm
- Blade terminal DIN 46244-A6.3-0.8 (QC .250)
- Symmetrical hat rail EN 50022-35x7.5

**Dimensions for surface mounting**

Other sockets available to special order
Labels: Weidmüller, D-33102 Paderborn

Ordering information Mounting socket 12

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Mounting socket</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10</td>
<td>Blade terminals A 6.3-0.8 (QC .250)</td>
</tr>
<tr>
<td>J20</td>
<td>Screw terminals 6-32 UNC</td>
</tr>
<tr>
<td>A10</td>
<td>1 blade terminal A6.3-0.8 (QC .250) / 1 screw terminal 6-32 UNC</td>
</tr>
</tbody>
</table>

**Labels**: Weidmüller, D-33102 Paderborn

**Accessories for mounting socket 12**

**Connector bus links - P10**
- X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

**Bus bar** (supplied as a complete package)
- Up to 100 A max. load
- X 211 157 01 with terminal
- X 211 157 02 without terminal

This is a metric design and millimeter dimensions take precedence (mm) inch.
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Issue B

www.e-t-a.com
Thermal Overcurrent Circuit Breaker 1658-...

Description

Very cost effective design to meet international requirements. No exposed metal parts which are, or could become, current-carrying except for terminals. R-type TO CBE to EN 60934.
- Manual reset, cycling trip free mechanism
- Extremely small and lightweight
- UL, CSA, VDE and EN 60934 (IEC 60934) approved

Typical applications

Battery chargers, consumer products, power supplies, motors.

Ordering information

Type No.
1658 single pole thermal circuit breaker

Threadneck design
G21 manual reset type, 3/8"-27 threadneck
G41 manual reset type, 7/16"-28 threadneck
A21 auto reset type, 3/8"-27 threadneck
A41 auto reset type, 7/16"-28 threadneck
A00 auto reset type, without threadneck
F01 snap in

Hardware
00 no hardware
01 one PAL nut, bulk
02 one PAL nut, one knurled nut, bulk
03 one PAL nut mounted
04 one PAL nut mounted, one knurled nut, bulk
06 one knurled nut, bulk
07 one hex nut, bulk
08 two hex nuts, bulk

Terminals
P10 blade terminals A6.3-0.8 (QC .250)
P13 blade terminals A6.3-0.8 (QC .250), 90°
S80 straight screw terminals
S83 90° bent screw terminals

Current ratings
5 ... 30 A

Ordering example
1658 - G21 - 02 - P10 - 5 A

* Screws and lock washers bulk shipped

Standard current ratings and typical voltage drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>≤ 150</td>
<td>12</td>
<td>≤ 140</td>
</tr>
<tr>
<td>6</td>
<td>≤ 150</td>
<td>15</td>
<td>≤ 240</td>
</tr>
<tr>
<td>7</td>
<td>≤ 150</td>
<td>16</td>
<td>≤ 240</td>
</tr>
<tr>
<td>8</td>
<td>≤ 150</td>
<td>20</td>
<td>≤ 240</td>
</tr>
<tr>
<td>9</td>
<td>≤ 150</td>
<td>25</td>
<td>≤ 240</td>
</tr>
<tr>
<td>10</td>
<td>≤ 140</td>
<td>30</td>
<td>≤ 240</td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V; DC 28 V</td>
<td>5...25 A</td>
</tr>
<tr>
<td>UL</td>
<td>AC 240 V</td>
<td>5...16 A 1658-G-/F.</td>
</tr>
<tr>
<td></td>
<td>AC 120 V</td>
<td>17...25 A 1658-G-/F.</td>
</tr>
<tr>
<td></td>
<td>AC 120 V</td>
<td>18...30 A 1658-G-/F.</td>
</tr>
<tr>
<td></td>
<td>DC 32 V</td>
<td>5...30 A 1658-G-/F.</td>
</tr>
<tr>
<td></td>
<td>DC 28 V</td>
<td>5...30 A 1658-G-/F.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1658-A...</td>
</tr>
</tbody>
</table>

For further details please see chapter: Technical Information

Voltage rating AC 240 V; DC 28 V
Current ratings 5...30 A

Typical life
AC + DC 5...16 A 1,000 operations at 2 x I N, inductive
17...25 A 1,000 operations at 2 x I N, resistive

Ambient temperature
-20...+60 °C (-4...+140 °F),
≤ 7 A max., +40 °C (+104 °F)

Insulation co-ordination
rated impulse voltage 2.5 kV
pollution withstand voltage 2
reinforced insulation in operating area

Dielectric strength
(IEC 60664 and 60664 A) test voltage
operating area AC 3,000 V

Insulation resistance
> 100 MΩ (DC 500 V)

Interrupting capacity I on
5...7 A 180 A
8...30 A 200 A

Interrupting capacity
(UL 1077/EN 60934 PC1) IA
5...16 A AC 240 V 2,000 A
18...30 A AC 120 V 2,000 A
5...30 A DC 32 V 2,500 A
5...30 A DC 28 V 2,000 A (1658-A...)

Degree of protection
(IEC 60529/DIN 40050) operating area IP40
terminal area IP00

Vibration
8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 6068-2-6, test Fc, 10 frequency cycles/axis

Shock
30 g (11 ms) to IEC 6068-2-27, test Ea

Corrosion
96 hours at 5 % salt mist, to IEC 6068-2-11, test Ka

Humidity
240 hours at 95 % RH, to IEC 6068-2-78, test Cab

Mass
approx. 16 g

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Dimensions**

<table>
<thead>
<tr>
<th>Section</th>
<th>Dimensions</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A00</td>
<td>![Dimension Diagram]</td>
<td></td>
</tr>
<tr>
<td>A21</td>
<td>Tightening torque max. 0.8 Nm 3/8-27UNS-2A</td>
<td></td>
</tr>
<tr>
<td>G21</td>
<td>Tightening torque max. 0.8 Nm 3/8-27UNS-2A</td>
<td></td>
</tr>
<tr>
<td>A41</td>
<td>![Dimension Diagram]</td>
<td></td>
</tr>
<tr>
<td>G41</td>
<td>![Dimension Diagram]</td>
<td></td>
</tr>
<tr>
<td>F01</td>
<td>![Dimension Diagram]</td>
<td>Caution: Please keep a tight grip on the unit while removing the female contacts. See ordering information for mounting hardware.</td>
</tr>
</tbody>
</table>

**Terminal design**

<table>
<thead>
<tr>
<th>Section</th>
<th>Design</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>P10</td>
<td>![Terminal Design Diagram]</td>
<td>Blade terminals DIN 46244-A6.3-0.8 (QC .250) Terminal screw 6-32 UNC Lock washer</td>
</tr>
<tr>
<td>P13</td>
<td>![Terminal Design Diagram]</td>
<td>Blade terminals DIN 46244-A6.3-0.8 (QC .250) Angled 90° Terminal screw 6-32 UNC Lock washer</td>
</tr>
<tr>
<td>P10-S83</td>
<td>![Terminal Design Diagram]</td>
<td>Blade terminals DIN 46244-A6.3-0.8 (QC .250) Terminal screw 6-32 UNC Lock washer</td>
</tr>
<tr>
<td>S80</td>
<td>![Terminal Design Diagram]</td>
<td></td>
</tr>
</tbody>
</table>

**Installation drawing**

<table>
<thead>
<tr>
<th>Section</th>
<th>Drawing</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Installation Drawing Diagram]</td>
<td>Operating area</td>
<td></td>
</tr>
<tr>
<td>![Installation Drawing Diagram]</td>
<td>Mounting area</td>
<td></td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm) over inch (in).
Internal connection diagram

Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>23</td>
<td>40</td>
<td>50</td>
<td>60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.63</td>
<td>0.85</td>
<td>0.9</td>
<td>1.1</td>
<td>1.16</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>IN &gt; 7A</td>
<td>0.74</td>
<td>0.76</td>
<td>0.82</td>
<td>1.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN ≤ 7A</td>
<td>0.74</td>
<td>0.76</td>
<td>0.82</td>
<td>1.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Accessories

Mounting nut 3/8", 27-thread
Y306 671 01

Mounting nut 7/16", 28-thread
Y303 200 01

Knurled nut 3/8", 27-thread
plastic (standard)
Y307 117 02

Knurled nut 7/16", 28-thread
nickel-plated brass
Y302 294 03

Knurled nut 3/8", 27-thread
nickel-plated brass
Y300 190 03

Hex nut 3/8", 27-thread
nickel-plated brass
Y300 192 01

Hex nut 7/16", 28-thread
nickel-plated brass
Y302 295 01

Press to Reset Plate for 3/8"
thread, aluminium
Y 301 059 02

Press to Reset Plate for 7/16"
thread, aluminium
Y 302 732 01

This is a metric design and millimeter dimensions take precedence.
Thermal Overcurrent Circuit Breaker 1658-...

Accessories

Reset button seal for 3/8", 27-thread, short
X201 285 01
long
X200 799 01

Reset button seal for 7/16", 28-thread, short
X222 119 01
long
X222 119 02

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
## Description

An extremely versatile range of rocker switch/thermal circuit breakers (S-type TO CBE to EN 60934 with trip free mechanism) offering the choice of single pole, double pole with single pole protection, and double pole with protection on both poles. Designed for snap-in panel mounting with versions available for three different panel cut-out sizes. Illumination is optional and there is a range of colours and markings for the rocker. Under overload conditions the rocker returns to the OFF position. 6-way frame for 3120-F available upon request. Any one of the following additional function modules can be supplied factory fitted to the rear of the switch/circuit breaker:

- Under voltage release coil (for double pole versions only).
- Magnetic trip coil for short circuit protection.
- Magnetic trip coil for remote relay trip.
- Auxiliary contacts for status signalling.
- Mechanical slide interlock.

Approved to CBE standard EN 60934 (IEC 60934).

Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

## Technical data

For further details please see chapter: Technical Information

### Voltage rating

<table>
<thead>
<tr>
<th>Voltage ratings</th>
<th>AC 240 V; DC 50 V</th>
<th>(AC 415 V to special order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...20 A</td>
<td>(UL: AC 250 V; DC 50 V)</td>
</tr>
<tr>
<td>Typical life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-pole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC 240 V:</td>
<td>0.1...20 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>DC 50 V:</td>
<td>0.1...4 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>DC 28 V:</td>
<td>4.5...16 A</td>
<td>30,000 operations at 1 x I N, resistive</td>
</tr>
<tr>
<td>2-pole</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC 240 V:</td>
<td>0.1...16 A</td>
<td>10,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>AC 240 V:</td>
<td>0.1...16 A</td>
<td>50,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>DC 50 V:</td>
<td>0.1...16 A</td>
<td>50,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>DC 28 V:</td>
<td>4.5...20 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30...+60 °C</td>
<td>(-22...+140 °F)</td>
</tr>
<tr>
<td>Insulation co-ordination</td>
<td>(IEC 60664 and 60664 A)</td>
<td>rated impulse withstand voltage degree</td>
</tr>
<tr>
<td>Dielectric strength</td>
<td>(IEC 60664 and 60664A)</td>
<td>test voltage</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
<td></td>
</tr>
<tr>
<td>Interrupting capacity Icn</td>
<td>0.1...2 A</td>
<td>10 x I N, inductive</td>
</tr>
<tr>
<td>Interrupting capacity Icn</td>
<td>2.5...20 A</td>
<td>250 A 2-pole, or 150 A 1-pole</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>(IEC 60529/DIN 40050)</td>
<td>operating area IP40</td>
</tr>
<tr>
<td>Vibration</td>
<td>8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)</td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>30 g (11 ms) to IEC 60668-2-27, test Fc</td>
<td></td>
</tr>
<tr>
<td>Corrosion</td>
<td>96 hours at 5 % salt mist, to IEC 60668-2-11, test Fc</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH, to IEC 60668-2-11, test Cab</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 33 g (double pole) approx. 27 g (single pole)</td>
<td></td>
</tr>
</tbody>
</table>

## Typical applications

Motors, transformers, solenoids, extra low voltage wiring systems, office machines, electro-medical equipment, power supplies, communications systems, medical equipment to EN 60601.

## Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>4</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>4.5</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>5</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>6</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>7</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.6</td>
<td>2.90</td>
<td>8</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.45</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>18</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.0595</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.0565</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Illumination voltage/power consumption

operating voltage | power consumption Y + R | G | T
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>2 mA</td>
<td>3.6 mA</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>0.9 mA</td>
<td>2.8 mA</td>
<td>2.2 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>0.9 mA</td>
<td>2.8 mA</td>
<td>2.2 mA</td>
</tr>
</tbody>
</table>
**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>3120</th>
<th>rocker switch/circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mounting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>snap in frame</td>
<td></td>
</tr>
<tr>
<td><strong>Size of frame</strong></td>
<td>panel thickness</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>to fit mounting cut-out 50.5 x 21.5 mm</td>
<td>1-6.35 mm (.039–.250 in)</td>
</tr>
<tr>
<td>5</td>
<td>to fit mounting cut-out 44.5 x 22 mm</td>
<td>1-4 mm (.039–.157 in)</td>
</tr>
<tr>
<td>6</td>
<td>to fit mounting cut-out 45 x 33.7 mm</td>
<td>1.2-2.4 mm (.047–.094 in)</td>
</tr>
<tr>
<td><strong>Number of poles</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>2-pole, unprotected, switch only</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1-pole, thermally protected</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2-pole, thermally protected</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>2-pole, thermally protected on one pole only (terminals 11,12k,12i)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>1-pole, unprotected, switch only</td>
<td></td>
</tr>
<tr>
<td><strong>Mounting frame design</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>collar height 1 mm</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>collar height 9 mm</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>collar height 2 mm with water splash protection (IP54), not with -F6...</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>with water splash protection and actuator guard</td>
<td></td>
</tr>
<tr>
<td><strong>Terminal configuration</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P7</td>
<td>blade terminals 2x2.8x0.8 mm (QC 2x.110) (terminals 12k), 22(x), 11, 21), not for under voltage module, not for switch</td>
<td></td>
</tr>
<tr>
<td>H7</td>
<td>12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws, not for switch</td>
<td></td>
</tr>
<tr>
<td>R7</td>
<td>as P7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110) not for under voltage module</td>
<td></td>
</tr>
<tr>
<td>G7</td>
<td>as H7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110)</td>
<td></td>
</tr>
<tr>
<td><strong>Characteristic curve</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>thermal, 1.01-1.4 x (I_n)</td>
<td></td>
</tr>
<tr>
<td>Q1</td>
<td>switch only</td>
<td></td>
</tr>
<tr>
<td><strong>Actuator style</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>rocker</td>
<td></td>
</tr>
<tr>
<td>U</td>
<td>momentary switch</td>
<td></td>
</tr>
<tr>
<td><strong>Switch colour designation</strong></td>
<td></td>
<td>(for illuminated versions)</td>
</tr>
<tr>
<td>01</td>
<td>black</td>
<td>12</td>
</tr>
<tr>
<td>02</td>
<td>white</td>
<td>14</td>
</tr>
<tr>
<td>04</td>
<td>red</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td>sky blue</td>
<td>19</td>
</tr>
<tr>
<td><strong>Rocker markings</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>without marking</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Rocker illumination (optional)**

<table>
<thead>
<tr>
<th>G</th>
<th>green LED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>yellow LED</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>red LED</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>blue LED</td>
<td></td>
</tr>
</tbody>
</table>

**Illumination voltage range**

| 0 | 0 - 4 V AC/DC |  |
| 1 | 10 - 14 V AC/DC |  |
| 2 | 20 - 28 V AC/DC |  |
| 3 | 90 - 140 V AC |  |
| 4 | 185 - 275 V AC |  |
| 5 | 42 - 54 V AC/DC |  |

**Current ratings**

| 0.1 | 0.1 A single or double pole load |  |
| ... |  |
| 20 |  |  |

**Ambient temperature**

<table>
<thead>
<tr>
<th>°F</th>
<th>-22</th>
<th>-4</th>
<th>14</th>
<th>+32</th>
<th>+73.4</th>
<th>+122</th>
<th>+140</th>
<th>+60</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+104</td>
<td>+140</td>
<td>+50</td>
</tr>
</tbody>
</table>

**Derating factor**

| 0.8 | 0.76 | 0.84 | 0.92 | 1.08 | 1.16 | 1.24 |

**Ordering example**

3120 - F 3 2 1 - N7 T1 - W14 A R 4 - 10 A

3120 - F 6 0 - N7 G1 - W.. - - - 20 A (switch only)

**N.B.**

Switch only versions must be specified with -N7 or -G7 terminals. Terminals 12(1) and 22(1) are not fitted.

---

**Typical time/current characteristics**

**single or double pole load**

<table>
<thead>
<tr>
<th>0.1</th>
<th>2 A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10000</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**2.5 | 20 A**

| 1 | 10000 |  |
| 2 | 1000 |  |
| 3 | 100 |  |
| 4 | 10 |  |
| 5 | 1 |  |

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.
Thermal Overcurrent Circuit Breaker 3120-F...

Dimensions

Style F3.1
- Collar height 1 mm/.039 in.
- Actuating force max. 35 N
- Optional illumination in ON position

Mounting style variants

Style F 3.3
- Collar height 9 mm (.354 in.)

Style F 3.4
- Collar height 2 mm (.079 in.), with water splash protection

Installation drawing

When installing the circuit breaker apply pressure on bezel only

- Operating area
- Mounting area

This is a metric design and millimeter dimensions take precedence (mm/"")

Internal connection diagrams

2-pole, thermally protected on both poles
- 2-pole, thermally protected on one pole only
- 1-pole, thermally protected
- 2-pole, unprotected

Mounting style variants

Style F 5.1
- Optional illumination

Style F 5.U
- With water splash protection (IP54) and actuator guard

Dimension diagram for style F6 is available on request.
**Rear terminal shroud black (IP64)**

Y 304 275 01

**Water splash cover, transparent (IP66)**
for style -F5..
X 221 619 01

**6-way frame for 3120-F5... upon request**

**Insulated cover**

Y 303 068 01

**Terminal adapter**

Y 303 862 01

**Spacer for 3120-F3...**

Y 303 675 01/02

**Spacer for 3120-F5...**

Y 303 676 01

**Blanking piece in -F3 frame**

Y 303 885 31

---

**Cut-out dimensions**

**Cut-out for mounting style -F3 with rocker and push button**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel thickness</td>
<td>1.75</td>
<td>1.89</td>
</tr>
<tr>
<td>Panel thickness</td>
<td>1.99</td>
<td>1.89</td>
</tr>
</tbody>
</table>

**Cut-out for mounting style -F6 with rocker**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel thickness</td>
<td>2.28</td>
<td>2.99</td>
</tr>
</tbody>
</table>

**Cut-out for mounting style -F5 with rocker**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel thickness</td>
<td>3.78</td>
<td>4.05</td>
</tr>
</tbody>
</table>

**Edges of working parts: ISO 13715**

---

This is a metric design and millimeter dimensions take precedence.
**Description**

E-T-A’s proven type 3120 in a new attractive styling (S-type TO CBE to EN 60934 with trip free mechanism) offering the choice of single pole, double pole with single pole protection, and double pole with protection on both poles. Designed for snap-in panel mounting with illumination as an option. Under overload conditions the rocker returns to the OFF position.

- Under voltage release coil (for double pole versions only).
- Magnetic trip coil for short circuit protection.
- Magnetic trip coil for remote relay trip.
- Auxiliary contacts for status signalling.
- Mechanical slide interlock.

Approved to CBE standard EN 60934 (IEC 60934). Meets the requirements regarding fire resistance of EN 60335-1: 2007-02 Safety of household and similar electrical appliances.

**Available accessories:** water splash protection and actuator guard to prevent inadvertent operation.

**Technical data**

**For further details please see chapter: Technical Information**

**Voltage rating**
- AC 240 V; DC 50 V
- (AC 415 V to special order)
- (UL: AC 250 V; DC 50 V)

**Current ratings**
- 0.1...20 A
- (up to 30 A to special order, single pole only)

**Typical life**
- 1-pole
  - AC 240 V: 0.1...20 A 30,000 operations at 1 x I N, inductive
  - DC 50 V: 0.1...4 A 30,000 operations at 1 x I N, resistive
  - DC 28 V: 4.5...20 A 30,000 operations at 1 x I N, inductive
- 2-pole
  - AC 415 V: 0.1...20 A 10,000 operations at 1 x I N, inductive
  - AC 240 V: 0.1...16 A 50,000 operations at 1 x I N, inductive
  - DC 28 V: 17...20 A 10,000 operations at 1 x I N, inductive

**Ambient temperature**
- -30...+60 °C (-22...+140 °F)

**Insulation co-ordination**
- rated impulse withstand voltage: 2.5 kV
- reinforced insulation in operating area

**Dielectric strength**
- (IEC 60664 and 60664A)
  - test voltage: AC 3,000 V
  - between poles (2-pole): AC 1,500 V

**Insulation resistance**
  > 100 MΩ (DC 500 V)

**Interrupting capacity Icn**
- 0.1...2 A    10 x I N
- 2.5...20 A   250 A
- 2-pole
- 0.1...2 A    200 A
- 2.5...3 A    AC 250 V, 1,000 A
- 3.5...8 A    AC 250 V, 2,000 A
- 9...6 A     AC 250 V, 3,500 A
- 18...20 A   AC 250 V, 5,000 A
- 20 A        DC 50 V, 1,000 A
- 1-pole
- 0.1...20 A   250 A
- 2-pole
- 0.1...20 A   250 A
- 2-pole
- 0.1...20 A   250 A

**Degree of protection**
- operating area IP40
- (IP54 with water splash protection)
- terminal area IP00

**Vibration**
- 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)
- to IEC 6068-2-6, test Fc
- 10 frequency cycles/axis

**Shock**
- 30 g (11 ms)
- to IEC 6068-2-27, test Ea

**Corrosion**
- 96 hours at 5 % salt mist,
- to IEC 6068-2-11, test Ka

**Humidity**
- 240 hours at 95 % RH,
- to IEC 60068-2-78, test Cab

**Mass**
- approx. 33 g (double pole)
- approx. 27 g (single pole)

**Illumination voltage/power consumption**

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>2.2 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>2.2 mA</td>
</tr>
</tbody>
</table>

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V; DC 28 V</td>
<td>0.1...20 A</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.1...20 A 2-pole</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.1...10 A 1-pole</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>AC 250 V; DC 50 V</td>
<td>0.1...20 A</td>
</tr>
<tr>
<td>CCC</td>
<td>AC 250 V; DC 50 V</td>
<td>0.1...20 A</td>
</tr>
</tbody>
</table>
Thermal Overcurrent Circuit Breaker 3120-F7..

### Ordering information

**Type No.**
- 3120 rocker switch/circuit breaker

**Mounting**
- F snap in frame

**Size of frame**
- 7 to fit mounting cut-out 44.5x22 mm (1.75x.866 in) 1-4 mm (.039-.157 in)

**Number of poles**
- 0 2-pole, unprotected, switch only
- 1 1-pole, thermally protected
- 2 2-pole, thermally protected
- 5 2-pole, thermally protected on one pole only (terminals 11,12k,12i)
- 6 1-pole, unprotected, switch only

**Mounting frame design**
- N grey frame
- P snap-on actuator guard grey
- Q snap-on water splash cover grey
- R black frame
- S snap-on actuator guard black
- T snap-on water splash cover black

**Terminal configuration**
- P7 blade terminals 2x2.8x0.8 mm (QC 2x.110) (terminals 12(k), 22(k),11, 21), not for under voltage module, not for switch
- H7 12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws, not for switch
- R7 as P7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110) not for under voltage module
- G7 as H7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110)

**Characteristic curve**
- T1 thermal, 1.01-1.4 x Iₚ
- Q1 switch only

**Actuator style**
- A rocker

**Switch colour designation**
- opaque
- blue
- sky blue

**Rocker markings**
- Q "I" and "O" moulded in

**Push button illumination (optional)**
- T blue LED

**Illumination voltage range (optional)**
- 0 4 - 7 V
- 1 10 - 14 V
- 2 20 - 28 V
- 3 90 - 140 V
- 4 185 - 275 V
- 5 42 - 54 V AC/DC

**Current ratings**
- 0.1...20 A

### Typical time/current characteristics

**0.1 ... 2 A**

**2.5 ... 20 A**

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>22</th>
<th>30</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
<td></td>
</tr>
</tbody>
</table>

**Derating factor**
- 0.8
- 0.76
- 0.84
- 0.92
- 1
- 1.08
- 1.16
- 1.24

N.B. Switch only versions must be specified with -N7 or -G7 terminals. Terminals 12(k) and 22(k) are not fitted.
### Dimensions

**Style -F7.N and F7.R**

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dimensions</strong></td>
<td></td>
</tr>
<tr>
<td>Blade terminals DIN 46244-C-Ms-S (QC 2 x .110)</td>
<td></td>
</tr>
<tr>
<td>- Flat head screw ISO1580 M3.5x5-M5S tightening torque max. 0.8 Nm</td>
<td></td>
</tr>
</tbody>
</table>

**Style -F7.P and F7.S**

| Style -F7.P and F7.S | 
| --- | --- |
| **Dimensions** | 
| Blade terminals DIN 46244-C-Ms-S (QC 2 x .110) | 
| - Flat head screw ISO1580 M3.5x5-M5S tightening torque max. 0.8 Nm | 

**Style -F7.Q and F7.T**

| Style -F7.Q and F7.T | 
| --- | --- |
| **Dimensions** | 
| Blade terminals DIN 46244-C-Ms-S (QC 2 x .110) | 
| - Flat head screw ISO1580 M3.5x5-M5S tightening torque max. 0.8 Nm | 

### Internal connection diagrams

**2-pole, thermally protected on both poles**

**2-pole, thermally protected on one pole only**

**1-pole, thermally protected**

**2-pole, unprotected**

### Installation drawing

When installing the circuit breaker apply pressure on bezel only.

**Panel cut-out**

Edges of working parts: ISO 13715

This is a metric design and millimeter dimensions take precedence (mm).
Thermal Overcurrent Circuit Breaker 3120-F7...

Accessories

**Insulated cover**
Y 303 068 01
![Insulated cover diagram]

**Terminal adapter**
Y 303 862 01
![Terminal adapter diagram]

**Spacer**
Y 303 676 01
![Spacer diagram]

**Rear terminal shroud black (IP64)**
Y 304 275 01
![Rear terminal shroud diagram]

**Translucent water splash cover (IP54)**
X 222 143 01
Consisting of:
- Y 307 097 01 snap-on frame with actuator guard
- Y 307 096 01 soft plastic cover

**Snap-on frame with actuator guard** (can be snapped on as switch-on protection or switch-off protection)
Y 307 097 01
![Snap-on frame diagram]

This is a metric design and millimeter dimensions take precedence (mm). Inch dimensions are only approximate.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description
Switch/thermal trip free circuit breaker (S-type TO CBE to EN 60934) with standard isolator style two button operation. Single button press-to-reset version also available. Both types can be supplied in single pole configuration only, in double pole with single pole protection, and in double pole with protection on both poles. Designed for snap-in panel mounting. There is a choice of push button colour combinations and illumination is optional.

Any one of the following additional function modules can be supplied factory fitted to the rear of the switch/circuit breaker:
- Under voltage release coil (for double pole versions only).
- Magnetic trip coil for short circuit protection.
- Magnetic trip coil for remote relay trip.
- Auxiliary contacts for status signalling.
- Mechanical slide interlock.

Approved to CBE standard EN 60934 (IEC 60934).
Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

Typical applications
Motors, transformers, solenoids, extra low voltage wiring systems, office machines, electro-medical equipment, power supplies, communications systems, industrial controls.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A) per pole</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A) per pole</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>4</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>4.5</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>5</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>6</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>7</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.6</td>
<td>2.90</td>
<td>8</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.45</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>18</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.0595</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.0565</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Illumination voltage/power consumption

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption Y + R</th>
<th>Power consumption G</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>2 mA</td>
<td>3.6 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>2 mA</td>
<td>3.5 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>0.9 mA</td>
<td>2.8 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>0.9 mA</td>
<td>2.8 mA</td>
</tr>
</tbody>
</table>

Approvals

Authority               Voltage ratings          Current ratings
VDE (EN 60934)          AC 240 V; DC 28 V     0.1...20 A 1-pole
                        DC 50 V      0.1...20 A 2-pole
                        DC 50 V      0.1...20 A 1-pole
UL, CSA                AC 250 V; DC 50 V     0.1...20 A
CCC                    AC 250 V; DC 50 V     0.1...20 A

Technical data

For further details please see chapter: Technical Information

Voltage rating
- AC 240 V; DC 50 V
- (AC 415 V to special order)
- (UL: AC 250 V; DC 50 V)

Current ratings
- 0.1...20 A
  (up to 30 A to special order, single pole only)

Typical life
- 1-pole
  - AC 240 V: 0.1...20 A 30,000 operations at 1 x I N, inductive
  - DC 50 V: 0.1...4 A 30,000 operations at 1 x I N, inductive
  - 4.5...16 A 30,000 operations at 1 x I N, resistive
  - DC 28 V: 4.5...20 A 30,000 operations at 1 x I N, inductive
- 2-pole
  - AC 240 V: 0.1...16 A 10,000 operations at 1 x I N, inductive
  - AC 240 V: 0.1...16 A 50,000 operations at 1 x I N, inductive
  - 17...20 A 30,000 operations at 1 x I N, inductive
  - DC 50 V: 0.1...16 A 10,000 operations at 1 x I N, inductive
  - DC 50 V: 0.1...16 A 50,000 operations at 1 x I N, inductive

Ambient temperature
- -30...+60 °C (-22...+140 °F)

Insulation co-ordination
- Rated impulse withstand voltage degree 2.5 kV
- Reinforced insulation in operating area

Dielectric strength
- Operating area test voltage
  - AC 3,000 V
  - AC 1,500 V

Insulation resistance
- > 100 MΩ (DC 500 V)

Interrupting capacity
- I_{IN} UN
  - 2-pole
    - AC 250 V: 0.1...2 A 10 x I N
    - 2.5...20 A 250 A
  - 1-pole
    - DC 50 V: 0.1...2 A 200 A

Degree of protection
- Operating area (IP40)
- Terminal area (IP00)

Vibration
- 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)
- To IEC 60068-2-6, test Fc
- 10 frequency cycles/axis

Shock
- 30 g (11 ms)
- To IEC 60068-2-27, test Ea

Corrosion
- 96 hours at 5 % salt mist
- To IEC 60068-2-11, test Ka

Humidity
- 240 hours at 95 % RH
- To IEC 60068-2-78, test Cab

Mass
- Approx. 33 g (double pole)
- Approx. 27 g (single pole)
# Thermal Overcurrent Circuit Breaker 3120-F...

## Ordering Information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3120</td>
<td>Push button switch/circuit breaker</td>
</tr>
</tbody>
</table>

**Mounting**
- **F**: Snap in frame

**Size of frame**
- 2: Flange mounting, special frame for fitting splash cover
- 3: To fit mounting cut-out 50.5 x 21.5 mm (1.99 x 8.47 in) panel thickness 1 - 6.35 mm (.039 -.250 in)

**Number of poles**
- 0: 2-pole, unprotected, switch only
- 1: 1-pole, thermally protected
- 2: 2-pole, thermally protected on one pole only (terminals 11, 12k, 12i)
- 6: 1-pole, unprotected, switch only

**Mounting frame design**
- **F**: With 2 push buttons
- **G**: With 1 push button (switch-on only)

**Terminal configuration**
- **P7**: Blade terminals 2x2.8x0.8 mm (QC 2x.110) (terminals 12k, 22k, 11, 21), not for under voltage module, not for switch
- **N7**: 12k, 22k: Blade terminals 2x2.8-0.8 mm (QC 2x.110) 11, 21: terminal screws, not for switch
- **G7**: As P7, but including shunt terminals 12i and 22i as blade terminals 2x2,8x0.8 mm (QC 2x.110) not for under voltage module

**Characteristic curve**
- **T1**: Thermal, 1.01 - 1.4 I₀
- **Q1**: Switch only, only for N7 or G7 terminals

**Switch style/colour**
- **D**: 1 push button (reset only)
- **Z**: 1 push button (momentary switch)
- **01X**: Black
- **04X**: Red
- **12X**: White translucent
- **19X**: Green translucent

**S**: 2 push buttons on/off
- **GRX**: Green translucent/red
- **WRX**: White translucent/red
- **WBX**: White translucent/black

**Push button illumination (optional)**
- **G**: Green LED, AC/DC
- **Y**: Yellow LED, AC/DC
- **R**: Red LED, AC/DC

**Illumination voltage range (optional)**
- **0**: 0 - 4 V AC/DC
- **1**: 10 - 14 V AC/DC
- **2**: 20 - 28 V AC/DC
- **3**: 90 - 140 V AC
- **4**: 185 - 275 V AC
- **5**: 42 - 54 V AC/DC

**Current ratings**
- 0.1...20 A

**Ordering example**
- 3120 - F 3 2 F - N7 T1 - S GRX G 4 - 10 A
- 3120 - F 3 0 F - N7 Q1 - S ... - 20 A

**N.B.**
Switch only versions must be specified with -N7 or -G7 terminals. Terminals 12(k) and 22 (k) are not fitted.

## Typical Time/Current Characteristics

| Current (A) | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | 3.0 |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Time (s)    | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 | 1.7 | 1.8 | 1.9 | 2.0 | 2.1 | 2.2 | 2.3 | 2.4 | 2.5 | 2.6 | 2.7 | 2.8 | 2.9 | 3.0 | 3.1 |

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient Temperature °F</th>
<th>-22</th>
<th>-4</th>
<th>0</th>
<th>14</th>
<th>32</th>
<th>73.4</th>
<th>104</th>
<th>122</th>
<th>140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>23</td>
<td>40</td>
<td>50</td>
<td>60</td>
<td></td>
</tr>
</tbody>
</table>

| Derating Factor | 0.8 | 0.76 | 0.84 | 0.92 | 1 | 1.08 | 1.16 | 1.24 |     |
Thermal Overcurrent Circuit Breaker 3120-F...

Dimensions

3120-F3.F----S----

- Off position
- Blade terminals DIN 46244-C-Ms-S (QC 2 x .110)
- Flat head screw ISO1580 M3.5x5-Ms
- Tightening torque max. 0.8 Nm
- Actuating force max. 35 N
- Optional illumination in ON position

3120-F3.G----D----

- Off position
- Blade terminals DIN 46244-C-Ms-S (QC 2 x .110)
- Flat head screw ISO1580 M3.5x5-Ms
- Tightening torque max. 0.8 Nm
- Optional illumination in ON position

3120-F2.F----

- Retaining clip
- Cover
- Water splash cover (see next page)

Internal connection diagrams

2-pole, thermally protected on both poles
2-pole, thermally protected on one pole only
1-pole, thermally protected
2-pole, unprotected

Installation drawing

When installing the circuit breaker apply pressure on bezel only.

Panel cut-out

3120-F3...

- Min. R0.3 max. R0.3
- Max. P0.2 min. P0.2
- Max. R0.3 min. R0.3
- Max. P0.2 min. P0.2
- Max. 3.5 min. 3.5
- Max. 3.5 min. 3.5

3120-F2...

- T max. 0.3
- Metal min. 2 mm (.079 in.)
- Plastic min. 3 mm (.118 in.)

This is a metric design and millimeter dimensions take precedence (mm/ in.)
**Thermal Overcurrent Circuit Breaker 3120-F...**

**Accessories**

**Insulated cover**
Y 303 068 01

**Terminal adapter**
Y 303 862 01

**Spacer for 3120-F3...**
Y 303 675 01/02

**Blanking piece in -F3 frame**
Y 303 885 31

**Rear terminal shroud black (IP64)**
Y 304 275 01

**Water splash cover, transparent (IP66) for style 3120-F2..-..**
X 221 619 01

- retaining clip Y 306 551 01
- cover Y 306 001 01

---

This is a metric design and millimeter dimensions take precedence (mm).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Auxiliary Contact Module X3120-S for circuit breaker 3120-F...

**Description**

A module supplied factory fitted to type 3120-F to provide electrically separate changeover contacts which operate as the main contacts open/close. Ideally suited to status signalling and sequence switching.

**Typical applications**

Monitoring of the switching position of the circuit breaker or any connected load.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Module for type 3120 and type 3140</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3120-S</td>
<td></td>
</tr>
</tbody>
</table>

**Function**

5 auxiliary contact module

**Contact configuration**

0 change-over contact

**Terminal design**

2 blade terminals 2.8 x 0.5 (QC .110), silver plated

**Contact rating**

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 V-250 V</td>
<td>0.1...4 A</td>
</tr>
<tr>
<td>24 V</td>
<td>0.1...4 A</td>
</tr>
<tr>
<td>60 V</td>
<td>0.1...1 A</td>
</tr>
<tr>
<td>110 V</td>
<td>0.1...0.5 A</td>
</tr>
<tr>
<td>220 V</td>
<td>0.1...25 A</td>
</tr>
<tr>
<td>5 V-250 V</td>
<td>0.05...1 A</td>
</tr>
</tbody>
</table>

**Supply condition**

M module mounted to circuit breaker 3120-...

**Ordering example**

X3120 - S 0 1 A M

**Technical data**

- **Voltage rating**: AC 250 V; DC 220 V
- **Current rating**: 0.1...4 A / 0.05...1 A
- **Typical life**: 50,000 operations
- **Ambient temperature**: -30...+60 °C (-22...+140 °F)
- **Dielectric strength**: (IEC 60664 and 60664A) test voltage between main and auxiliary circuit AC 3,000 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Vibration**: 6 g (type X3120-S...A) 8 g (type X3120-S...B) (57-500 Hz), a 0.46 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
- **Shock**: 15 g (11 ms), type X3120-S...A 20 g (11 ms), type X3120-S...B to IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH to IEC 60068-2-78, test Cab
- **Mass**: approx. 38 g (complete assembly)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Undervoltage Release Module X3120-U...for circuit breaker 3120-F...

Description
A module suitable for all double pole versions of type 3120-F to trip the main switch/circuit breaker mechanism in the event of loss of voltage. When the voltage is restored the rocker switch must be reset to reconnect the load, thereby avoiding the safety hazards associated with automatic re-starting of machinery.

Note: Basic unit 3120-...-H7 or -G7: screw terminals necessary.

Typical applications
Machines such as power tools, industrial equipment and domestic appliances where automatic restart after restoration of power could be dangerous (EC Machinery Directive).

Ordering information
Type No.
X3120 Module for type 3120

Function
U undervoltage release module

Terminal design
00 standard (without separate connections)
01 1 blade terminal 2.8x0.8 (QC .110)
02 2 blade terminals 2.8x0.8 (QC .110)

Voltage ratings
00 AC 230/240 V 50/60 Hz
01 AC 120 V 50/60 Hz
02 AC 100 V 50/60 Hz
03 DC 24 V

Assembly status
M module mounted to the circuit breaker 3120

X3120 - U 00 00 M ordering example

Approvals (complete circuit breaker/module assembly)
Authority Voltage ratings
VDE (EN 60934) AC 100...240 V; DC 24 V
UL, CSA AC 100...240 V; DC 24 V

Dimensions

Internal connection diagrams

Technical data
Voltage ratings AC 100; 120 V; 230/240 V 50/60 Hz
DC 24 V

Voltage tolerance +10%/-15%

Current consumption approx. 2.5 mA

Typical life 20,000 operations

Release values 0.2 x U_N < U < 0.7 x U_N
(at a rated voltage of AC 100 V the device may release at 70 V and must release at 20 V)

Release delay t < 20 ms

Latch-in values ≥ 85 % U_N

Ambient temperature -30...+60 °C (-22...+140 °F)

Vibration 8 g (57-500 Hz) ± 0.61 mm (10-57 Hz)
to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock 30 g (11 ms)
to IEC 60068-2-27, test Ea

Corrosion 48 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Humidity 240 hours at 95% RH
to IEC 60068-2-78, test Cab

Mass approx. 53 g (complete assembly)

This is a metric design and millimeter dimensions take precedence (inch)

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

A module which adds remote trip capability to all versions of type 3120-F. A voltage applied across the coil, by means of an external sensor for example, will cause disconnection of the main switch/circuit breaker mechanism.

Typical applications

Electrical monitoring of safety systems, remote trip.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Module for type 3120</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3120</td>
<td>Module for type 3120</td>
</tr>
</tbody>
</table>

Function

M magnetic relay trip module

Style

S magnetic remote trip coil

Terminal design

P7 blade terminals 2x2.8x0.8 (QC 2x.110) tin plated

Supply condition

M module mounted to the circuit breaker

Voltage ratings

AC 12, 24, 48, 60, 120, 220, 230, 240 V
DC 12, 24 V

Ordining example

X3120 - M 2 P7 M - 12 V

Standard voltage ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Voltage rating (V)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Voltage rating (V)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V AC/DC</td>
<td>0.78</td>
<td>120 V AC</td>
<td>71.0</td>
</tr>
<tr>
<td>24 V AC/DC</td>
<td>3.3</td>
<td>220 V AC</td>
<td>312</td>
</tr>
<tr>
<td>48 V AC</td>
<td>11.9</td>
<td>230 V AC</td>
<td>312</td>
</tr>
<tr>
<td>60 V AC</td>
<td>18.5</td>
<td>240 V AC</td>
<td>312</td>
</tr>
</tbody>
</table>

Technical data

Voltage ratings

AC 12...240 V; DC 12...24 V

Power consumption

approx. 200 W

Pulse operation

20 ms < tON < 100 ms / tOFF > 10 sec

Release delay

t < 20 ms

Typical life

50,000 operations at UN

Ambient temperature

-30...+60 °C (-22...+140 °F)

Dielectric strength

(IEC 60664 and 60664A) test voltage between main circuit and trip coil circuit

AC 3,000 V

Insulation resistance

> 100 MΩ (DC 500 V)

Vibration

8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc

10 frequency cycles/axis

Shock

30 g (11 ms) to IEC 60068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka

Humidity

240 hours at 95 % RH to IEC 60068-2-78, test Cab

Mass

approx. 53 g (complete assembly)

This is a metric design and millimeter dimensions take precedence (\text{mm}) over (\text{inch}).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Suitable for use with all type 3120-F versions, this module provides a mechanical safety interlock which, according to the option specified, prevents the main switch/circuit breaker mechanism from being reset/switched on. The actuator is intended for use with interlock systems to ensure that machinery cannot be operated without covers and safety guards in place, for instance.

**Typical applications**

Mechanical monitoring of safety systems, e.g. for garden shredders.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Function</th>
<th>Module operation</th>
<th>Interlock design</th>
<th>Delivery condition of interlock</th>
<th>Operating direction of interlock</th>
<th>Assembly status</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3120</td>
<td>V: mechanical slide interlock module</td>
<td>3120 can only be switched on without the interlock fitted</td>
<td>without interlock</td>
<td>L: interlock supplied separately with the module</td>
<td>0: without interlock, or interlock supplied separately</td>
<td>L: module supplied separately</td>
</tr>
</tbody>
</table>

| | | | 01 interlock version 01 (see dimension diagram) | M: module factory-fitted with the interlock in its centre position | 1: interlock operated from the side near terminals 11, 12k, 12i of the 3120-... | M: module mounted to the circuit breaker |
| | | | | | 2: interlock operated from the side near terminals 21, 22k, 22i of the 3120-... |

| | | | | | Assembly status | |
| | | | | | | L: module supplied separately |
| | | | | | | M: module mounted to the circuit breaker |

**Dimensions**

| | | | | | | |
| | | | | | | |

This is a metric design and millimeter dimensions take precedence (mm) inch. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Description**

Single, two and three pole rocker switch/thermal trip free circuit breakers (S-type TO CBE to EN 60934) of compact design for snap-in panel mounting. Available either with protection on one/both/all poles or, in the case of the double pole version, protection on one pole only. Illumination is optional and there is a choice of rocker colours. Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Motors, transformers, solenoids, household and office machines, electrical tools, mobile homes, boating, construction vehicles, medical equipment to EN 60601.

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>0.1</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>0.2</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>0.3</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>0.4</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>0.5</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>0.8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>1</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>1.2</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.45</td>
<td>1.5</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>2</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>2.5</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.0595</td>
<td>3</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.0565</td>
<td>3.5</td>
<td>not available</td>
</tr>
</tbody>
</table>

* single pole version only

**Illumination voltage/power consumption**

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Filament/neon</th>
<th>LED (G, R, Y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>60 mA</td>
<td>9 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>20 mA</td>
<td>9 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>20 mA</td>
<td>9 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>20 mA</td>
<td>1.5 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>&lt; 1.5 mA</td>
<td>&lt; 1 mA*</td>
</tr>
<tr>
<td>230 V</td>
<td>&lt; 1.5 mA</td>
<td>&lt; 1 mA*</td>
</tr>
<tr>
<td>415 V</td>
<td>&lt; 1 mA</td>
<td>not available</td>
</tr>
</tbody>
</table>

* single pole version only

**Technical data**

For further details please see chapter: Technical Information

**For further details please see chapter: Technical Information**

- **Voltage rating**: AC 240 V; 3 AC 415 V; DC 50 V
- **Current ratings**: 0.1...20 A
- **Typical life**: 1-pole
  - AC 240 V: 0.1...20 A
  - DC 50 V: 0.1...4 A
  - DC 28 V: 4.5...20 A
- **Interrupting capacity Icn**: 2.5...20 A
- **Ambient temperature**: -30...+60 °C
- **Insulation co-ordination rated impulse withstand voltage degree**: 2.5 kV
- **Dielectric strength test voltage**: AC 3,000 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity In**: 0.1...12 A
- **Degree of protection (IEC 60529/DIN 40050)**: IP40
- **Vibration**: 5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
- **Shock**: 25 g (11 ms) 2 + 3-pole: 20 g (11 ms)
- **Corrosion**: 96 hours at 5 % salt mist
- **Humidity**: 240 hours at 95 % RH
- **Mass**: approx. 45 g (three pole)

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240/415 V</td>
<td>0.1...20 A single pole</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.1...16 A multipole</td>
</tr>
<tr>
<td></td>
<td>DC 28 V</td>
<td>0.1...8 A multipole</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>AC 250 V</td>
<td>0.1...16 A single pole</td>
</tr>
<tr>
<td></td>
<td>3 AC 250 V</td>
<td>0.1...12 A 1- and 2-pole</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved.Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### Ordering information - 1-pole

<table>
<thead>
<tr>
<th>Type No.</th>
<th>3130</th>
<th>rocker switch/circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>F snap in frame</td>
<td></td>
</tr>
<tr>
<td>Number of poles</td>
<td>1 single pole, thermally protected</td>
<td></td>
</tr>
<tr>
<td>Frame mounting</td>
<td>0 panel thickness 1-2.5 mm (0.039-0.099 in) (only 3130-F1-...)</td>
<td></td>
</tr>
<tr>
<td>Frame</td>
<td>1 standard</td>
<td></td>
</tr>
<tr>
<td>3 special single pole version</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 single pole, thermally protected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A 1-pole, unprotected**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal design</td>
<td>P7 blade terminals DIN 46244-C-Ms-S (QC 2x,110)</td>
<td></td>
</tr>
<tr>
<td>H7 for terminals 1, 2, 3</td>
<td>1.1, 2.1, 3.1 terminal screws M 3.5</td>
<td></td>
</tr>
<tr>
<td>for terminals 1, 2, 3</td>
<td>1.1, 2.1, 3.1 blade terminals (QC 2x,110)</td>
<td></td>
</tr>
<tr>
<td>N7 blade terminals</td>
<td>(QC 2x,110), with shunt terminal</td>
<td></td>
</tr>
</tbody>
</table>

#### Characteristic curve

- T1 thermal, 1.05-1.4 I_{N}
- Q1 switch, only with terminal design -N7

#### Switch style

- W rocker
- U momentary switch function

#### Switch colour designation

- opaque
- translucent
- 01 black
- 12 white
- 02 white
- 14 red
- 04 red
- 19 green

#### Rocker markings

- A dot (ON position, only with switch colour designation 29)
- Q "I" and "O" moulded in
- 09 green
- 29 black, rocker with green dot

#### Rocker illumination (optional)

- 12 Q Y white rocker, yellow LED, AC/DC
- 14 Q R red rocker, red LED, AC/DC
- 19 Q Y green rocker, yellow LED, AC/DC
- 29 A G black rocker with dot, green LED

#### Illumination voltage range* (optional)

| 1 | 4 - 7 V | (G,R,Y) |
| 2 | 10 - 14 V | (G,R,Y) |
| 3 | 20 - 28 V | (G,R,Y) |
| 4 | 42 - 54 V | (R,Y) |
| 5 | 90 - 140 V | (R,Y) |
| 6 | 185 - 275 V | (R,Y) |
| X | LED, DC 8 - 10 mA*** |

**Current ratings | 0.1...20 A**

#### Ordering example

3130 - F 1 1 0 - P7 T1 - W 12 Q Y 7 - 5 A

---

**N/A for non-illuminated version**

**unprotected poles have to ordered with terminal design N7**

---

### Ordering information - multipole

<table>
<thead>
<tr>
<th>Type No.</th>
<th>3130</th>
<th>rocker switch/circuit breaker multiple</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>F snap in frame</td>
<td></td>
</tr>
<tr>
<td>Number of poles</td>
<td>2 2-pole, thermally protected</td>
<td></td>
</tr>
<tr>
<td>3 3-pole, thermally protected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 2-pole, thermally protected on one pole only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 3-pole, thermally protected on two poles only</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 2-pole, unprotected**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>C 3-pole, unprotected**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frame mounting</td>
<td>0 panel thickness 1-2.5 mm (0.039-0.099 in) (only 3130-F1-...)</td>
<td></td>
</tr>
<tr>
<td>Frame</td>
<td>1 standard</td>
<td></td>
</tr>
<tr>
<td>3 special multiple pole version</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 single pole, thermally protected</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A 1-pole, unprotected**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal design</td>
<td>P7 blade terminals DIN 46244-C-Ms-S (QC 2x,110)</td>
<td></td>
</tr>
<tr>
<td>H7 for terminals 1, 2, 3</td>
<td>1.1, 2.1, 3.1 terminal screws M 3.5</td>
<td></td>
</tr>
<tr>
<td>for terminals 1, 2, 3</td>
<td>1.1, 2.1, 3.1 blade terminals (QC 2x,110)</td>
<td></td>
</tr>
<tr>
<td>N7 blade terminals</td>
<td>(QC 2x,110), with shunt terminal</td>
<td></td>
</tr>
</tbody>
</table>

#### Characteristic curve

- T1 thermal, 1.05-1.4 I_{N}
- Q1 switch, only with terminal design -N7

#### Switch style

- W rocker
- U momentary switch function

#### Switch colour designation

- opaque
- translucent
- 01 black
- 12 white
- 02 white
- 14 red
- 04 red
- 19 green

#### Rocker markings

- Q "I" and "O" moulded in

#### Rocker illumination (optional)

- 12 Q Y white rocker, yellow LED, AC/DC
- 14 Q R red rocker, red LED, AC/DC
- 19 Q Y green rocker, yellow LED, AC/DC
- 29 A G black rocker with dot, green LED

#### Illumination voltage range* (optional)

| 1 | 4 - 7 V | (B,G,R,Y) |
| 2 | 10 - 14 V | (B,G,R,Y) |
| 3 | 20 - 28 V | (B,G,R,Y) |
| 4 | 42 - 54 V | (B,R,Y) |
| 5 | 90 - 140 V | (B) |
| 6 | 185 - 275 V | (B) |
| 8 | 320 - 450 V | (B) |

**Current ratings | 0.1...16 A**

#### Ordering example

3130 - F 1 1 0 - P7 T1 - W 12 Q B 7 - 5 A

---

**N/A for non-illuminated version**

**unprotected poles have to ordered with terminal design N7**

---

*Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com*
I.3

Thermal Overcurrent Circuit Breaker 3130

Dimensions

3130-F110...

terminal for illumination conductor size 0.14 mm² (AWG26), length 160 mm (7.09 in.)

flat head screw M3.5 x 5 - MS ISO 1580 (H7)

Panel cut-out

switch only

illuminated dot (- .29AG-)

3130-F120...

flat head screw M3.5 x 5 - MS ISO 1580 (H7)
tightening torque max. 0.8 Nm

panel thickness 1.25 mm (.039-.098 in.)

optional illumination

Edges of working parts: DIN 6784

3130-F311...

terminal for illumination conductor size 0.14 mm² (AWG26), length 160 mm (7.09 in.)

flat head screw M3.5 x 5 - MS ISO 1580 (H7)
tightening torque max. 0.8 Nm

optional illumination

Edges of working parts: DIN 6784

This is a metric design and millimeter dimensions take precedence ( mm ) inch

www.e-t-a.com
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>0.8</td>
</tr>
<tr>
<td>-20</td>
<td>0.76</td>
</tr>
<tr>
<td>-14</td>
<td>0.84</td>
</tr>
<tr>
<td>-10</td>
<td>0.92</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>+10</td>
<td>1.08</td>
</tr>
<tr>
<td>+23</td>
<td>1.16</td>
</tr>
<tr>
<td>+32</td>
<td>1.24</td>
</tr>
<tr>
<td>+40</td>
<td>1.31</td>
</tr>
<tr>
<td>+50</td>
<td>1.38</td>
</tr>
<tr>
<td>+60</td>
<td>1.45</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm)inch.
Description

Single pole rocker switch/thermal trip free circuit breakers (S-type TO CBE to EN 60934) of compact design for snap-in panel mounting. Available either with protection on one/both/all poles or, in the case of the double pole version, protection on one pole only. Illumination is optional and there is a choice of rocker colours. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, household and office machines, electrical tools, mobile homes, boating, construction vehicles, medical equipment to EN 60601.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A) per pole</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A) per pole</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>4</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>5</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>6</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>7</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>8</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.45</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>18</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.0595</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.0565</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Illumination voltage/power consumption

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>filament/neon (B)</td>
</tr>
<tr>
<td></td>
<td>LED (G, R, Y)</td>
</tr>
<tr>
<td>6 V</td>
<td>60 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>20 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>&lt; 1.5 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>&lt; 1.5 mA</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

Voltage rating
AC 240 V; DC 50 V (UL: AC 250 V; DC 50 V)

Current ratings
0.1...20 A

Typical life
AC 240 V:
0.1...20 A 30,000 operations at 1 x I N, inductive
DC 50 V:
0.1...4 A 30,000 operations at 1 x I N, inductive
4.5...16 A 30,000 operations at 1 x I N, resistive
DC 28 V:
4.5...20 A 30,000 operations at 1 x I N, inductive

Ambient temperature
-30...+60 °C (-22...+140 °F)

Insulation co-ordination
Rated impulse withstand voltage degree
2.5 kV 2
Reinforced insulation in operating area

Dielectric strength
(IEC 60664 and 60664 A)
Test voltage
AC 3,000 V
AC 1,500 V

Insulation resistance
> 100 MΩ (DC 500 V)

Interrupting capacity Icn
0.1...2 A 10 x I N
2.5...20 A 150 A

Interrupting capacity (UL 1077)
0.1...12 A 14...16 A
AC 250 V/3,500 A
AC 250 V/3,500 A
250 V/2,000 A
DC 50 V/2,000 A

Degree of protection
(IEC 60529/DIN 40050)
Operating area IP66
Terminal area IP00

Vibration
5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock
25 g (11 ms)
to IEC 60068-2-27, test Ea

Corrosion
96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Humidity
240 hours at 95 % RH,
to IEC 60068-2-78, test Cab

Mass
Approx. 17 g

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240/415 V</td>
<td>0.1...20 A</td>
</tr>
<tr>
<td></td>
<td>DC 50 V</td>
<td>0.1...8 A</td>
</tr>
<tr>
<td></td>
<td>DC 28 V</td>
<td>0.1...20 A</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>AC 250 V, DC 50 V</td>
<td>0.1...16 A</td>
</tr>
</tbody>
</table>

Crafted by Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Overcurrent Circuit Breaker 3130

Ordering information - IP66

<table>
<thead>
<tr>
<th>Type No.</th>
<th>3130</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>rocker switch/circuit breaker</td>
</tr>
<tr>
<td>F</td>
<td>snap in frame</td>
</tr>
<tr>
<td>I.1</td>
<td>LINE</td>
</tr>
<tr>
<td>I.2</td>
<td>LINE</td>
</tr>
<tr>
<td>I.3</td>
<td>LINE</td>
</tr>
</tbody>
</table>

- **Frame**
  - 2 splash water protected
  - Number of poles
    - 1 single pole, theromally protected
    - A 1-pole, unprotected **
- **Frame mounting**
  - 2 panel thickness 2-3.5 mm
- **Terminal design**
  - P7 blade terminals DIN 46244-C-Ms-S (QC 2x.110)
  - H7 for terminals 1.1 terminal screws M 3.5
    - for terminals 1.2 2 x .110 blade terminals
  - N7 blade terminals DIN 46244-C-Ms-S (QC 2x.110),
    - with shunt terminal or for switch only
- **Characteristic curve**
  - T1 thermal, 1.05-1.4 l_i
  - Q1 switch, only with terminal design -N7
- **Switch style**
  - S 00 without actuator rocker X 222 420 ..
    - must be ordered separately.
    - Available symbols see following pages.
  - S rocker
  - P momentary switch
- **Switch colour designation (not 500)**
  - 01 black
  - 02 white
  - 04 red
  - 09 green
- **Switch markings**
  - 12 Q white rocker, yellow LED, AC/DC
  - 14 Q red rocker, red LED, AC/DC
  - 19 Q green rocker, yellow LED, AC/DC
  - S 00 Y without rocker, LED yellow, AC/DC
- **Illumination voltage range**
  - 1 4 - 7 V (R,Y)
  - 2 10 - 14 V (R,Y)
  - 3 20 - 28 V (R,Y)
  - 4 42 - 54 V (R,Y)
  - 6 90 - 140 V (R,Y)
  - 7 185 - 275 V (R,Y)
  - X LED, DC 8-10 mA ***
- **Current ratings**
  - 0.1...20 A

3130 F 2 1 2 - P7 T1 - S 12 Q Y 7 - 5 A ordering example

- N/A for non-illuminated version
- unprotected poles have to ordered with terminal design N7
*** without series resistor and diode, to be selected by customer.

Recommendation:
- 4-7 V Rv 0.43 kΩ
- 10-14 V Rv 1.1 kΩ
- 20-28 V RV 2.7 kΩ
- diode 1N4007

Dimensions 3130-F212-...

- Terminal for illumination flying lead conductor size
  - 0.14 mm², length 180 mm (7.09 in.)
- Terminal for illumination flying lead conductor size
  - 0.14 mm², length 160 mm (6.30 in.)
- flat head screw M3.5x5 -MS ISO 1580 (H7)
- tightening torque max. 0.8 Nm
- illuminated trip indication (optional)
- Panel cut-out
  - min. 1.5 mm
  - max. 0.5 mm
- Panel thickness
  - 2 - 3.5 mm (0.079-0.138 in.)
- Edges of working parts: DIN 6784

Installation drawing 3130-F212-...

- operating area
- mounting area

This is a metric design and millimeter dimensions take precedence (mm)

www.e-t-a.com

Issue B

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-22</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.6</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence. (inches)
Thermal Overcurrent Circuit Breaker 3130

### Accessories

#### Symbols/legends available

- **Interior light**: X 222 420 01
- **Anchor light**: X 222 420 02
- **Cockpit light**: X 222 420 03
- **Navigation light**: X 222 420 04
- **VHF radio**: X 222 420 05
- **Refrigerator**: X 222 420 06
- **Anchor**: X 222 420 07
- **Windshield wiper**: X 222 420 08
- **Bilge pump**: X 222 420 09
- **Potable water**: X 222 420 10
- **Horn**: X 222 420 11
- **Ventilation fan**: X 222 420 12
- **Panel light**: X 222 420 13
- **Navigation instruments**: X 222 420 14
- **Music**: X 222 420 15
- **Heating**: X 222 420 16
- **Shower pump**: X 222 420 17
- **Icebox**: X 222 420 18
- **Water for windshield wiper**: X 222 420 19
- **Weigh anchor**: X 222 420 20
- **Drop anchor**: X 222 420 21
- **Search light**: X 222 420 22
- **Autopilot**: X 222 420 23
- **Trim flaps**: X 222 420 24
- **Mast lift**: X 222 420 25
- **Navigation lights (sailing ship)**: X 222 420 26
- **Cockpit light (sailing ship)**: X 222 420 27
- **Deck light (sailing ship)**: X 222 420 28
- **Anchor light (sailing ship)**: X 222 420 29
- **Further symbols upon request.**

**500 switch style:**
white translucent rocker coated with black lacquer with laser marked symbols that appear in white translucent.

---

**Blanking piece (black)**
3130-387012

- **OFF**: 1.2
- **ON**: 1.7
- **Panel cut-out**
  - 26 mm x 110 mm
- **Panel thickness**: 2 - 3.5 mm (.079 - .138 in.)

Edges of working parts: DIN 6784

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Combination of single pole circuit breaker and ON/OFF switch with soft-touch rocker actuation. Contoured rockers are available with a choice of colours and legends, with optional illumination. The 3131 is sealed to provide IP66 rated front of panel water splash protection. It meets the requirements of circuit breaker standard EN 60934 (IEC 60934): S type, TO.

**Typical applications**

Motor protection, transformer protection, household appliances and office equipment, electrical tools, mobile homes, watercraft, construction vehicles, medical equipment.

**Current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>4</td>
<td>0.0435</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>5</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>6</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>7</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>8</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.45</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>18</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.0595</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3.5</td>
<td>0.0565</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Illumination voltage / power consumption**

Operating voltage | Power consumption (LED) | Y = yellow | T = blue |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
<td>10 mA</td>
<td>10 mA</td>
<td></td>
</tr>
<tr>
<td>24 V</td>
<td>10 mA</td>
<td>10 mA</td>
<td></td>
</tr>
<tr>
<td>115 V</td>
<td>&lt; 1 mA</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>230 V</td>
<td>&lt; 1 mA</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

**Technical data**

For further details please see chapter: Technical Information

Voltage rating: AC 240 V; DC 28 V

Current rating range: 0.1...20 A

Typical life: 0.1...20 A

30,000 operations at 1 x I N, inductive

Ambient temperature: -20...+60 °C (-4...+140 °F)

Insulation co-ordination (IEC 60664) reinforced insulation in the operating area

Dielectric strength:
operating area test voltage AC 3,000 V

current path/current path test voltage AC 1,500 V

Insulation resistance: > 100 MΩ (DC 500 V)

Interrupting capacity $I_{cn}$:
0.1...2 A 10 x $I_N$
2.5...20 A 150 A

Interrupting capacity (UL 1077):
AC 240 V 3,000 A
DC 32 V 2,500 A

Protection class (IEC 60934):
operating area IP66
terminal area IP00

Vibration:
5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
test to IEC 60068-2-6, test Fc,
10 frequency cycles/axis

Shock:
25 g (11 ms),
test to IEC 60068-2-27, test Ea

Corrosion:
96 hours at 5 % salt mist,
test to IEC 60068-2-11, test Ka

Humidity:
240 hours at 95 % RH,
test to IEC 60068-2-78, test Cab

Mass:
approx. 30 g

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1500</td>
<td>Ignition Protected</td>
<td></td>
</tr>
<tr>
<td>UL 1077</td>
<td>AC 250 V; DC 32 V 0.1...20 A</td>
<td></td>
</tr>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V; DC 32 V 0.05...20 A</td>
<td></td>
</tr>
</tbody>
</table>
### Ordering Information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Single pole thermal circuit breaker or switch</th>
</tr>
</thead>
<tbody>
<tr>
<td>3131</td>
<td>A: circuit breaker single pole, latching switch</td>
</tr>
<tr>
<td></td>
<td>C: circuit breaker single pole, momentary switch</td>
</tr>
</tbody>
</table>

| Mounting | F: flange mounting with sealing IP66 |

<table>
<thead>
<tr>
<th>Accessories</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>H: terminal 1: screws M3.5x5 ISO 1580 (DIN 85)</td>
</tr>
<tr>
<td></td>
<td>terminal 2: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 mm EN 60934 connectors</td>
</tr>
<tr>
<td></td>
<td>N: terminals 1 and 2: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 mm EN 60934 connectors</td>
</tr>
<tr>
<td></td>
<td>P: terminals 1 and 2: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 mm EN 60934 connectors</td>
</tr>
</tbody>
</table>

| Characteristic curve | T: thermal 1.0 - 1.4 times rated current |
| Actuator style | Q: switch only |
| Actuator colour | 0: without actuator rocker X3131-W... must be ordered separately |
| Rocker legends | 0: without |
| Rocker marking | 0: without |
| Orientation | 0: without illumination |
|            | 1: illuminated when in position 1 (ON) |
|            | 3: as 1, with dimmed illumination of window 1 |

| Type of illumination | 0: without illumination |
|                     | T: blue LED |
|                     | Y: yellow LED |

| Illumination voltage range | 0: without illumination |
|                          | 2: 10 - 14 V DC |
|                          | 3: 20 - 32 V DC |
|                          | 6: 90 - 140 V AC |
|                          | 7: 185 - 275 V AC |

| Current ratings | 0.1...20 A |

| 3131 - A F 1 P Y 0 0 0 0 - 1 Y 0 - 10A ordering example |

| 3131 - . . . N Q 0 0 0 0 0 - - . - 20A switch |

---

### Dimensions

#### Terminal Design

- Terminal 1 is for connection of the rocker illumination

#### Panel Cut-out

- Panel cut-out dimensions: 36.8 mm x 21.1 mm

#### Installation Drawing

- Push here during installation
- Operating area

---

This is a metric design and millimeter dimensions take precedence. 

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
Internal connection diagrams

Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.84</td>
<td>0.88</td>
<td>0.92</td>
<td>1.08</td>
<td>1.14</td>
<td>1.23</td>
<td></td>
</tr>
</tbody>
</table>

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.84</td>
<td>0.88</td>
<td>0.92</td>
<td>1.08</td>
<td>1.14</td>
<td>1.23</td>
<td></td>
</tr>
</tbody>
</table>
### List of available legends

| Interior light | 01 |
| Anchor light | 02 |
| Cockpit light | 03 |
| Navigation light | 04 |
| UKW-radio | 05 |
| Refrigerator | 06 |
| Anchor | 07 |
| Windshield wiper | 08 |
| Bilge pump | 09 |
| Potable water | 10 |
| Horn | 11 |
| Ventilation fan | 12 |
| Panel light | 13 |
| Navigation instruments | 14 |
| Music | 15 |
| Heating | 16 |
| Shower pump | 17 |
| Icebox | 19 |
| Screenwash | 20 |
| Search light | 23 |
| Autopilot | 24 |
| Trim tabs | 25 |
| Mast lift | 26 |

| Navigation light (sailing ship) | 27 |
| Cockpit light (sailing ship) | 28 |
| Deck light (sailing ship) | 29 |
| Anchor light (sailing ship) | 30 |
| Toilet | 31 |
| Outlet | 41 |

Further symbols upon request

---

### Ordering Information X3131-

<table>
<thead>
<tr>
<th>Type number</th>
<th>X3131 module for type 3131</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Actuator style</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actuator colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rocker legends</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rocker marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ordering information</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3131 - W A 01 01 ordering example</td>
</tr>
</tbody>
</table>
Three-position switch 3131

Description

Single pole three-position switch with latching or momentary switch functions. Featuring a soft-touch contoured rocker actuator with optional illumination. The 3131 is sealed to provide IP66 rated front of panel water splash protection.

Typical applications

Household appliances, electrical tools, mobile homes, watercraft, construction vehicles, medical equipment

Ordering Information

<table>
<thead>
<tr>
<th>Type number</th>
<th>3131</th>
</tr>
</thead>
</table>
| Function    | B: 3-position switch single pole, switching function  
 D: 3-position switch single pole, momentary switch function  
 E: latching switch under window 1, momentary switch under window 2  
 F: momentary switch under window 1, latching switch under window 2 |
| Mounting    | F: flange mounting |
| Accessories | 1: with sealing IP66 |
| Terminal design | N: blade terminals 2x2.8x0.8 EN 60934  
 Q: switch only |
| Actuator style | 0: without actuator  
 X: rocker X3131-W... must be ordered separately |
| Actuator colour | 0: without actuator |
| rocker legends | 00: without |
| 00: without  
 0: without  
 2: two LEDs, full illumination in position 1 and 2, dimmed illumination in position 0 |
| Orientation | 0: without  
 0: without  
 2: illumination in position 1, 2 |
| Illumination | 0: without illumination  
 1: blue LED  
 2: yellow LED |
| Illumination voltage range | 0: without illumination  
 2: 20 - 32 V DC |
| Current ratings | 20 A |

Technical data

For further details please see chapter: Technical Information

- **Voltage rating**: DC 32 V
- **Current rating**: 20 A
- **Typical life**: 30,000 operations at 1 x IN, inductive
- **Ambient temperature**: -20...+60 °C (-4...+140 °F)
- **Insulation co-ordination**: 2.5 kV/2 (IEC 60664) re-inforced insulation in the operating area
- **Dielectric strength**: operating area test voltage AC 3,000 V  
 current path/test voltage AC 1,500 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Protection class**: operating area IP66  
 terminal area IP00
- **Vibration**: 5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
  test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
- **Shock**: 25 g (11 ma), test to IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist, test to IEC 60068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH, test to IEC 60068-2-78, test Cab
- **Mass**: approx. 30 g

Approvals

- **Authority**: UL 1500 Ignition Protected

Illumination voltage / power consumption

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 V</td>
<td>10 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>10 mA</td>
</tr>
</tbody>
</table>
Three-position switch 3131

Dimensions

<table>
<thead>
<tr>
<th>Pos. I (ON)</th>
<th>Pos. D (OFF)</th>
<th>Pos. II (ON)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.8</td>
<td>1.89</td>
<td>1.44</td>
</tr>
<tr>
<td>10.4</td>
<td>.409</td>
<td>.015</td>
</tr>
<tr>
<td>18</td>
<td>.099</td>
<td>.2</td>
</tr>
<tr>
<td>36.5</td>
<td>1.44</td>
<td>1.44</td>
</tr>
<tr>
<td>20.2</td>
<td>.795</td>
<td>.126</td>
</tr>
<tr>
<td>10.4</td>
<td>.409</td>
<td>.015</td>
</tr>
<tr>
<td>18</td>
<td>.099</td>
<td>.2</td>
</tr>
<tr>
<td>36.5</td>
<td>1.44</td>
<td>1.44</td>
</tr>
<tr>
<td>20.2</td>
<td>.795</td>
<td>.126</td>
</tr>
</tbody>
</table>

Panel thickness 2 - 3.5
Panel cut-out

Internal connection diagrams

**Latching switch**

**Momentary switch**

**Without illumination**

**With illumination**

Installation drawing

This is a metric design and millimeter dimensions take precedence (mm) inch.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Three-position switch 3131

List of available legends

<table>
<thead>
<tr>
<th>Legend</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anchor</td>
<td>07</td>
</tr>
<tr>
<td>Windshield wiper</td>
<td>08</td>
</tr>
<tr>
<td>Bilge pump</td>
<td>09</td>
</tr>
<tr>
<td>Ventilation fan</td>
<td>12</td>
</tr>
<tr>
<td>Trim tabs</td>
<td>25</td>
</tr>
<tr>
<td>Mast lift</td>
<td>26</td>
</tr>
</tbody>
</table>

Further symbols upon request

Ordering Information X3131--...

<table>
<thead>
<tr>
<th>Type number</th>
<th>Module for type 3131</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3131</td>
<td>-</td>
</tr>
</tbody>
</table>

Actuator style

- rocker soft-touch, two illumination windows

Actuator colour

- A: blue / white translucent
- B: black / white translucent
- C: skyblue / white translucent

Rocker legends

- 00: without
  - see separate survey of legends
- 0: without orientation
- 1: and II
- C: and (orientation 1 only)

Orientation

- 0: without orientation
- 1: orientation 1 (standard)
- 2: orientation 2
- 3: orientation 3
- 4: orientation 4

X3131 - W A 07 0 1 ordering example

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Thermal Overcurrent Circuit Breaker 3140

Description

Four pole switch or three pole switch/thermal circuit breaker (S-type TO CBE to EN 60934) with trip-free mechanism and red/green two button operation. Designed for snap-in panel mounting. Integral splash water protection to meet protection degree IP 66 in the operating area (option). Optional with under voltage release module and auxiliary contact module. Complies with CBE standard EN 60934 (IEC 60934).

Typical applications

High-pressure cleaners, shredders, pumps, power saws, electric tools, motors, processing systems.

Ordering information

Type No.
3140 four pole switch or three pole switch/circuit breaker

Mounting
F snap in frame

Frame
1 standard
2 splash water protected version

Number of poles
3 3-pole, thermally protected
4 4-pole, thermally protected on 3 poles only

3-pole, unprotected, switch only
4 4-pole, unprotected, switch only

Number of poles
0 panel thickness 1-6.35 mm (.04-.25 in)

Frame mounting
P7 Blade terminals 2x2.8x0.8 mm (QC 2x.110), DIN 46244-C

N7 as P7, but with shunt terminal
H7 as P7, but for terminals x.1 terminal screws M3.5 (required with X3140 fitted)

G7 as H7, but with shunt terminal

Characteristic curve
T1 thermal
Q1 switch only (10,000 operations)*

Switch style
S 2 push buttons (ON/OFF)

Switch colour
GRX green/red

Current rating range
0.1...16 A ordering example

Technical data

For further details please see chapter: Technical Information

Voltage rating 3 AC 415 V; DC 50 V

Current rating range 0.1...16 A

Typical life
3-pole
3 AC 415 V: 0.1...14 A 10,000 operations at 1 x I N, inductive
15...16 A 10,000 operations at 1 x I N, resistive

4-pole
3 AC 415 V 0.1...14 A 10,000 operations at 1 x I N, inductive
15...16 A 10,000 operations at 1 x I N, resistive

Ambient temperature -30...+60 °C (-22...+140 °F)

Dielectric strength
 test voltage
(IEC 60664 and 60664A) operating area AC 3,000 V
between poles (3-pole) AC 1,500 V

Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity Icn 0.1...2 A 10 x I N
2.5...16 A 150 A

Degree of protection
operating area IP40
IP66 with water splash protection

Vibration
5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)
to IEC 60068-2-6, test Fc, 10 frequency cycles/axis

Shock
20 g (11 ms)
to IEC 60068-2-27, test Ea

Humidity
240 hours at 95 % RH,
to IEC 6068-2-78, test Cab

Corrosion
96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Mass
approx. 68

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>94</td>
<td>0.5</td>
<td>0.0595</td>
</tr>
<tr>
<td>0.2</td>
<td>24</td>
<td>0.4</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.3</td>
<td>12</td>
<td>0.3</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.4</td>
<td>5.30</td>
<td>0.5</td>
<td>0.0215</td>
</tr>
<tr>
<td>0.5</td>
<td>4.20</td>
<td>0.6</td>
<td>0.0325</td>
</tr>
<tr>
<td>0.6</td>
<td>2.90</td>
<td>0.7</td>
<td>0.0165</td>
</tr>
<tr>
<td>0.8</td>
<td>1.50</td>
<td>0.8</td>
<td>0.0125</td>
</tr>
<tr>
<td>1</td>
<td>0.9</td>
<td>1.2</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.80</td>
<td>1.5</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.27</td>
<td>2</td>
<td>0.27</td>
</tr>
<tr>
<td>2.5</td>
<td>0.0785</td>
<td>3</td>
<td>0.0595</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Dimensions

- OFF-position
- Internal connection diagrams

Internal connection diagrams

- 3-pole thermally protected
- 4-pole 3-poles thermally protected
- 3-pole unprotected
- 4-pole unprotected

Typical time/current characteristics

- 0.1 ... 2 A
- 2.5 ... 16 A

Installation drawing

- When installing the circuit breaker apply pressure on bezel only
- Operating area

- Flat head screw ISO1587 M3,5x5-M5 tightening torque max. 0.8 Nm with 4 pole unit only

- Blade terminal DIN 46244-C-M

- Panel cut-out
- Edges of working parts: ISO 13715

- Mounting area
- Operating area

This is a metric design and millimeter dimensions take precedence.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F  -22 -4 +140 +23 +73.4 +104 +122 +140 °F  -30 -22 +140 +23 +73.4 +104 +50 +60

Derating factor  0.8  0.76  0.84  0.92  1  1.08  1.16  1.24

www.e-t-a.com

Issue B

1 - 92
Description

A module suitable for all versions of type 3140 to trip the main switch/circuit breaker mechanism in the event of loss of voltage of the connected phases. When the voltage is restored the switch must be reset to reconnect the load, thereby avoiding the safety hazards associated with automatic re-starting of machinery.

Note: Basic unit 3140-... must be fitted with -H7 or -G7 screw terminals.

Typical applications

Machines such as power tools, industrial equipment and domestic appliances where automatic restart after restoration of power could be dangerous (EU Machinery Directive).

Ordering information

Type No.  X3140 - Module for type 3140
Function  U undervoltage release module
Terminal design  
00 standard (without separate connections)  
01 one blade terminal 2.8x0.8 (QC .110)  
02 two blade terminals 2.8x0.8 (QC .110)  
03 as 01, with flying lead 0.5 mm² (l = 250 mm) and female connector 6.3x1 DIN 46247-MS
Voltage ratings  
00 AC 400 V 50/60 Hz  
03 DC 24 V  
09 AC 230 / 240 V 50/60 Hz
Assembly status  
M module mounted to the circuit breaker

Technical data

Voltage ratings   AC 400 V 50/60 Hz; AC 230 V; DC 24 V
Voltage tolerance  +10%/-15%
Current consumption approx. 2.0 mA
Release values  0.2 x U_N < U < 0.7 x U_N (at a rated voltage of AC 400 V the device may release at 280 V and must release at 80 V)
Release delay  t < 20 ms
Latch-in values  > 85 % U_N
Ambient temperature  -30...+60 °C (-22...+140 °F)
Vibration  5 g (57-500 Hz) ± 0.38 mm (10-57 Hz)  
10 frequency cycles/axis
Shock  20 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion  48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity  240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass  approx. 90 g (complete assembly)

Approvals (complete circuit breaker/module assembly)

Authority  Voltage ratings
VDE (EN 60934)  AC 400 V; AC 230/240 V; DC 24 V

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Auxiliary Contact Module X3120-S for circuit breaker 3140-F...

Description

A module supplied factory fitted to type 3140-F to provide electrically separate changeover contacts which operate as the main contacts open/close. Ideally suited to status signalling and sequence switching.

Typical applications

Monitoring of the switching position of the circuit breaker or any connected load.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Function</th>
<th>Contact configuration</th>
<th>Terminal design</th>
<th>Contact rating</th>
<th>Assembly status</th>
</tr>
</thead>
<tbody>
<tr>
<td>X3120</td>
<td>S</td>
<td>0</td>
<td>1</td>
<td>DC (not approved)</td>
<td>module mounted to circuit breaker 3140-...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Module for type 3120 and type 3140</th>
</tr>
</thead>
</table>

Technical data

- **Voltage rating**: AC 250 V; DC 220 V
- **Current rating**: 0.1...4 A / 0.05...1 A
- **Typical life**: 50,000 operations
- **Ambient temperature**: -30...+60 °C (-22...+140 °F)
- **Dielectric strength (IEC 60664 and 60664A)**: test voltage between main and auxiliary circuit AC 3,000 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Vibration**: 8 g (type X3120-S...A)
  - 8 g (type X3120-S...B)
  - (57-500 Hz) ± 0.46 mm (10-57 Hz)
  - to IEC 60068-2-6, test Fc
  - 10 frequency cycles/axis
- **Shock**: 15 g (11 ms), type X3120-S...A
  - 20 g (11 ms), type X3120-S...B
  - to IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist,
  - to IEC 60068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH
  - to IEC 60068-2-78, test Cab
- **Mass**: approx. 38 g (complete assembly)

Approval (complete circuit breaker/module assembly)

- **Authority**: VDE (EN 60934)
  - Voltage ratings: AC 250 V; DC 28 V
  - Current ratings: 0.05...4 A
- **UL, CSA**: AC 250 V
  - Current ratings: 0.05...4 A

This is a metric design and millimeter dimensions take precedence (inches). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Options include an additional unprotected circuit tap (-A3) and -KF housing particularly suited to high humidity and other damp conditions. Designed for threadneck panel mounting.

Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, hand tools, appliances.

Ordering information

Type No.
2-4100 threadneck panel mounting
(hardware bulk shipped)
L10 solder terminals
P10 blade terminals A6.3-0.8 mm (QC .250)
P50 blade terminals A4.8-0.8 mm (QC .190)
A3 shunt terminal (5 A max. load)

Current Internal Current Internal
rating (A) resistance (Ω) rating (A) resistance (Ω)
0.05 322 1.8 0.34
0.08 125 2 0.29
0.1 101 2.5 0.18
0.2 25 3 0.14
0.3 11 3.5 0.1
0.4 6.3 4 0.08
0.5 4.1 4.5 0.069
0.6 2.8 5 0.053
0.7 2.1 6 < 0.05
0.8 1.6 7 < 0.05
1 0.97 8 < 0.05
1.2 0.66 10 < 0.05
1.5 0.4

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

Typical life
AC 250 V / DC 28 V: 2,000 operations at 2 x I N, resistive
DC 28 V: 0.05...10 A 1,000 operations at 2 x I N, inductive

Ambient temperature
-20...+60 °C (-4...+140 °F)

Insulation co-ordination
rated impulse withstand voltage pollution degree
(IEC 60664 and 60664 A) 2.5 kV 2
reinforced insulation in operating area

Dielectric strength
(IEC 60664 and 60664 A) test voltage operating area AC 3,000 V
 rated impulse withstand voltage degree
operating area AC 3,000 V
AC 250 V 8 x I N
7...10 A 6 x I N

Dielectric strength
(UL 1077) test voltage AC 250 V 200 A
Interrupting capacity IN 5 A
0.05...6 A
5 A
10 x I N
8 x I N

Degree of protection
(IEC 60529/DIN 40050) operating area IP40
terminal area IP00

Degree of protection
(IEC 60629 and IEC 60664) test voltage AC 250 V
Interrupting capacity
UL 1077
250 A
8 x I N
7...10 A 6 x I N

250 A
8 x I N
7...10 A 6 x I N

Shock
25 g (11 ma)
to IEC 60068-2-27, test Ea

Corrosion
96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Humidity
240 hours at 95 % RH

to IEC 60068-2-78, test Cab

Mass
approx. 15 g

For further details please see chapter: Technical Information

Voltage rating AC 250 V; DC 28 V
Current rating range 0.05...10 A

Typical life
AC 250 V / DC 28 V: 2,000 operations at 2 x I N, resistive
DC 28 V: 0.05...10 A 1,000 operations at 2 x I N, inductive

Ambient temperature
-20...+60 °C (-4...+140 °F)

Insulation co-ordination
rated impulse withstand voltage pollution degree
(IEC 60664 and 60664 A) 2.5 kV 2
reinforced insulation in operating area

Dielectric strength
(IEC 60664 and 60664 A) test voltage operating area AC 3,000 V
 rated impulse withstand voltage degree
operating area AC 3,000 V
AC 250 V 8 x I N
7...10 A 6 x I N

Dielectric strength
(UL 1077) test voltage AC 250 V 200 A
Interrupting capacity IN 5 A
0.05...6 A
5 A
10 x I N
8 x I N

Degree of protection
(IEC 60529/DIN 40050) operating area IP40
terminal area IP00

Degree of protection
(IEC 60629 and IEC 60664) test voltage AC 250 V
Interrupting capacity
UL 1077
250 A
8 x I N
7...10 A 6 x I N

250 A
8 x I N
7...10 A 6 x I N

Shock
25 g (11 ma)
to IEC 60068-2-27, test Ea

Corrosion
96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Humidity
240 hours at 95 % RH

to IEC 60068-2-78, test Cab

Mass
approx. 15 g

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com
This is a metric design and millimeter dimensions take precedence.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.76</td>
</tr>
<tr>
<td>-14</td>
<td>-10</td>
<td>0.84</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0.92</td>
</tr>
<tr>
<td>+32</td>
<td>+10</td>
<td>1</td>
</tr>
<tr>
<td>+73.4</td>
<td>+23</td>
<td>1.08</td>
</tr>
<tr>
<td>+104</td>
<td>+40</td>
<td>1.16</td>
</tr>
<tr>
<td>+122</td>
<td>+50</td>
<td>1.24</td>
</tr>
<tr>
<td>+140</td>
<td>+60</td>
<td></td>
</tr>
</tbody>
</table>

Accessories

- Water splash cover, transparent Y 300 538 01, bonded to knurled nut Y 300 628 01
  X 200 799 01 (IP64)
- Water splash cover, transparent with hex nut X 201 296 03 (IP64)
- Hex nut with splash cover, black X 210 739 01 (IP64)

This is a metric design and millimeter dimensions take precedence.
Description

Single pole high performance thermal circuit breaker, with push-to-reset tease free, trip-free snap action mechanism (R-type TO CBE to EN 60934). Designed for threadneck panel mounting and for applications with a high fault current switching requirement. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, battery chargers, power supplies, appliances, machinery, extra low voltage systems.

Ordering information

Type No. 4130 single pole thermal circuit breaker

Mounting G threadneck panel mounting

Threadneck design

2 M12x1, knurled nut (bulk shipped)
4 M12x1, hex nut and knurled nut (bulk shipped)

Number of poles

1 single pole, thermally protected

Actuator configuration

1 black push button

Terminal design

K4 terminal M6x8 screw and washer bulk shipped

Characteristic curve

M1 medium delay

Current ratings

20...70 A

4130 - G 2 1 - K4 M1 - 20 A ordering example

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>&lt; 0.02</td>
<td>40</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02</td>
<td>50</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02</td>
<td>60</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>35</td>
<td>&lt; 0.02</td>
<td>70</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Approvals

Authority Voltage ratings Current ratings

VDE (EN 60934) AC 240 V; DC 50 V 20...70 A

UL AC 240 V; AC 120 V; DC 50 V 20...80 A

Technical data

For further details please see chapter: Technical Information

Voltage rating AC 240 V; DC 50 V

Current rating range 20...70 A

Typical life

AC 240 V: 20...70 A 100 operations at 2 x I N, inductive 500 operations at 2 x I N, resistive

DC 50 V: 20...80 A 500 operations at 2 x I N, inductive

Ambient temperature -30...+60 °C (-22...+140 °F)

Insulation co-ordination withstand voltage

rated impulse pollution degree

2.5 kV 2 (reinforced insulation in the mounting area)

Dielectric strength

operating area test voltage

AC 3,000 V

Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity I_{on}

800 A

Interrupting capacity (UL 1077)

I_N 20...70 A AC 240 V 1,000 A
20...60 A AC 120 V 3,500 A
70 A AC 120 V 2,000 A
20...50 A DC 50 V 3,500 A
60...70 A DC 50 V 2,000 A

Degree of protection

(IEC 60529/DIN 40050) operating area IP40 terminal area IP00

Vibration

8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis

Shock

25 g (11 ms) to IEC 60068-2-7, test Ea

Corrosion

96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka

Humidity

240 hours at 95 % RH to IEC 60068-2-78, test Cab

Mass

approx. 55 g
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-22</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.68</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
</tr>
</tbody>
</table>

High Performance Thermal Circuit Breaker 4130-...

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

www.e-t-a.com
Thermal Overcurrent Circuit Breakers 2-5000/2-5700-...

**Description**

Single pole thermal circuit breaker with press-to-reset, tease-free, trip-free, snap action mechanism. Type 2-5000 is available with optional manual release (-H), type 2-5700 can be supplied as a push-push switch/circuit breaker (R-type TO CBE to EN 60934 in press-to-reset configuration; M-type when fitted with manual release -H; S-type with push-push operation). Fitted with flange or threadneck for panel mounting. Options include an additional unprotected circuit tap (-A3). Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Motors, transformers, solenoids, battery chargers, power supplies, appliances, machinery, extra low voltage systems.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>flange mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5000</td>
<td>threadneck panel mounting</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Threadneck design – type 2-5700 only</th>
</tr>
</thead>
<tbody>
<tr>
<td>IG1 moulded threadneck 3/8”-27UNS-2A</td>
</tr>
<tr>
<td>IG2 moulded threadneck M12x1</td>
</tr>
<tr>
<td>Terminal design</td>
</tr>
<tr>
<td>P10 blade terminals 6.3-0.8 mm (QC .250)</td>
</tr>
<tr>
<td>K10 screw terminals M4x6</td>
</tr>
<tr>
<td>Shunt terminal (optional) -P10 only</td>
</tr>
<tr>
<td>H manual release facility (type 2-5000 only)</td>
</tr>
<tr>
<td>A3 shunt terminal (up to I_n 2.5 A/8 A max. load)</td>
</tr>
<tr>
<td>Current ratings</td>
</tr>
<tr>
<td>0.05...25 A</td>
</tr>
</tbody>
</table>

| 2-5700 - IG1 - P10 - .. - DD - 8 A ordering example |

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

**Technical data**

For further details please see chapter: Technical Information

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 250 V; DC 28 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating range</td>
<td>0.05...25 A</td>
</tr>
<tr>
<td>Typical life</td>
<td>AC 250 V / DC 28 V</td>
</tr>
<tr>
<td>0.05...16 A</td>
<td>5,000 operations at 2 x I_n, inductive</td>
</tr>
<tr>
<td>17...25 A</td>
<td>5,000 operations at 2 x I_n, resistive</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-20...+60 °C (-4...+140 °F)</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664 and 60664A)</td>
<td>rated impulse pollution withstand voltage degree</td>
</tr>
<tr>
<td>2.5 kV</td>
<td>2</td>
</tr>
<tr>
<td>reinforced insulation in operating area</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength (IEC 60664 and 60664A)</td>
<td>test voltage</td>
</tr>
<tr>
<td>operating area</td>
<td>AC 3,000 V</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Interrupting capacity I_on</td>
<td>0.05...2.5 A</td>
</tr>
<tr>
<td>3...5 A</td>
<td>8 x I_n</td>
</tr>
<tr>
<td>6...12 A</td>
<td>20 x I_n</td>
</tr>
<tr>
<td>(higher interrupting capacity available to special order)</td>
<td></td>
</tr>
<tr>
<td>13...25 A</td>
<td>200 A</td>
</tr>
<tr>
<td>Degree of protection (IEC 60529/DIN 40050)</td>
<td>operating area IP40</td>
</tr>
<tr>
<td>terminal area IP00</td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis</td>
</tr>
<tr>
<td>Shock</td>
<td>25 g (11 ms) to IEC 60068-2-27, test Ea</td>
</tr>
<tr>
<td>Corrosion</td>
<td>96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka</td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH to IEC 60068-2-78, test Cab</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 29 g</td>
</tr>
</tbody>
</table>

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05...25 A</td>
</tr>
<tr>
<td>CSA/ UL</td>
<td>AC 250 V; DC 50 V</td>
<td>0.05...20 A</td>
</tr>
<tr>
<td>CCC</td>
<td>AC 250 V</td>
<td>0.05...25 A</td>
</tr>
<tr>
<td>SEV</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05...25 A</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal Overcurrent Circuit Breakers 2-5000/2-5700-...

### Dimensions

#### 2-5000-P10

- **iG1=ø9.6 -0.1**
- **iG2=ø12.2 -0.1**
- **blade terminal DIN 46244-A6.3-0.8 (Qc .250)**
- **current rating in A:** 1.22

#### 2-5700-P10

- **iG1=3/8-27UNS-2A**
- **iG2=M12x1**
- **tightening torque max. 1 Nm**
- **current rating in A:** 1.43

### Terminal design

#### -P10-A3

- 0.05...2.5 A
- flat head screw M4x6 ISO 1580 tightening torque 1.2 Nm

#### -K10

### Installation drawings

#### 2-5000-P10

- **operating area**
- **mounting area**

#### 2-5700-P10

- **operating area**
- **mounting area**

This is a metric design and millimeter dimensions take precedence (mm) inch

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Typical time/current characteristics at +23 °C/+73.4 °F

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.76</td>
<td>0.84</td>
<td>0.92</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
<td></td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (mm).
### Accessories for types 2-5000 and 2-5700 with screw terminals -K10

<table>
<thead>
<tr>
<th>Bus bar</th>
<th>Y 303 563 01</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Water splash cover, transparent for push button (IP64)</th>
<th>Fixing plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y 300 728 01</td>
<td>Y 301 056 02</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rear terminal shroud, transparent (IP64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y 300 476 01</td>
</tr>
</tbody>
</table>

### Accessories for type 2-5000-...

**With 3/8” threadneck (-iG1)**

- Water splash cover, transparent Y 300 538 01 and knurled nut Y 300 628 01
- X 200 799 01 (IP64)

**With M12 threadneck (-iG2)**

- Hex nut with splash cover, black without O ring X 210 739 01 (IP64)
  - Transparent splash cover X 201 296 03 (IP64)

### Accessories for type 2-5700-...

**With 3/8” threadneck (-iG1)**

- Water splash cover, transparent Y 300 538 01 and knurled nut Y 300 628 01
- X 200 799 01 (IP64)

**With M12 threadneck (-iG2)**

- Hex nut with splash cover, black without O ring X 210 739 01 (IP64)
  - Transparent with knurled nut and O ring X 210 663 01 (IP64)

---

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934; M-type when fitted with optional manual release feature). Designed for plug-in mounting with E-T-A sockets 10 and 16.

**Typical applications**

Extra low voltage wiring systems and components.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>2-5200 plug-in</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual release (optional)</td>
<td>H manual release facility</td>
</tr>
</tbody>
</table>

2-5200 - H - .. - 5 A ordering example

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>280</td>
<td>2.5</td>
<td>0.2</td>
</tr>
<tr>
<td>0.08</td>
<td>100</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>0.1</td>
<td>110</td>
<td>3.5</td>
<td>0.065</td>
</tr>
<tr>
<td>0.2</td>
<td>29</td>
<td>4</td>
<td>0.065</td>
</tr>
<tr>
<td>0.3</td>
<td>14</td>
<td>4.5</td>
<td>0.05</td>
</tr>
<tr>
<td>0.4</td>
<td>7</td>
<td>5</td>
<td>0.05</td>
</tr>
<tr>
<td>0.5</td>
<td>4.9</td>
<td>6</td>
<td>0.02</td>
</tr>
<tr>
<td>0.6</td>
<td>3.4</td>
<td>7</td>
<td>0.02</td>
</tr>
<tr>
<td>0.7</td>
<td>2.5</td>
<td>8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>1.8</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.84</td>
<td>13</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.6</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.8</td>
<td>0.4</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>AC 250 V; DC 50 V</td>
<td>0.05...20 A</td>
</tr>
</tbody>
</table>

**Technical data**

For further details please see chapter: Technical Information

- **Voltage rating**: DC 28 V (UL: AC 250; DC 50 V)
- **Current rating range**: 0.05...16 A (up to 25 A to special order)
- **Typical life**: AC 250 V / DC 28 V: 0.05...16 A 5,000 operations at 2 x I_n, inductive
- **Ambient temperature**: -20...+60 °C (-4...+140 °F)
- **Insulation co-ordination**: rated impulse withstand voltage 2.5 kV,
- **Pollution degree**: 2
- **Dielectric strength**: (IEC 60664 and 60664A) test voltage AC 1,500 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity**: (IEC 60664 and 60664A) Icn 0.05...2.5 A 8 x I_n, 3...5 A 20 x I_n, 6...16 A (25 A) 400 A
- **Degree of protection**: operating area IP40, terminal area IP00
- **Vibration**: 8 g (57 to 500 Hz) ± 0.61 mm, (10-57 Hz), to IEC 60068-2-6, test Fc,
- **Shock**: 25 g (11 ms) to IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH, to IEC 60068-2-78, test Cab
- **Mass**: approx. 35 g

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
## Dimensions

- **Dimensions**
- **Accessories**

### Sockets 10R-K10
- 10R-P10

- **Socket 16**
  - (up to 16 A max. load)

### Blanking plug
- Y 301 477 01 for sockets 10R-P10/K10

### Terminal for mounting rack
- X 200 800 01 for sockets 10R, 10F on EN rail 50 035-G32

### Connector bus links - P10
- X 210 588 01/ 1.5 mm² (AWG 16) (brown)
- X 210 588 02/ 2.5 mm² (AWG 14) (black)
- X 210 588 03/ 2.5 mm² (AWG 14) (red)
- X 210 588 04/ 2.5 mm² (AWG 14) (blue)

### Connector bus links - K10
- X 210 589 01/ 2.5 mm² (AWG 14) (black)
- X 210 589 02/ 1.5 mm² (AWG 16) (brown)

## Internal connection diagram

- **Internal connection diagram**

## Typical time/current characteristics at +23 °C/+73.4 °F

- **Typical time/current characteristics**

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.94</td>
</tr>
<tr>
<td>+14</td>
<td>+10</td>
<td>0.97</td>
</tr>
<tr>
<td>+32</td>
<td>0</td>
<td>1.08</td>
</tr>
<tr>
<td>+73.4</td>
<td>+23</td>
<td>1.16</td>
</tr>
<tr>
<td>+104</td>
<td>+40</td>
<td>1.24</td>
</tr>
<tr>
<td>+140</td>
<td>+50</td>
<td>1.24</td>
</tr>
<tr>
<td>+140</td>
<td>+60</td>
<td>1.24</td>
</tr>
</tbody>
</table>

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.
Thermal Overcurrent Circuit Breakers 2-6200/2-6400-...

Description

Single pole thermal circuit breakers with push-to-reset, tease-free, trip-free, snap action mechanism (R type TO CBE to EN 60934; M-type when fitted with manual release features/type 2-6200 only). Featuring auxiliary contacts (1 x N/C; 1 x N/O) as standard. Options include manual release (type 2-6200 only), an additional unprotected circuit tap (-A3) and a centre reset position in which all contacts are open (-ZR: type 2-6200-H only). Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Motors, transformers, solenoids, controls for oil and gas boilers.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Flange mounting, with auxiliary contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-6200</td>
<td></td>
</tr>
<tr>
<td>2-6400</td>
<td>Threadneck panel mounting, with auxiliary contacts</td>
</tr>
</tbody>
</table>

Mounting (type 2-6400 only)

| G1 | moulded threadneck 3/8-27UNS-2A |
| G2 | moulded threadneck M12x1 |

Terminal design - main circuit

| LT0 | solder terminals |
| P10 | blade terminals A6.3-0.8 mm (QC .250) |

Shunt terminal (optional)

| A3 | shunt terminal same as main terminal (up to 7/5 A max. load: up to 16 A/10 A max. load) |

Manual release (optional)

| H  | manual release facility (type 2-6200 only) |
| ZR | intermediate position (type 2-6200-H only) |
| Si | N/O and N/C contacts, solder terminals |

Current ratings

| 0.05...16 A |

Interlocking (UL 1077)

| 10 x In |

Degree of protection (IEC 60529/DIN 40050)

| operating area IP40 |
| terminal area IP00 |

Vibration

10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 6068-2-6, test Fc, 10 frequency cycles/axis

Shock

40 g (11 ms) to IEC 6068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist, to IEC 6068-2-11, test Ka

Humidity

240 hours at 95 % RH to IEC 6068-2-78, test Cab

Mass

approx. 25 g

Approval

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>CSA/ UL</td>
<td>AC 250 V; DC 28 V</td>
<td>0.05...16 A</td>
</tr>
</tbody>
</table>

For further details please see chapter: Technical Information

Voltage rating: AC 250 V; DC 28 V

Current rating range: 0.05...16 A

Auxiliary circuit: 1 A, AC 250 V/DC 28 V

Typical life: AC 250 V / DC 28 V: 5,000 operations at 2 x IN, inductive

Insulation co-ordination rated impulse withstand voltage: 2.5 kV

Dielectric strength: reinforced insulation in operating area

Voltage test: AC 3,000 V operating area to aux. circuit 4-5 to 6-7 AC 840 V

Insulation resistance: > 100 MΩ (DC 500 V)

Interrupting capacity: Icn 10 x IN

Degree of protection: operating area IP40

Mass: approx. 25 g

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>257</td>
<td>2</td>
<td>0.30</td>
</tr>
<tr>
<td>0.08</td>
<td>138</td>
<td>2.5</td>
<td>0.20</td>
</tr>
<tr>
<td>0.1</td>
<td>90</td>
<td>3</td>
<td>0.12</td>
</tr>
<tr>
<td>0.2</td>
<td>32.2</td>
<td>3.5</td>
<td>0.10</td>
</tr>
<tr>
<td>0.3</td>
<td>14.6</td>
<td>4</td>
<td>0.07</td>
</tr>
<tr>
<td>0.4</td>
<td>8.4</td>
<td>4.5</td>
<td>0.056</td>
</tr>
<tr>
<td>0.5</td>
<td>5.15</td>
<td>5</td>
<td>0.046</td>
</tr>
<tr>
<td>0.6</td>
<td>3.82</td>
<td>6</td>
<td>0.035</td>
</tr>
<tr>
<td>0.7</td>
<td>2.80</td>
<td>7</td>
<td>0.03</td>
</tr>
<tr>
<td>0.8</td>
<td>2.15</td>
<td>8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>1.42</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.2</td>
<td>0.96</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.51</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.8</td>
<td>0.40</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>
Typical time/current characteristics at +23 °C/+73.4 °F

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4</td>
<td>0.76</td>
</tr>
<tr>
<td>+14</td>
<td>0.84</td>
</tr>
<tr>
<td>+32</td>
<td>0.92</td>
</tr>
<tr>
<td>+73.4</td>
<td>1</td>
</tr>
<tr>
<td>+104</td>
<td>1.08</td>
</tr>
<tr>
<td>+122</td>
<td>1.16</td>
</tr>
<tr>
<td>+140</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Dimensions

2-6200-...

<table>
<thead>
<tr>
<th>Blade terminal DIN 46244-A6.3-0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
</tr>
<tr>
<td>OFF</td>
</tr>
<tr>
<td>intermediate position</td>
</tr>
</tbody>
</table>

Blade terminal DIN 46244-A6.3-0.8 (QC .250)

Blade terminal DIN 46244-A6.3-0.8 (QC .250)

Current rating in A

Mounting hole

Tightening torque max. 1 Nm

Tightening torque max. 1.5 Nm

Moulded threadneck

This is a metric design and millimeter dimensions take precedence (mm).
**Installation drawings**

**2-6200-...**

- Operating area
- Mounting area

---

**2-6400-...**

- Operating area
- Mounting area

---

**Terminal design**

- **P10** 0.05...7 A
  - See dimension diagram.

- **P10** 8...16 A

- **P10-A3** 0.05...16 A

- **L10** 0.05...7 A

- **L10** 8...16 A

- **L10-A3** 0.05...16 A

---

This is a metric design and millimeter dimensions take precedence (mm).
Accessories for type 2-6400-...

With 3/8” threadneck (+G1)

Water splash cover, transparent Y 300 538 01 and knurled nut Y 300 628 01
X 200 799 01 (IP64)

Water splash cover, transparent with special knurled nut
X 200 798 02 (IP64)

Hex nut with splash cover black without O ring
X 210 739 01 (IP64)
transparent splash cover
X 201 299 03 (IP64)

Separate hardware
Hex nut
Y 300 192 01

Knurled nut
Y 307 117 02

With M12 threadneck (+G2)

Hex nut with splash cover, black
X 201 206 01 without O ring (IP64)
X 200 801 03 with O ring (IP66 and IP67)

Hex nut with splash cover, transparent
X 200 801 08 with O ring (IP66 and IP67)

Water splash cover, transparent with knurled nut and O ring
X 210 663 01 (IP64)

Hex nut
Y 300 116 02

Knurled nut
Y 302 065 01

This is a metric design and millimeter dimensions take precedence (mm).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Bimetal operated single pole motor protection control with automatic reset actuation, small physical size, reliable snap-action mechanism.

Caution: In specifying this product, care should be taken to ensure that automatic motor re-start does not represent a safety hazard.

Typical applications

Motors, transformers, extra low voltage wiring.

Ordering information

Type No.
2-6500 surface type with flange
2-6500 - P10 - ... - 5 A ordering example

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>140</td>
<td>2</td>
<td>0.47</td>
</tr>
<tr>
<td>0.2</td>
<td>47.5</td>
<td>2.5</td>
<td>0.33</td>
</tr>
<tr>
<td>0.3</td>
<td>20.5</td>
<td>3</td>
<td>0.212</td>
</tr>
<tr>
<td>0.4</td>
<td>11.4</td>
<td>3.5</td>
<td>0.155</td>
</tr>
<tr>
<td>0.5</td>
<td>7.25</td>
<td>4</td>
<td>0.107</td>
</tr>
<tr>
<td>0.6</td>
<td>5.35</td>
<td>4.5</td>
<td>0.095</td>
</tr>
<tr>
<td>0.7</td>
<td>3.8</td>
<td>5</td>
<td>0.072</td>
</tr>
<tr>
<td>0.8</td>
<td>2.95</td>
<td>6</td>
<td>0.054</td>
</tr>
<tr>
<td>1</td>
<td>1.92</td>
<td>7</td>
<td>0.032</td>
</tr>
<tr>
<td>1.2</td>
<td>1.32</td>
<td>8</td>
<td>0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.85</td>
<td>9</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.8</td>
<td>0.59</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>AC 250 V; DC 28 V</td>
<td>0.1...10 A</td>
</tr>
</tbody>
</table>

Technical data

- Voltage rating: AC 250 V (50/60 Hz); DC 28 V
- Current ratings: 0.1...10 A (up to 15 A upon request)
- Typical life: 100,000 operations at 2 x \( I_n \)
- Protection is ensured for 18 days of continuous locked rotor condition with \( I_k \leq 6 \times I_n \), max. 30 A (unsupervised duty)
- Ambient temperature: -10...+60 °C (-10...+140 °F)
- Insulation co-ordination: rated impulse withstand voltage \( 2.5 \) kV; pollution degree 3
- Dielectric strength: test voltage AC \( 2,000 \) V
- Insulation resistance: > \( 100 \) MΩ (DC \( 500 \) V)
- Interrupting capacity: \( 8 \times I_n \) (co-co-co)
- Reset time at 23 °C: ≥ 30 sec, ≤ 70 sec
- Degree of protection: housing IP30; terminal area IP00
- Vibration: 5 g (57-500 Hz) ≤ 0.38 mm (10-57 Hz); 10 frequency cycles/axis
- Shock: 15 g (11 ms); test to IEC 60068-2-27, test Ea
- Corrosion: 48 hours at 5 % salt mist to IEC 60068-2-11, test Ka
- Humidity: 240 hours at 95 % RH to IEC 60068-2-78, test Cab
- Mass: approx. 20 g
**Dimensions**

![Internal connection diagram]

**Typical time/current characteristics at +23 °C/+73.4 °F**

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>+14</th>
<th>+32</th>
<th>+50</th>
<th>+73.4</th>
<th>+86</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-10</td>
<td>0</td>
<td>+10</td>
<td>+23</td>
<td>+30</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.84</td>
<td>0.92</td>
<td>1</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
<td></td>
</tr>
</tbody>
</table>

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single pole thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Featuring a narrow profile housing, recessed terminals, standard EN rail mounting, and precision CBE performance. Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Process control systems, instrumentation, rail vehicles.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>single pole, rail mounted version</td>
</tr>
<tr>
<td>201-WA</td>
<td>low-resistance version</td>
</tr>
</tbody>
</table>

- **Option**
  - 2705 fitted with adapter X 200 409 01

**Current ratings**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) 201</th>
<th>Internal resistance (Ω) 201-WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>447</td>
<td>211</td>
</tr>
<tr>
<td>0.1</td>
<td>131</td>
<td>48</td>
</tr>
<tr>
<td>0.2</td>
<td>40</td>
<td>12.4</td>
</tr>
<tr>
<td>0.3</td>
<td>19.3</td>
<td>5.7</td>
</tr>
<tr>
<td>0.4</td>
<td>10.4</td>
<td>3.1</td>
</tr>
<tr>
<td>0.5</td>
<td>7.1</td>
<td>2.0</td>
</tr>
<tr>
<td>0.6</td>
<td>4.3</td>
<td>1.32</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
<td>0.76</td>
</tr>
<tr>
<td>1.0</td>
<td>1.67</td>
<td>0.49</td>
</tr>
<tr>
<td>1.5</td>
<td>0.61</td>
<td>0.21</td>
</tr>
<tr>
<td>2.0</td>
<td>0.38</td>
<td>0.101</td>
</tr>
<tr>
<td>2.5</td>
<td>0.24</td>
<td>0.078</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) 201-WA</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>19.0</td>
</tr>
<tr>
<td>0.1</td>
<td>4.0</td>
</tr>
<tr>
<td>0.2</td>
<td>1.0</td>
</tr>
<tr>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>0.5</td>
<td>0.2</td>
</tr>
<tr>
<td>0.6</td>
<td>0.1</td>
</tr>
<tr>
<td>0.8</td>
<td>0.05</td>
</tr>
<tr>
<td>1.0</td>
<td>0.05</td>
</tr>
<tr>
<td>1.5</td>
<td>0.05</td>
</tr>
<tr>
<td>2.0</td>
<td>0.05</td>
</tr>
<tr>
<td>2.5</td>
<td>0.05</td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

**Technical data**

For further details please see chapter: Technical Information

- **Voltage rating**: AC 240 V (50/60 Hz); DC 65 V (UL: AC 250 V; DC 80 V)
- **Current rating range**: 201: 0.05...16 A
  - 201-WA: 0.05...10 A
- **Typical life**: 5,000 operations at 1 x \( I_{\text{IN}} \) inductive
  - 5,000 operations at 2 x \( I_{\text{IN}} \) resistive
- **Ambient temperature**: -30...+60 °C (-22...+140 °F)
- **Insulation co-ordination rated impulse withstand voltage**
  - (IEC 60664 and 60664 A)
    - 2.5 kV reinforced insulation in operating area
  - Degree of pollution
    - 2
- **Dielectric strength**
  - (IEC 60664 and 60664 A)
    - Operating area
      - AC 3,000 V
  - Insulation test voltage
    - AC 3,000 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity**
  - \( I_{\text{ON}} \)
    - 201: 0.05...0.8 A
    - 201-WA: 0.05...0.2 A
  - \( I_{\text{OFF}} \)
    - 201: 1...2 A
    - 201-WA: 0.3...2 A
  - Operating area
    - 2.5 A
  - Terminal area
    - 10 A
  - UL (1077)
    - 0.05...16 A
    - 0.05...16 A
    - AC 250 V
    - DC 80 V
  - 1,000 A
- **Degree of protection**
  - Operating area
    - IP40
  - Terminal area
    - IP20
- **Vibration**
  - 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)
- **Degree of protection**
  - (IEC 60529/DIN 40050)
    - Operating area
      - IP40
    - Terminal area
      - IP20
- **Shock**
  - 25 g (11 ms)
  - to IEC 60068-2-27, test E
- **Corrosion**
  - 96 hours at 5 % salt mist
  - to IEC 60068-2-11, test K
- **Humidity**
  - 240 hours at 95 % RH
  - to IEC 60068-2-78, test C
- **Mass**
  - approx. 60 g

**Approvals**

- **Authority**
  - VDE (EN 60 934)
  - CSA, UL
  - UL
- **Voltage ratings**
  - AC 240 V; DC 65 V
  - AC 250 V; DC 80 V
  - DC 65 V
- **Current ratings**
  - 0.05...16 A
  - 0.05...10 A
  - 0.05...25 A
Thermal-Magnetic Circuit Breaker 201/-WA

Dimensions

Installation drawing

Internal connection diagram

Typical time/current characteristics
**Busbar 1-pole, 90°**

* X 222 549 01

The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.

\[ I_{\text{max}} \text{- busbar 100 A (40°C)} \]

**Plug-on cap, 1-pole**

* Y 307 851 01

**Supply terminal**

* Y 308 551 01

Max. tightening torque of terminal screw 2 Nm

Max. cable cross section:
- 25 mm² / single strand
- 16 mm² / multistrand

with wire end ferrule

---

**Adapter for EN rail 50035-G32 specified as a separate item**

* X 200 409 01

**Connector bus links -K10**

* X 210 589 01/2.5 mm², (AWG 14) (black) up to 20 A max. load
* X 210 589 02/1.5 mm², (AWG 16) (brown) up to 13 A max. load

---

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
## Description

One, two and three pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934/IEC 934). Designed for panel or plug-in mounting. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling. Two and three pole models are internally linked to ensure that both/all poles trip in the event of an overload on one pole, even if the actuator is held in the ON position. A choice of characteristic curves further extends the range of applications possibilities for these CBEs. Special auxiliary contact versions for industrial atmosphere and low voltages (e.g. 5 V) available on request. Approved to CBE standard EN 60934 (IEC 60934). Suitable for use in distribution rails – see section 7.

## Typical applications

Process control equipment, robotics, machine tool control, communications systems, instrumentation, rail vehicles. Special versions, e.g. for aggressive environmental conditions and low voltages (e.g. 5 V) on request.

## Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2210</td>
<td>single or multipole thermal-magnetic circuit breaker</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Actuator design</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 toggle</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of poles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-pole protected</td>
</tr>
<tr>
<td>2-pole protected</td>
</tr>
<tr>
<td>3-pole protected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - without hardware</td>
</tr>
<tr>
<td>1 - with M3 thread</td>
</tr>
<tr>
<td>2 - with 6/32 thread</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal design (main contacts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 blade terminals 6.3-0.8 (QC 250)</td>
</tr>
<tr>
<td>F1 fast acting: therm. 1.01-1.4xIbn; magn. 3-6.5xIbn, DC (DC only)</td>
</tr>
<tr>
<td>F2 fast acting: therm. 1.01-1.4xIbn; magn. 6-12xIbn, AC; 7.8-15.6xIbn, DC</td>
</tr>
<tr>
<td>M1 standard delay: therm. 1.01-1.4xIbn; magn. 6-12xIbn, AC; 7.8-15.6xIbn, DC</td>
</tr>
<tr>
<td>T1 delayed: therm. 1.01-1.4xIbn; magn. 10-20xIbn, AC</td>
</tr>
<tr>
<td>T2 thermal only: 1.01-1.4xIbn</td>
</tr>
<tr>
<td>M3 standard delay, low resistance: therm. 1.4-1.8xIbn; magn. 6-12xIbn, AC; 7.8-15.6xIbn, DC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Intermediate position</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 - without intermediate position (standard)</td>
</tr>
<tr>
<td>2 - with intermediate position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary contacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - without auxiliary contacts</td>
</tr>
<tr>
<td>1 - with auxiliary contacts in all poles (only multipole devices)</td>
</tr>
<tr>
<td>3 - with auxiliary contacts in poles 1 and 3 (≥ 3-pole devices)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary contact function (see diagram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - one each N/C and N/O (standard)</td>
</tr>
<tr>
<td>2 - one N/O contact (23/24)</td>
</tr>
<tr>
<td>3 - one N/C contact (11/12)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary contact - terminal design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - same as main terminals</td>
</tr>
<tr>
<td>2 - same as main terminals</td>
</tr>
<tr>
<td>Current ratings</td>
</tr>
<tr>
<td>0.1...25 A</td>
</tr>
</tbody>
</table>

2210 - S 2 1 0 - P1 F1 - H 1 1 - 10 A ordering example

Remote trip coil available to special order.

## Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 250 V; 3 AC 433 V (50-60Hz); DC 65 V (UL: AC 277 V; DC 65 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating range</td>
<td>0.1...25 A for curves M1, T1, T2</td>
</tr>
<tr>
<td>Auxiliary circuit</td>
<td>1 A, AC 240 V/DC 65 V</td>
</tr>
<tr>
<td>Typical life</td>
<td>10,000 operations at 1 x Ibn, inductive</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30...+60 °C ( -22...+140 °F) T 60</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664 and 60664A)</td>
<td>rated impulse withstand voltage degree</td>
</tr>
<tr>
<td></td>
<td>2.5 kV 2</td>
</tr>
<tr>
<td></td>
<td>reinforced insulation in operating area</td>
</tr>
</tbody>
</table>

## For further details please see chapter: Technical Information

- **Voltage rating**
  - AC 250 V
  - AC 433 V (50-60Hz)
  - DC 65 V
  - UL: AC 277 V
  - DC 65 V

- **Current rating range**
  - 0.1...25 A for curves M1, T1, T2

- **Auxiliary circuit**
  - 1 A, AC 240 V/DC 65 V

- **Typical life**
  - 10,000 operations at 1 x Ibn, inductive

- **Ambient temperature**
  - -30...+60 °C ( -22...+140 °F) T 60

- **Insulation co-ordination (IEC 60664 and 60664A)**
  - Rated impulse withstand voltage degree
  - 2.5 kV
  - Reinforced insulation in operating area

## Technical data

### Dielectric strength

- **IEC 60664 and 60664A**
  - Test voltage
  - Operating area AC 3,000 V
  - Main/aux. circuit AC 1,500 V
  - Aux. circuit 11-12/23-24 AC 240 V

- **Insulation resistance**
  - > 100 MΩ

### Interrupting capacity

- **IEC 60664 and 60664A**
  - Operating area
  - AC 3,000 V
  - Main/aux. circuit
  - AC 1,500 V
  - Aux. circuit 11-12/23-24 AC 240 V

- **Insulation resistance**
  - > 100 MΩ (DC 500 V)

### Dielectric strength

- **IEC 60664 and 60664A**
  - Test voltage
  - Operating area AC 3,000 V
  - Main/aux. circuit AC 1,500 V
  - Aux. circuit 11-12/23-24 AC 240 V

### Insulation resistance

- > 100 MΩ (DC 500 V)

### Interrupting capacity (UL 1077)

- **IEC 60664 and 60664A**
  - Test voltage
  - Operating area AC 3,000 V
  - Main/aux. circuit AC 1,500 V

### Degree of protection (IEC 60529/DIN 40050)

- **Operating area**
  - IP30

### Vibration

- **IEC 60664 and 60664A**
  - Frequency cycles/axis
  - 10 g (11 ms), direction 6

### Shock

- **IEC 60664 and 60664A**
  - Frequency cycles/axis
  - 10 g (11 ms), direction 6

### Corrosion

- **IEC 60664 and 60664A**
  - 96 hours in 5 % salt mist

### Humidity

- **IEC 60664 and 60664A**
  - 240 hours at 95 % RH

### Temperature

- **IEC 60664 and 60664A**
  - Operating area
  - -30...+60 °C

### Mass

- Approx. 50 g per pole

---

2210 - S 2 1 0 - P1 F1 - H 1 1 - 10 A ordering example

Remote trip coil available to special order.

---

For further details please see chapter: Technical Information

- **Voltage rating**
  - AC 250 V
  - AC 433 V (50-60Hz)
  - DC 65 V

- **Current rating range**
  - 0.1...25 A for curves M1, T1, T2

- **Auxiliary circuit**
  - 1 A, AC 240 V/DC 65 V

- **Typical life**
  - 10,000 operations at 1 x Ibn, inductive

- **Ambient temperature**
  - -30...+60 °C ( -22...+140 °F) T 60

- **Insulation co-ordination (IEC 60664 and 60664A)**
  - Rated impulse withstand voltage degree
  - 2.5 kV
  - Reinforced insulation in operating area

- **Dielectric strength**
  - (IEC 60664 and 60664A)
  - Test voltage
  - Operating area
  - Main/aux. circuit
  - Aux. circuit

- **Insulation resistance**
  - > 100 MΩ

- **Interrupting capacity (UL 1077)**
  - For curves M1, M3, T1, T2: 25 g (11 ms), directions 1, 2, 3, 4, 5

- **Degree of protection (IEC 60529/DIN 40050)**
  - Operating area

- **Vibration**
  - (IEC 60664 and 60664A)
  - Frequency cycles/axis
  - 10 g (11 ms), direction 6

- **Shock**
  - (IEC 60664 and 60664A)
  - Frequency cycles/axis
  - 10 g (11 ms), direction 6

- **Corrosion**
  - (IEC 60664 and 60664A)
  - 96 hours in 5 % salt mist

- **Humidity**
  - (IEC 60664 and 60664A)
  - 240 hours at 95 % RH

- **Temperature**
  - (IEC 60664 and 60664A)
  - Operating area

- **Mass**
  - Approx. 50 g per pole

---

For further details please see chapter: Technical Information
Thermal-Magnetic Circuit Breaker 2210-S2..

### Dimensions

- **Cut-out dimensions**

- **Installation drawing**

### Approvals

- **Authority**
  - GL, VDE (EN 60934)
  - UL, CSA

- **Voltage ratings**
  - AC 250 V; DC 65 V;
  - AC 277 V; DC 65 V;
  - AC 433 V; AC 277/480 V

- **Current ratings**
  - 0.1...25 A

### Toggle positions

- **OFF position**
- **intermediate position**
- **ON position**

### Shock directions

- **Operating area (reinforced insulation)**
- **Mounting area (standard insulation)**

### Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>M1 standard delay for AC + DC</th>
<th>T1 delayed for AC + DC</th>
<th>M3 standard delay for AC + DC</th>
<th>T2 thermal for AC + DC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F1 fast acting for DC only</td>
<td>F2 fast acting for AC + DC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.1</td>
<td>162</td>
<td>162</td>
<td>92</td>
<td>81</td>
<td>42</td>
</tr>
<tr>
<td>0.2</td>
<td>39.3</td>
<td>39.3</td>
<td>26.1</td>
<td>24.2</td>
<td>11.7</td>
</tr>
<tr>
<td>0.3</td>
<td>17.5</td>
<td>17.5</td>
<td>11.6</td>
<td>10.4</td>
<td>5.6</td>
</tr>
<tr>
<td>0.4</td>
<td>9.2</td>
<td>9.2</td>
<td>6.6</td>
<td>6.0</td>
<td>2.9</td>
</tr>
<tr>
<td>0.5</td>
<td>6.8</td>
<td>6.8</td>
<td>4.1</td>
<td>3.9</td>
<td>1.75</td>
</tr>
<tr>
<td>0.6</td>
<td>4.2</td>
<td>4.2</td>
<td>3</td>
<td>2.7</td>
<td>1.42</td>
</tr>
<tr>
<td>0.8</td>
<td>2.8</td>
<td>2.8</td>
<td>1.65</td>
<td>1.53</td>
<td>0.75</td>
</tr>
<tr>
<td>1</td>
<td>1.6</td>
<td>1.6</td>
<td>1.10</td>
<td>0.98</td>
<td>0.5</td>
</tr>
<tr>
<td>1.5</td>
<td>0.78</td>
<td>0.78</td>
<td>0.47</td>
<td>0.42</td>
<td>0.22</td>
</tr>
<tr>
<td>2</td>
<td>0.42</td>
<td>0.42</td>
<td>0.28</td>
<td>0.24</td>
<td>0.136</td>
</tr>
<tr>
<td>2.5</td>
<td>0.26</td>
<td>0.26</td>
<td>0.183</td>
<td>0.17</td>
<td>0.083</td>
</tr>
<tr>
<td>3</td>
<td>0.18</td>
<td>0.18</td>
<td>0.124</td>
<td>0.12</td>
<td>0.057</td>
</tr>
<tr>
<td>4</td>
<td>0.12</td>
<td>0.12</td>
<td>0.077</td>
<td>0.073</td>
<td>0.041</td>
</tr>
<tr>
<td>5</td>
<td>0.092</td>
<td>0.092</td>
<td>0.063</td>
<td>0.055</td>
<td>0.032</td>
</tr>
<tr>
<td>6</td>
<td>0.054</td>
<td>0.054</td>
<td>0.045</td>
<td>0.039</td>
<td>0.021</td>
</tr>
<tr>
<td>8</td>
<td>0.025</td>
<td>0.025</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>10</td>
<td>0.022</td>
<td>0.022</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>12</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>16</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>20</td>
<td>-</td>
<td>-</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>25</td>
<td>-</td>
<td>-</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
</tbody>
</table>

### Current Internal resistance (Ω)

<table>
<thead>
<tr>
<th>Current (A)</th>
<th>Fast Acting</th>
<th>Standard Delay</th>
<th>Thermal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>1.9</td>
<td>1.2</td>
<td>1.9</td>
</tr>
<tr>
<td>0.2</td>
<td>3.9</td>
<td>2.5</td>
<td>3.9</td>
</tr>
<tr>
<td>0.3</td>
<td>5.9</td>
<td>4.0</td>
<td>5.9</td>
</tr>
<tr>
<td>0.4</td>
<td>7.9</td>
<td>5.5</td>
<td>7.9</td>
</tr>
<tr>
<td>0.5</td>
<td>9.9</td>
<td>6.9</td>
<td>9.9</td>
</tr>
<tr>
<td>0.6</td>
<td>11.9</td>
<td>7.9</td>
<td>11.9</td>
</tr>
<tr>
<td>0.8</td>
<td>13.9</td>
<td>8.9</td>
<td>13.9</td>
</tr>
<tr>
<td>1</td>
<td>15.9</td>
<td>9.9</td>
<td>15.9</td>
</tr>
<tr>
<td>1.5</td>
<td>17.9</td>
<td>10.9</td>
<td>17.9</td>
</tr>
<tr>
<td>2</td>
<td>19.9</td>
<td>11.9</td>
<td>19.9</td>
</tr>
<tr>
<td>2.5</td>
<td>21.9</td>
<td>12.9</td>
<td>21.9</td>
</tr>
<tr>
<td>3</td>
<td>23.9</td>
<td>13.9</td>
<td>23.9</td>
</tr>
<tr>
<td>4</td>
<td>25.9</td>
<td>14.9</td>
<td>25.9</td>
</tr>
<tr>
<td>5</td>
<td>27.9</td>
<td>15.9</td>
<td>27.9</td>
</tr>
<tr>
<td>6</td>
<td>29.9</td>
<td>16.9</td>
<td>29.9</td>
</tr>
<tr>
<td>8</td>
<td>31.9</td>
<td>18.9</td>
<td>31.9</td>
</tr>
<tr>
<td>10</td>
<td>33.9</td>
<td>19.9</td>
<td>33.9</td>
</tr>
<tr>
<td>12</td>
<td>35.9</td>
<td>20.9</td>
<td>35.9</td>
</tr>
<tr>
<td>16</td>
<td>37.9</td>
<td>21.9</td>
<td>37.9</td>
</tr>
<tr>
<td>20</td>
<td>39.9</td>
<td>22.9</td>
<td>39.9</td>
</tr>
<tr>
<td>25</td>
<td>40.9</td>
<td>23.9</td>
<td>40.9</td>
</tr>
</tbody>
</table>
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °C</th>
<th>-30</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+23</th>
<th>+30</th>
<th>+40</th>
<th>+50</th>
<th>+60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Derating factor</td>
<td>0.76</td>
<td>0.79</td>
<td>0.83</td>
<td>0.88</td>
<td>1</td>
<td>1.04</td>
<td>1.11</td>
<td>1.19</td>
<td>1.29</td>
</tr>
</tbody>
</table>

Multipole devices: all poles symmetrically loaded. With single pole overload, thermal tripping will be at max. 1.7 x I_n with curves F1, F2, M1 and T2, and at max. 2.2 x I_n with curve M3.

1) Magnetic tripping currents are increased by 30% on DC supplies.
Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

### Ambient temperature

<table>
<thead>
<tr>
<th>°F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>-30</td>
<td>0.76</td>
</tr>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.79</td>
</tr>
<tr>
<td>+14</td>
<td>0</td>
<td>0.83</td>
</tr>
<tr>
<td>+32</td>
<td>+23</td>
<td>0.88</td>
</tr>
<tr>
<td>+73.4</td>
<td>+30</td>
<td>1.04</td>
</tr>
<tr>
<td>+160</td>
<td>+40</td>
<td>1.11</td>
</tr>
<tr>
<td>+180</td>
<td>+50</td>
<td>1.19</td>
</tr>
<tr>
<td>+200</td>
<td>+60</td>
<td>1.29</td>
</tr>
</tbody>
</table>

### Multi pole devices

All poles symmetrically loaded. With single pole overload, the thermal tripping will be at max. 1.7 x I_N with curves F1, F2, M1 and T2, and at max. 2.2 x I_N with curve M3.

1) Magnetic tripping currents are increased by 30% on DC supplies (curves M1, M3, T1).
### Accessories

**Connector bus links -P10**
- X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

**Splash cover (transparent)**
- with fixing plate and screws (IP54)
  - for type 2210-S211-... (1-pole)
  - X 211 117 02

**Splash cover (transparent)**
- with fixing plate and screws (IP54)
  - for type 2210-S221-... (2-pole) and type 2210-S231-... (3-pole)
  - X 211 118 01

**Toggle guard for 1-pole units, black**
- X 221 617 01

For front panel mounting.

---

This is a metric design and millimeter dimensions take precedence (\textsuperscript{mm})\textsuperscript{in}

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Description**

Single pole thermal-magnetic circuit breaker with trip-free mechanism and toggle actuation. Two-chamber construction with cascade contact arrangement to provide high voltage DC capability and high switching performance. Designed for plug-in mounting in distribution rail X2210-S0606J (see section 7) or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005. Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Communications systems, power supplies, process control equipment.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2210</td>
<td>thermal-magnetic circuit breaker, toggle operated</td>
</tr>
<tr>
<td>S291</td>
<td>socket or panel mounting with M3 thread</td>
</tr>
<tr>
<td>P9</td>
<td>blade terminals, for distribution rails X2210-S.. and X2210-K..</td>
</tr>
<tr>
<td>M2</td>
<td>medium delay</td>
</tr>
<tr>
<td>410033</td>
<td>single pole with two chambers (one chamber protected only), 1 break contact Si1</td>
</tr>
</tbody>
</table>

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.10</td>
</tr>
<tr>
<td>2</td>
<td>0.25</td>
</tr>
<tr>
<td>3</td>
<td>0.13</td>
</tr>
<tr>
<td>4</td>
<td>0.07</td>
</tr>
<tr>
<td>6</td>
<td>0.04</td>
</tr>
<tr>
<td>8</td>
<td>0.02</td>
</tr>
<tr>
<td>10</td>
<td>0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>25*</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

*80% Iν continuous load

**Technical data**

- **Voltage rating**: AC 250 V; DC 65 V
- **Current rating range**: 1...25 A
- **Auxiliary circuit**: 1 A, AC 240 V/DC 65 V
- **Typical life**: > 10,000 operations at 1 x Iν > 20,000 operations mechanical
- **Ambient temperature**: -30°C...+60 °C (-22...+140 °F)
- **Insulation co-ordination rated impulse withstand voltage**: 2.5 kV
- **Rated impulse withstand voltage**: 2
- **Pollution degree**: reinforced insulation in operating area
- **Rated test voltage**: operating area AC 3,000 V, main to aux. circuit AC 1,500 V
- **Interrupting capacity Icn**: AC 250 V 1,000 A cos ϕ = 0.8 DC 65 V 2,000 A L/R = 4 ms
- **Degree of protection**: operating area IP30, terminal area IP00
- **Vibration**: 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 60668-2-6, test Fc 10 frequency cycles/axis
- **Shock**: 25 g (11ms) directions 1, 2, 3, 4, 5 20 g (11 ms) direction 6 to IEC 6068-2-27, test Ea
- **Corrosion**: 96 hours in 5 % salt mist to IEC 6068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH to IEC 6068-2-78, test Cab
- **Mass**: approx. 80 g

**Approvals**

- **Authority**: GL, VDE (EN 60934)
- **Voltage ratings**: AC 250 V; DC 65 V
- **Current ratings**: 1...25 A

---

**Ordering example**: 2210-S291-P9M2-410033-...A

**Issue B**

www.e-t-a.com

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal-Magnetic Circuit Breaker 2210-S291-P9M2-410033-...A

Dimensions

![Dimension Diagram](image1)

- **Dimensions**: All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Internal connection diagrams

![Internal Connection Diagram](image2)

- **Internal Connection Diagrams**: See page 2 - 21.

Shock directions

![Shock Directions](image3)

- **Shock Directions**: See page 2 - 21.

Installation drawing

![Installation Drawing](image4)

- **Installation Drawing**: See page 2 - 21.

Typical time/current characteristics

- **Typical Time/Current Characteristics**: See page 2 - 21.

This is a metric design and millimeter dimensions take precedence (mm).
Description

Single pole thermal-magnetic circuit breaker with trip-free mechanism and toggle actuation. Two-chamber construction with cascade contact arrangement to provide high voltage DC capability and high switching performance. Designed for plug-in mounting in distribution rail X2210-S0606J (see section 7) or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Communications systems, power supplies, process control equipment.

Ordering information

Type No. 2210-S291-P9M2-410005-10A

Mounting
S291 socket or panel mounting with M3 thread

Terminal design
P9 blade terminals, for distribution rails X2210-S, and X2210-K.

Characteristic curve
M2 medium delay

Style
410005 single pole with two chambers (protected), 1 break contact Si1

Technical data

Voltage rating AC 250 V; DC 65 V
Current rating range 0.4…25 A
Auxiliary circuit 1 A, AC 240 V/DC 65 V
Typical life > 10,000 operations at 1 x IN, > 20,000 operations mechanical
Ambient temperature -30°C...+60 °C (-22...+140 °F)

Insulation co-ordination withstand voltage degree
IEC 60664 and 60664A 2.5 kV 2
IEC reinforced insulation in operating area

Dielectric strength (IEC 60664 and 60664A) test voltage
Operating area AC 3,000 V
Main to aux. circuit AC 1,500 V

Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity Icn
AC 250 V cosϕ = 0.8
0.4…1 A self-limiting
1.6…25 A 2,000 A
DC 65 V L/R = 4 ms
0.4…4 A self-limiting
6…25 A 3,500 A

Degree of protection (IEC 60529/DIN 40050) operating area IP30

Vibration 5 g (5-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock 25 g (11ms) directions 1, 2, 3, 4, 5
20 g (11 ms) direction 6
to IEC 60068-2-27, test Ea

Corrosion 96 hours in 5 % salt mist
to IEC 60068-2-11, test Ka

Humidity 240 hours at 95 % RH
to IEC 60668-2-78, test Cab

Mass approx. 80 g

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.4</td>
<td>6.87</td>
<td>6</td>
<td>0.09</td>
</tr>
<tr>
<td>0.65</td>
<td>2.96</td>
<td>8</td>
<td>0.03</td>
</tr>
<tr>
<td>1</td>
<td>1.84</td>
<td>10</td>
<td>0.03</td>
</tr>
<tr>
<td>1.6</td>
<td>0.75</td>
<td>12</td>
<td>0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.50</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.35</td>
<td>20*</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.25</td>
<td>25*</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>4</td>
<td>0.15</td>
<td>*80 % IN continuous load</td>
<td></td>
</tr>
</tbody>
</table>

Approvals

Authority Voltage ratings Current ratings
GL, VDE (EN 60934) AC 250 V; DC 65 V 0.4…25A
## Selective back-up fuses

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>Interrupting capacity</th>
<th>Selective to</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>NH fuse rating</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 V DC</td>
<td>3,500 A</td>
<td>35 A ≤ 6 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 A ≤ 12 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63 A ≤ 20 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80 A ≤ 25 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 A ≤ 25 A</td>
</tr>
<tr>
<td>250 V AC</td>
<td>2,000 A</td>
<td>35 A ≤ 3 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 A ≤ 8 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>63 A ≤ 20 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>80 A ≤ 25 A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 A ≤ 25 A</td>
</tr>
</tbody>
</table>

NH fuse according to VDE 0636, part 21 (IEC 269)
NH fuse = low voltage power fuse
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>0.4 ... 6 A</th>
<th>0.4 ... 6 A</th>
<th>8 ... 25 A</th>
<th>8 ... 25 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>-30</td>
<td>0.76</td>
<td>0.79</td>
<td>0.76</td>
<td>0.79</td>
</tr>
<tr>
<td>-4</td>
<td>-20</td>
<td>0.83</td>
<td>0.86</td>
<td>0.83</td>
<td>0.86</td>
</tr>
<tr>
<td>+4</td>
<td>+14</td>
<td>1</td>
<td>1.04</td>
<td>1</td>
<td>1.04</td>
</tr>
<tr>
<td>+14</td>
<td>+32</td>
<td>0.88</td>
<td>1.11</td>
<td>0.88</td>
<td>1.11</td>
</tr>
<tr>
<td>+23</td>
<td>+40</td>
<td>1.19</td>
<td>1.19</td>
<td>1.19</td>
<td>1.19</td>
</tr>
<tr>
<td>+30</td>
<td>+50</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
</tr>
<tr>
<td>+73.4</td>
<td>+86</td>
<td>1.11</td>
<td>1.11</td>
<td>1.11</td>
<td>1.11</td>
</tr>
<tr>
<td>+140</td>
<td>+104</td>
<td>1.19</td>
<td>1.19</td>
<td>1.19</td>
<td>1.19</td>
</tr>
<tr>
<td>+140</td>
<td>+122</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
</tr>
<tr>
<td>+140</td>
<td>+140</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
<td>1.29</td>
</tr>
</tbody>
</table>
Thermal-Magnetic Circuit Breaker 2210-S291-P9M2-410005-...A

Accessories

Mounting sockets 23-P10-Si-202005

63-P10-Si-202005

Distribution rail X2210-S06..., see section 7.

This is a metric design and millimeter dimensions take precedence (inch).
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

One, two and three pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934/IEC 934). Featuring a combi-foot design for both symmetric and asymmetric rail mounting. Available with auxiliary contact (1 x N/O or 1 x N/C) for status signalling. Two and three pole models are internally linked to ensure that both/all poles trip in the event of an overload on one pole, even if the actuator is held in the ON position. This CBE can be supplied in current ratings up to 32 A with a choice of characteristic curves. All screw terminals are recessed for safety. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Process control equipment, robotics, machine tool control, communications systems, instrumentation.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>single and multipole thermal-magnetic circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>2210</td>
<td></td>
</tr>
</tbody>
</table>

Mounting

<table>
<thead>
<tr>
<th>Rail mounting</th>
<th>2 toggle</th>
</tr>
</thead>
</table>

Number of poles

<table>
<thead>
<tr>
<th>Single pole protected</th>
<th>2-pole protected</th>
<th>3-pole protected</th>
<th>2-pole, protected on one pole only</th>
</tr>
</thead>
</table>

Accessories

<table>
<thead>
<tr>
<th>Terminal design (main contacts)</th>
<th>0 without accessories</th>
</tr>
</thead>
</table>

Characteristic curve

| F1 fast acting: therm. 1.01-1.4xI₀, magn. 2-4xI₀ DC (DC only) |
| F2 fast acting: therm. 1.01-1.4xI₀, magn. 3.5-6.5xI₀ AC, 4.5-8.5xI₀ DC |
| M1 standard delay: therm. 1.01-1.4xI₀, magn. 6-12xI₀ AC, 7.8-15.6xI₀ DC |
| T1 delayed: therm. 1.01-1.4xI₀, magn. 10-20xI₀ AC |
| T2 thermal only, 1.01-1.4xI₀ |
| M3 standard delay, low resistance: therm. 1.4-1.8xI₀, magn. 6-12xI₀ AC, 7.8-15.6xI₀ DC |

Auxiliary contact design

| 0 without intermediate position |
| 1 with auxiliary contacts |
| 2 auxiliary contacts on pole 1 only (multipole devices) |
| 3 auxiliary contacts on pole 1 and 3 (3-pole devices) |

Auxiliary contact function (see diagrams)

| 2 N/O contact |
| 3 N/C contact |

Auxiliary contact - terminal design

| 1 screw terminals |

Current ratings

| 0...10 A |

Technical data

For further details please see chapter: Technical Information

Voltage rating

- AC 250 V; 3 AC 433 V (50/60 Hz); DC 65 V (UL: AC 277/480 V; DC 65 V)
- Current rating range: 0.1...32 A for curves M1, T1, T2
- Auxiliary circuit: 1 A, AC 240 V / DC 65 V

Typical life

- 3 AC 433 V; AC 250 V: 0.1...25 A, 10,000 operations at 1 x Iₜₜ, inductive
- DC 65 V: 0.1...32 A, 10,000 operations at 1 x Iₜₜ, resistive

Ambient temperature

- -30...+60 °C (-22...+140 °F) T 60

Dielectric strength

- (IEC 60664 and 60664A) test voltage
  - main/aux. circuit: AC 3,000 V
  - pole/pole: AC 1,500 V
- (UL 1077) test voltage
  - 1- + 2-pole AC 277 V / 5,000 A
  - 3-pole AC 480 V / 5,000 A
  - AC 200 A / DC 400 A

Degree of protection

- (IEC 60529/DIN 40050) operating area IP30
- (IEC 60068-2-11, test Ka)

Vibration

- (IEC 60068-2-6, test Fc)
  - 2 g (57-500 Hz), ± 0.23 mm (10-57 Hz)
  - 20 g (57-500 Hz), ± 0.38 mm (10-57 Hz)

Shock

- (IEC 60068-2-27, test Ea)
  - 20 g (57-500 Hz), ± 0.23 mm (10-57 Hz)
  - 80 g (57-500 Hz), ± 0.38 mm (10-57 Hz)

Corrosion

- 96 hours at 5 % salt mist (IEC 60068-2-11, test Ka)

Humidity

- 240 hours at 95 % RH (IEC 60068-2-78, test Cab)

Mass

- approx. 60 g per pole

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>GL, VDE (EN 60934)</td>
<td>3 AC 433 V; AC 250 V; DC 65 V</td>
<td>0.1...32 A</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>3 AC 480 V; AC 277 V; AC 277/480 V; DC 65 V</td>
<td>0.1...32 A</td>
</tr>
</tbody>
</table>
### Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>F1 fast acting for DC only</th>
<th>F2 fast acting delay for AC + DC</th>
<th>M1 standard delay for AC + DC</th>
<th>M3 standard delay for AC + DC</th>
<th>T1 delayed thermal for AC + DC</th>
<th>T2 thermal for AC + DC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>162</td>
<td>162</td>
<td>92</td>
<td>81</td>
<td>42</td>
<td>77</td>
<td></td>
</tr>
<tr>
<td>0.2</td>
<td>39.3</td>
<td>39.3</td>
<td>26.1</td>
<td>24.2</td>
<td>11.7</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>17.5</td>
<td>17.5</td>
<td>11.6</td>
<td>10.4</td>
<td>5.6</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>0.4</td>
<td>9.2</td>
<td>9.2</td>
<td>6.6</td>
<td>6.0</td>
<td>2.9</td>
<td>5.7</td>
<td></td>
</tr>
<tr>
<td>0.5</td>
<td>6.8</td>
<td>6.8</td>
<td>4.1</td>
<td>3.9</td>
<td>1.75</td>
<td>3.7</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>4.2</td>
<td>4.2</td>
<td>3</td>
<td>2.7</td>
<td>1.42</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>0.8</td>
<td>2.8</td>
<td>2.8</td>
<td>1.65</td>
<td>1.53</td>
<td>0.75</td>
<td>1.39</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1.6</td>
<td>1.6</td>
<td>1.10</td>
<td>0.98</td>
<td>0.5</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>1.5</td>
<td>0.78</td>
<td>0.78</td>
<td>0.47</td>
<td>0.42</td>
<td>0.22</td>
<td>0.36</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.42</td>
<td>0.42</td>
<td>0.28</td>
<td>0.24</td>
<td>0.136</td>
<td>0.19</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>0.26</td>
<td>0.26</td>
<td>0.183</td>
<td>0.17</td>
<td>0.083</td>
<td>0.141</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>0.18</td>
<td>0.18</td>
<td>0.124</td>
<td>0.12</td>
<td>0.057</td>
<td>0.091</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>0.12</td>
<td>0.12</td>
<td>0.077</td>
<td>0.073</td>
<td>0.041</td>
<td>0.051</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.092</td>
<td>0.092</td>
<td>0.063</td>
<td>0.055</td>
<td>0.032</td>
<td>0.040</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>0.054</td>
<td>0.054</td>
<td>0.045</td>
<td>0.039</td>
<td>0.021</td>
<td>0.027</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>0.025</td>
<td>0.025</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>0.022</td>
<td>0.022</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>-</td>
<td>-</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>-</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>-</td>
<td>-</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>-</td>
<td>≤ 0.02</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>-</td>
<td>-</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>-</td>
<td>≤ 0.02</td>
<td></td>
</tr>
</tbody>
</table>

### Dimensions

- **G-profile EN 50032**
- **Symmetric rail EN 50022-35×15/1.5**
- **Main contact terminal max. 6 mm² (AWG 10) (rigid conductor)**
- **Tightening torque 0.5 Nm**
- **Slot fitting labels from Phoenix Weidmüller**
- **Si-terminal M3 max. 1.5 mm² (AWG 16) (rigid conductor)**
- **Tightening torque 0.5 Nm**

### Installation drawing

- **Operating area (reinforced insulation)**
- **Mounting area**

This is a metric design and millimeter dimensions take precedence (mm) inch.
Thermal-Magnetic Circuit Breaker 2210-T2...

Internal connection diagrams

Typical time/current characteristics

-Magnetic tripping currents are increased by 30% on DC supplies.
Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature

<table>
<thead>
<tr>
<th>°C</th>
<th>-30</th>
<th>-20</th>
<th>-10</th>
<th>0</th>
<th>+23</th>
<th>+40</th>
<th>+50</th>
<th>+60</th>
</tr>
</thead>
<tbody>
<tr>
<td>°F</td>
<td>-22</td>
<td>-4</td>
<td>+14</td>
<td>+32</td>
<td>+73,4</td>
<td>+104</td>
<td>+122</td>
<td>+140</td>
</tr>
</tbody>
</table>

Derating factor

| Derating factor | 0.76 | 0.79 | 0.83 | 0.88 | 1   | 1.04 | 1.11 | 1.19 | 1.29 |

Multi pole devices: all poles symmetrically loaded. With single pole overload, thermal tripping will be at max. 1.7 x I_N with curves F1, F2, M1 and T2, and at max. 2.2 x I_N with curve M3.

1) Magnetic tripping currents are increased by 30% on DC supplies.
**Busbar 1-pole, 90°**

**X 222 540 01**

The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.

**I_{max}** – busbar 100 A (40°C)

---

**Busbar 1-pole**

**Y 308 498 01**

**I_{max}** – busbar 100 A (40°C)

---

**Busbar 2-pole**

**Y 308 499 01**

**I_{max}** – busbar 100 A (40°C)

---

**Busbar 3-pole**

**Y 308 500 01**

**I_{max}** – busbar 100 A (40°C)

---

**Supply terminal**

**Y 308 503 01**

**I_{max} 63 A with 1-pole busbar,**

**50 A with multipole busbar**

Max. tightening torque of terminal screw 2 Nm

Max. cable cross section: 25 mm² / single strand

16 mm² / multistrand with wire end ferrule

---

**Caution:**

When using multipole busbars please leave at least one pole’s width between two adjacent line entry terminals.

---

This is a metric design and millimeter dimensions take precedence (inches)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Thermal-Magnetic Circuit Breaker 2215-L.../G...

Description

Miniaturised single pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934). Two designs provide the option of either printed circuit board or threadneck panel mounting. A separate shunt tap terminal and auxiliary contacts are available. Fast acting, medium or long delay characteristics can be specified for both models.

Suitable for use in distribution rails – see section 7.

Complies with CBE standard EN 60934 (IEC 60935).

Typical applications

Control equipment, communications systems, instrumentation. Suitable for mounting on Euro cards.

Ordering information

Type No.
2215 - single pole thermal-magnetic circuit breaker

Mounting
G1 threadneck panel mounting
L1 PCB mounting

Number of poles
1 - 1-pole protected

Mounting hardware
0 - without accessories
1 - 2 hex nuts 1/4"-20 UNS-2A, serrated washer, location pin (-G1 only)

Terminal design (main contacts)
P1 blade terminals 6.3-0.8, without shunt terminal
B1 blade terminals 6.3-0.8, with shunt terminal
L1 solder pins, without shunt terminal
M1 solder pins, with shunt terminal

Characteristic curve
F1 fast acting: 1.01-1.4xI_
M1 standard delay: therm. 1.01-1.4xI_
magn. 4.5-10.5xI_
T1 delayed: therm. 1.01-1.4xI_
magn. 8.1-17xI_
T3 delayed: therm. 1.01-1.4xI_
magn. 13-20xI_

Auxiliary contacts
S0 without auxiliary contact
S1 with auxiliary contact (change over)

Auxiliary contact - terminal design
1 blade terminals 6.3x0.8 (QC .250)
2 solder pins

Current ratings
Current ratings (A) Internal resistance (Ω) Current ratings (A) Internal resistance (Ω)
0.05 440 1.5 0.55
0.1 108 2 0.34
0.2 29.9 2.5 0.21
0.3 14.2 3 0.15
0.4 7.9 4 0.084
0.5 5.0 5 0.057
0.6 3.5 6 0.043
0.8 1.8 8 ≤ 0.02
1 1.2 10 ≤ 0.02

Standard current ratings and typical internal resistance values

Voltage rating AC 250 V (50/60 Hz); DC 50 V
Current rating range 0.05...10 A (higher current ratings to special order)
Auxiliary circuit 1 A, AC 250 V/DC 28 V
Typical life 10,000 operations at 1 x I_
Ambient temperature -30...+60 °C (-22...+140 °F)
Insulation co-ordination rated impulse withstand voltage reinforced insulation in operating area

Dielectric strength IEC 60664 and 60664A test voltage
operating area AC 3,000 V
main/aux. circuit AC 1,500 V

Interrupting capacity (UL 1077)
I_n 300 A

Degree of protection (IEC 60529/DIN 40050) operating area IP30
terminal area IP00

Vibration
curve F1: 6 g (57-500 Hz), ± 0.46 mm (10-57 Hz)
curves M1, T1, T3: 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)

Shock
curves F1, M1, T1, T3: 30 g (11 ms), directions 1, 2, 3, 4, 5,
curve F1: 10 g (11 ms), direction 6
curves M1, T1, T3: 15 g (11 ms), direction 6
to IEC 60689-2-27, test Ea

Corrosion
96 hours at 5 % salt mist to IEC 60068-2-11, test Ka

Humidity
240 hours at 95 % RH to IEC 60068-2-78, test Cab

Mass
approx. 25 g

Approvals

Authority Voltage ratings Current ratings
UL AC 250 V 0.05...10 A
DC 75 V 0.05...20 A
CSA AC 250 V; DC 48 V 0.05...10 A

Compatible with Euro cards. Suitable for partitions in rail systems.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal-Magnetic Circuit Breaker 2215-L.../G...

Dimensions 2215-L1..

Installation drawing

Dimensions 2215-G1..

Internal connection diagram

Shock directions

This is a metric design and millimeter dimensions take precedence (mm) inch.
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 - Technical information.

Ambient temperature °F °C
-22 -30 -10 +10 +30 +50 +104 +122 +140
-4 -20 0 +14 +32 +73.4 +86 +104 +122 +140

Derating factor:
-0.76 0.79 0.83 0.88 0.93 1 1.04 1.11 1.19 1.29

0.05...10 A:

The typical time/current characteristics are shown in the diagrams. The time in seconds is plotted against the current in amperes. The diagrams show the trip time for different current levels and ambient temperatures.

Note: Magnetic tripping currents are increased by 30% on DC supplies (curve M1 and T1).
Typical time/current characteristics

Magnetic tripping currents are increased by 30% on DC supplies.
**Description**

Miniaturised two pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934). Fitted with panel mounting flange and push-on termination, also suitable for mounting on Euro Cards. Available with auxiliary contacts and a choice of fast, medium or long delay characteristics. Complies with CBE standard EN 60934 (IEC 60934).

**Typical applications**

Control equipment, communications systems, instrumentation.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>2215</th>
<th>double pole thermal-magnetic circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>F1</td>
<td>flange mounting, with M3 mounting thread</td>
</tr>
<tr>
<td>Number of poles</td>
<td>2</td>
<td>2-pole protected</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2-pole, protected on one pole only</td>
</tr>
<tr>
<td>Accessories</td>
<td>0</td>
<td>without</td>
</tr>
<tr>
<td>Terminal design (main contacts)</td>
<td></td>
<td>without shunt terminal</td>
</tr>
<tr>
<td>P1</td>
<td>blade terminals 6.3x0.8mm (QC .250)</td>
<td></td>
</tr>
</tbody>
</table>

**Characteristic curve**

- F1: fast acting: 1.01-1.4xIth; magn. 2-4xIth DC (DC only)
- M1: standard delay: therm. 1.01-1.4xIth; magn. 4.5-10.5xIth DC; magn. 3.5-8xIth AC
- T1: delayed: therm. 1.01-1.4xIth; magn. 8-17xIth DC; magn. 6-13xIth AC
- T3: delayed: therm. 1.01-1.4xIth; magn. 13-20xIth DC; magn. 9.5-15.5xIth AC

**Auxiliary contacts**

- S0: without auxiliary contacts
- S1: with auxiliary contacts (change over)
- S2: with auxiliary contact on pole 1 only

**Auxiliary contact - terminal design**

- 1 blade terminals 6.3x0.8

**Current ratings**

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05...10 A</td>
<td></td>
</tr>
</tbody>
</table>

---

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>440</td>
</tr>
<tr>
<td>0.1</td>
<td>108</td>
</tr>
<tr>
<td>0.2</td>
<td>29.9</td>
</tr>
<tr>
<td>0.3</td>
<td>14.2</td>
</tr>
<tr>
<td>0.4</td>
<td>7.9</td>
</tr>
<tr>
<td>0.5</td>
<td>5.0</td>
</tr>
<tr>
<td>0.6</td>
<td>3.5</td>
</tr>
<tr>
<td>0.8</td>
<td>1.8</td>
</tr>
<tr>
<td>1</td>
<td>1.2</td>
</tr>
</tbody>
</table>

---

**Voltage rating**

- AC 250 V (50/60 Hz); DC 50 V
- (UL: AC 250 V; DC 75 V)
- (higher DC voltage to special order)

**Current rating range**

- 0.05...10 A

**Auxiliary circuit**

- 1 A, AC 250 V/DC 28 V resistive load

**Typical life**

- 10,000 operations at 1 x Ith

**Ambient temperature**

- -30...+60 °C (-22...+140 °F)

**Insulation co-ordination**

- Rated impulse withstand voltage 2.5 kV
- Pollution degree 2
- Reinforced insulation in operating area

**Dielectric strength**

- (IEC 60664 and 60664A)
- Test voltage
  - operating area: 3,000 V AC
  - pole/pole: 1,500 V AC
  - main/aux. circuit: 1,500 V AC

**Insulation resistance**

- > 100 MΩ (DC 500 V)

**Interrupting capacity Icn**

- 600 A

**Degree of protection**

- Operating area: IP30
- Terminal area: IP00

**Vibration**

- Curve F1: 6 g (57-500 Hz), ± 0.46 mm (10-57 Hz)
- Curves M1, T1, T3: 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz)

**Shock**

- Curves F1, M1, T1, T3: 30 g (11 ms), directions 1, 2, 3, 4, 5
- Curve F1: 10 g (11 ms), direction 6
- Curve M1, T1, T3: 15 g (11 ms), direction 6

**Corrosion**

- 96 hours at 5 % salt mist

**Humidity**

- 240 hours at 95 % RH

**Mass**

- Approx. 50 g

---

**Ordering example**

2215 - F1  0  - P1  F1 - S1  1 - 0.5  A

---

**Technical data**

---

**Control equipment, communications systems, instrumentation.**
Thermal-Magnetic Circuit Breaker 2215-F1...

Dimensions 2215-F1...

Internal connection diagram

Shock directions

Installation drawing

This is a metric design and millimeter dimensions take precedence (mm) over inch.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Typical time/current characteristics

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 - Technical information.

0.05...10 A:

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-22</th>
<th>-14</th>
<th>-10</th>
<th>0</th>
<th>+23</th>
<th>+30</th>
<th>+40</th>
<th>+50</th>
<th>+60</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+10</td>
<td>+23</td>
<td>+30</td>
<td>+40</td>
<td>+50</td>
</tr>
</tbody>
</table>

Derating factor: 0.76 0.79 0.83 0.88 0.93 1 1.04 1.11 1.19 1.29

† Magnetic tripping currents are increased by 30% on DC supplies (curve M1 and T1).
Typical time/current characteristics

Magnetic tripping currents are increased by 30% on DC supplies.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single or two pole rocker switch/thermal-magnetic circuit breaker with trip-free mechanism (S-type TM CBE to EN 60934). The addition of a magnetic tripping module to the type 3120 range described in catalogue section 1 extends the choices available to include single pole with thermal-magnetic protection; double pole switching with thermal-magnetic protection on one pole, thermal protection on the other; double pole switching with thermal-magnetic protection on one pole only. All are offered with rocker switch or push button control - two buttons for ON/OFF or one button press-to-reset only, in designs to suit one of three different panel cut-out sizes. Illumination is optional. Approved to CBE standard EN 60934 (IEC 60934).

Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

Typical applications

Motors, machine tools, office equipment, appliances.

Technical data

For further details please see chapter: Technical Information

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V (50/60 Hz); DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...16 A</td>
</tr>
</tbody>
</table>

Typical life

1-pole

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V</th>
<th>DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...20 A</td>
<td>0.1...4 A</td>
</tr>
<tr>
<td></td>
<td>4.5...16 A</td>
<td>4.5...20 A</td>
</tr>
</tbody>
</table>

2-pole

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V</th>
<th>DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...16 A</td>
<td>0.1...16 A</td>
</tr>
<tr>
<td></td>
<td>17...20 A</td>
<td>17...20 A</td>
</tr>
</tbody>
</table>

Ambient temperature

-30...+60 °C (-22...+140 °F)

Insulation co-ordination

rated impulse withstand voltage degree

2.5 kV reinforced insulation in operating area

Dielectric strength

test voltage

AC 3,000 V

AC 1,500 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity

<table>
<thead>
<tr>
<th>I&lt;sub&gt;on&lt;/sub&gt;</th>
<th>0.1...2 A</th>
<th>0.25...16 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>UN</td>
<td>100 x I&lt;sub&gt;n&lt;/sub&gt;</td>
<td>250 A 2-pole</td>
</tr>
<tr>
<td>I&lt;sub&gt;n&lt;/sub&gt;</td>
<td>150 A 1-pole</td>
<td></td>
</tr>
</tbody>
</table>

Interrupting capacity (UL 1077)

<table>
<thead>
<tr>
<th>I&lt;sub&gt;n&lt;/sub&gt;</th>
<th>U&lt;sub&gt;n&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1...4 A</td>
<td>AC 250 V</td>
</tr>
<tr>
<td>5...10 A</td>
<td>AC 250 V</td>
</tr>
<tr>
<td>12...14 A</td>
<td>AC 125 V</td>
</tr>
</tbody>
</table>

Degree of protection

operating area IP40

(water splash protection IP54)

terminal area IP00

Vibration

8 g (57-500 Hz) ≤ 0.61 mm (10-57 Hz) to IEC 6068-2-6, test Fc

10 frequency cycles/axis

Shock

30 g (11 ms) to IEC 6068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist to IEC 60068-2-11, test Ka

Humidity

240 hours at 95 % RH to IEC 60068-2-78, test Cab

Mass

approx. 53 g (2-pole)

approx. 50 g (1-pole)
The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.
Mounting frame variants

**Mounting style F3.3 with rocker collar height 9 mm (.354 in.)**

**Mounting style F3.4 with rocker collar height 2 mm (.079 in.), with water splash protection**

**Mounting style F3.F-...-S... with 2 push buttons**

**Mounting style F3.G-...-D... with 1 push button**

For mounting styles -F2., -F5., -F6., please see section 1.

This is a metric design and millimeter dimensions take precedence (mm) over inch (in).

**Dimensions**

- **Mounting style -F3.1**, with rocker - Collar height 1 mm

- **Mounting style -F3.2**, with rocker - Collar height 2 mm (.079 in.), with water splash protection

- **Mounting style -F3.3**, with rocker - Collar height 9 mm (.354 in.)

**Cut-out dimensions**

- **Cut-out for mounting style -F3 with rocker and push button**

- **Cut-out for mounting style -F6 with rocker**

- **Cut-out for mounting style -F5 with rocker**

**Installation drawing**

- Required safety distances for rocker and push button

  When installing the circuit breaker apply pressure on bezel only. operating area

  When in OFF position optional illumination in ON position

**Cut-out thickness**

- Panel thickness: mm 1.2 ±.01, 1.6 ±.02, 2.4 ±.03 inch .047-.047, .063-.063, .094-.094

- Dimension “A” mm 45 ±.01, 46 ±.01, 46 ±.01 inch 1.77-.177, 1.77-.177, 1.77-.177

Edges of working parts: ISO 13715

This is a metric design and millimeter dimensions take precedence (mm) over inch (in).
Internal connection diagrams

Therm.-magn. protection on one pole thermally protected on the other pole

Typical time/current characteristics at +23°C/+73.4°F

Single or double pole load

0.1 ... 2 A

AC/DC °

2.5 ... 16 A

AC/DC °

† Magnetic tripping currents are increased by 25% on DC supplies.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F -22 0 40 60 80 100
°C -30 0 30 60 90 120

Derating factor 0.8 0.76 0.74 0.72 0.7 0.68

Accessories

Insulated cover

Y 303 068 01

Spacer for 3120-F3...

Y 303 675 01/02

Spacer for 3120-F5...

Y 303 676 01

Blanking piece in -F3... size mounting frame

Y 303 885 31

Separate water splash cover, transparent (IP66) for use with -F5... size mounting frames

X 221 619 01

This is a metric design and millimeter dimensions take precedence. **(mm)** *inch*
Description

Single or two pole rocker switch/thermal-magnetic circuit breaker with trip-free mechanism (S-type TM CBE to EN 60934). The addition of a magnetic tripping module to the type 3120 range described in catalogue section 1 extends the choices available to include single pole with thermal-magnetic protection; double pole switching with thermal-magnetic protection on one pole, thermal protection on the other; double pole switching with thermal-magnetic protection on one pole only. All are offered with rocker switch actuation. Illumination is optional.

Approved to CBE standard EN 60934 (IEC 60934).
Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

Typical applications

Motors, machine tools, office equipment, appliances.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance per pole (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>thermal-magn.</td>
</tr>
<tr>
<td>0.1</td>
<td>165</td>
</tr>
<tr>
<td>0.2</td>
<td>42.5</td>
</tr>
<tr>
<td>0.3</td>
<td>20.2</td>
</tr>
<tr>
<td>0.4</td>
<td>9.7</td>
</tr>
<tr>
<td>0.5</td>
<td>7.17</td>
</tr>
<tr>
<td>0.6</td>
<td>4.9</td>
</tr>
<tr>
<td>0.8</td>
<td>2.65</td>
</tr>
<tr>
<td>1</td>
<td>1.49</td>
</tr>
<tr>
<td>1.2</td>
<td>1.25</td>
</tr>
<tr>
<td>1.5</td>
<td>0.74</td>
</tr>
<tr>
<td>2</td>
<td>0.49</td>
</tr>
<tr>
<td>2.5</td>
<td>0.20</td>
</tr>
<tr>
<td>3</td>
<td>0.14</td>
</tr>
<tr>
<td>3.5</td>
<td>0.114</td>
</tr>
<tr>
<td>4</td>
<td>0.092</td>
</tr>
<tr>
<td>5</td>
<td>0.06</td>
</tr>
<tr>
<td>6</td>
<td>0.043</td>
</tr>
<tr>
<td>7</td>
<td>0.030</td>
</tr>
<tr>
<td>8</td>
<td>0.029</td>
</tr>
<tr>
<td>10</td>
<td>0.021</td>
</tr>
<tr>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V, 50/60 Hz; DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.1...16 A</td>
</tr>
</tbody>
</table>

Typical life

1-pole

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V</th>
<th>DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1...20 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
<tr>
<td>0.1...4 A</td>
<td>30,000 operations at 1 x I N, resistive</td>
<td></td>
</tr>
<tr>
<td>4.5...16 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
<tr>
<td>4.5...20 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
</tbody>
</table>

2-pole

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 240 V</th>
<th>DC 50 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1...16 A</td>
<td>50,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
<tr>
<td>17...20 A</td>
<td>30,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
<tr>
<td>17...20 A</td>
<td>10,000 operations at 1 x I N, inductive</td>
<td></td>
</tr>
</tbody>
</table>

Ambient temperature

-30...+60 °C (-22...+140 °F)

Insulation co-ordination

Rated impulse withstand voltage: 2.5 kV
Reinforced insulation in operating area

Dielectric strength

Test voltage: AC 3,000 V
AC 1,500 V

Insulation resistance

> 100 MΩ (DC 500 V)

Interrupting capacity

I N: 0.1...2 A, 100 x I N
2.5...16 A, 250 A 2-pole, 150 A 1-pole

Degree of protection

IP40 (IEC 60529/DIN 40050) (with water splash protection IP54)

Vibration

8 g (57-500 Hz) ± 0.61 mm (10-57 Hz)
to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock

30 g (11 ms)
to IEC 60068-2-27, test Ea

Corrosion

96 hours at 5 % salt mist
to IEC 60068-2-11, test Ka

Humidity

240 hours at 95 % RH
to IEC 60068-2-78, test Cab

Mass

 approx. 53 g (2-pole)
approx. 50 g (1-pole)

Illumination voltage / Power consumption

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>2.2 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>2.2 mA</td>
</tr>
</tbody>
</table>

Illumination voltage / Power consumption

<table>
<thead>
<tr>
<th>Operating voltage</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>12 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>24 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>48 V</td>
<td>4.9 mA</td>
</tr>
<tr>
<td>115 V</td>
<td>2.2 mA</td>
</tr>
<tr>
<td>230 V</td>
<td>2.2 mA</td>
</tr>
</tbody>
</table>
Ordering information

| Type       | 3120  
|------------|------
| Type       | rocker switch/circuit breaker 
| Mounting   | F
| Mounting   | snap-in frame 
| Size of frame | panel thickness 
| 7          | to fit in cut-out 44.5 x 22 mm 
| Number of poles | 1-pole, thermal-magnetic protection 
| Number of poles | 2-pole, thermal-magnetic protection on one pole, thermally protected on the other pole 
| Number of poles | 2-pole, thermal-magnetic protection on one pole, unprotected on the other pole 
| Number of poles | 
| Mounting frame design | 
| N          | new design, grey 
| P          | snap-on actuator guard grey 
| Q          | snap-on splash cover grey 
| S          | snap-on actuator guard black 
| T          | snap-on splash cover black 
| Terminal configuration | 
| P7         | blade terminals 2x2.8-0.8 mm (QC 2x.110) 
|           | (terminals 12(k), 22(k), 11, 21) 
| H7         | 12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 
|           | 11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8 (QC 2x.110) 
| N7         | as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110) 
| G7         | as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110) 
| Characteristic curve | 
| M1         | standard delay, therm. 1.01-1.4 x Ibc, magn. 4.9 x Ib AC 
| Betätigungselement | 
| A          | Switch style 
| Switch colour designation | OPAQUE  
|           | TRANSLUCENT (for illuminated versions) 
| 20 blue    | 30 blue 
| 26 sky blue| 36 sky blue 
| Rocker markings | 
| Q          | permanently raised marking 
| Rocker illumination | 
| T          | LED, blue 
| illumination voltage range (= operating voltage) | 
| 0          | 4 - 7 V 
| 1          | 10 - 14 V 
| 2          | 20 - 28 V 
| 3          | 30 - 40 V 
| 4          | 150 - 275 V 
| 5          | 42 - 54 V AC/DC 
| Current ratings | 0.1...16 A 
| Approvals | 
| Authority  | Voltage ratings | Current ratings 
| VDE (EN 60934) | AC 240 V; DC 28 V | 0.1...16 A 
|           | DC 50 V         | 0.1...16 A 
|           | DC 100 V        | 0.1...16 A 
| CSA, UL   | AC 250 V        | 0.1...10 A 
|           | AC 125 V        | 0.1...16 A 
| CCC       | AC 250 V; DC 50 V | 0.1...20 A 
| Internal connection diagrams | 
| Typical time/current characteristics at +23°C/+73.4°F | 
| Single or double pole load | 0.1 ... 2 A 
| 2.5 ... 16 A | AC/DC 

1) Magnetic tripping currents are increased by 25% on DC supplies.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>Derating factor</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>0.8</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-30</td>
<td>0.76</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-20</td>
<td>0.84</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>0</td>
<td>0.92</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1</td>
<td>1.08</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.2</td>
<td>1.16</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.4</td>
<td>1.24</td>
<td>0.01...16 A</td>
</tr>
</tbody>
</table>

† The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>Derating factor</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>0.8</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-30</td>
<td>0.76</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-20</td>
<td>0.84</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>0</td>
<td>0.92</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1</td>
<td>1.08</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.2</td>
<td>1.16</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.4</td>
<td>1.24</td>
<td>0.01...16 A</td>
</tr>
</tbody>
</table>

†† The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>Derating factor</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>0.8</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-30</td>
<td>0.76</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-20</td>
<td>0.84</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>0</td>
<td>0.92</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1</td>
<td>1.08</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.2</td>
<td>1.16</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.4</td>
<td>1.24</td>
<td>0.01...16 A</td>
</tr>
</tbody>
</table>

††† The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>Derating factor</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>0.8</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-30</td>
<td>0.76</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>-20</td>
<td>0.84</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>0</td>
<td>0.92</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1</td>
<td>1.08</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.2</td>
<td>1.16</td>
<td>0.01...16 A</td>
</tr>
<tr>
<td>1.4</td>
<td>1.24</td>
<td>0.01...16 A</td>
</tr>
</tbody>
</table>
Dimensions


blade terminals DIN 46244-C-Ms-S
(QC 2 x .110)
fat head screw ISO1580 M3.5x5-MS
tightening torque max. 0.8 Nm

Mounting style -F7.P and -F7.S

blade terminals DIN 46244-C-Ms-S
(QC 2 x .110)
flat head screw ISO1580 M3.5x5-MS
tightening torque max. 0.8 Nm

Mounting style -F7.Q and -F7.T

blade terminals DIN 46244-C-Ms-S
(QC 2 x .110)
flat head screw ISO1580 M3.5x5-MS
tightening torque max. 0.8 Nm

Installation drawing

When installing the circuit breaker apply pressure on bezel only.

Cut-out dimensions

This is a metric design and millimeter dimensions take precedence (mm) inch
**Accessories**

**Insulated cover**
Y 303 068 01

**Spacer for 3120-F7...**
Y 303 676 01

**Translucent water splash cover (IP54)**
X 222 143 01
Consisting of:
- Y 307 097 01 snap-on frame with actuator guard
- Y 307 096 01 soft plastic cover

**Snap-on frame with actuator guard (can be snapped on as switch-on protection or switch-off protection)**
Y 307 097 01

---

This is a metric design and millimeter dimensions take precedence (mm) inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description


Typical applications

Control equipment, extra-low voltage wiring systems and components.

Ordering information

Type No.
3200 plug-in

Current ratings
0.05...25 A

3200 - 5 A ordering example

Standard current ratings and typical internal resistances

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>534</td>
<td>4</td>
<td>0.141</td>
</tr>
<tr>
<td>0.1</td>
<td>149</td>
<td>5</td>
<td>0.107</td>
</tr>
<tr>
<td>0.2</td>
<td>56</td>
<td>6</td>
<td>0.060</td>
</tr>
<tr>
<td>0.3</td>
<td>24.2</td>
<td>7</td>
<td>0.049</td>
</tr>
<tr>
<td>0.4</td>
<td>13.6</td>
<td>8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.5</td>
<td>8.1</td>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.6</td>
<td>5.25</td>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>3.55</td>
<td>14</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1</td>
<td>2.02</td>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.90</td>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.51</td>
<td>18</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.36</td>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.23</td>
<td>25</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

Approvals

Authority | Voltage ratings | Current ratings |
-----------|-----------------|-----------------|
VDE (EN 60934) | AC 240 V; DC 28 V | 0.05...25 A |
CSA        | AC 250 V; DC 28 V | 0.05...15 A |

Technical data

For further details please see chapter: Technical Information

Voltage rating AC 240 V, 50/60 Hz; DC 28 V
Current ratings 0.05...25 A
Typical life 500 operations at 1 x I_{nu} inductive
4,000 operations at 1 x I_{nu} resistive
Ambient temperature -30...+60 °C (-22...+140 °F)
Insulation co-ordination (IEC 60664 and 60664 A)
rated impulse withstand voltage 2.5 kV
pollution degree reinforced insulation in operating area 2
Dielectric strength (IEC 60664 and 60664A)
test voltage AC 3,000 V double insulation
Insulation resistance > 100 MΩ (DC 500 V)
Interrupting capacity I_{on} 0.05...0.8 A self-limiting
1...2 A 200 A
2.5...25 A 400 A
Degree of protection (IEC 60529/DIN 40050)
operating area IP40
terminal area IP00
Vibration 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 6068-2-6, test Fc
10 frequency cycles/axis
Shock 25 g (11 ma) to IEC 6068-2-27, test Ea
Corrosion 96 hours at 5 % salt mist to IEC 6068-2-11, test Ka
Humidity 240 hours at 95 % RH to IEC 6068-2-78, test Cab
Mass approx. 50 g
**Thermal-Magnetic Overcurrent Circuit Breaker 3200**

**Dimensions**

- **Dimensions**
  - OFF: 1.69 in. \(\times\) 19.748 in. \(\times\) 19.748 in.
  - ON: 1.69 in. \(\times\) 19.748 in. \(\times\) 19.748 in.
  - Ø9.5: 374 in.
  - Ø13: 512 in.

**Installation drawing**

- **Operating area (reinforced insulation)**

**Internal connection diagram**

- **Line 1**

---

**Typical time/current characteristics**

- **0.05 ... 7 A AC/DC**
  - Trip time in seconds
  - Times rated current

- **8 ... 16 A AC/DC**
  - Trip time in seconds
  - Times rated current

- **18 ... 25 A AC/DC**
  - Trip time in seconds
  - Times rated current

---

This is a metric design and millimeter dimensions take precedence (mm) inch.

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>0.76</td>
</tr>
<tr>
<td>-30</td>
<td>0.79</td>
</tr>
<tr>
<td>-4</td>
<td>0.83</td>
</tr>
<tr>
<td>0</td>
<td>0.88</td>
</tr>
<tr>
<td>+14</td>
<td>1</td>
</tr>
<tr>
<td>+32</td>
<td>+104</td>
</tr>
<tr>
<td>+40</td>
<td>+122</td>
</tr>
<tr>
<td>+50</td>
<td>+140</td>
</tr>
</tbody>
</table>

---

0 Magnetic tripping currents are increased by 20% on DC supplies.
Accessories

**Sockets 10R-K10**
- Blade terminal: DIN 46244-A6.3-0.8 (QC .250)
- Wire cross sectional areas:
  - 2 x max. 2.5 mm² (AWG 14) stranded
  - 2 x max. 4 mm² (AWG 12) solid

**10R-P10**
- Blade terminal: DIN 46244-A6.3-0.8 (QC .250)
- Wire cross sectional areas:
  - 2 x max. 2.5 mm² (AWG 14) stranded
  - 2 x max. 4 mm² (AWG 12) solid

**10R-A10**
- Blade terminal: DIN 46244-A6.3-0.8 (QC .250)
- Wire cross sectional areas:
  - 2 x max. 2.5 mm² (AWG 14) stranded
  - 2 x max. 4 mm² (AWG 12) solid

**Bus bars for sockets 10...** (up to 20 A max. load)
- Y 301 166 02, 2-way
- Y 301 166 01, 4-way

**Socket 16**
- (up to 16 A max. load)

**Adapter**
- for socket 16
- X 200 409 01
- for track mounting to EN 50035-G32 (G profile) on request

**Blanking plug**
- Y 301 477 01
- for sockets 10R-P10/K10/A10

**Terminal for mounting rack**
- DIN/EN 50 035-G32
- X 200 800 01
- for sockets 10R

**Connector bus links - K10**
- X 210 589 01/ 2.5 mm², (AWG 14) (black) up to 20 A max. load
- X 210 589 02/ 1.5 mm², (AWG 16) (brown) up to 13 A max. load
- for sockets 10R-P10, 10R-A10 and 16

**Connector bus links - P10**
- X 210 588 01/ 1.5 mm², (AWG 16) (brown) up to 13 A max. load
- X 210 588 02/ 2.5 mm², (AWG 14) (black) up to 20 A max. load
- X 210 588 03/ 2.5 mm², (AWG 14) (red) up to 20 A max. load
- X 210 588 04/ 2.5 mm², (AWG 14) (blue) up to 20 A max. load
- for sockets 10R-P10, 10R-A10

This is a metric design and millimeter dimensions take precedence (mm).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole thermal-magnetic circuit breakers with tease-free, trip-free, press-to-reset, snap action mechanism (R-type TM CBE to EN 60934; M-type with manual release (-H). Available with fast acting and standard magnetic tripping characteristics - types 3300 and 3400 - both with threadneck panel mounting. Options include auxiliary contacts, a separate shunt tap terminal (-A3), and pull-to-trip manual release (-H). Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>3300</th>
<th>fast acting</th>
</tr>
</thead>
<tbody>
<tr>
<td>3400</td>
<td>standard delay</td>
<td></td>
</tr>
</tbody>
</table>

- **Mounting**
  - iG2 moulded threadneck M12x1 (bulk-shipped), not with -H;
  - leave blank for metal threadneck, required for -H

- **Terminal design**
  - P10 blade terminals 6.3-0.8 (QC -250)
  - K20 screw terminals M3.5x5.5 with clamp (not for -Si and -A3)

- **Shunt terminal (optional)**
  - A3 same as main terminals, up to I_{N}=7 A max. load 5 A
  - H manual release facility (pull), without reinforced insulation in operating area, for M12x1 metal threadneck only. Metal threadneck version for -H is not approved.
  - Auxiliary contacts (optional)
    - Si with silver-plated solder terminals (N/O and N/C)

- **Push button marking (optional)**
  - T without
  - Current ratings
    - 0.05...16 A

- **3400 - iG2 - P10 - .. - .. - Si - .. - 10 A** ordering example, without manual release and with moulded threadneck

- **3400 - ... - P10 - .. - H - Si - .. - 10 A** ordering example, with manual release and metal threadneck

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance (Ω) 3300</th>
<th>Internal resistance (Ω) 3400</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>447</td>
<td>211</td>
</tr>
<tr>
<td>0.1</td>
<td>131</td>
<td>131</td>
</tr>
<tr>
<td>0.2</td>
<td>41</td>
<td>40</td>
</tr>
<tr>
<td>0.3</td>
<td>19.6</td>
<td>19.3</td>
</tr>
<tr>
<td>0.4</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>0.5</td>
<td>7.2</td>
<td>7.1</td>
</tr>
<tr>
<td>0.6</td>
<td>4.8</td>
<td>4.3</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
<td>2.5</td>
</tr>
<tr>
<td>1</td>
<td>1.93</td>
<td>1.67</td>
</tr>
<tr>
<td>1.5</td>
<td>0.81</td>
<td>0.61</td>
</tr>
<tr>
<td>2</td>
<td>0.44</td>
<td>0.38</td>
</tr>
<tr>
<td>2.5</td>
<td>0.27</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

- **Voltage rating**
  - AC 240 V, 50/60 Hz; DC 65 V
  - (UL: AC 250 V; DC 80 V)

- **Current ratings**
  - 0.05...16 A

- **Auxiliary circuit**
  - 1 A, AC 240 V / DC 65 V

- **Typical life**
  - with -H: 5,000 operations at 1 x I_N, inductive
  - 5,000 operations at 2 x I_N, resistive
  - without -H: 0.05...8 A
  - > 8 A
  - 1,500 operations at 2 x I_N, inductive

- **Ambient temperature**
  - -30...+60 °C (-22...+140 °F)

- **Insulation resistance**
  - 0.05...16 A
  - AC 240 V / DC 65 V
  - 1 A, AC 250 V / DC 80 V

- **Interruption capacity**
  - I_{ON} 0.05...0.8 A self-limiting
  - 1...2 A
  - 200 A
  - 2.5...16 A
  - 400 A

- **Degree of protection**
  - operating area IP40
  - terminal area IP00

- **Vibration**
  - 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)

- **Shock**
  - 25 g (11 ms) to IEC 60686-2-27, test Ea

- **Humidity**
  - 240 hours at 95 % RH, to IEC 60068-2-78, test Cab

- **Mass**
  - 3300: approx. 55 g
  - 3400: approx. 50 g

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V; DC 65 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>CSA, UL</td>
<td>AC 250 V; DC 80 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>UL: only type 3400</td>
<td>DC 65 V</td>
<td>0.05...25 A</td>
</tr>
</tbody>
</table>
### Dimensions

- **-iG2-P10**
  - M12x1 tightening torque max. 1.5 Nm
  - Blade terminals DIN 46244-A6.3-0.8 (QC .250)

- **-H**
  - Ø6.4
  - M12x1
  - Mounting holes

- **-Pi2-P10**
  - Ø6.4
  - M12x1
  - Mounting holes

- **-P10-A3**
  - Ø12.2 ±0.1
  - M12x1

- **-P10-Si**
  - Ø12.2 ±0.1

- **-K20**
  - Ø3.5
  - M3.5x5.5 ISO 1207 tightening torque max. 0.8 Nm

### Internal connection diagrams

- Line 1
- Line 2
- Line 3

- Line 4
- Line 5
- Line 6

- Line 7

With shunt terminal (-A3) and auxiliary contacts (-Si)

### Terminal design

- Blade terminals DIN 46244-A6.3-0.8 (QC .250)

### Installation drawing

- Operating area (reinforced insulation)
- Mounting area

This is a metric design and millimeter dimensions take precedence (mm).
**Typical time/current characteristics**

### Type 3300 0.05 ... 7 A AC/DC

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trip Time in Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>+60°C (+140°F)</td>
<td>10000</td>
</tr>
<tr>
<td>+23°C (+73.4°F)</td>
<td>1000</td>
</tr>
<tr>
<td>-30°C (-22°F)</td>
<td>10</td>
</tr>
</tbody>
</table>

### Type 3400 0.05 ... 7 A AC/DC

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trip Time in Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>+60°C (+140°F)</td>
<td>10000</td>
</tr>
<tr>
<td>+23°C (+73.4°F)</td>
<td>1000</td>
</tr>
<tr>
<td>-30°C (-22°F)</td>
<td>10</td>
</tr>
</tbody>
</table>

### Type 3300 8 ... 16 A AC/DC

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trip Time in Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>+60°C (+140°F)</td>
<td>10000</td>
</tr>
<tr>
<td>+23°C (+73.4°F)</td>
<td>1000</td>
</tr>
<tr>
<td>-30°C (-22°F)</td>
<td>10</td>
</tr>
</tbody>
</table>

### Type 3400 8 ... 16 A AC/DC

<table>
<thead>
<tr>
<th>Condition</th>
<th>Trip Time in Seconds</th>
</tr>
</thead>
<tbody>
<tr>
<td>+60°C (+140°F)</td>
<td>10000</td>
</tr>
<tr>
<td>+23°C (+73.4°F)</td>
<td>1000</td>
</tr>
<tr>
<td>-30°C (-22°F)</td>
<td>10</td>
</tr>
</tbody>
</table>

1) Magnetic tripping currents are increased by 20% on DC supplies.

### Accessories

#### For push buttons with M12 moulded threadneck (-iG2)

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 201 296 01</td>
<td>Black (IP64)</td>
</tr>
<tr>
<td>X 200 801 08</td>
<td>Transparent, with knurled nut (IP66 and IP67)</td>
</tr>
</tbody>
</table>

#### Water splash cover

- Black (IP64)
- Transparent (IP66 and IP67)

<table>
<thead>
<tr>
<th>Water splash cover</th>
<th>Product Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 210 663 01</td>
<td>(IP64)</td>
</tr>
</tbody>
</table>

The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient Temperature °F</th>
<th>Derating Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>0.76</td>
</tr>
<tr>
<td>-4</td>
<td>0.79</td>
</tr>
<tr>
<td>+14</td>
<td>0.83</td>
</tr>
<tr>
<td>+32</td>
<td>0.90</td>
</tr>
<tr>
<td>+73.4</td>
<td>1</td>
</tr>
<tr>
<td>+104</td>
<td>1.08</td>
</tr>
<tr>
<td>+122</td>
<td>1.16</td>
</tr>
<tr>
<td>+140</td>
<td>1.24</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole thermal-magnetic circuit breaker with a trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Featuring a flange for panel mounting, and optional auxiliary contacts and unprotected shunt tap terminal. Type 4000 offers lower internal resistance values and is fitted as standard with auxiliary contacts and an intermediate reset position in which all contacts are isolated. Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics, communications systems.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>standard version</th>
<th>low resistance version</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mounting (optional)

- **F11**: flange with additional M3 insertion nuts
- **P10**: blade terminals 6.3-0.8 (QC 250), tinned
- **K20**: screw terminals M3x5.5 with clamp (not with -Si or type 4000)

### Shunt terminal (optional)

- **A3**: same as main terminals (up to \( I_n = 7 \text{ A, max. load 5 A} \))
- **ZR-Si**: auxiliary contacts with intermediate position (standard with type 4000)

<table>
<thead>
<tr>
<th>Current ratings</th>
<th>0.05...16 A (type 3500)</th>
<th>0.05...10 A (type 4000)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

### Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500</td>
<td>4000</td>
</tr>
<tr>
<td>0.05</td>
<td>447</td>
</tr>
<tr>
<td>0.1</td>
<td>131</td>
</tr>
<tr>
<td>0.2</td>
<td>40.1</td>
</tr>
<tr>
<td>0.3</td>
<td>19.3</td>
</tr>
<tr>
<td>0.4</td>
<td>10.4</td>
</tr>
<tr>
<td>0.5</td>
<td>7.1</td>
</tr>
<tr>
<td>0.6</td>
<td>4.3</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.67</td>
</tr>
<tr>
<td>1.5</td>
<td>0.61</td>
</tr>
<tr>
<td>2.0</td>
<td>0.38</td>
</tr>
<tr>
<td>2.5</td>
<td>0.24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500</td>
<td>4000</td>
</tr>
<tr>
<td>0.05</td>
<td>211</td>
</tr>
<tr>
<td>0.1</td>
<td>48</td>
</tr>
<tr>
<td>0.2</td>
<td>12.4</td>
</tr>
<tr>
<td>0.3</td>
<td>5.4</td>
</tr>
<tr>
<td>0.4</td>
<td>3.1</td>
</tr>
<tr>
<td>0.5</td>
<td>2.0</td>
</tr>
<tr>
<td>0.6</td>
<td>1.32</td>
</tr>
<tr>
<td>0.8</td>
<td>0.76</td>
</tr>
<tr>
<td>1.0</td>
<td>0.49</td>
</tr>
<tr>
<td>1.5</td>
<td>0.21</td>
</tr>
<tr>
<td>2.0</td>
<td>0.101</td>
</tr>
<tr>
<td>2.5</td>
<td>0.078</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

### Voltage rating

<table>
<thead>
<tr>
<th>AC 240 V</th>
<th>50/60 Hz</th>
<th>DC 65 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL: AC 250 V</td>
<td>DC 80 V</td>
<td></td>
</tr>
</tbody>
</table>

### Current rating range

- **3500**: 0.05...16 A
- **4000**: 0.05...10 A

### Auxiliary circuit

- **1 A, AC 240 V / DC 65 V**

### Typical life

- 5,000 operations at 1 \( x I_n \), inductive
- 5,000 operations at 2 \( x I_n \), resistive

### Ambient temperature

- -30...+60 °C (-22...+140 °F)

### Insulation resistance

- > 100 MΩ (DC 500 V)

### Interrupting capacity

<table>
<thead>
<tr>
<th>3500</th>
<th>4000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05...0.8 A</td>
<td>0.05...0.2 A</td>
</tr>
<tr>
<td>1...2 A</td>
<td>0.3...2 A</td>
</tr>
<tr>
<td>2.5...16 A</td>
<td>2.5...10 A</td>
</tr>
<tr>
<td>400 A</td>
<td></td>
</tr>
</tbody>
</table>

### Insulation withstand voltage

<table>
<thead>
<tr>
<th>AC 240 V</th>
<th>DC 65 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5 kV</td>
<td></td>
</tr>
</tbody>
</table>

### Reinforced insulation in operating area

### Dielectric strength

<table>
<thead>
<tr>
<th>UL 1077</th>
<th>VDE (EN 60934)</th>
<th>CSA, UL</th>
<th>UL</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 3,000 V</td>
<td>AC 240 V</td>
<td>AC 250 V</td>
<td>DC 65 V</td>
</tr>
<tr>
<td>AC 1,500 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC 840 V</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Current Internal resistance

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3500</td>
<td>4000</td>
</tr>
<tr>
<td>0.05</td>
<td>447</td>
</tr>
<tr>
<td>0.1</td>
<td>131</td>
</tr>
<tr>
<td>0.2</td>
<td>40.1</td>
</tr>
<tr>
<td>0.3</td>
<td>19.3</td>
</tr>
<tr>
<td>0.4</td>
<td>10.4</td>
</tr>
<tr>
<td>0.5</td>
<td>7.1</td>
</tr>
<tr>
<td>0.6</td>
<td>4.3</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
</tr>
<tr>
<td>1.0</td>
<td>1.67</td>
</tr>
<tr>
<td>1.5</td>
<td>0.61</td>
</tr>
<tr>
<td>2.0</td>
<td>0.38</td>
</tr>
<tr>
<td>2.5</td>
<td>0.24</td>
</tr>
</tbody>
</table>

### Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>CSA, UL</td>
<td>AC 250 V</td>
<td>0.05...16 A</td>
</tr>
<tr>
<td>UL</td>
<td>DC 65 V</td>
<td>0.05...25 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V</td>
<td>0.05...10 A</td>
</tr>
<tr>
<td>CSA</td>
<td>AC 250 V</td>
<td>0.05...10 A</td>
</tr>
</tbody>
</table>

Approvals

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal-Magnetic Circuit Breakers 3500/4000

Dimensions

**Version -P10**

Internal connection diagrams

with shunt terminal (-A3) and auxiliary contacts (-Si)

Switching position with intermediate position and auxiliary contacts (-ZR-Si)

Terminal design

- **P10-A3**
- **P10-Si**
- **P10-A3-Si**
- **-K20**

This is a metric design and millimeter dimensions take precedence (mm).
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F

-22 -4 +14 +32 +73.4 +104 +122 +140

°C

-30 -20 -10 0 +23 +40 +50 +60

Derating factor

0.76 0.79 0.83 0.88 1 1.08 1.16 1.24

Magnetic tripping currents are increased by 20% on DC supplies.
Magnetic tripping currents are decreased by 20% on AC supplies.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Thermal-Magnetic Circuit Breakers 3500/4000

**Special version 3500-...-2100**

Single pole thermal-magnetic overcurrent circuit breaker with slow magnetic trip curve, suitable for high inrush currents (up to 12 \( i_N \)). Suffix -2100 is also available for types 3400 and 3600. Enquire for further details.

**Typical applications**

Industrial control systems, telecommunications, etc.

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.06</td>
<td>292</td>
<td>3</td>
<td>0.18</td>
</tr>
<tr>
<td>0.1</td>
<td>165</td>
<td>4</td>
<td>0.11</td>
</tr>
<tr>
<td>0.2</td>
<td>41.7</td>
<td>5</td>
<td>0.067</td>
</tr>
<tr>
<td>0.3</td>
<td>19.7</td>
<td>6</td>
<td>0.052</td>
</tr>
<tr>
<td>0.4</td>
<td>12.1</td>
<td>7</td>
<td>0.035</td>
</tr>
<tr>
<td>0.5</td>
<td>7.9</td>
<td>8</td>
<td>0.031</td>
</tr>
<tr>
<td>0.6</td>
<td>5.5</td>
<td>10</td>
<td>0.022</td>
</tr>
<tr>
<td>0.8</td>
<td>2.6</td>
<td>12</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>1</td>
<td>1.88</td>
<td>14</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>1.5</td>
<td>0.77</td>
<td>15</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>2</td>
<td>0.42</td>
<td>16</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>2.5</td>
<td>0.24</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Typical time/current characteristics at +23 °C**

1) Magnetic tripping currents are increased by 20% on DC supplies.

**Special version 3500-...-2350**

Single pole thermal-magnetic circuit breaker suitable for high ambient temperatures. The special rating of the circuit breaker allows resetting at no load in ambient temperatures up to +80 °C. Suffix -2350 is also available for types 3400 and 3600. Enquire for further details.

**Typical applications**

Industrial control systems.

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>583</td>
<td>2.5</td>
<td>0.42</td>
</tr>
<tr>
<td>0.1</td>
<td>167</td>
<td>3</td>
<td>0.21</td>
</tr>
<tr>
<td>0.2</td>
<td>49.9</td>
<td>4</td>
<td>0.13</td>
</tr>
<tr>
<td>0.3</td>
<td>23.1</td>
<td>5</td>
<td>0.11</td>
</tr>
<tr>
<td>0.4</td>
<td>12.8</td>
<td>6</td>
<td>0.056</td>
</tr>
<tr>
<td>0.5</td>
<td>8.7</td>
<td>10</td>
<td>0.022</td>
</tr>
<tr>
<td>0.8</td>
<td>3.45</td>
<td>12</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>1</td>
<td>2.3</td>
<td>15</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>1.5</td>
<td>0.89</td>
<td>16</td>
<td>(\leq 0.02)</td>
</tr>
<tr>
<td>2</td>
<td>0.48</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Typical time/current characteristics**

1) Magnetic tripping currents are increased by 20% on DC supplies.
Description

Single pole thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Designed for plug-in mounting with E-T-A sockets 17-P10-Si, 23-P10-Si, 63-P10-Si; or panel mounting using E-T-A clips. Featuring an unprotected shunt tap terminal and optional auxiliary contacts. Type 3900 offers lower internal resistance values and is fitted as standard with auxiliary contacts and an intermediate reset position in which all contacts are isolated.

Approved to CBE standard EN 60934 (IEC 60934).

Typical applications

Process control systems, instrumentation, communications systems, rail vehicles.

Ordering information

Type No.
3600 standard version with shunt tap terminal -3
3900 low-resistance version

Terminal design
P10 blade terminals 6.3-0.8 (QC-250)
Si auxiliary contact (only 3900)
Si60 special auxiliary contact (only 3900)
ZR-Si auxiliary contacts with intermediate position (only 3600)
ZR-Si60 special auxiliary contact (only 3600)
Si3-R auxiliary contacts, 2 NC contacts with reset button (not approved)

3600 - P10 - Si - 10 A ordering example

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) 3600</th>
<th>Current rating (A) 3900</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>447</td>
<td>3</td>
<td>0.19</td>
</tr>
<tr>
<td>0.1</td>
<td>131</td>
<td>4</td>
<td>0.090</td>
</tr>
<tr>
<td>0.2</td>
<td>40</td>
<td>5</td>
<td>0.061</td>
</tr>
<tr>
<td>0.3</td>
<td>19.3</td>
<td>6</td>
<td>0.041</td>
</tr>
<tr>
<td>0.4</td>
<td>10.4</td>
<td>7</td>
<td>0.034</td>
</tr>
<tr>
<td>0.5</td>
<td>7.1</td>
<td>8</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>0.6</td>
<td>4.3</td>
<td>10</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>2.5</td>
<td>12</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>1.0</td>
<td>1.67</td>
<td>14</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.61</td>
<td>15</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>2.0</td>
<td>0.38</td>
<td>16</td>
<td>≤ 0.02</td>
</tr>
</tbody>
</table>

For further details please see chapter: Technical Information

Voltage rating
AC 240 V, 50/60 Hz; DC 65 V
(UL: AC 250 V; DC 65 V)

Current rating range
3600: 0.05...16 A
3900: 0.05...10 A

Auxiliary circuit
1 A, AC 240 V / DC 65 V

Typical life
5,000 operations at 1 x IN, inductive
5,000 operations at 2 x IN, resistive

Ambient temperature
-30...+60 °C (-22...+140 °F)

Insulation co-ordination
rated impulse withstand voltage
2.5 kV 2 reinforced insulation in operating area

Dielectric strength
IC60664 and 60664A test voltage
operating area AC 3,000 V
main/aux. circuit AC 1,500 V
aux. circuit 4-5/6-7 AC 840 V

Insulation resistance
>100 MΩ (DC 500 V)

Interrupting capacity Icn
3600
0.05...0.8 A self-limiting
1...2 A 200 A
2.5...10 A 400 A

3900
0.05...0.2 A
0.3...2 A
2...10 A

Degree of protection
operating area IP40
terminal area IP00

Vibration
5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)
to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock
25 g (11 ms) to IEC 60068-2-27, test Ea

Corrosion
96 hours at 5 % salt mist
to IEC 60068-2-11, test Ka

Humidity
240 hours at 95 % RH
to IEC 6068-2-78, test Cab

Mass
approx. 45 g

Approvals

3600:
VDE (EN 60934) AC 240 V; DC 65 V 0.05...16 A
CSA/UL AC 250 V; DC 80 V 0.05...16 A
UL DC 65 V 0.05...25 A

3900:
VDE (EN 60934) AC 240 V; DC 65 V 0.05...10 A

Authority Voltage ratings Current ratings
3600:
VDE (EN 60934) AC 240 V; DC 65 V 0.05...16 A
CSA/UL AC 250 V; DC 80 V 0.05...16 A
UL DC 65 V 0.05...25 A

3900:
VDE (EN 60934) AC 240 V; DC 65 V 0.05...10 A

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Dimensions

- **P10-Si**
  - Blade terminals: DIN 46244-A6.3-0.8 (QC .250)
  - Current rating in A: 1.69
  - Units: millimeters

- **Si3-R**
  - Blade terminals: DIN 46244-A6.3-0.8 (QC .250)
  - Current rating in A: 1.69

Intermediate position: Holding down reset button and actuating manual release simultaneously.

Internal connection diagrams

- **Switching position with auxiliary contacts and reset button (Si3-R)**
  - OFF position
  - Intermediate position
  - ON position

- **Switching position with special auxiliary contact (Si60, -ZR-Si60)**
  - OFF position
  - Intermediate position
  - ON position

- **Switching position with intermediate position and auxiliary contacts (3600: -ZR-Si, 3900: -Si)**
  - OFF position
  - Intermediate position
  - ON position

Terminal design -P10

- **Operating area**
- **Mounting area**
- **This is a metric design and millimeter dimensions take precedence. (Inches)**

Installation drawing
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>-22</th>
<th>-4</th>
<th>+14</th>
<th>+32</th>
<th>+73.4</th>
<th>+104</th>
<th>+122</th>
<th>+140</th>
</tr>
</thead>
<tbody>
<tr>
<td>°C</td>
<td>-30</td>
<td>-20</td>
<td>-10</td>
<td>0</td>
<td>+23</td>
<td>+40</td>
<td>+50</td>
<td>+60</td>
</tr>
<tr>
<td>Derating factor</td>
<td>0.76</td>
<td>0.79</td>
<td>0.83</td>
<td>0.88</td>
<td>1</td>
<td>1.08</td>
<td>1.16</td>
<td>1.24</td>
</tr>
</tbody>
</table>

Magnetic tripping currents are increased by 20% on DC supplies.
Magnetic tripping currents are decreased by 20% on AC supplies.

### Accessories

**Module 17plus**

Modular power distribution system for circuit breakers 2210-S, 3600 or 3900.
For technical details see product group 7.

**Power-D-Box with sockets**

accommodating up to 30 E-T-A thermal-magnetic circuit breakers type 3600-P10-Si or 3900-P10-Si.
For technical data see product group 7.
Thermal-Magnetic Circuit Breakers 3600/3900

Accessories

Sockets
17-P10-Si
(up to 16 A max. load)
Retaining clip Y 300 581 11 to special order.

17-P10-Si-20025
mounted with adapter.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved.Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

This is a metric design and millimeter dimensions take precedence (mm).

Installate drawing with mounting clips Y 300 504 02

Mounting clip
Y 300 504 02
(2 pcs needed per unit)

Bus bar (10-way) (supplied as a complete package)
for socket 17 (for max. 100 A continuous load)
X 211 157 01 with terminal
X 211 157 02 without terminal
(more positions available on request)

Connector bus links -P10
X 210 588 01/ 1.5 mm² (AWG 16), brown up to 13 A max. load
X 210 588 02/ 2.5 mm² (AWG 14), black up to 20 A max. load
X 210 588 03/ 2.5 mm² (AWG 14), red up to 20 A max. load
X 210 588 04/ 2.5 mm² (AWG 14), blue up to 20 A max. load

Insulate sleeving for bus bar
Y 303 824 01

Extraction tool
Y 301 398 02

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

2 - 60
www.e-t-a.com
Issue B
**Description**

Single, double and three pole thermal-magnetic circuit breakers with high rupture capacity to UL 489 (5 kA), EN/IEC 60934 (6kA) and UL 1077 (5 kA). With toggle actuation, positively trip-free mechanism, a choice of characteristic curves and a wide range of current ratings in finely graded steps from 0.1 A through 32 A. Auxiliary contacts (make or break contacts) are optionally available. Track-mountable design, width only 12.5 mm. Ease of wiring by means of an integral busbar concept: line entry busbar LINE+ and signal busbars/signal jumpers.

**Typical applications**

Protection of power supplies, equipment and cables in centralised control systems and in decentralised installations serving automation, petro-chemical, power plant, steel industry and similar industrial applications.

**Ordering Information**

<table>
<thead>
<tr>
<th>Type number</th>
<th>4220</th>
<th>thermal-magnetic high performance circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>T1</td>
<td>track-mounting</td>
</tr>
<tr>
<td>Number of poles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>single pole</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>double pole</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>three pole</td>
<td></td>
</tr>
<tr>
<td>Additional feature</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>without actuator guard</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>with actuator guard</td>
<td></td>
</tr>
<tr>
<td>Main terminals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K0</td>
<td>screw terminals 16 mm² / 10 mm²</td>
<td></td>
</tr>
<tr>
<td>Characteristic curve</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1</td>
<td>thermal-magnetic, extremely fast, DC</td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>thermal-magnetic, fast, AC/DC</td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>thermal-magnetic, medium delay, AC/DC</td>
<td></td>
</tr>
<tr>
<td>T1</td>
<td>thermal-magnetic, long delay, AC/DC</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contacts</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H0</td>
<td>without</td>
<td></td>
</tr>
<tr>
<td>H1</td>
<td>with auxiliary contacts in all poles</td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>with auxiliary contacts only in pole 1 (2-pole plus)</td>
<td></td>
</tr>
<tr>
<td>H3</td>
<td>with auxiliary contacts only in poles 1+3 (3-pole plus)</td>
<td></td>
</tr>
<tr>
<td>H4</td>
<td>with auxiliary contacts only in pole 2 (3-pole plus)</td>
<td></td>
</tr>
<tr>
<td>H5</td>
<td>with auxiliary contacts only in the last pole</td>
<td></td>
</tr>
<tr>
<td>H6</td>
<td>with auxiliary contacts only in poles 1÷2 (3-pole plus)</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contact function</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>without</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>make contact (N/O)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>break contact (N/C)</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>pole 1 break contact, all other poles break contacts (2-pole plus)</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>poles 1÷2 break contacts, other poles break contacts (3-pole plus)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>pole 1 break contact, other poles make contacts (2-pole plus)</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contacts – terminal design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>without</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>screw terminals 1 mm²</td>
<td></td>
</tr>
<tr>
<td>Voltage rating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A ≤ AC 277 V or ≤ DC 60 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current rating range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0...32 A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approval logo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>V</td>
<td>UL 489</td>
<td></td>
</tr>
<tr>
<td>4220 - T1 1 0 - K0 M1 - H1 2 1 - A - 10 A - V</td>
<td>ordering example</td>
<td></td>
</tr>
</tbody>
</table>

**Technical data**

For further details please see catalogue section: Technical Information

| Voltage rating | 3 AC 415 V; 3 AC 480 V; AC 277 V; AC 240 V; AC 120 V; DC 60 V |
| Current rating range | 0.1...32 A |
| Auxiliary circuit | DC 10 - 30 V; 10 - 500 mA |
| Typical life | IEC 60934 3 AC 415 V 1,000 cycles at 1 x IN, inductive load |
|               | AC 240 V: 6,000 cycles at 1 x IN, inductive load |
|               | DC 60 V: 6,000 cycles at 1 x IN, resistive load |
|               | UL 489 AC 120 V: 6,000 cycles at 1 x IN, inductive load |
|               | UL 1077 3 AC 415 V 3,000 cycles at 1 x IN, inductive load |
|               | AC 277 V: 6,000 cycles at 1 x IN, inductive load |
|               | DC 60 V: 6,000 cycles at 1 x IN, resistive load |
| Ambient temperature | -30...+60°C (-22...+140°F, T60) |
| Storage temperature | -40 ... 60°C (-40 ... +140°F) |
| Insulation co-ordination | IEC 60664 2,5 kV / 2 |
| reinforced insulation in the operating area |
| Dielectric strength | IEC 60934 test voltage AC 3,000 V |
| operating area (reinforced insulation) |
| pole to pole | test voltage AC 1,500 V |
| main circuit to auxiliary circuit | test voltage AC 1,500 V |
| open main circuit | test voltage AC 1,500 V |
| open auxiliary circuit | test voltage AC 250 V |
| Insulation resistance | > 100 MΩ (DC 500 V) |
| Interrupting capacity | I₀, PC1 AC 240 V, 6,000 A |
| IEC 60934 DC 60 V, 6,000 A |
| UL 489 AC 120 V, 5,000 A |
| UL 1077 AC 240 V, 5,000 A |
| Protection class | operating area IP30 |
| (IEC 60529) terminal area IP00 |
| Vibration (sinusoidal) | ± 0.38 mm (10-57 Hz), 5 g (57-500 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis |
| Shock | 25 g (11 ms) test to IEC 60068-2-27, test Ea |
| Corrosion | 96 hrs in 5% salt mist, test to IEC 60068-2-11, test Ka |
| Humidity | 240 hrs in 95% RH, to IEC 60068-2-78, test Cab |
| Housing material | moulded material |
| Mounting | on symmetrical rail to EN 50022-35x7.5 |
| Mounting dimension | (w x h x d) 12.5 x 89.3 x 87.1 |
Technical data

**LINE terminal**
- **LINE and/or DC+** terminals
- Screw terminals: M5
- Flexible with wire end ferrule w/o plastic sleeve: 1 – 16 mm²
- Multi-lead connection (2 identical cables)
- Flexible with wire end ferrule without plastic sleeve: 1 – 6 mm²
- Flexible with TWIN wire end ferrule with plastic sleeve: 0.75 – 10 mm²
- Wire stripping length: 14 mm
- Tightening torque: 2.5 – 3 Nm

**LOAD terminal**
- Screw terminals: M4
- Flexible with wire end ferrule w/o plastic sleeve: 0.5 – 10 mm
- Multi-lead connection (2 identical cables)
- Flexible with wire end ferrule without plastic sleeve: 0.5 – 2.5 mm²
- Flexible with TWIN wire end ferrule with plastic sleeve: 0.5 – 6 mm²
- Wire stripping length: 10 mm
- Tightening torque: 1.2 – 1.4 Nm

**Auxiliary contact terminals**
- Screw terminals: M2
- Flexible with wire end ferrule w/o plastic sleeve: 0.25 – 0.75 mm²
- Multi-lead connection (2 identical cables)
- Flexible with wire end ferrule without plastic sleeve: 0.25 – 0.34 mm²
- Wire stripping length: 6 mm
- Tightening torque: 0.22 – 0.25 Nm

**Mass**
- Approx. 90 g per pole with aux. contact

**Current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Trip curve M1 (medium delay)</th>
<th>Trip curve T1 (long delay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC only</td>
<td>AC + DC</td>
<td>AC + DC</td>
<td>AC + DC</td>
</tr>
<tr>
<td><strong>Trip curve F1</strong></td>
<td><strong>Trip curve F2</strong></td>
<td><strong>Trip curve M1</strong></td>
<td><strong>Trip curve T1</strong></td>
</tr>
<tr>
<td>0.1</td>
<td>166</td>
<td>148</td>
<td>122</td>
</tr>
<tr>
<td>0.2</td>
<td>45</td>
<td>41</td>
<td>34</td>
</tr>
<tr>
<td>0.3</td>
<td>19</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>0.4</td>
<td>12</td>
<td>11</td>
<td>7.9</td>
</tr>
<tr>
<td>0.5</td>
<td>6.8</td>
<td>5.6</td>
<td>4.7</td>
</tr>
<tr>
<td>0.6</td>
<td>4.9</td>
<td>4.5</td>
<td>3.7</td>
</tr>
<tr>
<td>0.8</td>
<td>2.9</td>
<td>2.7</td>
<td>2.1</td>
</tr>
<tr>
<td>1</td>
<td>1.8</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>1.5</td>
<td>0.93</td>
<td>0.76</td>
<td>0.62</td>
</tr>
<tr>
<td>2</td>
<td>0.47</td>
<td>0.40</td>
<td>0.34</td>
</tr>
<tr>
<td>2.5</td>
<td>0.30</td>
<td>0.27</td>
<td>0.23</td>
</tr>
<tr>
<td>3</td>
<td>0.22</td>
<td>0.20</td>
<td>0.17</td>
</tr>
<tr>
<td>3.5</td>
<td>0.17</td>
<td>0.16</td>
<td>0.13</td>
</tr>
<tr>
<td>4</td>
<td>0.11</td>
<td>0.11</td>
<td>0.084</td>
</tr>
<tr>
<td>5</td>
<td>0.086</td>
<td>0.082</td>
<td>0.066</td>
</tr>
<tr>
<td>6</td>
<td>0.064</td>
<td>0.062</td>
<td>0.053</td>
</tr>
<tr>
<td>8</td>
<td>0.029</td>
<td>0.026</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>10</td>
<td>≤ 0.022</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>12</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>15</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>16</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>18</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>20</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>25</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>32</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
</tbody>
</table>

**Dimensions**

**Label see accessories**

**Technical data**
- **LINE terminal**
  - Screw terminals: M5
  - Flexible with wire end ferrule w/o plastic sleeve: 1 – 16 mm²
  - Multi-lead connection (2 identical cables)
  - Flexible with wire end ferrule without plastic sleeve: 1 – 6 mm²
  - Flexible with TWIN wire end ferrule with plastic sleeve: 0.75 – 10 mm²
  - Wire stripping length: 14 mm
  - Tightening torque: 2.5 – 3 Nm

**LOAD terminal**
- Screw terminals: M4
- Flexible with wire end ferrule w/o plastic sleeve: 0.5 – 10 mm
- Multi-lead connection (2 identical cables)
- Flexible with wire end ferrule without plastic sleeve: 0.5 – 2.5 mm²
- Flexible with TWIN wire end ferrule with plastic sleeve: 0.5 – 6 mm²
- Wire stripping length: 10 mm
- Tightening torque: 1.2 – 1.4 Nm

**Auxiliary contact terminals**
- Screw terminals: M2
- Flexible with wire end ferrule w/o plastic sleeve: 0.25 – 0.75 mm²
- Multi-lead connection (2 identical cables)
- Flexible with wire end ferrule without plastic sleeve: 0.25 – 0.34 mm²
- Wire stripping length: 6 mm
- Tightening torque: 0.22 – 0.25 Nm

**Mass**
- Approx. 90 g per pole with aux. contact

**Current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance per pole (Ω)</th>
<th>Trip curve M1 (medium delay)</th>
<th>Trip curve T1 (long delay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC only</td>
<td>AC + DC</td>
<td>AC + DC</td>
<td>AC + DC</td>
</tr>
<tr>
<td><strong>Trip curve F1</strong></td>
<td><strong>Trip curve F2</strong></td>
<td><strong>Trip curve M1</strong></td>
<td><strong>Trip curve T1</strong></td>
</tr>
<tr>
<td>0.1</td>
<td>166</td>
<td>148</td>
<td>122</td>
</tr>
<tr>
<td>0.2</td>
<td>45</td>
<td>41</td>
<td>34</td>
</tr>
<tr>
<td>0.3</td>
<td>19</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>0.4</td>
<td>12</td>
<td>11</td>
<td>7.9</td>
</tr>
<tr>
<td>0.5</td>
<td>6.8</td>
<td>5.6</td>
<td>4.7</td>
</tr>
<tr>
<td>0.6</td>
<td>4.9</td>
<td>4.5</td>
<td>3.7</td>
</tr>
<tr>
<td>0.8</td>
<td>2.9</td>
<td>2.7</td>
<td>2.1</td>
</tr>
<tr>
<td>1</td>
<td>1.8</td>
<td>1.6</td>
<td>1.3</td>
</tr>
<tr>
<td>1.5</td>
<td>0.93</td>
<td>0.76</td>
<td>0.62</td>
</tr>
<tr>
<td>2</td>
<td>0.47</td>
<td>0.40</td>
<td>0.34</td>
</tr>
<tr>
<td>2.5</td>
<td>0.30</td>
<td>0.27</td>
<td>0.23</td>
</tr>
<tr>
<td>3</td>
<td>0.22</td>
<td>0.20</td>
<td>0.17</td>
</tr>
<tr>
<td>3.5</td>
<td>0.17</td>
<td>0.16</td>
<td>0.13</td>
</tr>
<tr>
<td>4</td>
<td>0.11</td>
<td>0.11</td>
<td>0.084</td>
</tr>
<tr>
<td>5</td>
<td>0.086</td>
<td>0.082</td>
<td>0.066</td>
</tr>
<tr>
<td>6</td>
<td>0.064</td>
<td>0.062</td>
<td>0.053</td>
</tr>
<tr>
<td>8</td>
<td>0.029</td>
<td>0.026</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>10</td>
<td>≤ 0.022</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>12</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>15</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>16</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>18</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>20</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>25</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>32</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
<td>≤ 0.02</td>
</tr>
</tbody>
</table>

**Installation drawing**

**Internal connection diagrams**

This is a metric design and millimeter dimensions take precedence. (in mm) inch
Termination examples

4220-T with busbars and signal busbars (auxiliary contacts connected in parallel)

Busbars, signal busbars and jumpers: see accessories

4220-T with busbars and jumpers (auxiliary contacts connected in parallel)

Description | Part number
---|---
busbar red, 500 mm length, can be cut to length | X 222 611 01
busbar grey, 500 mm length, can be cut to length | X 222 611 02
signal busbar blue, 500 mm length, can be cut to length | X 222 005 01
signal busbar red, 500 mm length, can be cut to length | X 222 005 02
signal busbar grey, 500 mm length, can be cut to length | X 222 005 03
signal busbar grey (packing unit 25 pcs) | X 222 486 25

Label (packing unit 50 pcs) or from Phoenix ZBF 12 | X 222 977 50

Accessories

X 222 611 01

X 222 611 02

X 222 005 01

X 222 005 02

X 222 005 03

X 222 486 25 grey

X 222 977 50

or from Phoenix ZBF 12

This is a metric design and millimeter dimensions take precedence (mm) inch
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below.

<table>
<thead>
<tr>
<th>Ambient temperature °F</th>
<th>°C</th>
<th>Derating factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-22</td>
<td>-30</td>
<td>0,76</td>
</tr>
<tr>
<td>-4</td>
<td>-20</td>
<td>0,79</td>
</tr>
<tr>
<td>+14</td>
<td>0</td>
<td>0,83</td>
</tr>
<tr>
<td>+32</td>
<td>+10</td>
<td>0,88</td>
</tr>
<tr>
<td>+50</td>
<td>+23</td>
<td>0,93</td>
</tr>
<tr>
<td>+73.4</td>
<td>+30</td>
<td>1</td>
</tr>
<tr>
<td>+86</td>
<td>+40</td>
<td>1,24</td>
</tr>
<tr>
<td>+104</td>
<td>+50</td>
<td>1,32</td>
</tr>
<tr>
<td>+122</td>
<td>+60</td>
<td>1,35</td>
</tr>
</tbody>
</table>

Magnetic tripping currents are increased by 30 % on DC supplies.

When several devices are mounted together, an air gap between each is recommended. If this is not possible, each device should carry only 80 % of its rating.
### Description

Single pole miniaturised magnetic circuit breakers with unique high-speed operating mechanism and push/pull on/off manual actuation. Fitted with electrically separate excitation and switching circuits, and one pair of auxiliary contacts which close when the main circuit is open. Also suitable for impulse operation. Designed for printed circuit board mounting. Low temperature sensitivity.

### Typical applications

Printed circuit boards and components, safety and control systems.

### Ordering information

**Type No.**
808 (fast-acting)

**Manual release**
- 01 press-to-reset button, blue
- B manual release facility, blue (Standard)

**Current ratings**
- 0.01...5 A

**Ordering example**
808 - B - 5 A

### Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>DC 24 V (higher voltages to special order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current ratings</td>
<td>0.01...5 A</td>
</tr>
<tr>
<td>Max. continuous load excitation circuit (2-3)</td>
<td>2.65 x I_N</td>
</tr>
<tr>
<td>Max. continuous load switching circuit 6-7 auxiliary circuit 4-5</td>
<td>5 A</td>
</tr>
<tr>
<td>Typical life</td>
<td>6,000 operations at 5 A for switching circuit</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-30...+70 °C (-22...+158 °F)</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664-1) withstand voltage</td>
<td>1.5 kV</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Interrupting capacity (o-o-o)</td>
<td>100 A</td>
</tr>
<tr>
<td>Interrupting capacity (UL 1077)</td>
<td>2,000 A AC 120 V, 1,000 A DC 60 V</td>
</tr>
<tr>
<td>Degree of protection (IEC 60529/DIN 40050)</td>
<td>operating area IP30 terminal area IP00</td>
</tr>
<tr>
<td>Vibration</td>
<td>3 g (57-500 Hz), ± 0.23 mm (10-57 Hz), to IEC 60668-2-6, test Fc 10 frequency cycles/axis</td>
</tr>
<tr>
<td>Shock</td>
<td>25 g (11 ms) to IEC 60668-2-27, test Ea</td>
</tr>
<tr>
<td>Corrosion</td>
<td>48 hours at 5 % salt mist, to IEC 60668-2-11, test Ka</td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH to IEC 60668-2-78, test Cab</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 10 g</td>
</tr>
</tbody>
</table>
Dimensions

Internal connection diagram

Typical time/current characteristics at +23 °C/+73.4 °F

This is a metric design and millimeter dimensions take precedence.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-G2...

**Description**

Single, two and three pole magnetic circuit breakers with trip-free mechanism and push/pull on/off manual actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Convenient threadneck panel or plug-in mounting, and with a white push button indicator band showing clearly the tripped/off position. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling and fitted with an unprotected shunt tap terminal as standard. Approved to CBE standard EN 60934 (IEC 60934).

**Typical application**

Control equipment, communications systems, power semiconductors.

**Technical data**

For further details please see chapter: Technical Information

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>Current ratings</th>
<th>Auxiliary circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 AC 415 V; AC 240 V; DC 80 V</td>
<td>0.02...50 A single pole (40+50 A DC only)</td>
<td>1 A, AC 240 V/DC 85 V</td>
</tr>
<tr>
<td>0.02...30 A multipole</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) per pole</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>curve F4/F9</td>
</tr>
<tr>
<td>0.02</td>
<td>583</td>
</tr>
<tr>
<td>0.05</td>
<td>94</td>
</tr>
<tr>
<td>0.08</td>
<td>35.8</td>
</tr>
<tr>
<td>0.1</td>
<td>23</td>
</tr>
<tr>
<td>0.15</td>
<td>9.9</td>
</tr>
<tr>
<td>0.2</td>
<td>5</td>
</tr>
<tr>
<td>0.3</td>
<td>2.44</td>
</tr>
<tr>
<td>0.5</td>
<td>0.79</td>
</tr>
<tr>
<td>0.75</td>
<td>0.39</td>
</tr>
<tr>
<td>1</td>
<td>0.25</td>
</tr>
<tr>
<td>1.25</td>
<td>0.15</td>
</tr>
<tr>
<td>1.5</td>
<td>0.10</td>
</tr>
<tr>
<td>1.75</td>
<td>0.083</td>
</tr>
<tr>
<td>2</td>
<td>0.059</td>
</tr>
<tr>
<td>2.5</td>
<td>0.044</td>
</tr>
<tr>
<td>3</td>
<td>0.028</td>
</tr>
<tr>
<td>4</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>12</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02*</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02*</td>
</tr>
<tr>
<td>40</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

* 50 % ON duty / 60 min.

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>3 AC 415 V; AC 240 V; DC 80 V</td>
<td>0.02...30 A</td>
</tr>
<tr>
<td>UL 1077, CSA</td>
<td>DC 80 V; 3 AC 250 V; AC 250 V</td>
<td>0.02...50 A 1, 2-pole</td>
</tr>
<tr>
<td>UL 489 A</td>
<td>DC 80 V</td>
<td>0.05...30 A 1, 2-pole</td>
</tr>
<tr>
<td>CCC</td>
<td>3 AC 415 V; AC 240 V; DC 80 V</td>
<td>0.02...30 A</td>
</tr>
</tbody>
</table>

**Vibration with button down:**

- 10 g (57-2000 Hz), ± 0.76 mm (10-57 Hz) at 0.9 x I_n
- Other mounting planes:
  - 10 g (57-2000 Hz) at I_n
to IEC 60686-2-6, test Fc
- 10 frequency cycles/axis

**Shock**

- 100 g (11 ms) at 1 x I_n, directions 1,2,3,4,5
- 100 g (11 ms) at 0.8 x I_n, direction 6
to IEC 60686-2-7, test Ea

**Corrosion**

- 96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

**Humidity**

- 240 hours at 95 % RH
to IEC 60068-2-78, test Cab

**Mass**

- approx. 70 g per pole

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-G2...

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>G</td>
</tr>
<tr>
<td>Threadneck panel mounting</td>
<td></td>
</tr>
</tbody>
</table>

Number of poles (main current paths)

- 0: single pole, switch only
- 1: single pole, protected
- 2: two pole, protected
- 3: three pole, protected
- 5: two pole, protected on one pole only

Panel hardware

- 0: without panel hardware
- 1: with hex nut M12x1 and washer 12/15

Terminal design

- P1 blade terminals A6.3-0.8 mm (QC.250)
- K3 screw terminals M4 recommended for \( I_{N} > 20 \, \text{A} \)
- K4 screw terminals M5 recommended for \( I_{N} > 40 \, \text{A} \)
- R1 round connectors ø6
- X1 blade terminals A6.3-0.8 mm (QC.250), separate switching and trip circuit

Characteristic curve

- F4 instantaneous trip: magn. 1.5-2.2x\( I_{N} \) DC (\( I_{N} \leq 30 \, \text{A} \))
- F5 magn.1.2-1.7x\( I_{N} \) AC 50/60 Hz (\( I_{N} \leq 30 \, \text{A} \))
- E1 short delay: magn.-hydr. 1.01-1.4 \( I_{N} \) DC
- E2 short delay: magn.-hydr. 1.01-1.4 \( I_{N} \) AC 50/60 Hz
- H1 medium delay: magn.-hydr. 1.01-1.4 \( I_{N} \) DC
- H2 medium delay: magn.-hydr. 1.01-1.4 \( I_{N} \) AC 50/60 Hz
- R1 long delay: magn.-hydr. 1.01-1.5 \( I_{N} \) DC
- R2 long delay: magn.-hydr. 1.01-1.5 \( I_{N} \) AC 50/60 Hz

Actuator colour

- A: black with white trip indicator band

Actuator marking

- 0: without marking
- 4: rated current (legible with location pin above) standard
- 7: rated current (legible with location pin below)

Auxiliary contacts

- H0 without auxiliary contacts
- H1 with auxiliary contacts
- H2 with auxiliary contacts on pole 1 only (2 and 3-pole types)
- H3 with auxiliary contacts on poles 1 and 3 (3-pole type)

Auxiliary contact function

- 1: one each N/O and N/C
- 2: 1 pair N/O (23/24)
- 3: 1 pair N/C (11/12)

Auxiliary contact terminal design

- 1 blade terminals A6.3-0.8 mm

Current ratings (optional)

- 0.02...50 A

Approval (optional)

- U UL 489 A

Ordering example

8340 - G 2 1 1 - P1 F4 - A 4 H1 1 1 - 8 A - U

Dimensions (1-pole)

- 2-pole
- 3-pole
- Cut-out dimensions:

This is a metric design and millimeter dimensions take precedence (\text{mm})/\text{inch}

 Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Terminal design

Terminal design - P1

Terminal design - K3/-K4

Terminal design - R

Auxiliary contact terminal design

1 N/O, 1 N/C

1 N/O

1 N/C

Installation drawings

Terminal design - P

Terminal design - K

Terminal design - R

This is a metric design and millimeter dimensions take precedence (inch, mm)

Internal connection diagrams

1-pole, protected magnetically

1-pole, protected hydraulically-magnetically

Circuit variants 1-pole

multipole

8340-G211-X1F4-A4H121-...A

1 - 11

switching circuit

8340-G211-X1F4-A4H131-...A

1 - 23

switching circuit

1-pole

2(k) - 2(k)

magnetic trip circuit

auxiliary circuit (N/O)

2(k) - 2(k)

auxiliary circuit (N/C)
Typical time/current characteristics

Curve F4 for DC, magnetic (undelayed)
($I_N > 20$ A, 50% ON period, 60 min.) at +23 °C / +73.4 °F

Curve F5 for AC 50/60 Hz, magnetic (undelayed)
($I_N > 20$ A, 50% ON period, 60 min.) at +23 °C / +73.4 °F

Short delay curves E1 for DC and E2 for AC 50/60 Hz, hydraulic-magnetic

Medium delay curves H1 for DC and H2 for AC 50/60 Hz, hydraulic-magnetic

Other curves upon request (e.g. impulse delay).

N.B. Curves E1, E2, H1, H2, R1 and R2 will only be maintained if the escutcheon is mounted on a vertical surface.
Accessories

**Socket 18-P10-Si**
(for ratings >16 A please contact E-T-A)
- Bus bar (10-way) (supplied as a complete package) for type 18 socket
  - Phoenix terminal AKG 35
  - cross section max 35 mm² (AWG 2)
- Connector bus link -P10
  - X 210 588 01/1.5 mm² (AWG 16), brown (up to 13 A max. load)
  - X 210 588 02/2.5 mm² (AWG 14), black (up to 20 A max. load)
  - X 210 588 03/2.5 mm² (AWG 14), red (up to 20 A max. load)
  - X 210 588 04/2.5 mm² (AWG 14), blue (up to 20 A max. load)

**Polarized socket with adapter 18-P10-Si-20025**
- blade terminal A6.3-0.8 (I²C .250) to DIN 46244 polarized to ensure correct connection
- 10 mm depth

**Insulated sleeving for bus bars**
Y 303 824 11

**Retaining clip for socket 18-P10-Si**
Y 300 579 11

**Hex nut**
Y 300 116 02

**Spring washer**
Y 300 118 03

**Accessories for push button**
- Splash cover with hex nut and O ring (IP66 and IP67)
  - X 200 801 08 (nickel plated hex nut M12x1, splash cover transparent)
  - X 200 801 03 (black finish hex nut M12x1, splash cover black)

**Actuator extension**
X 200 803 01 (black button)

**Shock directions / Mounting attitudes**

---

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single and two pole magnetic circuit breakers with trip-free mechanism and push/pull on/off manual actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Convenient threadneck panel or plug-in mounting, and with a white push button indicator band showing clearly the tripped/off position. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling and fitted with an unprotected shunt tap terminal as standard. Reliable tripping with even the smallest overcurrents. Approved to CBE standard EN 60934 (IEC 60934).

Typical application

Railway vehicles, telecommunications, process control.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) per pole curve -F4</th>
<th>Internal resistance (Ω) per pole curve -E1/H1/R1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>583</td>
<td>2441</td>
</tr>
<tr>
<td>0.05</td>
<td>94</td>
<td>376</td>
</tr>
<tr>
<td>0.08</td>
<td>34</td>
<td>148</td>
</tr>
<tr>
<td>0.1</td>
<td>23</td>
<td>94</td>
</tr>
<tr>
<td>0.15</td>
<td>25.1</td>
<td>39</td>
</tr>
<tr>
<td>0.2</td>
<td>14.6</td>
<td>30.5</td>
</tr>
<tr>
<td>0.3</td>
<td>6.32</td>
<td>9.9</td>
</tr>
<tr>
<td>0.5</td>
<td>0.79</td>
<td>3.16</td>
</tr>
<tr>
<td>0.75</td>
<td>0.39</td>
<td>1.55</td>
</tr>
<tr>
<td>1</td>
<td>0.25</td>
<td>0.79</td>
</tr>
<tr>
<td>1.5</td>
<td>0.27</td>
<td>0.37</td>
</tr>
<tr>
<td>2</td>
<td>0.059</td>
<td>0.20</td>
</tr>
<tr>
<td>2.5</td>
<td>0.044</td>
<td>0.146</td>
</tr>
<tr>
<td>3</td>
<td>0.028</td>
<td>0.10</td>
</tr>
<tr>
<td>4</td>
<td>0.04</td>
<td>0.059</td>
</tr>
<tr>
<td>5</td>
<td>&lt; 0.02</td>
<td>0.040</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 0.02</td>
<td>0.026</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>12</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02*</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02*</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>40</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
</tbody>
</table>

* 50 % ON duty / 60 min.

Technical data

For further details please see chapter: Technical Information

Voltage rating DC 110 V ± 25 %
Current ratings 0.02...50 A single pole
0.02...30 A 2-pole
Auxiliary circuit AC 240 V/DC 65 V 1 A
DC 110 V ± 25 % 0.3 A
Typical life DC 110 V: 0.02...35 A 10,000 operations at 1 x I N
40 + 50 A 3,000 operations at 1 x I N
0.02...30 A 5,000 operations at 2 x I N
Ambient temperature -40...+85 °C (-40...+185 °F)
Insulation co-ordination rated impulse withstand voltage degree
reinforced insulation in operating area
Dielectric strength test voltage
(I 60664 and 60664A) AC 3,000 V
pole to pole (2-pole) AC 1,500 V
main to auxiliary circuit AC 1,500 V
aux. circuit 11-12/23-24 AC 1,000 V
switching to trip circuit (-X) AC 1,500 V
Insulation resistance > 100 MΩ (DC 500 V)
Interrupting capacity Icn 1,000 A
Degree of protection operating area IP40
(I 60529/DIN 40050) terminal area IP00
Vibration with button down: 10 g (57-2000 Hz), ± 0.76 mm (10-57 Hz)
at 0.9 x I N
other mounting planes: 10 g (57-2000 Hz) at I N
to IEC 60068-2-6, test Fc
10 frequency cycles/axis
Shock 100 g (11 ms) at 1 x I N, directions 1,2,3,4,5
100 g (11 ms) at 0.8 x I N, direction 6
to IEC 60068-2-27, test Ea
Corrosion 96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka
Humidity 240 hours at 95 % RH
to IEC 60068-2-78, test Cab
Mass approx. 70 g per pole
### Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-G2...110 V

#### Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8340</th>
<th>Magnetic push/pull circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>G threadneck panel mounting</td>
<td></td>
</tr>
<tr>
<td>Number of poles (main current paths)</td>
<td>1 single pole, protected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 two pole, protected</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 two pole, protected on one pole only</td>
<td></td>
</tr>
<tr>
<td>Panel hardware</td>
<td>0 without panel hardware</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 with hex nut M12x1 and washer 12/15</td>
<td></td>
</tr>
<tr>
<td>Terminal design</td>
<td>P1 blade terminals A6.3-0.8 mm (QC.250)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K3 screw terminals M4 recommended for ( I_n &gt; 20 ) A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K4 screw terminals M5 recommended for ( I_n &gt; 40 ) A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R1 round connectors ø6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X1 blade terminals A6.3-0.8 mm (QC.250), separate switching and trip circuit</td>
<td></td>
</tr>
<tr>
<td>Characteristic curve</td>
<td>F4 instantaneous trip: magn. 1.5-2.2 x ( I_n )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E1 short delay: magn.-hydr. 1.01-1.4 x ( I_n )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H1 medium delay: magn.-hydr.1.01-1.4 x ( I_n )</td>
<td></td>
</tr>
<tr>
<td></td>
<td>R1 long delay: magn.-hydr. 1.01-1.5 x ( I_n )</td>
<td></td>
</tr>
<tr>
<td>Actuator colour</td>
<td>A black with white trip indicator band</td>
<td></td>
</tr>
<tr>
<td>Actuator marking</td>
<td>4 rated current (legible with location pin above) standard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 rated current (legible with location pin below)</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contacts</td>
<td>H0 without auxiliary contacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H1 with auxiliary contacts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H2 with auxiliary contacts on pole 1 only (2- and 3-pole types)</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contacts function</td>
<td>1 one each N/O and N/C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 1 pair N/O (23/24)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 1 pair N/C (11/12)</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contact terminal design</td>
<td>1 blade terminals A6.3-0.8 mm</td>
<td></td>
</tr>
<tr>
<td>Voltage rating</td>
<td>D DC 110 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E DC 110 V + higher flammability rating</td>
<td></td>
</tr>
<tr>
<td>Current ratings</td>
<td>0.02...50 A</td>
<td></td>
</tr>
</tbody>
</table>

#### Dimensions (1-pole)

<table>
<thead>
<tr>
<th>Dimensions (1-pole)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tightening torque max. 4 Nm</td>
</tr>
<tr>
<td>Current rating in A</td>
</tr>
<tr>
<td>Location pin for 3mm (.118 in.)</td>
</tr>
<tr>
<td>Mounting hole dia.</td>
</tr>
<tr>
<td>Panel thickness max. 3 mm (.118 in.)</td>
</tr>
</tbody>
</table>

#### 2-pole

<table>
<thead>
<tr>
<th>Cut-out dimensions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit 1</td>
</tr>
<tr>
<td>Unit 2</td>
</tr>
<tr>
<td>Panel thickness 1.5 - 3 mm (.099-.118 in.)</td>
</tr>
</tbody>
</table>

---

This is a metric design and millimeter dimensions take precedence (\text{mm}) inch

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Terminal design

Terminal design - P1

Terminal design - K3/-K4

Terminal design - R

Auxiliary contact terminal design

1 N/O, 1 N/C

1 N/O

1 N/C

Installation drawings

Terminal design - P

Terminal design - K

Terminal design - R

Internal connection diagrams

1-pole, protected magnetically

2-pole

1-pole, protected hydraulic-magnetically

This is a metric design and millimeter dimensions take precedence.
Typical time/current characteristics

**Curve F4, magnetic (undelayed)**
at +23 °C / +73.4 °F

**Medium delay curve H1, hydraulic-magnetic**

**Short delay curve E1, hydraulic-magnetic**

**Long delay curve R1, hydraulic-magnetic**

N.B. Curves E1, H1 and R1 will only be maintained if the escutcheon is mounted on a vertical surface.

Other curves upon request (e.g. impulse delay).
Accessories

**Socket 18-P10-Si**
(for ratings >16 A please contact E-T-A)

**Polarized socket with adapter 18-P10-Si-20025**
blade terminal A6.3-0.8 (QC .250) to DIN 46244 polarized to ensure correct connection

**Bus bar (10-way)** (supplied as a complete package)
for type 18 socket
(for max. 100 A continuous load),
more positions available on request
X 211 158 01 with terminal
X 211 158 02 without terminal
Phoenix terminal AG0 35
cross section max 35 mm² (AWG 2)
cylinder-head screw
female connector
copper rail tin-plated

**Insulated sleeving for bus bars**
Y 303 824 11

**Retaining clip for socket 18-P10-Si**
Y 300 579 11

**Connector bus link -P10**
X 210 588 01/1.5 mm² (AWG 16), brown (up to 13 A max. load)
X 210 588 02/2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 588 03/2.5 mm² (AWG 14), red (up to 20 A max. load)
X 210 588 04/2.5 mm² (AWG 14), blue (up to 20 A max. load)

**Hex nut**
Y 300 116 02

**Spring washer**
Y 300 118 03

**Accessories for push button**
Splash cover with hex nut and O ring (IP66 and IP67)
X 200 801 08 (nickel plated hex nut M12x1, splash cover transparent)
X 200 801 03 (black finish hex nut M12x1, splash cover black)

**Splash seal, black, hex nut and O ring** (IP54)
X 200 802 01 (nickel plated hex nut M12x1, splash cover black)

**Actuator extension**
X 200 803 01 (black button)

**Shock directions / Mounting attitudes**

---

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single and multipole magnetic circuit breakers with trip-free mechanism and toggle actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Options include auxiliary changeover contacts, or relay trip function. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 60934).

**Typical applications**

Control equipment, communications systems, transportation, power supplies.

**Technical data**

For further details please see chapter: Technical Information

**Voltage rating**

3 AC 415 V; AC 240 V, 50/60 Hz; DC 80 V

**Current ratings**

- 0.02...50 A 1-pole (40 + 50 A DC only)
- 0.02...30 A multipole

**Auxiliary circuit**

- 6 A, AC 240 V
- 3 A, DC 28 V
- 1 A, DC 65 V
- 0.5 A, DC 80 V

**Typical life**

- 3 AC 415 V, AC 240 V:
  - 0.02...30 A 6,000 operations at 1 x I_N, inductive
  - 10,000 operations at 1 x I_N, resistive
- DC 80 V:
  - 0.02...25 A 6,000 operations at 1 x I_N, inductive
  - 0.02...30 A 10,000 operations at 1 x I_N, resistive
  - 40 + 50 A 6,000 operations at 1 x I_N, resistive

**Ambient temperature**

- -40...+85 °C (-40...+185 °F)

**Insulation co-ordination**

- Rated impulse withstand voltage 2.5 kV

**Dielectric strength**

- IEC 60664 and 60664A
- Operating area: AC 3,000 V
- Pole to pole (2- and 3-pole): AC 1,500 V
- Main to auxiliary circuit: AC 3,000 V
- Switching to trip circuit: AC 1,500 V (version -X)

**Insulation resistance**

- > 100 MΩ (DC 500 V)

**Interrupting capacity**

- UL 1077: AC 250 V/3,500 A (1-pole)
- UL 489A: DC 80 V/3,500 A

**Degree of protection**

- Operating area IP40
- Terminal area IP00

**Vibration**

- With toggle down: 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz) at 0.9 x I_N
- With directions 1, 2, 3, 4, 5:
  - Limit with curves F1, F2 in all planes:
    - 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz) at 0.8 x I_N
    - To IEC 6068-2-6, test Fc
- 10 frequency cycles/axis

**Shock**

- With instructions F1, F2:
  - 100 g (11 ms) at 1 x I_N, directions 1, 2, 3, 4, 5
  - 100 g (11 ms) at 0.8 x I_N, direction 6.
  - To IEC 6068-2-7, test Ea

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Curves and internal resistance per pole (Ω)</th>
<th>K1, M1, T1, K2, M2, T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>1493 953</td>
<td>2669 2457</td>
</tr>
<tr>
<td>0.05</td>
<td>276 152</td>
<td>452 376</td>
</tr>
<tr>
<td>0.1</td>
<td>58 37</td>
<td>100 94</td>
</tr>
<tr>
<td>0.25</td>
<td>8.2 6.0</td>
<td>15.5 14.7</td>
</tr>
<tr>
<td>0.5</td>
<td>2.3 1.47</td>
<td>3.9 3.2</td>
</tr>
<tr>
<td>0.75</td>
<td>0.98 0.63</td>
<td>1.65 1.56</td>
</tr>
<tr>
<td>1</td>
<td>0.58 0.35</td>
<td>0.95 0.90</td>
</tr>
<tr>
<td>2</td>
<td>0.145 0.096</td>
<td>0.26 0.20</td>
</tr>
<tr>
<td>2.5</td>
<td>0.096 0.061</td>
<td>0.15 0.15</td>
</tr>
<tr>
<td>3</td>
<td>0.065 0.048</td>
<td>0.10 0.10</td>
</tr>
<tr>
<td>5</td>
<td>0.025 &lt; 0.02</td>
<td>0.042 0.040</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 0.028</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>12</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02 &lt; 0.02</td>
<td>&lt; 0.02 &lt; 0.02</td>
</tr>
<tr>
<td>40</td>
<td>&lt; 0.01 -</td>
<td>&lt; 0.01 -</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.01 -</td>
<td>&lt; 0.01 -</td>
</tr>
</tbody>
</table>

**Corrosion**

96 hours at 5 % salt mist to IEC 6068-2-11, test Ka

**Humidity**

240 hours at 95 % RH to IEC 6068-2-78, test Cab

**Mass**

approx. 65 g per pole
### Ordering Information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8340-F 1 1 0 - P1 M1 - A L H1 4 2 - 30 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating</td>
<td>only curves X1, X2</td>
</tr>
<tr>
<td>DC 5, 8, 12, 24 V</td>
<td>AC 110, 220, 240 V</td>
</tr>
<tr>
<td>Options</td>
<td>higher flammability rating</td>
</tr>
<tr>
<td>Approvals</td>
<td>upon request</td>
</tr>
<tr>
<td>Approval (optional)</td>
<td>U UL 489 A</td>
</tr>
</tbody>
</table>

### Internal Connection Diagrams

#### 1-pole protected magnetically with separate switching and relay circuit

![Diagram of 1-pole protected circuit](image_url)

#### 1-pole protected hydraulic-magnetic multipole

![Diagram of hydraulic-magnetic circuit](image_url)
Dimensions

Flange mounting
Configuration: F1/F4
Actuator: long toggle

Actuator: short toggle

Actuator: without toggle, with slot

Applicable for nominal dimensions without direct tolerance indication:
DIN ISO 286 ± IT13

number of poles: 1-4

Cut-out dimensions
max. panel thickness: 3 mm

Mounting thread M3
or 6-32 UNC-2B
mounting depth
max. 4.5 mm/177 in.
tightening torque max. 0.33 Nm

Configuration: F9
Actuator: long toggle

Actuator: short toggle

Actuator: without toggle, with slot

number of poles: 1-4

Cut-out dimensions
max. panel thickness: 2 ± 0.5 mm

Applicable for nominal dimensions without direct tolerance indication:
DIN ISO 286 ± IT13

This is a metric design and millimeter dimensions take precedence:

M7 ± .004

19.2 ± 0.12

2.95 ± .005

19.2 ± 0.12

2.95 ± .005
**Terminal design / Dimensions**

**K 3/4 screw terminals**
- Tightening torque max. 1.2 Nm

**K3 screw terminals M4**

**K4 screw terminals M5**

**P1 blade terminals**
- Terminal design
- Dimensions

**X1 blade terminals**
- With separate switching and relay circuit
- Terminal design
- Dimensions

**Auxiliary contacts**
- Version H (standard, asymmetrical gold-flushed terminals, silver contacts)

**Actuator configuration**

**Actuator design**
- Number of poles: 1 - 4
- Configuration: F1 / F4
- Actuator long

**Actuator short**
- Number of poles: 1 - 4
- Configuration: F9
- Actuator long

**Actuator: Z** (black, without toggle, with slot)

**Installation drawing**

**Terminal design K**
- Blow out outlet CBE
- Operating area (reinforced insulation)
- Mounting area

**Terminal design P**
- Blow out area (miniaturable on request)
- Terminal area

Trip time values indicated for front mounting on a vertical even surface

---

This is a metric design and millimeter dimensions take precedence.
Typical time/current characteristics at 23 °C / +73.4 °F

Curve F1 (instantaneous) for DC

Curve M0 (medium delay) for AC/DC

Curve F2 (instantaneous) for AC 50/60 Hz

Curve M1 (medium delay) for DC

Curve K1 (short delay) for DC

Curve M2 (medium delay) for AC 50/60 Hz

Curve K2 (short delay) for AC 50/60 Hz

N.B. All curves will only be maintained if the escutcheon is mounted on a vertical surface.
Other characteristic curves to special order (e.g. with impulse delay for inrush peaks).
### Accessories

#### Splash cover with mounting plate and screws

1 pole

**Y 303 555 01**

- 1 pole
- Mounting holes

2 pole

**X 211 118 01**

- 2 pole
- Mounting holes

3 pole

**X 211 119 01**

- 3 pole
- Mounting holes

- **Toggle guard**

**Y 307 250 01**

- Mounting holes

---

**N.B.** All curves will only be maintained if the escutcheon is mounted on a vertical surface.

**Other characteristic curves to special order (e.g. with impulse delay for inrush peaks).**

---

**Shock directions / Mounting attitudes**

---

**Typical time/current characteristics at 23 °C / +73.4 °F**

<table>
<thead>
<tr>
<th>Curve T1 (long delay) for DC</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Graph" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Curve T2 (long delay) for AC 50/60 Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="#" alt="Graph" /></td>
</tr>
</tbody>
</table>

---

**All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.**

---

This is a metric design and millimeter dimensions take precedence (mm) inch.
Description

Single, two, three and four pole magnetic and hydraulic-magnetic circuit breakers with trip-free mechanism and toggle actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Featuring a combi-foot design for symmetric and asymmetric rail mounting. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934.

Typical applications

Power supplies, control equipment, communication systems, EDP systems.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Curves and internal resistance per pole (Ω)</th>
<th>F1</th>
<th>F2</th>
<th>K1, M1, T1, K2, M2, T2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.02</td>
<td>1493</td>
<td>953</td>
<td>2669</td>
<td>2457</td>
</tr>
<tr>
<td>0.05</td>
<td>276</td>
<td>152</td>
<td>452</td>
<td>376</td>
</tr>
<tr>
<td>0.1</td>
<td>58</td>
<td>37</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>0.25</td>
<td>8.2</td>
<td>6.0</td>
<td>15.5</td>
<td>14.7</td>
</tr>
<tr>
<td>0.5</td>
<td>2.3</td>
<td>1.47</td>
<td>3.9</td>
<td>3.2</td>
</tr>
<tr>
<td>0.75</td>
<td>0.98</td>
<td>0.63</td>
<td>1.65</td>
<td>1.56</td>
</tr>
<tr>
<td>1</td>
<td>0.58</td>
<td>0.35</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>2</td>
<td>0.145</td>
<td>0.096</td>
<td>0.26</td>
<td>0.20</td>
</tr>
<tr>
<td>2.5</td>
<td>0.096</td>
<td>0.061</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>3</td>
<td>0.065</td>
<td>0.048</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>5</td>
<td>0.025</td>
<td>&lt; 0.02</td>
<td>0.042</td>
<td>0.040</td>
</tr>
<tr>
<td>6</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>0.029</td>
<td>0.028</td>
</tr>
<tr>
<td>8</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>12</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>16</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>40</td>
<td>≤ 0.01</td>
<td>-</td>
<td>≤ 0.01</td>
<td>-</td>
</tr>
<tr>
<td>50</td>
<td>≤ 0.01</td>
<td>-</td>
<td>≤ 0.01</td>
<td>-</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

Voltage rating 3 AC 415 V; AC 240 V; DC 80 V

Current rating range 0.02...50 A single pole (40 + 50 A DC only) 0.02...50 A multiple

Auxiliary circuit 1 A, AC 240 V/DC 80 V 0.5 A DC 80 V

Typical life

3 AC 415 V AC 240 V:
- 0.02...30 A 6,000 operations at 1 x I N, inductive
- 10,000 operations at 1 x I N, resistive

DC 80 V:
- 0.02...25 A 6,000 operations at 1 x I N, inductive
- 0.02...30 A 10,000 operations at 1 x I N, resistive
- 40 + 50 A 6,000 operations at 1 x I N, resistive

Ambient temperature -40...+85 °C (-40...+185 °F)

Insulation co-ordination rated impulse pollution withstand voltage degree reinforced insulation in operating area

Dielectric strength (IEC 60664 and 60664A) test voltage
- AC 3,000 V
- AC 1,500 V
- AC 1,500 V

Insulation resistance > 100 MΩ (DC 500 V)

Interrupting capacity Icn 1,200 A at AC 2,000 A at DC

Interrupting capacity (UL 489A)
- 1,200 A at AC
- 2,000 A at DC

Degree of protection operating area IP40

Vibration with toggle down:
- 10 g at 0.9 I N
- 10 g at 1 x I N
- 10 g at 0.8 x I N in all planes.

(5-7 kHz) ± 0.76 mm (10-57 Hz) to IEC 60068-2-6, test Fc

Shock with directions 1, 2, 3, 4, 5:
- 100 g (11 ms) at 1 x I N
- 100 g (11 ms) at 0.8 x I N
- 100 g (11 ms) at 0.8 x I N

to IEC 60068-2-27, test Ea

Corrosion 96 hours at 5 % salt mist.

Authority Voltage ratings Current ratings

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>3 AC 415 V; AC 240 V; DC 80 V</td>
<td>0.02...30 A 1 to 6-pole DC 80 V 0.02...50 A 1-pole</td>
</tr>
<tr>
<td>UL1077, CSA</td>
<td>DC 80 V</td>
<td>0.02...50 A 1 to 6-pole DC 80 V 0.02...30 A 1 to 6-pole</td>
</tr>
<tr>
<td>UL 489 A</td>
<td>DC 80 V</td>
<td>0.05...30 A 1, 2-pole</td>
</tr>
<tr>
<td>CCC</td>
<td>3 AC 415 V; AC 240 V</td>
<td>0.02...50 A 1, 2-pole</td>
</tr>
</tbody>
</table>

Humidity 240 hours at 95 % RH, to IEC 60688-2-78, test Cab

Mass approx. 98 g per pole
Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-T...

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breaker</td>
<td>with toggle actuator</td>
</tr>
<tr>
<td>Mounting</td>
<td>T rail mounting</td>
</tr>
</tbody>
</table>

Configuration

- 1 snap-on installation

Number of poles

- 0 single pole, switch only
- 1 single pole protected
- 2 two pole protected
- 3 three pole protected
- 4 four pole protected
- 5 two pole, protected on one only
- 6 four pole, protected on poles 1, 2 and 3 only
- 7 two pole, switch only

Panel hardware

- 0 without panel hardware
- K1 recessed screw/pressure plates M4

Characteristic curve

- Curve F, instantaneous trip:
  - F1 DC trip at 1.01-1.5 x Iₚ₀
  - F2 AC 60/50 Hz trip at 1.01-1.5 x Iₚ₀
- Curve K, short delay:
  - K1 DC trip at 2 x Iₚ₀ 0.16-1.2 s
  - K2 AC 60/50 Hz trip at 2 x Iₚ₀ 0.13-1.6 s
- Curve M, medium delay:
  - M1 DC trip at 2 x Iₚ₀ 0.6-7.5 s
  - M2 AC 60/50 Hz trip at 2 x Iₚ₀ 2.2-20 s

Without characteristic curve

- Q0 switch only

Curve T, long delay:

- T1 DC trip at 2 x Iₚ₀ 10-70 s
- T2 AC 60/50 Hz trip at 2 x Iₚ₀ 15-150 s

Other characteristic curves to special order

(e.g. pulse-delayed, high inrush currents, capacitive loads)

<table>
<thead>
<tr>
<th>Actuator colour</th>
<th>A black, long toggle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>B white, long toggle</td>
</tr>
<tr>
<td></td>
<td>C blue, long toggle</td>
</tr>
<tr>
<td></td>
<td>K black, short toggle</td>
</tr>
<tr>
<td></td>
<td>L white, short toggle</td>
</tr>
<tr>
<td></td>
<td>M blue, short toggle</td>
</tr>
</tbody>
</table>

Other colours to special order

- Marking on actuator
  - 0 without marking
  - L 1-O; ON-OFF
  - M 1-O; ON-OFF (I₀, U₀, trip curve, schematic diagram on housing top)
  - N 1-O; ON-OFF (I₀, U₀ on housing top)

Auxiliary contacts

- H0 without auxiliary contacts
- H1 with auxiliary contact
- H2 with auxiliary contact on one pole only (multipole)

Auxiliary contact function

(see internal connection diagrams)

- 1 N/O contact
- 3 1 N/C contact

Auxiliary contact terminal design

- 6 screw/pressure plate M3

Current ratings

- 0.02...50 A

Approval (optional)

- UL 489 A

8340 - 1 1 0 - K1 M1 - A L H1 2 6 - 10 A - U ordering example

Dimensions

<table>
<thead>
<tr>
<th>long toggle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
</tr>
<tr>
<td>Height</td>
</tr>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>Main contact terminal M4 tightening torque max. 0.5 Nm wire section max. 0.75 ... 10 mm² rigid conductor (AWG 18 ... AWG 8) 0.75 ... 6 mm² flexible conductor (AWG 18 ... AWG 10)</td>
</tr>
<tr>
<td>Auxiliary contact terminal M3 tightening torque max. 0.5 Nm wire section max. 2.5 mm² (AWG 14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>short toggle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
</tr>
<tr>
<td>Height</td>
</tr>
<tr>
<td>Depth</td>
</tr>
<tr>
<td>Snap-in socket: G profile top-hat rail</td>
</tr>
</tbody>
</table>

Installation drawing

- Operating area (reinforced insulation)
- Mounting area
- Terminal area
- Blow out area (miniauturble on request)

This is a metric design and millimeter dimensions take precedence ( ).

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Internal connection diagrams

1-pole protected magnetically

line 1 or line 2

Optional N/C or N/O auxiliary contact (Si)

1-pole protected hydraulic-magnetically

multipole

Typical time/current characteristics at 23 °C / +73.4 °F

Curve T1 (long delay) for DC

Trip time in seconds

... times rated current

Curve T2 (long delay) for AC 50/60 Hz

Trip time in seconds

... times rated current

N.B. All curves will only be maintained if the escutcheon is mounted on a vertical surface.

Other characteristic curves to special order (e.g. with impulse delay for inrush peaks).

Shock directions
Typical time/current characteristics at 23 °C / +73.4 °F

Curve F1 (instantaneous) for DC

Curve F2 (instantaneous) for AC 50/60 Hz

Curve K1 (short delay) for DC

Curve K2 (short delay) for AC 50/60 Hz

Curve M0 (medium delay) for AC/DC

Curve M1 (medium delay) for DC

Curve M2 (medium delay) for AC 50/60 Hz

N.B. All curves will only be maintained if the escutcheon is mounted on a vertical surface.
Other characteristic curves to special order (e.g. with impulse delay for inrush peaks).
**Busbar 1-pole**  
**Y 308 495 01**  
The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.  
\[ I_{\text{max}} \] - busbar 100 A (40°C)

**Busbar 2-pole**  
**Y 308 496 01**  
\[ I_{\text{max}} \] - busbar 100 A (40°C)

**Busbar 3-pole**  
**Y 308 497 01**  
\[ I_{\text{max}} \] - busbar 100 A (40°C)

---

**Plug-on cap, busbar 2/3-pole**  
**Y 308 506 01**

**Caution:**  
When using multipole busbars please leave at least one pole’s width between two adjacent line entry terminals.
Description

Single or multipole hydraulic-magnetic circuit breakers with trip-free-mechanism and toggle actuation. A choice of switching characteristics ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Auxiliary contacts optional. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 60934) S-type HM CBE.

Typical applications

In the business fields Communication and Transport: power supplies, switchgear, instrumentation and process control engineering.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Trip curves and internal resistance (Ω) per pole</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K1, M1, T1,</td>
<td>K2, M2, T2</td>
</tr>
<tr>
<td>0.05</td>
<td>452</td>
<td>376</td>
</tr>
<tr>
<td>0.1</td>
<td>100</td>
<td>94</td>
</tr>
<tr>
<td>1</td>
<td>0.95</td>
<td>0.90</td>
</tr>
<tr>
<td>2</td>
<td>0.26</td>
<td>0.20</td>
</tr>
<tr>
<td>3</td>
<td>0.10</td>
<td>0.10</td>
</tr>
<tr>
<td>5</td>
<td>0.042</td>
<td>0.040</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.02</td>
<td>&lt; 0.02</td>
</tr>
<tr>
<td>40</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>60</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>80</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>100</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>125</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

Interrupting capacity to EN 60934, UL 489 and UL 1077

IEC 60934 – test series E

Voltage | number of poles | IN max. (A) | I(B) (A)
---|----------------|-------------|-----|
DC 80 V | 1 + 2          | 0.02...125  | 10,000 |
AC 240/415 V | 1 - 6          | 0.02...80   | 6 x IN |
AC 240 V | 1              | 0.02...20   | 5,000  |

UL 489 – test sequence Z

Voltage | number of poles | IN max. (A) | I(B) (A)
---|----------------|-------------|-----|
DC 80 V | 1 + 2          | 0.5...125   | 10,000 |
AC 120 V | 1              | 0.5...80    | 5,000  |
AC 120/240 V | 1          | 0.5...80    | 5,000  |
AC 240 V | 1 (2)         | 0.5...20   | 5,000  |

UL 1077

Voltage | number of poles | IN max. (A) | I(B) (A)
---|----------------|-------------|-----|
DC 80 V | 1 + 2          | 0.02...125  | 10,000 |
AC 277/480 V | 1 - 6         | 0.02...70  | 5,000  |

Technical data

Voltage rating | 3 AC 415 V; AC 277/480 V; AC 120/240 V; AC 240 V; DC 80 V.
Current rating range | 0.05...125 A single and multipole 150...180 A single pole, two poles connected in parallel higher ratings upon request
Auxiliary circuit | AC 240 V 6 A DC 28 V 3 A DC 65 V 1 A DC 80 V 0.5 A
Typical life | 10,000 operations at 1 x IN
Ambient temperature | -40...+85 °C (-40...+185 °F)
Insulation co-ordination (IEC 60664) | 2.5 kV/2 reinforced insulation in operating area
Dielectric strength test voltage | operating area AC 3,000 V pole to pole AC 1,500 V main to auxiliary circuit AC 3,000 V switching to trip circuit AC 1,500 V
Insulation resistance | > 100 MΩ (DC 500 V)
Degree of protection (IEC 60529) | operating area IP40 terminal area IP00
Vibration upside down: | 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz) at 0.9 IN
directions 1, 2, 3, 4, 5: | 10 g at 0.8 x IN in all planes. (57-2000 Hz) ± 0.76 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock directions 1, 2, 3, 4, 5: | 100 g (11 ms) at 1 x IN
with curves F1, F2: | 100 g (11 ms) at 0.8 x IN to IEC 60068-2-27, test Ea
Corrosion | 96 hours at 5% salt mist, to IEC 60068-2-11, test Ka
Humidity | 240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Mass | approx. 90 - 120 g per pole depending on version

Approvals

VDE (EN 60934) 1- to 6-pole
UL 489
UL 1077 1- to 6-pole
CCC 1- to 4-pole
Magnetic and Hydraulic-Magnetic Circuit Breaker 8345-

Ordering information for EN 60934 and UL 1077

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8345</th>
</tr>
</thead>
</table>

**Mounting**

- B flange mounting, with rectangular aperture with mounting nut 6-32UNC
- C flange mounting, with rectangular aperture with mounting nut M3
- E flange mounting, with round aperture with mounting nut 6-32UNC
- F flange mounting, with round aperture with mounting nut M3
- X flange mounting, with rectangular aperture, with 2 mounting brackets

**Configuration**

- 0 without barrier
- 1 with small barrier
- 2 with large barrier (requested for multipole AC applications with approvals to UL 489, UL 1077, IEC)

**Number of poles**

- 0 single pole unprotected
- 1 single pole protected
- 2 two pole protected
- 3 three pole protected
- 4 four pole protected

**P** one pole protected, two poles connected in parallel characteristic curves E/H/R upon request

**Q** one pole protected, three poles connected in parallel characteristic curves E/H/R upon request

**R** one pole protected, four poles connected in parallel characteristic curves E/H/R upon request

**S** one pole protected, five poles connected in parallel characteristic curves E/H/R upon request

**Actuator configuration**

- A all poles with standard toggle
- B reduced number of standard toggles
- Z without actuator

**Terminal design**

- L screw terminals M5 ≤ 50 A
- M solder terminals ≤ 75 A
- N blade terminals ≤ 35 A
- R round connectors 6 mm
- S stud terminals M5 ≤ 60 A
- T stud terminals 10-32UNF-3A ≤ 60 A
- U stud terminals M6 ≤ 125 A
- V stud terminals 1/4-20UNC-3A ≤ 125 A
- W laminated round terminals ≤ 125 A

**Terminal hardware**

- 0 without
- 3 with washer and nut
- 6 Phillips screws

**Characteristic curve**

- K1 short delay DC
- K2 short delay AC
- M0 medium delay AC/DC
- M1 medium delay DC
- M2 medium delay AC
- Q0 switch only
- T1 long delay DC
- T2 long delay AC

**Version**

- 0 standard

**Colour configuration**

- B1 black actuator
- B2 white actuator
- B3 blue actuator

**Marking**

- front plate actuator base
- B1 without ON-OFF
- B2 \( i_{\text{th}} \) ON-OFF
- B3 \( i_{\text{th}} \) ON-OFF

**Rated voltage**

- B AC or ≤ 80 V DC
- C DC ≤ 80 V
- \( AC \leq 277 V \) (only for configurations 0 and 1 for UL 1077)

Remote trip coil available to special order!

Ordering information for auxiliary contact module

<table>
<thead>
<tr>
<th>Type number</th>
<th>X6345</th>
</tr>
</thead>
</table>

**Module**

- S auxiliary contact module

**Auxiliary contacts**

- 01 in all poles
- 02 in pole 1 only
- 03 in poles 1 + 3 only
- 04 in pole 2 only

**Auxiliary contact version**

- H auxiliary contacts standard, gold-flushed (asymmetrical terminals)
- K auxiliary contacts, tin-plated (symmetrical terminals)

**Auxiliary contact function**

- W1 1 changeover
- W2 2 changeover

**Terminal design**

- 02 microswitch with blade terminals DIN 46244-A2.8-0.5
- M mounted to base unit

**Rated voltage**

- B AC or ≤ 80 V DC
- C DC ≤ 80 V
- \( AC \leq 277 V \) (only for configurations 0 and 1 for UL 1077)
Remote trip coil available to special order!
### Dimensions

**Mounting version B/C**
Flange mounting, rectangular aperture

- **Cut-out dimensions:**
  - 1-pole
    - max. panel thickness: 3 mm
  - 4-pole

**Mounting version X**
Flange mounting with rectangular aperture, with 2 mounting brackets

- **Cut-out dimensions:**
  - 1-pole
  - 4-pole

**Mounting version E/F**
Flange mounting round aperture

- **Cut-out dimensions:**
  - 1-pole
  - 4-pole

### Installation drawing

- Blow out space (can be reduced on request)
- Operating area (reinforced insulation)
- Terminal area
Terminal design / Dimensions

1-pole protected

L - with screw terminals

M - with solder terminals

P - with blade terminals

W - laminated round terminals

Number of poles / Dimensions

P 1-pole protected, 2-poles connected in parallel for rating currents from 150 to 180 A

R - round connectors D = 6 mm (dia .236) (version H) asymmetrical terminals (not for UL 489)

S/U/T/V - with auxiliary contacts (version H) asymmetrical terminals (not for UL 489)

Internal connection diagrams

1-pole protected magnetically

1-pole protected hydraulic-magnetically

multipole

This is a metric design and millimeter dimensions take precedence (mm) inch
Typical time/current characteristics at +23 °C / +73.4 °F

(trip time at rated current and all poles symmetrically loaded)

**Curve K1 (short delay) for DC**

**Curve K2 (short delay) for AC 50/60 Hz**

**Curve T1 (long delay) for DC**

**Curve T2 (long delay) for AC 50/60 Hz**

**Curve M0 (medium delay) for AC/DC**

**Curve M1 (medium delay) for DC**

**Curve M2 (medium delay) for AC 50/60 Hz**

All curves will only be maintained if the escutcheon is mounted on a vertical surface.

Other characteristic curves to special order (e.g. pulse delayed, for high inrush currents or capacitive loads).
**Actuator configuration**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Diagrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1 toggle per pole, mounting version B/C</td>
<td>![Diagram A]</td>
</tr>
<tr>
<td>B reduced number of toggles per unit, mounting version B/C</td>
<td>![Diagram B]</td>
</tr>
<tr>
<td>Z without toggles</td>
<td>![Diagram Z]</td>
</tr>
<tr>
<td>A 1 toggle per pole, mounting version E/F</td>
<td>![Diagram A]</td>
</tr>
<tr>
<td>B reduced number of toggles per unit, mounting version E/F</td>
<td>![Diagram B]</td>
</tr>
</tbody>
</table>

**Interphase barriers / Dimensions**

<table>
<thead>
<tr>
<th>1 - Interphase barrier (small)</th>
<th>2 - Interphase barrier (large)</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Diagram 1]</td>
<td>![Diagram 2]</td>
</tr>
</tbody>
</table>

**Accessories**

<table>
<thead>
<tr>
<th>Splash cover (IP65) for 1-, 2-, 3-pole (only for mounting version B/C)</th>
<th>Number of poles</th>
<th>Mounting version</th>
<th>Actuator configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 222 444 01</td>
<td>1-pole B</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>X 222 444 02</td>
<td>1-pole C</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>X 222 444 11</td>
<td>2-pole B</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>X 222 444 12</td>
<td>2-pole C</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>X 222 444 21</td>
<td>3-pole B</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>X 222 444 22</td>
<td>3-pole C</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

**Toggle guard** (only for mounting version B/C)

Y 307 381 01

**Shock directions**

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

A module which adds remote trip capability to all versions of type 8345. A voltage applied across the coil, by means of an external sensor for example, will cause disconnection of the main switch/circuit breaker mechanism.

Typical applications

Electrical monitoring of safety systems, remote trip.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Module for type 8345</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8345</td>
<td>F remote trip module</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Assembly version</th>
<th>01</th>
<th>only in pole 1</th>
<th>02</th>
<th>only in pole 2</th>
<th>03</th>
<th>only in pole 3</th>
<th>04</th>
<th>only in pole 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote trip version</td>
<td>X1</td>
<td>DC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>12 V</th>
<th>24 V</th>
<th>48 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal design</td>
<td>02</td>
<td>blade terminals DIN 4644-A2.8-0.5</td>
<td>M</td>
</tr>
</tbody>
</table>

Voltage ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Voltage ratings</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 12 V</td>
<td>3.4</td>
</tr>
<tr>
<td>DC 24 V</td>
<td>13.9</td>
</tr>
<tr>
<td>DC 48 V</td>
<td>64.3</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Voltage ratings</th>
<th>DC 12 V; DC 24 V; DC 48 V</th>
</tr>
</thead>
</table>

Power consumption approx. 40 W

Pulse operation 20 ms < t_{on} < 100 ms/t_{off} > 10 sec (Continuous duty possible for multipole devices upon request)

Typical life 10,000 operations at U_N

Ambient temperature -40...+85 °C (-40...+185 °F)

Insulation co-ordination (IEC 60664) 2.5 kV/2 (EN 60934)

Dielectric strength test voltage between main circuit and trip coil circuit AC 3,000 V (EN 60934)

Insulation resistance > 100 MΩ (DC 500 V)

Vibration 6 g (57-2000 Hz) ± 0.46 mm (10-57 Hz) shock direction 1/2

4 g (57-2000 Hz) ± 0.30 mm (10-57 Hz) shock direction 3/4

3 g (57-2000 Hz) ± 0.23 mm (10-57 Hz) shock direction 5/6

to IEC 60668-2-6, test Fc 10 frequency cycles/axis

Shock 100 g (11 ms)

(not when mounted upside down)
to IEC 60068-2-27, test Ea

Corrosion 96 hours at 5 % salt mist,
to IEC 60668-2-11, test Ka

Humidity 240 hours at 95 % RH,
to IEC 60668-2-78, test Cab

Mass approx. 8.5 g (without base unit)

This is a metric design and millimeter dimensions take precedence (\text{mm} -> \text{inch})

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Remote ON/OFF actuation X8345-R for Circuit Breaker 8345

Description

The X8345-R is an additional module which provides remotely controlled ON and OFF functionality for the E-T-A series 8345 magnetic circuit breaker range. The module actuator, which is motor driven, is factory fitted adjacent to the circuit breaker(s) which it is controlling. The module can be operated by a suitable external changeover switch, momentary switches (one ON, one OFF) or logic system (not part of our product). The status of the actuator will follow the position of the external switch, i.e. if the circuit breaker trips electrically or is operated manually, the actuator will not change.

A single module will control a single pole breaker or multipole circuit breakers up to 3 poles. In the application it has to be ensured that the supply voltage is maintained at all times.

When switching the circuit breaker OFF manually the module has also to be switched off by means of te changeover switch before switching the breaker on again. The same is true for normal switch-on of the breaker.

Ordering information

<table>
<thead>
<tr>
<th>Type number</th>
<th>Module for type 8345, 1, 2 and 3 pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8345</td>
<td>remote ON/OFF actuation</td>
</tr>
</tbody>
</table>

Operating voltage: 24 DC V

Add-on version:
- 01 mounted on right side
- 00 front panel mounting (standard)
- 01 single bracket: module fitted
- 02 2-bracket: module and circuit breaker fitted

Technical data

- Voltage rating: DC 24 V (16...32 V)
- ON duty: 50 %
- Trip time: < 2 sec
- Blocking current: < 1.5 A
- Control current: < 3 mA
- Typical life: 10,000 operations (ON/OFF)
- Ambient temperature: -25...70 °C (-13...158 °F)
- Insulation co-ordination (IEC 60664): 2.5 kV/2 (EN 60934)
- Dielectric strength: pole to module test voltage AC 1,500 V (EN 60934)
- Insulation resistance: > 100 MΩ (DC 500 V)
- Vibration: 10 g (57-2000 Hz), ± 0.76 mm (10-57 Hz) to IEC 60668-2-6, test Fc, 10 frequency cycles/axis
- Shock: 100 g (11 ms) to IEC 60668-2-27, test Ea
- Corrosion: 96 hours at 5% salt mist, to IEC 60668-2-11, test Ka
- Humidity: 240 hours at 95 % RH, to IEC 60668-2-78, test Ca
- Mass: approx. 65 g (without base unit)

Internal connection diagrams

Typical applications

Remote circuit breaker control (ON/OFF) for communication systems, marine installations, automation equipment and similar requirements.
Remote ON/OFF actuation X8345-R for Circuit Breaker 8345

Dimensions

spring loaded screwless terminal 5-pin

X8345-R-24-01-01-01-M

X8345-R-24-01-02-01-M

X8345-R-24-01-00-01-M

This is a metric design and millimeter dimensions take precedence.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single and double pole hydraulic-magnetic circuit breakers with trip-free-mechanism and toggle actuation. A choice of switching characteristics ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Auxiliary contacts optional. Low temperature sensitivity at rated load. Complies with CBE standard EN 60934 (IEC 60934) S-type HM CBE.

**Typical applications**

Railway vehicles.
In the business fields Communication and Transport: power supplies, switchgear, instrumentation and process control engineering.

**Standard current ratings and typical internal resistance values**

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Trip curves and internal resistance (Ω) per pole</th>
<th>F1, F7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>K1, M1, T1</td>
<td></td>
</tr>
<tr>
<td>0.05</td>
<td>531</td>
<td>275</td>
</tr>
<tr>
<td>0.1</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1.10</td>
<td>0.578</td>
</tr>
<tr>
<td>2</td>
<td>0.295</td>
<td>0.144</td>
</tr>
<tr>
<td>3</td>
<td>0.121</td>
<td>0.064</td>
</tr>
<tr>
<td>5</td>
<td>0.044</td>
<td>0.025</td>
</tr>
<tr>
<td>10</td>
<td>&lt; 0.02</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>15</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>20</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>25</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>30</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>40</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>60</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>&lt; 0.01</td>
<td></td>
</tr>
</tbody>
</table>

**Technical data**

- **Voltage rating**: DC 110 V ± 25 %
- **Current rating range**: 0.05...125 A
- **Auxiliary circuit**: AC 240 V 6 A
- **Voltage**: DC 28 V 3 A
- **DC 65 V 1 A**: DC 80 V 0.5 A
- **Typical life**: 5,000 operations at 1 x \(I_n\)
- **Ambient temperature**: -40...+85 °C (-40...+185 °F)
- **Insulation co-ordination (IEC 60664)**: 2.5 kV/2 reinforced insulation in operating area
- **Dielectric strength**
  - test voltage operating area AC 3,000 V
  - pole to pole AC 1,500 V
  - main to auxiliary circuit AC 3,000 V
  - switching to trip circuit AC 1,500 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity (\(I_{cn}\))**: 0.1...125 A: 5,000 A (resistive load)
  - 0.1...100 A: 3,000 A (inductive load)
  - 125 A: 2,000 A (inductive load)
- **Degree of protection (IEC 60529)**
  - operating area IP40
  - terminal area IP60
- **Vibration**
  - upside down: 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz)
  - at 0.9 \(I_n\)
  - directions 1, 2, 3, 4, 5: 10 g at 1 x \(I_n\)
  - with curve F1: 10 g at 0.8 x \(I_n\) in all planes. (57-2000 Hz) ± 0.76 mm (10-57 Hz)
  - to IEC 6068-2-6, test Fc
  - 10 frequency cycles/axis
- **Shock**
  - directions 1, 2, 3, 4, 5: 100 g (11 ms) at 1 x \(I_n\)
  - direction 6: 100 g (11 ms) at 0.8 x \(I_n\)
  - with curve F1: 100 g (11 ms) at 0.8 x \(I_n\)
  - to IEC 6068-2-27, test Ea
- **Corrosion**: 96 hours at 5% salt mist, to IEC 6068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH, to IEC 6068-2-78, test Cab
- **Flammability**: Class I1 to NF EN ISO 4589-3 and ISO 4589-1 and -2
- **Smoke emission visibility**: Class F0 to NF X 10-702-2 "smoke chamber"
- **Mass**: approx. 65 g per pole depending on version
### Magnetic and Hydraulic-Magnetic Circuit Breaker 8345-...-DC110V

#### Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>8345</th>
</tr>
</thead>
</table>

**Mounting**
- B flange mounting, with rectangular aperture with mounting nut 6-32UNC
- C flange mounting, with rectangular aperture with mounting nut M3
- E flange mounting, with round aperture with mounting nut 6-32UNC
- X flange mounting, with rectangular aperture, with 2 mounting brackets

**Number of poles**
- 0 single pole unprotected
- 1 single pole protected
- 2 two pole protected

**Module**
- S auxiliary contact module

**Auxiliary contact configuration**
- A all poles with standard toggle
- B reduced number of standard toggles
- Z without actuator

**Auxiliary contacts**
- 01 in all poles
- 02 in pole 1 only
- 04 in pole 2 only

**Auxiliary contact version**
- H auxiliary contacts standard, gold-flushed
- K auxiliary contacts, tin-plated (symmetrical terminals)

**Auxiliary contact function**
- W1 1 changeover
- W2 2 changeover

**Terminal design**
- L screw terminals M5 ≤ 50 A
- M solder terminals ≤ 75 A
- P blade terminals ≤ 35 A
- R round connectors 6 mm
- S stud terminals M5 ≤ 60 A
- T stud terminals 10-32UNF-3A ≤ 60 A
- U stud terminals M6 ≤ 125 A
- V stud terminals 1/4-20UNC-3A ≤ 125 A
- W laminated round terminals ≤ 125 A

**Terminal hardware**
- 0 without
- 3 with washer and nut
- 6 Phillips screws

**Characteristic curve**
- F1 instantaneous trip ≤ 50 A (tripping current 150 %)
- F7 instantaneous trip ≤ 50 A (tripping current 125 %)
- K1 short delay
- M1 medium delay
- Q0 switch only
- T1 long delay

**Version**
- D standard

**Colour configuration**
- B1 black actuator
- B2 white actuator
- B3 blue actuator

**Marking**
- B0 front plate actuator base
- B1 without
- B2 ON-OFF
- B3 ON-OFF
- B4 characteristic curve ON-OFF

**Rated voltage**
- A DC 110 V
- 0.05...125 A
- higher current ratings upon request

**Ordering example**
- X8345 - C 0 1 A - U 3 M1 - D B1 A1 A - DC110 V ordering example

Remote trip coil available to special order!
### Dimensions

<table>
<thead>
<tr>
<th>Mounting version B/C</th>
<th>Flange mounting rectangular aperture</th>
</tr>
</thead>
<tbody>
<tr>
<td>number of poles 1 to 2</td>
<td></td>
</tr>
<tr>
<td>pole 1</td>
<td>2</td>
</tr>
<tr>
<td>19.1 ± 0.1</td>
<td></td>
</tr>
<tr>
<td>19.7 ± 0.04</td>
<td></td>
</tr>
<tr>
<td>mounting thread M3 or 6-32</td>
<td></td>
</tr>
<tr>
<td>all dimensions referred to the top edge</td>
<td></td>
</tr>
<tr>
<td>mounting depth 4.2 mm/165 in</td>
<td></td>
</tr>
<tr>
<td>max. insertion depth 5.5 mm</td>
<td></td>
</tr>
<tr>
<td>max. tightening torque 0.33 Nm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cut-out dimensions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-pole</td>
</tr>
<tr>
<td>2-pole</td>
</tr>
<tr>
<td>6.2</td>
</tr>
<tr>
<td>2.67</td>
</tr>
<tr>
<td>67.7</td>
</tr>
<tr>
<td>11</td>
</tr>
<tr>
<td>1.13</td>
</tr>
<tr>
<td>46</td>
</tr>
<tr>
<td>48</td>
</tr>
<tr>
<td>2.079</td>
</tr>
<tr>
<td>3.956</td>
</tr>
<tr>
<td>3.58</td>
</tr>
<tr>
<td>19.2</td>
</tr>
<tr>
<td>.138-0(\times)M3</td>
</tr>
<tr>
<td>3.58-0(\times) (6-32UNC)</td>
</tr>
<tr>
<td>.157-0(\times) (6-32UNC)</td>
</tr>
<tr>
<td>max. panel thickness: 3 mm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting version X</th>
<th>Flange mounting, with rectangular aperture, with 2 mounting brackets</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-pole</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
</tr>
<tr>
<td>2.35</td>
<td></td>
</tr>
<tr>
<td>Interphase barrier</td>
<td></td>
</tr>
<tr>
<td>n x 19 x 4 (42)</td>
<td></td>
</tr>
<tr>
<td>n x .748 ± .757 (1.50)</td>
<td></td>
</tr>
<tr>
<td>mounting screw M6</td>
<td></td>
</tr>
<tr>
<td>n x 19 x 24 (82)</td>
<td></td>
</tr>
<tr>
<td>n x .748 ± .966 (2.44)</td>
<td></td>
</tr>
<tr>
<td>n x 19 x 40 (76)</td>
<td></td>
</tr>
<tr>
<td>n x .748 ± 1.57 (3.44)</td>
<td></td>
</tr>
<tr>
<td>blow out space (can be reduced on request)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>1.14</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
</tr>
<tr>
<td>67.5</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td></td>
</tr>
<tr>
<td>mounting area</td>
<td></td>
</tr>
<tr>
<td>terminal area</td>
<td></td>
</tr>
</tbody>
</table>

### Installation drawing

This is a metric design and millimeter dimensions take precedence (mm) inch

---

**Issue B**

www.e-t-a.com

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Terminal design / Dimensions

P - with blade terminals

L - with screw terminals

terminal with flat head screw M5 tightening torque max. 1.2 Nm

M - with solder terminals

R - round connectors D = 6 mm (dia. 0.236) (version H) asymmetrical terminals (not for UL 489)

S/U/T/V - with auxiliary contacts (version H) asymmetrical terminals (not for UL 489)

auxiliary contact module (change over)

auxiliary contacts version K symmetrical terminals

W - laminated round terminals

plug-in hole

cylindrical terminal area

Internal connection diagrams

1-pole protected magnetically

multipole

1-pole protected hydraulic-magnetically

This is a metric design and millimeter dimensions take precedence (mm) inch.
(Trip time at rated current and all poles symmetrically loaded)

**Curve F1** (instantaneous trip) \( \leq 50 \, \text{A} \)

**Curve F7** (instantaneous trip) \( \leq 50 \, \text{A} \)

**Curve K1** (short delay)

**Curve M1** (medium delay)

**Curve T1** (long delay)

All curves will only be maintained if the escutcheon is mounted on a vertical surface.

Other characteristic curves to special order (e.g., pulse delayed, for high inrush currents or capacitive loads).
Actuator configuration

A  1 toggle per pole, mounting version B/C

B  reduced number of toggles per unit, mounting version B/C

Z  without toggles

A  1 toggle per pole, mounting version E/F

B  reduced number of toggles per unit, mounting version E/F

Interphase barriers / Dimensions

1 - Interphase barrier (small)

2 - Interphase barrier (large)

Accessories

Splash cover (IP65) for 1-, 2-pole (only for mounting version B/C)

<table>
<thead>
<tr>
<th>number of poles</th>
<th>mounting version</th>
<th>actuator configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 222 444 01</td>
<td>1-pole</td>
<td>B 1</td>
</tr>
<tr>
<td>X 222 444 02</td>
<td>1-pole</td>
<td>C 1</td>
</tr>
<tr>
<td>X 222 444 11</td>
<td>2-pole</td>
<td>B 2</td>
</tr>
<tr>
<td>X 222 444 12</td>
<td>2-pole</td>
<td>C 2</td>
</tr>
</tbody>
</table>

Toggle guard (only for mounting version B/C)

Y 307 381 01

Shock directions

This is a metric design and millimeter dimensions take precedence (mm).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com
Description

Single, double and three pole high performance thermal-magnetic circuit breakers with tease-free, trip-free, snap action mechanism and toggle actuation (S-type TM CBE to EN 60 934; also to EN 60 947). Designed for rail, panel or surface mounting. Available with a choice of characteristic curves and optional auxiliary contacts.

Typical applications

Motors, generators, transformers, thyristors and silicon rectifiers.

Interrupting capacity to IEC 60947/EN 60947

<table>
<thead>
<tr>
<th>AC voltage</th>
<th>Number of poles</th>
<th>Voltage rating</th>
<th>Interrupting capacity $I_n$</th>
<th>Power factor</th>
<th>Interrupting capacity $I_n$</th>
<th>Power factor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>AC 240 V</td>
<td>5,000 A</td>
<td>cosθ = 0.7</td>
<td>3,500 A</td>
<td>cosθ = 0.8</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>AC 240 V</td>
<td>8,000 A</td>
<td>cosθ = 0.7</td>
<td>6,000 A</td>
<td>cosθ = 0.7</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>3 AC 415 V</td>
<td>5,000 A</td>
<td>cosθ = 0.7</td>
<td>3,000 A</td>
<td>cosθ = 0.85</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>63</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>125</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

DC voltage ratings:

<table>
<thead>
<tr>
<th>DC voltage</th>
<th>Number of poles</th>
<th>Voltage rating</th>
<th>Interrupting capacity $I_n$</th>
<th>Time constant</th>
<th>Interrupting capacity $I_n$</th>
<th>Time constant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>DC 110 V</td>
<td>3,000 A</td>
<td>13 ms</td>
<td>3,000 A</td>
<td>L/R = 5 ms</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>DC 110 V</td>
<td>10,000 A</td>
<td>13 ms</td>
<td>3,000 A</td>
<td>L/R = 5 ms</td>
</tr>
</tbody>
</table>

Standard current ratings and typical internal resistance values

Curves 01, 02, 04, 05:

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) per pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>0.033</td>
</tr>
<tr>
<td>16</td>
<td>0.015</td>
</tr>
<tr>
<td>20</td>
<td>0.010</td>
</tr>
<tr>
<td>25</td>
<td>0.0062</td>
</tr>
<tr>
<td>32</td>
<td>0.0039</td>
</tr>
<tr>
<td>40</td>
<td>0.0031</td>
</tr>
<tr>
<td>50</td>
<td>0.0022</td>
</tr>
<tr>
<td>63</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>80</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>90</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>100</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>125</td>
<td>≤ 0.002</td>
</tr>
</tbody>
</table>

Curves B3, C3:

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω) per pole</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>16</td>
<td>10</td>
</tr>
<tr>
<td>20</td>
<td>12</td>
</tr>
<tr>
<td>25</td>
<td>16</td>
</tr>
<tr>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>40</td>
<td>25</td>
</tr>
<tr>
<td>50</td>
<td>32</td>
</tr>
<tr>
<td>63</td>
<td>40</td>
</tr>
<tr>
<td>80</td>
<td>50</td>
</tr>
<tr>
<td>90</td>
<td>63</td>
</tr>
<tr>
<td>100</td>
<td>80</td>
</tr>
<tr>
<td>125</td>
<td>100</td>
</tr>
</tbody>
</table>

Approvals

Authority | Voltage ratings | Current ratings |
----------|-----------------|-----------------|
UL        | AC 277 V        | 7...125 A (type 520) |
UL Canada | AC 277 V        | 7...125 A (type 520) |

Technical data

Voltage rating:
AC 240 V; 3 AC 415 V; DC 110 V

Current rating range:
10...125 A (EN 60947), curves 01/02/04/05
7...100 A (EN 60898), curves B3/C3/01

Auxiliary circuit:
6 A, AC 240 V or DC 28 V
1 A, DC 110 V

Typical life:
10,000 operations at 1 x $I_n$
20,000 operations mechanical

Ambient temperature:
-20...+60 °C (-4...+140 °F)

Insulation co-ordination rated impulse pollution (IEC 60664 and 60664A):
Rated withstand voltage: 6 kV
Degree of pollution: 3

Dielectric strength (IEC 60664 and 60664A):
Test voltage:
AC 3,300 V
AC 3,300 V
AC 2,200 V
AC 1,000 V

Insulation resistance:
> 100 MΩ (DC 500 V)

Degree of protection:
Operating area IP40
Terminal area IP00

Vibration:
Curves 02/04/05/B3/C3:
4 g (60-500 Hz), ± 0.30 mm (10-60 Hz)
Curve 01:
3 g (60-500 Hz), ± 0.23 mm (10-60 Hz)
to IEC 60068-2-6, test Fc
10 frequency cycles/axis

Shock:
Curves 02, 04, 05, B3, C3:
50 g (11 ms) directions 1, 2, 3, 4, 5
20 g in direction 6
to IEC 60068-27, test Ea

Corrosion:
96 hours at 5 % salt mist,
to IEC 60068-2-11, test Ka

Humidity:
240 hours at 95 % RH
to IEC 60068-2-3, test Ca

Mass:
410 (1-pole): approx. 290 g
520 (2-pole): approx. 580 g
530 (3-pole): approx. 870 g

 Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
High Performance Thermal-Magnetic Circuit Breakers 410/520/530-...

Ordering information

Type No.
410 single pole (ratings > 125 A: suffix 17015 - parallel connection)
520 double pole
530 three pole

Terminal design - main terminals
K screw terminals
- 10-32 A pressure plate B5-DIN 46288 (curves B3/C3, 7-25 A)
- 40-63 A pressure plate B6-DIN 46288 (curves B3/C3, 32-63 A)
- 80-125 A terminal screw DIN 46206, sheet 2, form 1, M6 thread

Mounting
1 surface mounting
2 rail mounting (DIN EN 50022-35x7.5) or panel mounting
3 rail mounting on G profile (DIN EN 50035-G32) or panel mounting
4 panel mounting with cylinder head screw M3.5
5 mounting brackets

Magnetic trip curves
01 2.1-3 x Iᵣ AC (thyristor and rectifier protection)
02 7-10 x Iᵣ AC (motor and generator protection to EN 60947)
04 3.5-5 x Iᵣ AC (cable protection to EN 60947)
05 4-6 x Iᵣ AC (generator protection to EN 60947)
B3 3-5 x Iᵣ AC (cable protection to EN 60898)
C3 5-10 x Iᵣ AC (cable protection to EN 60898)

Auxiliary contacts optional (terminals M3.5)
S1 one each N/O and N/C contact
S11 one N/C (11,12)
S12 one N/O (13,14)
S13 two each N/O and N/C (types 520/530)
S14 three N/C, three N/O (type 530)

Current ratings
-7...125 A

520 - K - 1 - 01 - ... - 10 A ordering example

The exact number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Mounting methods

Surface mounting
-1
-2 rail mounting (DIN EN 50 022-35x7.5)

rail mounting on G profile (DIN EN 50 035-G32)
-3

panel mounting
-4

surface mounting with mounting brackets
-5

Dimensions

This is a metric design and millimeter dimensions take precedence (mm) over (in).
Typical time/current characteristics at +23 °C/+73.4 °F

Magnetic trip curves 01, 02, 04, 05

Magnetic trip curves B3, C3

AC/DC

Trip time in seconds

... times rated current

1 Magnetic tripping currents are increased by 20% on DC supplies.

Internal connection diagrams

Type 410-K

Type 410-K-Si

Type 520-K-Si

Type 520-K-2Si

Type 530-K-Si

Type 530-K-3Si

Shock directions
Splash cover (transparent), with fixing plate and screws (IP54) for type 410 X 211 118 01

Splash cover (transparent), with fixing plate and screws (IP54) for type 520 X 211 119 01

Terminal insulation cover for 410/520/530-...
X 211 705 01
(1 set = 2 pcs per pole)

* to DIN 57106T100/VDE 0106 T100

This is a metric design and millimeter dimensions take precedence (mm).inch

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole high performance thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted and available in tracked vehicle, aircraft and general purpose versions.

Typical applications

Extra low voltage wiring systems on all types of vehicles for land, sea and air; defence equipment; battery powered machines.

Ordering information

Type No.
412 threadneck panel mounting

Terminal design
K14 screw terminals M4 (to aircraft specs.)
K54 screw terminals M4 sealed housing (to vehicle specs.)

Version
FN2 vehicle application, nickel-plated
LN2 aircraft application, black finish
N2 general application, nickel-plated

Current ratings
6...25 A (-FN2)
7.5...35 A (-LN2/N2)

412 - K14 - LN2 - 10 A ordering example

Standard current ratings and typical voltage drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
<th>Current rating (A)</th>
<th>Voltage drop (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-LN/N</td>
<td>-FN</td>
<td>-LN/N</td>
</tr>
<tr>
<td>6</td>
<td>≤ 300</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>7.5</td>
<td>≤ 250</td>
<td>≤ 250</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>≤ 200</td>
<td>≤ 200</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>≤ 200</td>
<td>≤ 200</td>
<td>30</td>
</tr>
<tr>
<td>12</td>
<td>≤ 200</td>
<td>≤ 200</td>
<td>35</td>
</tr>
<tr>
<td>13</td>
<td>≤ 200</td>
<td>≤ 200</td>
<td>40</td>
</tr>
</tbody>
</table>

Approvals

Test authority  Voltage ratings  Current ratings
UL  DC 28 V  0.1...35 A

Technical data

Voltage rating  DC 28 V
AC 115 V (400 Hz) upon request

Current rating range  6...25 A (-FN2)
7.5...35 A (-LN2/N2), lower current ratings to special order

Typical life  4,000 operations at 2 x I_n

Ambient temperature  -55...+75 °C (-67...+167 °F)

Insulation co-ordination (IEC 60664 and 60664A) withstand voltage 1.5 kV

Pollution degree  3

Dielectric strength (IEC 60664 and 60664A) test voltage AC 1,500 V

Insulation resistance  > 100 MΩ (DC 500 V)

Interrupting capacity (UL 1977) 6,000 A

Interrupting capacity (IEC 60529/DIN 40050) operating area IP40

Degree of protection operating area IP40

Vibration 10 g (56-500 Hz), ± 0.76 mm (10-55 Hz) to VG 95210, sheet 19,
MIL-STD-202, meth. 204,
IEC 60668-2-6, test Fc

Shock 25 g (11 ma) to VG 95210, sheet 28,
MIL-STD-202, meth. 213,
IEC 6068-2-27, test Ea

Corrosion 96 hours at 5 % salt mist,
to VG 95210, sheet 2,
MIL-STD-202, meth. 101,
IEC 60668-2-11, test Ka

Humidity 240 hours at 95 % RH

to VG 95210, sheet 7,
MIL-STD-202, meth. 106,
IEC 6068-2-3, test Ca

Mass approx. 40 g
High Performance Thermal Circuit Breaker 412-...

Dimensions

**412-K54-FN2/N2**

- Current rating in A: 6.0 to 25.0
- Thickness: 1.5 to 3 mm
- Location pin: 2.7
- Mounting holes: 9.5
- Terminal version: < 6 A
- Tightening torque max. 4 Nm

**412-K14/K54-FN2/N2**

- Current rating in A: 6.0 to 25.0
- Thickness: 1.5 to 3 mm
- Location pin: 2.7
- Mounting holes: 9.5
- Terminal version: < 6 A
- Tightening torque max. 4 Nm

**412-K14-LN2**

- Current rating in A: 7.5 to 35.0
- Thickness: 1.5 to 3 mm
- Location pin: 2.7
- Mounting holes: 9.5
- Terminal version: < 7.5 A

**412-K14/K54-LN2**

- Current rating in A: 7.5 to 35.0
- Thickness: 1.5 to 3 mm
- Location pin: 2.7
- Mounting holes: 9.5
- Terminal version: < 7.5 A

Internal connection diagram

Typical time/current characteristics

**412-...-FN2 6...25 A**

- Trip time in seconds
- Times rated current
- Temperature: +75°C, +167°F, +73.4°C, +23°C, +167°F, -55°C, -67°F

**412-...-LN2/-N2 7.5...35 A**

- Trip time in seconds
- Times rated current
- Temperature: +75°C, +167°F, +73.4°C, +23°C, +167°F, -55°C, -67°F

This is a metric design and millimeter dimensions take precedence (mm) inch.
**Accessories (approved to VG 95345, part 23)**

**Splash cover /hex nut assembly with O ring (IP66 and IP67)**
- X 200 801 08 - nickel plated nut M12x1, transparent cover
- X 200 801 03 - matt black finish nut M12x1, black cover

**Splash cover black /hex nut assembly with O ring (IP54)**
- X 200 802 01 - nickel plated nut M12x1
- X 200 802 02 - matt black finish nut M12x1

**Actuator extension** (black)
- to be fitted on the push button
- X 200 803 01

**Identification collar** to be snapped on the push button
- Y 307 004 01 - black
- Y 307 004 02 - white
- Y 307 004 03 - red
- Y 307 004 04 - green
- Y 307 004 05 - blue

**Lock out ring** to block the push button in OFF position
- Y 307 005 01 - red
- Y 307 005 02 - black

---

This is a metric design and millimeter dimensions take precedence (mm) inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
High Performance Thermal Circuit Breaker 413-...

**Description**

Single pole high performance thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted and available in tracked vehicle, aircraft and general purpose versions.

**Typical applications**

Extra low voltage wiring systems on all types of vehicles for land, sea and air; defence equipment; battery powered machines.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>threadneck panel mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>413</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal design</th>
</tr>
</thead>
<tbody>
<tr>
<td>K14</td>
</tr>
<tr>
<td>K34</td>
</tr>
<tr>
<td>K54</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN2</td>
</tr>
<tr>
<td>LN2</td>
</tr>
<tr>
<td>N2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>30...55 A (-FN2)</td>
</tr>
<tr>
<td>30...90 A (-LN2/N2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Technical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating</td>
</tr>
<tr>
<td>DC 28 V</td>
</tr>
<tr>
<td>AC 115 V (400 Hz) upon request</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current rating range</th>
</tr>
</thead>
<tbody>
<tr>
<td>30...55 A (-FN2)</td>
</tr>
<tr>
<td>30...90 A (-LN2/N2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical life</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,000 operations at 1 x (I_n)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ambient temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>-55...+75 °C (-67...+167 °F)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation co-ordination rated impulse withstand voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5 kV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dielectric strength (IEC 60664 and 60664A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>test voltage</td>
</tr>
<tr>
<td>AC 1,500 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation resistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interrupting capacity (UL 1077)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,000 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of protection (IEC 60664/DIN 40050)</th>
</tr>
</thead>
<tbody>
<tr>
<td>operating area</td>
</tr>
<tr>
<td>IP40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 g (56-500 Hz), ± 0.76 mm (10-55 Hz) to VG 95210, sheet 19, MIL-STD-202, meth. 204, IEC 60068-2-6, test Fc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 g (11 ma) to VG 95210, sheet 28, MIL-STD-202, meth. 213, IEC 60068-2-27, test Ea</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corrosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>96 hours at 5 % salt mist, to VG 95210, sheet 2, MIL-STD-202, meth. 101, IEC 60068-2-11, test Ka</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Humidity</th>
</tr>
</thead>
<tbody>
<tr>
<td>240 hours at 95 % RH to VG 95210, sheet 7, MIL-STD-202, meth. 106, IEC 60068-2-3, test Ca</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>approx. 65 g</td>
</tr>
</tbody>
</table>
High Performance Thermal Circuit Breaker 413-...

Dimensions

**413-K14-...**
- Current rating in A
- Location pin: SW14
- Mounting holes: min. Ø3.2, max. Ø12.5
- Thickness: 1.5 - 3 mm (.099 - .118 in.)
- Lock washer:
  - Black
  - White
  - Lock washer DIN 137-B6
- Tightening torque max. 4 Nm

**413-K14-LN2**
- Current rating in A
- Location pin: SW14
- Mounting holes: min. Ø3.2, max. Ø12.5
- Thickness: 1.5 - 3 mm (.099 - .118 in.)
- Lock washer:
  - Black
  - White
  - Lock washer DIN 137-B6
- Tightening torque max. 4 Nm

**413-K34/K54-...**
- Current rating in A
- Location pin
- Mounting holes: min. Ø3.2, max. Ø12.5
- Thickness: 1.5 - 3 mm (.099 - .118 in.)
- Lock washer:
  - Black
  - White
  - Lock washer DIN 137-B6
- Tightening torque max. 4 Nm

**413-K34/K54-FN2/-N2**
- Current rating in A
- Location pin
- Mounting holes: min. Ø3.2, max. Ø12.5
- Thickness: 1.5 - 3 mm (.099 - .118 in.)
- Lock washer:
  - Black
  - White
  - Lock washer DIN 137-B6
- Tightening torque max. 4 Nm

Typical time/current characteristics

**413-...-FN2 30...55 A**
- Trip time in seconds
- Rated current
- Time in seconds

**413-...-LN2/-N2 30...90 A**
- Trip time in seconds
- Rated current
- Time in seconds

This is a metric design and millimeter dimensions take precedence (mm) inch.
## Accessories (approved to VG 95345, part 23)

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splash cover /hex nut assembly with O ring (IP66 and IP67)</td>
<td>X 200 801 06</td>
<td>Nickel plated M12x1, transparent cover</td>
</tr>
<tr>
<td></td>
<td>X 200 801 03</td>
<td>Matt black finish M12x1, black cover</td>
</tr>
<tr>
<td>Splash cover black /hex nut assembly with O ring (IP54)</td>
<td>X 200 802 01</td>
<td>Nickel plated M12x1</td>
</tr>
<tr>
<td></td>
<td>X 200 802 02</td>
<td>Matt black finish M12x1</td>
</tr>
<tr>
<td>Actuator extension (black)</td>
<td>X 200 803 01</td>
<td>To be fitted on the push button</td>
</tr>
</tbody>
</table>

## Accessories

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification collar to be snapped on the push button</td>
<td>Y 307 004 01</td>
<td>Black</td>
</tr>
<tr>
<td></td>
<td>Y 307 004 02</td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Y 307 004 03</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>Y 307 004 04</td>
<td>Green</td>
</tr>
<tr>
<td></td>
<td>Y 307 004 05</td>
<td>Blue</td>
</tr>
<tr>
<td>Lock out ring to block the push button in OFF position</td>
<td>Y 307 005 01</td>
<td>Red</td>
</tr>
<tr>
<td></td>
<td>Y 307 005 02</td>
<td>Black</td>
</tr>
</tbody>
</table>

---

This is a metric design and millimeter dimensions take precedence (mm) inch. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description


Typical applications

Extra low voltage systems, control equipment.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Current ratings</th>
<th>Current ratings</th>
<th>Ordering example</th>
</tr>
</thead>
<tbody>
<tr>
<td>428</td>
<td>0.05...25 A</td>
<td>10 A</td>
<td></td>
</tr>
</tbody>
</table>

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.05</td>
<td>534</td>
<td>4</td>
<td>0.1407</td>
</tr>
<tr>
<td>0.1</td>
<td>149</td>
<td>5</td>
<td>0.1068</td>
</tr>
<tr>
<td>0.2</td>
<td>56</td>
<td>6</td>
<td>0.0627</td>
</tr>
<tr>
<td>0.3</td>
<td>24.2</td>
<td>7</td>
<td>0.0491</td>
</tr>
<tr>
<td>0.4</td>
<td>13.65</td>
<td>8</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>0.5</td>
<td>8.08</td>
<td>10</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>0.6</td>
<td>5.25</td>
<td>12</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>0.8</td>
<td>3.55</td>
<td>14</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>1</td>
<td>2.02</td>
<td>15</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>1.5</td>
<td>0.904</td>
<td>16</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>2</td>
<td>0.514</td>
<td>18</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>2.5</td>
<td>0.36</td>
<td>20</td>
<td>≤ 0.02</td>
</tr>
<tr>
<td>3</td>
<td>0.23</td>
<td>25</td>
<td>≤ 0.02</td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VDE (EN 60934)</td>
<td>AC 240 V; DC 28 V</td>
<td>0.05...25 A</td>
</tr>
</tbody>
</table>

Technical data

For further details please see chapter: Technical Information

| Voltage rating | 250 V (50/60 Hz); DC 28 V |
| Current rating range | 0.05...25 A |
| Typical life | 2,000 operations at 1 x I N, inductive; 4,000 operations at 1 x I N, resistive |
| Ambient temperature | -30...+60 °C (-22...+140 °F) |
| Insulation co-ordination | Rated impulse withstand voltage degree 2.5 kV reinforced insulation in operating area |
| Insulation resistance | > 100 MΩ (DC 500 V) |
| Interrupting capacity I on | 0.05...5 A 400 A; 5.5...7.5 A 750 A; 8...25 A 1,500 A (with back-up fuse NH 40 A to IEC 60269/VDE 0636) |
| Degree of protection (IEC 60529/DIN 40050) | Operating area IP40; terminal area IP00 |
| Vibration | 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc; 10 frequency cycles/axis |
| Shock | 25 g (11 ms) to IEC 60068-2-27, test Ea |
| Corrosion | 96 hours at 5 % salt mist to IEC 60068-2-11, test Ka |
| Humidity | 240 hours at 95 % RH to IEC 60068-2-3, test Ca |
| Mass | approx. 50 g |
**High Performance Thermal-Magnetic Circuit Breaker 428-...**

### Dimensions

- **Installation drawing**
  - Operating area (reinforced insulation)
  - Socket
  - Dimensions
    - ø9.5
    - 374
    - 43
    - 6
    - 236

- **Internal connection diagram**
  - Line 1
  - Current rating in A
  - ø9.5
  - 374
  - 43
  - 6
  - 236

### Typical time/current characteristics

- **0.05 ... 7 A AC/DC**
- **8 ... 16 A AC/DC**
- **16 ... 25 A (for \(I_p \geq 20 A\) ON duty/30 minutes) AC/DC**

*1 Magnetic tripping currents are increased by 20% on DC supplies.*
### Accessories

#### Sockets 10R-K10
(continuous load up to 20 A)

<table>
<thead>
<tr>
<th>Wire cross sectional area</th>
<th>Blade terminal DIN 46244-A6.3-0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x max. 2.5 mm² (AWG 14) stranded</td>
<td>(GC .250)</td>
</tr>
</tbody>
</table>

#### 10R-P10
(continuous load up to 16 A)

<table>
<thead>
<tr>
<th>Wire cross sectional area</th>
<th>Blade terminal DIN 46244-A6.3-0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x max. 4 mm² (AWG 12) solid</td>
<td>(GC .250)</td>
</tr>
</tbody>
</table>

#### 10R-A10
(continuous load up to 16 A)

<table>
<thead>
<tr>
<th>Wire cross sectional area</th>
<th>Blade terminal DIN 46244-A6.3-0.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x max. 4 mm² (AWG 12) solid</td>
<td>(GC .250)</td>
</tr>
</tbody>
</table>

#### Bus bars for sockets 10R....:
(continuous load up to 20 A)

<table>
<thead>
<tr>
<th>Y 301 166 02 (2-way)</th>
<th>Y 301 166 01 (4-way)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness = 0.8 mm .031 in.</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Socket 16
(continuous load up to 16 A)

<table>
<thead>
<tr>
<th>Symmetrical rail</th>
<th>EN 50022-35x7.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socket individually (de)mountable</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Blanking plug
Y 301 477 01
for sockets 10R-P10/K10/A10

#### Terminal for mounting rack
X 200 800 01
for socket 10R, 10F on EN rail 50 035-G32

#### Connector bus links -K10
X 210 589 01/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 589 02/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
for sockets 10R-P10, 10R-A10 and Nr. 16

#### Connector bus links -P10
X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

---

This is a metric design and millimeter dimensions take precedence (mm)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved.Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
High Performance Thermal-Magnetic Circuit Breaker 437-...

Description

Single pole high performance thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and toggle actuation (S-type TM CBE to EN 60894). Options include auxiliary contacts, a moulded flame retardant enclosure for added environmental protection, and remote operation - disconnection only, or disconnection and re-connection. Now also available in an IP65 housing (see E-1032, page 269).

Typical applications

Battery and cable protection for all types of vehicles (including rail vehicles and boats), battery powered systems.

Ordering information

- **Type No.**: 437 - single pole, toggle actuator (2-pole upon request)
- **Enclosure design (optional)**:
  - B3: moulded, high environmental protection degree, without operating knob
  - B31: moulded, high environmental protection degree, with operating knob
  - B35: as B31, but for remote disconnection and re-connection facility
- **C3 housing without operating knob, single pole, IP65**
- **Terminal design**:
  - K12: flat screw terminals M10, for enclosure B3, B31 or B35
  - K60: flat screw terminals DIN 46206, sheet 2, form 1, thread M10
  - K71: compulsory and only for C3 housing
- **Mounting**:
  - 1: lugs
  - 2: compulsory and only for C3 housing
  - 5: brackets
  - 06: fast trip
  - 07: delayed trip
- **Auxiliary contacts** (blade terminals 6.3x08):
  - S1: one each N/O and N/C
  - S101: one N/C (11/12), two N/O (13/14 + 23/24)
  - S12: one N/O (13/14)
  - 2S12: two N/O
- **Remote trip (optional)**:
  - FA: electrical remote disconnection
  - FC: electrical remote disconnection (FA) and re-connection (FE)
  - BC-FA: electrical remote disconnection (FA) and manual/remote re-connection not for enclosure B and C
- **Coil voltage**:
  - 12 DC 12 V
  - 24 DC 24 V
- **Voltage ratings** (blank) ≤ DC 110 V
  - B: ≥ DC 110 V
- **Auxiliary contact rating** 6 A max. at DC 28 V
- **Auxiliary current** approx. 0.2 A at DC 180 V
- **Switching time** ≤ 20 ms
- **Electrical remote disconnection (-FA)**
  - operating voltage DC 12 V or DC 24 V
  - max. pulse time 0.1 s < tON < 1.2 s / tOFF > 60 s
  - switching time < 100 ms
- **Electrical remote re-connection (-FC)**
  - operating voltage DC 12 V or DC 24 V
  - max. pulse time 10 ms < tON < 20 ms / tOFF > 10 s
  - switching time < 20 ms
- **Typical life** 3,000 operations at 24 A, DC 180 V
- **Insulation resistance** > 100 MΩ (DC 500 V)
- **Dielectric strength**
  - (IEC 6064 and 60664 A) test voltage rated impulse withstand voltage pollution degree
  - AC 3,300 V AC 2,200 V 6 kV 3
  - AC 1,000 V
- **Degree of protection** (IEC 60529/DIN 40050)
  - operating area IP40, terminal area IP00 with enclosure B IP54 with enclosure C IP65
- **Vibration**
  - curve 06: 25 g (11 ms), to IEC 60068-2-27, test FA
  - curve 07: 4 g (60-500 Hz), ± 0.3 mm (10-60 Hz)
  - 7,500 A at DC 28 V; L/R = 13 ms
  - 10,000 A at DC 28 V; L/R = 0 ms
  - 2,000 A at DC 180 V; L/R = 0 ms
  - 10,000 A at DC 28 V; L/R = 0 ms
- **Shock**
  - curve 06: 20 g (11 ms), to IEC 60068-2-27, test E
  - curve 07: 40 g (11 ms), to IEC 60068-2-27, test E
- **Humidity**
  - 240 hours at 95 % RH, to IEC 60068-2-3, test Ca
- **Mass**
  - approx. 900 g base unit
  - approx. 400 g remote disconnection
  - approx. 100 g remote re-connection
  - approx. 750 g B housing
  - approx. 1,000 g C housing

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>&lt; 0.003</td>
<td>120</td>
<td>≤ 0.002</td>
</tr>
<tr>
<td>50</td>
<td>&lt; 0.002</td>
<td>160</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>63</td>
<td>≤ 0.002</td>
<td>200</td>
<td>≤ 0.001</td>
</tr>
<tr>
<td>80</td>
<td>≤ 0.002</td>
<td>240</td>
<td>≤ 0.001</td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Ordering example

437-... K60 - 5 - 06 - 2Si2 - FA 24 - 50A - ...
High Performance Thermal-Magnetic Circuit Breaker 437-...

**Moulded enclosure IP54 - B3**

- Dimensions:
  - Cylinder-head screw M6x16-4.8 ISO 1207
  - Slot for mounting screw M6

**Moulded enclosure IP65 - C3**

- Dimensions:
  - Connector to DIN 72585
  - M10 tightening torque max. 20 Nm

**Terminals with housing C3**

- Specifications:
  - M10x25 tightening torque max. 4 Nm
  - Blade terminals (QC .250)
  - DIN 46244-A6.3-0.8-Bz
  - 2 terminals for remote disconnection
  - 2 terminals for S1 (N/C)
  - 2 terminals for 2S2 (2 N/O)

Rubber caps and cable fasteners are supplied with the product.

This is a metric design and millimeter dimensions take precedence over inch dimensions.

**Issue B**
High Performance Thermal-Magnetic Circuit Breaker 437-...

### Dimensions

#### 437-K12-…-BC-FA..

- M3.5x10 tightening torque max. 0.55 Nm
- N/C or FA
- N/O

### Typical time/current characteristics at +23 °C/+73.4 °F

#### Curve 06 (fast trip)

- DC

<table>
<thead>
<tr>
<th>Trip time in seconds</th>
<th>Rated current</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>10000</td>
</tr>
<tr>
<td>0.01</td>
<td>1000</td>
</tr>
<tr>
<td>0.01</td>
<td>100</td>
</tr>
<tr>
<td>0.01</td>
<td>10</td>
</tr>
<tr>
<td>0.01</td>
<td>1</td>
</tr>
<tr>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>0.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

#### Curve 07 (delayed trip)

- DC

<table>
<thead>
<tr>
<th>Trip time in seconds</th>
<th>Rated current</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>10000</td>
</tr>
<tr>
<td>0.01</td>
<td>1000</td>
</tr>
<tr>
<td>0.01</td>
<td>100</td>
</tr>
<tr>
<td>0.01</td>
<td>10</td>
</tr>
<tr>
<td>0.01</td>
<td>1</td>
</tr>
<tr>
<td>0.01</td>
<td>0.1</td>
</tr>
<tr>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>0.01</td>
<td>0.001</td>
</tr>
</tbody>
</table>

### Internal connection diagram

#### for housing C3

- **I_n ≤ 120 A**
  - Load
  - Si
  - S1
  - S2
  - 2S/2
  - Battery +

- **I_n > 120 A**
  - Load
  - Si
  - S1
  - S2
  - 2S/2
  - Battery +

- Recommended link for FA coil protection pre-wired at the factory

- REMOTE CONTROL
- AUX. CONTACTS
- Connector acc. to DIN 72582

### Note

- This is a metric design and millimeter dimensions take precedence (mm) inch
- All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

Single pole thermal-magnetic circuit breakers with tease-free, trip-free, press-to-reset snap action mechanism and special dual button manual release which avoids the danger of unintended disconnection (M-type TM CBE to EN 60934). Surface mounted, compact design available with fast acting, standard and delayed switching characteristics. Options include auxiliary contact and remote electrical disconnection.

Typical applications

Heavy duty vehicles, battery systems, process control.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Single pole base mounting, fast characteristic curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>446</td>
<td>single pole base mounting, medium delay characteristic curve</td>
</tr>
<tr>
<td>447</td>
<td>single pole base mounting, delayed characteristic curve</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal design, mounting</th>
<th>H standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>K screw terminals M12, insertion nuts M8</td>
<td></td>
</tr>
<tr>
<td>S screw terminals M12, insertion nuts 5/16-18</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Manual release</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>general application (type 446 only)</td>
</tr>
<tr>
<td>FN</td>
<td>general application (types 447 and 449 only)</td>
</tr>
<tr>
<td>SI</td>
<td>2 electrically separate auxiliary contacts with screw terminals M3.5 and blade terminals DIN 46244-C-MS-S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Remote trip (optional for types 447 and 449)</th>
<th>FA12: DC 12 V coil voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>FA24: DC 24 V coil voltage</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current ratings</th>
<th>30...400 A type 446</th>
</tr>
</thead>
<tbody>
<tr>
<td>100...400 A type 447</td>
<td></td>
</tr>
<tr>
<td>125...500 A type 449</td>
<td></td>
</tr>
</tbody>
</table>

Ordering example: 446-... 447-... 449-...

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>DC 28 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating range</td>
<td>type 446: 30...400 A</td>
</tr>
<tr>
<td></td>
<td>type 447: 100...400 A</td>
</tr>
<tr>
<td></td>
<td>type 449: 125...500 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Auxiliary circuit</th>
<th>10 A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Electrical remote disconnection (-FA)</th>
<th>test voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>operating voltage</td>
<td>DC 12 V or DC 24 V</td>
</tr>
<tr>
<td>operating current</td>
<td>approx. 18 A or 12 A</td>
</tr>
<tr>
<td>max. pulse time</td>
<td>10 ms &lt; tON &lt; 20 ms / tOFF &gt; 10 s</td>
</tr>
<tr>
<td>switching time</td>
<td>&lt; 20 ms</td>
</tr>
</tbody>
</table>

| Typical life | 1,000 operations at I N |

<table>
<thead>
<tr>
<th>Dielectric strength (IEC 60664 and 60664A)</th>
<th>test voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>operating area</td>
<td>1.5 kV</td>
</tr>
<tr>
<td>auxiliary contacts</td>
<td>1,500 V</td>
</tr>
<tr>
<td>main circuit to auxiliary contacts</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation resistance</th>
<th>&gt; 100 MΩ (DC 500 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dielectric strength (IEC 60664 and 60664A) test voltage</td>
<td></td>
</tr>
<tr>
<td>operating area</td>
<td>AC 1,500 V</td>
</tr>
<tr>
<td>auxiliary contacts</td>
<td>AC 1,500 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interrupting capacity Icn</th>
<th>10,000 A</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Degree of protection (IEC 60529/DIN 40050)</th>
<th>operating area</th>
</tr>
</thead>
<tbody>
<tr>
<td>terminal area</td>
<td>IP40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration (IEC 60068-2-6, test Fc)</th>
<th>without aux. contacts: 10 g (56-500 Hz), ± 0.76 mm (10-55 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>with auxiliary contacts: 20 g (11 ms)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock (IEC 60068-2-27, test Fc)</th>
<th>to VG 95210, sheet 19, IEC 60068-2-27, test Fc:</th>
</tr>
</thead>
<tbody>
<tr>
<td>without aux. contacts: 20 g (11 ms)</td>
<td></td>
</tr>
<tr>
<td>with auxiliary contacts: 4 g (56-500 Hz), ± 0.30 mm (10-56 Hz)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corrosion (IEC 60068-2-11, test Ka)</th>
<th>96 hours at 5 % salt mist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humidity (IEC 60068-2-3, test C)</td>
<td>240 hours at 95 % RH</td>
</tr>
</tbody>
</table>

| Mass | approx. 850 g |

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>DC 28 V</td>
<td>30...400 A</td>
</tr>
<tr>
<td>Type 447:</td>
<td>DC 28 V</td>
<td>100...400 A</td>
</tr>
<tr>
<td>GPL Sweden</td>
<td>DC 28 V</td>
<td>125...400 A</td>
</tr>
<tr>
<td>Type 449:</td>
<td>DC 28 V</td>
<td>125...350 A</td>
</tr>
<tr>
<td>VG 95345, part 15</td>
<td>DC 28 V</td>
<td>125...500 A</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
High Performance Thermal-Magnetic Circuit Breakers 446/447/449

Dimensions

- Typical time/current characteristics at +23 °C/+73.4 °F

- Recommended link for FA coil protection

- Blade terminal DIN 46244-C-M5-S

- Flat head screw ISO 1580-M3.5x5

- Tightening torque max. 0.55 Nm

- Hex screw ISO 4017-M12x30-Cu2-E1P

- Lock washer DIN 137-B12-X12CrNi 177

- FA-terminal (8)

- Hex nut M8 or 5/16"-18-NC

- 14 mm/5/16 in. usable thread length

- Tightening torque max. 3.5 Nm

- Dimensions

- Typical time/current characteristics

- Circuit breakers with remote disconnection facility will trip 10% faster.

- Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Description**

Single pole high performance thermal-magnetic circuit breaker, with tease-free, trip-free, snap action mechanism and push/pull on/off actuation (M-type TM CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted in tracked vehicle and aircraft/general purpose versions, with optional fast acting magnetic characteristics and auxiliary contacts.

**Typical applications**

Extra low voltage wiring systems on all types of vehicle for land, sea and air; defence equipment; battery powered machines.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Terminal design</th>
<th>Version</th>
<th>Auxiliary contacts</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>452</td>
<td>K14 screw terminals M6</td>
<td>FN2 vehicle application</td>
<td>(blank) without auxiliary contacts</td>
<td>50–100 A</td>
</tr>
<tr>
<td>452-2</td>
<td>K34 screw terminals M6, reinforced</td>
<td>LN2 aircraft/general application</td>
<td>ST with auxiliary contact</td>
<td>50–100 A</td>
</tr>
<tr>
<td>452-2</td>
<td></td>
<td></td>
<td>S5 as S1, but with polarized auxiliary contact (NC)</td>
<td></td>
</tr>
</tbody>
</table>

452-2 - K14 - LN2 - S1 - 80 A ordering example

**Technical data**

- **Voltage rating**: DC 28 V
- **Current rating range**: 50–100 A
- **Auxiliary circuit**: 0.5 A, DC 28 V
- **Typical life**: 2,500 operations at \( I_{N} \)
- **Ambient temperature**: -55...+75 °C (-67...+167 °F)
- **Insulation co-ordination (IEC 60664 and 60664A)**
- **Rated impulse withstand voltage**: 1.5 kV
- **Pollution degree**: 3
- **Dielectric strength** (AC 1,500 V)
- **Operating area**: 0.5 A
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity \( I_{cn} \)**: 6,000 A
- **Degree of protection** (IEC 60529/DIN 40050)
- **Vibration**: 10 g (55-2000 Hz), ± 0.76 mm (10-55 Hz) to VG 95210, sheet 19, IEC 60068-2-6, test Fc
- **Shock**: 50 g (11 ms) to VG 95210, sheet 28, IEC 60068-2-27, test Ea
- **Corrosion**: 96 hours at 5 % salt mist to VG 95210, sheet 2, IEC 60068-2-11, test Ka
- **Humidity**: 240 hours at 95 % RH to VG 95210, sheet 7, IEC 60068-2-3, test C
- **Explosion**: to VG 95210, sheet 10, MIL-STD-202, meth. 109
- **Mass**: approx. 122 g without auxiliary contact, approx. 126 g with auxiliary contact
Dimensions 452-K...-...

452-K34-FN2 (VG 95345 T17)
- Tightening torque max. 4 Nm
- Terminal screw ISO 1568-6M8 with lock washer DIN 137 B6
- Thickness 1.5 - 3 mm

452-K14-LN2 (VG 95345 T17)
- Tightening torque max. 4 Nm
- Terminal screw ISO 1568-6M8 with lock washer DIN 137 B6
- Thickness 1.5 - 3 mm

Dimensions 452-K...-S.

452-K34-LN2-S1 (VG 95345 T17)
- Tightening torque max. 4 Nm
- Terminal screw ISO 1568-6M8 with lock washer DIN 137 B6
- Thickness 1.5 - 3 mm

452-K34-LN2-S5
- Tightening torque max. 4 Nm
- Terminal screw ISO 1568-6M8 with lock washer DIN 137 B6
- Thickness 1.5 - 3 mm

Internal connection diagram

This is a metric design and millimeter dimensions take precedence (mm) inch.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Typical time/current characteristics**

<table>
<thead>
<tr>
<th>452-... (standard delay)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip time in seconds</td>
</tr>
<tr>
<td>10000</td>
</tr>
<tr>
<td>1000</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.01</td>
</tr>
<tr>
<td>0.001</td>
</tr>
<tr>
<td>Trip time in seconds</td>
</tr>
<tr>
<td>10000</td>
</tr>
<tr>
<td>1000</td>
</tr>
<tr>
<td>100</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>0.1</td>
</tr>
<tr>
<td>0.01</td>
</tr>
<tr>
<td>0.001</td>
</tr>
<tr>
<td>Characteristic curves for AC to special order.</td>
</tr>
</tbody>
</table>

**Accessories (approved to VG 95345, part 23)**

- **Splash cover/hex nut assembly with O ring** (IP66 and IP67)
  - X 200 801 08 nickel plated nut, transparent cover
  - X 200 801 03 matt black finish nut, black cover

- **Splash cover/hex nut assembly with O ring** (IP54)
  - X 200 802 01 nickel plated nut
  - X 200 802 02 matt black finish nut

- **Actuator extension** (black)
  - to be fitted on the push button
  - X 200 803 01

**Accessories**

- **Identification collar**
  - to be snapped on the push button
  - Y 307 004 01 black
  - Y 307 004 02 white
  - Y 307 004 03 red
  - Y 307 004 04 green
  - Y 307 004 05 blue

- **Lock out ring**
  - to block the push button in OFF position
  - Y 307 005 01 red
  - Y 307 005 02 black

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description
Single pole compact high performance thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted in tracked vehicle and aircraft/general purpose versions, with optional auxiliary contacts.

Typical applications
Extra low voltage wiring systems on all types of vehicles for land, sea and air, battery powered machines, process control.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>482</th>
<th>single pole thermal circuit breaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>G threadneck panel mounting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 M 12x1 nickel plated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 M 12x1 black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 15/32-UNC-2A black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 M12x1x8 black, without locating pin, push button marking as with 482-G2..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 M12x1x6,4 black, without locating pin, push button marking as with 482-G1..</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware - washer for threadneck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 without hardware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 corrugated washer 12/15, fitted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 serrated lock washer 12/15, fitted (MS 35333-136)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 serrated lock washer 12/15, bulk shipped (MS 35333-136)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware - hex nut for threadneck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 without hardware</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 hex nut M12x1 nickel plated</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 hex nut M12x1 black</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 hex nut 15/32-UN-2B black, fitted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 hex nut 15/32-UN-2B, bulk shipped</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal design (main terminals)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K1 screw terminals with metric thread M4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J1 screw terminals with inch thread 8-32-UNC-2B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R1 round connector ø6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Characteristic curve</td>
<td>M1</td>
<td>thermal 1.15-1.4 IN</td>
</tr>
<tr>
<td>Terminal screws</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>flat head screw M4x6, ISO 1580, fitted</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Phillips screw 8-35-UNC-2Ax6 (MS 51957-41), fitted</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Phillips screw M4x6 (ISO 7045), bulk shipped</td>
<td></td>
</tr>
<tr>
<td>H</td>
<td>socket head cap screw M4x6 (DIN 7984), fitted</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>hex screw 8-32UNC-3Ax7.6 fitted</td>
<td></td>
</tr>
<tr>
<td>Terminal washers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>without lock washer</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>lock washer DIN 137-B4, fitted</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>lock washer 4.3, fitted, MS 35338-137</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>lock washer 4.3, bulk shipped (MS 35338-137)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>lock washer 4.3/9, fitted</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>lock washer DIN 137-B4, bulk shipped</td>
<td></td>
</tr>
<tr>
<td>Auxiliary contact</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S0</td>
<td>without auxiliary contacts</td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td>with auxiliary contact (NC)</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>with polarized aux. contact (NC)</td>
<td></td>
</tr>
<tr>
<td>Barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Blank) without barrier</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>with barrier, 31 mm wide</td>
<td></td>
</tr>
</tbody>
</table>

Current ratings
- 0,1... 50 A
- 6,0... 50 A
- 35... 50 A
- 7,5... 50 A
- 4... 7 A
- 3... 3.5 A
- 250 A DC / 150 A AC
- 500 A
- 15 x IN
- > 30 A DC / 1,000 A AC
- > 30 A DC / 1,000 A AC

Technical data

| Voltage rating | AC 115 V (400 Hz); DC 28 V |
|----------------| AC 230 (50/60 Hz) to special order |

| Current rating range | 0.1... 50 A |

| Auxiliary circuit | 0.5 A, DC 28 V |

| Typical life | 10,000 operations mechanical |

| Ambient temperature | -55...+75 °C (-67...+167 °F) |

<table>
<thead>
<tr>
<th>Insulation co-ordination (IEC 60664 and 60664A)</th>
<th>rated impulse withstand voltage pollution degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>1.5 kV</td>
</tr>
<tr>
<td>-</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dielectric strength (IEC 60664 and 60664A)</th>
<th>test voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>operating area AC 1,500 V</td>
</tr>
<tr>
<td>-</td>
<td>main to aux. circuit AC 1,500 V</td>
</tr>
</tbody>
</table>

| Insulation resistance | > 100 MΩ (DC 500 V) |

<table>
<thead>
<tr>
<th>Interrupting capacity I_{on}</th>
<th>0.1...2.5 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>15 x IN</td>
</tr>
<tr>
<td>-</td>
<td>3...3.5 A</td>
</tr>
<tr>
<td>-</td>
<td>250 A DC / 150 A AC</td>
</tr>
<tr>
<td>-</td>
<td>500 A</td>
</tr>
<tr>
<td>-</td>
<td>7.5...50 A</td>
</tr>
<tr>
<td>-</td>
<td>6,000 A DC / 1,000 A AC</td>
</tr>
<tr>
<td>-</td>
<td>35...50 A</td>
</tr>
<tr>
<td>-</td>
<td>3,000 A AC / 1,000 A AC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interrupting capacity I_{off}</th>
<th>0.1...50 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>DC 72 V</td>
</tr>
<tr>
<td>-</td>
<td>5,000 A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of protection (IEC 60529/DIN 40050)</th>
<th>operating area IP40</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>terminal area IP00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vibration</th>
<th>10 g (55-2000 Hz), ± 0.76 mm (10-55 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>to VG 95210, sheet 19/IEC 60688-2-6, test FC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Shock</th>
<th>50 g (11 ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>to VG 95210, sheet 28/IEC 60688-2-27, test EA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Corrosion</th>
<th>48 hours at 5 % salt mist</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>to VG 95210, sheet 2/IEC 60688-2-11, test KA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Humidity</th>
<th>240 hours at 95 % RH</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>to VG 95210, sheet 7/IEC 60688-2-3, test C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Explosion</th>
<th>to VG 95210, sheet 10/MIL-STD-202, meth. 109</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass</td>
<td>approx. 43 g without auxiliary contact</td>
</tr>
<tr>
<td>-</td>
<td>approx. 46 g with auxiliary contact</td>
</tr>
</tbody>
</table>

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>VG 95345 T21</td>
<td>DC 28 V</td>
<td>0.1...50 A</td>
</tr>
<tr>
<td>OPL, Canada</td>
<td>DC 28 V</td>
<td>0.5...35 A</td>
</tr>
<tr>
<td>UL, CSA</td>
<td>DC 72 V</td>
<td>0.1...50 A</td>
</tr>
<tr>
<td>TÜV</td>
<td>DC 72 V</td>
<td>0.1...50 A</td>
</tr>
</tbody>
</table>
High Performance Thermal Circuit Breaker 482-...

Standard current ratings and typical volt drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Volt drop (mV)</th>
<th>Current rating (A)</th>
<th>Volt drop (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1</td>
<td>16,000</td>
<td>5</td>
<td>350</td>
</tr>
<tr>
<td>0.2</td>
<td>8,000</td>
<td>7.5</td>
<td>230</td>
</tr>
<tr>
<td>0.5</td>
<td>3,000</td>
<td>10</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>0.8</td>
<td>2,000</td>
<td>15</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>1</td>
<td>1,500</td>
<td>20</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>1.2</td>
<td>1,200</td>
<td>25</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>1.5</td>
<td>1,000</td>
<td>30</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>1.8</td>
<td>850</td>
<td>35</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>2</td>
<td>800</td>
<td>40</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>2.5</td>
<td>700</td>
<td>45</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>3</td>
<td>600</td>
<td>50</td>
<td>&lt; 200</td>
</tr>
<tr>
<td>4</td>
<td>430</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions 482-G1...

482-G111-K1M1-A1S0 (VG 95345 T21) tightening torque max. 4 Nm

482-G111-K1M1-A1S1 (VG 95345 T21)

482-G111-K1M1-A1S5

Dimensions 482-G2-..G6-..-G7-...

482-G212-K1M1-A1S0 (VG 95345 T21) tightening torque max. 4 Nm

482-G600-K1M1-A1S0 tightening torque max. 4 Nm

482-G700-R1M1-Z0S0 tightening torque max. 4 Nm

This is a metric design and millimeter dimensions take precedence (mm) inch.
**Dimensions 482-G3...**

482-G323-J1M1-B2 (MS 25 244)

- Dimensions: 482-G323-J1M1-B2 (MS 25 244)
- Tightening torque max. 4 Nm
- Min. ø3.2
- Max. ø12.5
- Thichkness: 1.5 - 3 mm
- Min. 0.126
- Max. 0.187
- Min. 0.19
- Max. 0.22

482-G323-J2..-E3S0T

- Dimensions: 482-G323-J2..-E3S0T
- Tightening torque max. 4 Nm
- Min. ø3.2
- Max. ø12.5
- Thichkness: 1.5 - 3 mm
- Min. 0.126
- Max. 0.187
- Min. 0.19
- Max. 0.22

**Typical time/current characteristics**

- 0.1...2.5 A
- Tip time in seconds
- 3...50 A
- Tip time in seconds

**Internal connection diagrams**

- With auxiliary contact
- With polarized auxiliary contact

---

This is a metric design and millimeter dimensions take precedence (mm) inch

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370 Main Office: (650) 588-9200 Outside Local Area: (800) 258-9200 www.stevenengineering.com

Issue B

www.e-t-a.com
**Accessories (approved to VG 95345, part 23)**

- **Splash cover /hex nut assembly with O ring (IP66 and IP67)**
  - X 200 801 08 - nickel plated nut M12x1, transparent cover
  - X 200 801 03 - matt black finish nut M12x1, black cover

- **Splash cover black /hex nut assembly with O ring (IP54)**
  - X 200 802 01 - nickel plated nut M12x1
  - X 200 802 02 - matt black finish nut M12x1

- **Actuator extension (black)**
  to be fitted on the push button
  - X 200 803 01

**Accessories**

- **Identification collar** to be snapped on the push button
  - Y 307 004 01 - black
  - Y 307 004 02 - white
  - Y 307 004 03 - red
  - Y 307 004 04 - green
  - Y 307 004 05 - blue

- **Lock out ring** to block the push button in OFF position
  - Y 307 005 01 - red
  - Y 307 005 02 - black

**Accessories (approved to VG 95345, part 23)**

- **Splash cover /hex nut assembly with O ring (IP66 and IP67)**
  - X 200 801 08 - nickel plated nut M12x1, transparent cover
  - X 200 801 03 - matt black finish nut M12x1, black cover

- **Splash cover black /hex nut assembly with O ring (IP54)**
  - X 200 802 01 - nickel plated nut M12x1
  - X 200 802 02 - matt black finish nut M12x1

- **Actuator extension (black)**
  to be fitted on the push button
  - X 200 803 01

**Accessories**

- **Identification collar** to be snapped on the push button
  - Y 307 004 01 - black
  - Y 307 004 02 - white
  - Y 307 004 03 - red
  - Y 307 004 04 - green
  - Y 307 004 05 - blue

- **Lock out ring** to block the push button in OFF position
  - Y 307 005 01 - red
  - Y 307 005 02 - black

**Accessories (approved to VG 95345, part 23)**

- **Splash cover /hex nut assembly with O ring (IP66 and IP67)**
  - X 200 801 08 - nickel plated nut M12x1, transparent cover
  - X 200 801 03 - matt black finish nut M12x1, black cover

- **Splash cover black /hex nut assembly with O ring (IP54)**
  - X 200 802 01 - nickel plated nut M12x1
  - X 200 802 02 - matt black finish nut M12x1

- **Actuator extension (black)**
  to be fitted on the push button
  - X 200 803 01

**Accessories**

- **Identification collar** to be snapped on the push button
  - Y 307 004 01 - black
  - Y 307 004 02 - white
  - Y 307 004 03 - red
  - Y 307 004 04 - green
  - Y 307 004 05 - blue

- **Lock out ring** to block the push button in OFF position
  - Y 307 005 01 - red
  - Y 307 005 02 - black

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole, miniaturised, aircraft style thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US (MS 3320) configurations. Advanced two-chamber design contributes to fail-safe operation. Temperature compensated from -55° to +125 °C, with optional auxiliary contacts, and fully approved for use on a wide range of aircraft and equipment. Full specification ensures suitability for the most demanding applications. For three pole version see type 583.

Typical applications

Aircraft systems and equipment (fixed wing and helicopters); other extra low voltage wiring applications; defence equipment; communications systems.

Technical data

- Voltage rating: AC 115 V (400 Hz); DC 28 V (higher voltage ratings upon request)
- Current rating range: 1...35 A
- Auxiliary circuit: 0.5 A, DC 28 V
- Typical life: 20,000 operations mechanical or 10,000 operations at Ih (≤ 25 A)
- Ambient temperature: -55...+125 °C (-67...+257 °F)
- Insulation co-ordination (IEC 60664 and 60664A): withstand voltage 1.5 kV, pollution degree 3
- Dielectric strength (IEC 60664 and 60664A): test voltage AC 1,500 V, AC 1,500 V
- Insulation resistance: > 100 MΩ (DC 500 V)
- Interrupting capacity Icn: AC 115 V (400 Hz): ≤ 4 A 1,000 A
- Acceleration: 17 g, to ISO 2669
- Shock: 75 g (11 ms) to VG 95210, sheet 28, IEC 60068-2-27, test Ea/ISO 7137
- Corrosion: 96 hours at 5 % salt mist, severity A
- Humidity: 240 hours at 95 % RH, to VG 95210, sheet 7, IEC 60068-2-3, test C/ISO 7137
- Altitude: ≤ 25,000 m above sea level
- Mass: max. 29 g with auxiliary contact, max. 25 g without auxiliary contact

Approvals

- Authority: LN 29886, VG 95345 T06, MS 3320, MS 3320 V, QPL, UL
- Voltage ratings: AC 250 V, 50/60 Hz, 1...25 A
- Current ratings: DC 75 V, 1...35 A

Standard current ratings and typical volt drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Volt drop (mV)</th>
<th>Current rating (A)</th>
<th>Volt drop (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>750</td>
<td>10</td>
<td>190</td>
</tr>
<tr>
<td>2</td>
<td>520</td>
<td>15</td>
<td>190</td>
</tr>
<tr>
<td>2.5</td>
<td>400</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>3</td>
<td>360</td>
<td>25</td>
<td>170</td>
</tr>
<tr>
<td>4</td>
<td>350</td>
<td>30</td>
<td>160</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>35</td>
<td>150</td>
</tr>
<tr>
<td>7.5</td>
<td>230</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Errors and omissions excepted.

Published by: Steven Engineering, Inc.
- 230 Ryan Way, South San Francisco, CA 94080-6370
- Main Office: (650) 588-9200
- Outside Local Area: (800) 258-9200
- www.stevenengineering.com

www.e-t-a.com
High Performance Thermal Circuit Breaker 483-...

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>483</th>
</tr>
</thead>
<tbody>
<tr>
<td>single pole, with temperature compensation</td>
<td></td>
</tr>
</tbody>
</table>

**Mounting**
- G threadneck panel mounting, standard
- L threadneck panel mounting, extended push button
- V threadneck panel mounting, high vibration performance

**Threadneck design**
1. M12x1x6.4x6.8 dia. with mounting plate (aux. contact version)
2. 15/32-2UNx6x7.8 dia. (without aux. contact)
3. M12x6.4x6.8 dia. (without aux. contact)
4. M12x1x6.4x6.8 dia. (without aux. contact)
5. 7/16-32UNx6.4x7.8 dia. (without aux. contact)
6. M12x1x6.4x8.8 dia. (without aux. contact)
7. 7/16-32UNx6x7.8 dia. with mounting plate (aux. contact version)
8. as 483-G1...but with aluminium threadneck (only mounting -G and aux. contact versions S1, S5)

**Hardware for threadneck (washers)**
- 0 without hardware
- 1 wave washer 12/15 - mounted
- 2 mounted washer 12.1/17.2 - mounted
- 3 mounted washer 11/3/14.9 - mounted (threadneck design 5,7 only)
- 4 mounted washer 12/15 - mounted
- 5 tooth washer 12.1/17.2, bulk shipped

**Hardware for threadneck (nuts)**
- 0 without hardware
- 1 hex nut M12x1 (threadneck design 1, 4, 6 only)
- 2 hex nut 15/32-2UN (threadneck design 2 only)
- 3 hex nut 7/16-32UN (threadneck design 5, 7 only)
- 4 hex nut M12x1, aluminium, fitted (threadneck design 8 only)
- 5 hex nut MJ12x1 (only with threadneck design 3)
- 6 hex nut M12x1, bulk shipped (threadneck design 1, 4, 6)

**Terminal design (main terminals)**
- K screws terminals with metric thread
  - 1 K14 (M4, MJ4)
  - J screw terminals with inch thread
    - 1 J14 (8-32UNC-2B)
    - 2 J17 (8-32UNC-2B)
    - 3 J25 (6-32UNC-2B)

**Characteristic curve**
- M1 thermal, 1.15-1.38 I
  - A Phillips screw M4x6
  - B Phillips screw 8-32UNC-2Ax6 (MS 51957-41)
  - C Phillips screw 6-32UNC-2Ax6 (MS 51957-26)
  - D slotted flat head screw M4x6
  - E hex screw with Phillips head 8-32UNC-3A-9.5
  - K hex screw with Phillips head 8-32UNC-3Ax7.6
  - L Phillips screw MJ4x6
  - M as "K" but bulk shipped
  - Z without accessories

**Terminal washers**
- 0 without lock washer
- 1 lock washer B4
- 2 lock washer 4.3 (MS 35338-137)
- 3 lock washer B4 and washer 4.4/9.5
- 4 lock washer 3.7 (MS 35338-136)
- 5 lock washer 4.3/9

**Auxiliary contact**
- 0 without auxiliary contact
- 1 with auxiliary contact (N/C) connector to EN155-016M2018, size 20
- 5 with polarized auxiliary contact (N/C)

**Barrier**
- Z without barrier (standard)
  - Colour of the push button
    - blank: black (standard) (e. g. 7.5)
    - A green (e. g. 7.5)
    - G green, marking to EN (e. g. 7 1/2)
    - N black, marking to EN (e. g. 7 1/2)
  - Current ratings
    - 1...35 A

Ordering example

483-G411-K1M1-A1S0ZN
Metric threadneck M12x1 and terminal design -K14 (M4x6), listed by the German Materialamt der Bundeswehr to VG 95345 T06.

483-G111-K1M1-A1S1ZN
Metric threadneck M12x1 and terminal design -K14 (M4x6) and auxiliary contact -Si, listed by the German Materialamt der Bundeswehr to VG 95345 T06.

483-G533-J1M1-B2S0ZN (MS 3320)
Threadneck size 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320.

483-V533-J1M1-B2S0ZN (MS 3320-V)
Threadneck size 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-V.

483-G533-J3M1-C4S0ZN
Threadneck size 7/16-32UNSx6.4 and terminal design -J25 (inch thread 6-32), listed by the German Materialamt der Bundeswehr to VG 95345, part 6.

483-G814-K1M1-A1S1ZN
Aluminium threadneck M12x1x6.4x6.8 dia.

Internal connection diagrams

- with auxiliary contact
- with polarized auxiliary contact
Other main terminal and threadneck designs

Terminal design -J2
Terminal distances to:
MS 14 105 (a, b)
MS 14 153 (a, b)
MS 22 573 (a)
MS 25 244 (a)
MS 25 373 (a, b)

Terminal design -J3
Terminal distances to:
MS 26 574 (a, b)

Mounting -G6
black
white

Mounting -L2/5/7
black
white

Accessories

Identification collar to be snapped on the push button
Y 307 004 01 black
Y 307 004 02 white
Y 307 004 03 red
Y 307 004 04 green
Y 307 004 05 blue

Lock out ring to block the push button in OFF position
Y 307 005 01 red
Y 307 005 02 black

Typical time/current characteristics

Accessories

Splash cover/hex nut assembly with O ring (IP66 and IP67) (approved to VG 95345, T23)
X 200 801 08 nickel plated nut, transparent cover
X 200 801 03 matt black finish nut, black cover
X 200 801 09 matt black finish nut 7/16-32, black cover

Splash cover/hex nut assembly with O ring (IP54) (approved to VG 95345, T23)
X 200 802 01 nickel plated nut
X 200 802 02 matt black finish nut

Actuator extension (black) to be fitted on the push button (approved to VG 95345, T23)
X 200 803 01

High Performance Thermal Circuit Breaker 483-...
Description

Single pole, miniaturised thermal circuit breaker with trip-free mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). Threadneck panel mounted, temperature-compensated, with optional auxiliary contacts. Fully approved for commercial aircraft and similar requirements.

Typical applications

Extra low voltage wiring systems on all types of vehicles for land, sea and air.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>single pole, with temperature compensation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4120</td>
<td></td>
</tr>
</tbody>
</table>

### Mounting

- G: threadneck panel mounting
- L: threadneck panel mounting, extended push button

### Threadneck design

- 1: M12x1x6.3 (aluminium)
- 2: 7/16-32 UNx0.3 (aluminium)

### Number of poles

- 1: pole, thermally protected

### Hardware for threadneck

- 0: without hardware
- 1: hex nut M12x1, serrated lock washer 12/17.2, fitted
- 3: hex nut 7/16-32UN (aluminium), serrated lock washer 11.3/14.9, fitted

### Terminal design (main terminals)

- K1: screw terminals with metric thread K14 (M4)
- J1: screw terminals with inch thread J14 (8-32UNC-2B)
- J2: screw terminals with inch thread J17 (8-32UNC-2B)
- J3: screw terminals with inch thread J25 (6-32UNC-2B)
- P1: blade terminals 6.3x0.8, DIN 46244, silver-plated

### Characteristic curve

- M1 thermal, 1.15 - 1.38 Ith

### Terminal screws

- A: Phillips screw M4x6, fitted
- B: Phillips screw 8-32UNC-2x6, fitted
- C: Phillips screw 6-32UNC-2x6 (MS 51957-26)
- D: slotted flat head screw M4x6, fitted
- K: hex screw with Phillips head 6-32UNC-3Ax7.6, bulk shipped
- M: hex screw with Phillips head 8-32UNC-3Ax7.6, bulk shipped
- Z: without terminal hardware

### Terminal washers

- 0: without lock washer
- 1: wave washer B4, fitted
- 2: lock washer 4.3, fitted
- 4: lock washer 3.7 (MS 35338-136)
- 5: lock washer 4.3/9, fitted
- 6: lock washer 4.3/9, bulk shipped

### Auxiliary contact

- S0: without auxiliary contact
- S1: with auxiliary contact (connector EN 3155-016M2018) (NC)
- S5: with polarized auxiliary contact (NC)

### Barrier

- Z: without barrier
- U: with barrier (19.5 wide)

### Colour of the push button

- G: green to EN (e. g. 2 1/2)
- N: black to EN (e. g. 2 1/2)
- S: black, with white marking (e. g. 2.5)
- X: black, without marking

### Current ratings

- 1...25 A

### Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>AC 115 V (400 Hz); DC 28 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating range</td>
<td>1...25 A (0.5 A upon request)</td>
</tr>
<tr>
<td>Auxiliary circuit</td>
<td>1 A, DC 28 V (0.5 A upon request)</td>
</tr>
<tr>
<td>Typical life</td>
<td>20,000 operations mechanical, or 5,000 operations at 1 x Ith</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-55°C ...+125°C (-67...+257 °F)</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664 and 60664A)</td>
<td>rated impulse withstand voltage 1.5 kV</td>
</tr>
<tr>
<td>Dielectric strength (IEC 60664 and 60664A)</td>
<td>test voltage</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Interrupting capacity Icn</td>
<td>AC 115 V (400 Hz): 1...4 A 1,000 A 5...20 A 2,000 A DC 28 V: 1...25 A 6,000 A</td>
</tr>
<tr>
<td>Degree of protection (IEC 60529/DIN 40050)</td>
<td>operating area IP40 terminal area IP00</td>
</tr>
<tr>
<td>Vibration (sinosoidal)</td>
<td>10 g (57-2000 Hz), ± 0.76 mm (5-57 Hz) to ISO 7137, EN 2350 para. 5.3.1</td>
</tr>
<tr>
<td>Vibration</td>
<td>1...2.5 A: 0.04 g/Hz ± 1,5 dB; 7.3 g eff 3...20 A: 0.06 g/Hz ± 1.5 dB; 9 g eff to ISO 7137, EN 2350 para. 5.3.1</td>
</tr>
<tr>
<td>Acceleration</td>
<td>17 g, to ISO 2669, EN 2350 para. 5.3.3</td>
</tr>
<tr>
<td>Shock</td>
<td>50 g (11 ms), to ISO 7137, EN 2350 para. 5.3.2</td>
</tr>
<tr>
<td>Corrosion</td>
<td>48 hours at 5 % salt mist to ISO 7137, EN 2350 para. 5.4.2</td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH, to ISO 7137, EN 2350 para. 5.4.3</td>
</tr>
<tr>
<td>Explosion</td>
<td>to VG 95210, sheet 10</td>
</tr>
<tr>
<td>Altitude</td>
<td>≤ 22,000 m above sea level</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 20.6 g with terminal screws, without -Si approx. 24.6 g with terminal screws, with -Si</td>
</tr>
</tbody>
</table>
This is a metric design and millimeter dimensions take precedence (mm).
**Mounting holes**

4120-G2...

- ** mounting holes S0**
  - min. 20
  - min. 25°
  - min. 78°
  - min. 98°

- ** thickness: 1.5 - 3 mm .059 - .118 in.**

4120-G1...

- ** mounting holes S1 or S5**
  - min. 20
  - min. 25°
  - min. 78°
  - min. 98°

- ** thickness: 1.5 - 3 mm .059 - .118 in.**

* min. 25 mm / .984 in. when fitted with splash cover

**Internal connection diagram**

- **with auxiliary contact**
  - VG 95345 T06

- **with polarized auxiliary contact**
  - EN 2995-004
  - EN 2995-005

**Other terminal designs**

- **Terminal design -J2**
  - Terminal distances to:
    - MS 14 105 (a, b)
    - MS 14 153 (a, b)
    - MS 22 073 (a)
    - MS 22 074 (a)
    - MS 25 244 (a)
    - MS 25 373 (a, b)

- **Terminal design -J3**
  - Terminal distances to:
    - MS 26 574 (a, b)

- **Terminal design -P1**

**Typical time/current characteristics**

This is a metric design and millimeter dimensions take precedence (mm) inch
Accessories (approved to VG 95 345, part 23)

Splash cover/hex nut assembly with O ring (IP66 and IP67)
X 200 801 08 nickel plated nut, transparent cover
X 200 801 03 matt black finish nut, black cover
X 200 801 09 matt black finish nut 7/16-32, black cover

**Actuator extension** (black) to be fitted on the push button
X 200 803 01

**Identification collar** to be snapped on the push button
Y 307 004 01 black
Y 307 004 02 white
Y 307 004 03 red
Y 307 004 04 green
Y 307 004 05 blue

**Lock out ring** to block the push button in OFF position
Y 307 005 01 red
Y 307 005 02 black

This is a metric design and millimeter dimensions take precedence (in mm).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole, thermal circuit breaker with trip-free mechanism, push/pull on/off manual actuation (M-type TO CBE to EN 60934) and temperature compensation. An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US configurations. The robust design makes type 4140 suitable for extremely harsh conditions.

Typical applications

Land vehicles, aircraft, watercraft, special vehicles.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>4140</th>
</tr>
</thead>
<tbody>
<tr>
<td>High performance thermal circuit breaker with temperature compensation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mounting</th>
<th>G threadneck panel mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threadneck design</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>M12x0.75x7 alu, blackened, 1 location pin</td>
</tr>
<tr>
<td>3</td>
<td>7/16-32UNx7 alu, blackened, 1 location pin</td>
</tr>
<tr>
<td>Number of poles</td>
<td>1 - pole, protected</td>
</tr>
<tr>
<td>Hardware for threadneck</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>without hardware</td>
</tr>
<tr>
<td>2</td>
<td>hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, fitted</td>
</tr>
<tr>
<td>3</td>
<td>hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, supplied separately</td>
</tr>
<tr>
<td>4</td>
<td>hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, fitted</td>
</tr>
<tr>
<td>5</td>
<td>hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, supplied separately</td>
</tr>
</tbody>
</table>

| Terminal design (main terminals) |
| J1 | screw terminals with inch thread (8-32UNC-2B) |
| Characteristic curve |
| M1 | thermal 1.1-1.45 x In |
| Terminal screws |
| B | Phillips cylinder head screw 8-32UNC-2Ax6 |
| K | hex screw with Phillips head 8-32UNC-3Ax7.6, fitted |
| M | hex screw with Phillips head 8-32UNC-3Ax7.6, supplied separately |
| Z | without accessories |
| Terminal washers |
| 0 | without lock washer |
| 5 | lock washer 4.3/9 fitted |
| 6 | lock washer 4.3/9 supplied separately |

| Auxiliary contact |
| S0 | without auxiliary contact |
| S1 | with aux. contact (N/C) (female contact for male contacts to EN3155-016M2018) |
| S5 | as S1 but polarized |

| Barrier |
| F | with barrier |
| G | green |
| N | black |

| Current ratings |
| 20...50 A |

Technical data

| Voltage rating | AC 115 V (400 Hz); DC 28 V |
| Current rating range | 20...50 A |
| Auxiliary circuit | 0.5 A, DC 28 V |
| Typical life | 5,000 operations mechanical and 2,500 operations at In |
| Ambient temperature | -55...+125 °C (-67...+257 °F) |
| Temperature compensation | -55...+90 °C (-67...+194 °F) |
| Insulation co-ordination |
| IEC 60664 |
| Insulation withstand voltage | 3 kV |
| Pollution degree | 3 |
| Dielectric strength test voltage |
| AC 1,500 V |
| Main to aux. circuit | AC 1,500 V |
| Insulation resistance | > 100 MΩ (DC 500 V) |
| Interrupting capacity In |
| AC 115 V (400 Hz): 1,500 A |
| DC 28 V: 4,000 A |
| Degree of protection |
| IEC 60529 |
| Operating area IP40 |
| Terminal area IP00 |
| Vibration (sinusoidal) |
| ± 0.76 mm (5-80 Hz) |
| 10 g (80-500 Hz), 5 g (500-2000 Hz) |
| to EN 2350 para 5.3.1 and ISO 7137 |
| Vibration (random) |
| 0.04 g/Hz (40-500 Hz) |
| 5.8 g rms (10-2000 Hz) |
| to ISO 7137 |
| Acceleration |
| 17 g, to EN 2350, para 5.3.3 and ISO 2669 |
| Shock |
| 50 g (11 ms), to EN 2350 para 5.3.2 and ISO 7137 |
| Corrosion |
| 48 hours at 5 % salt mist to EN 2350 para 5.4.2 and ISO 7137 |
| Humidity |
| 48 hours at 95 % RH, to EN 2350 para 5.4.3 and ISO 7137 |
| Altitude |
| ≤ 15,000 m above sea level |
| Mass |
| ca. 57 g with accessories and without auxiliary contact |
| ca. 60 g with accessories and with auxiliary contact |
High Performance Thermal Circuit Breaker 4140-...

Standard current ratings and typical volt drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Volt drop per pole (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>150</td>
</tr>
<tr>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>35</td>
<td>150</td>
</tr>
<tr>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>50</td>
<td>120</td>
</tr>
</tbody>
</table>

Approvals

ASNE 0732-005 / prEN 3661-005
NSA 931321 / prEN2794-004

Dimensions

This is a metric design and millimeter dimensions take precedence (mm) inch.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-
Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Internal connection diagrams

with auxiliary contact

with polarized auxiliary contact

Typical time/current characteristics

Accessories

Splash cover/hex nut assembly with O ring (IP66 and IP67)
X 200 801 15 black chromated nut M12x0.75x6, black cover

Splash cover/hex nut assembly with O ring (IP66 and IP67)
X 200 801 16 black chromated nut 7/16-32UNx6, black cover

Actuator extension (black) to be fitted on the push button
X 200 803 01 (approved to VG 95345, part 23)

Identification collar to be snapped on the push button
Y 307 004 01 black
Y 307 004 02 white
Y 307 004 03 red
Y 307 004 04 green
Y 307 004 05 blue

This is a metric design and millimeter dimensions take precedence (mm). inch

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single pole remote control circuit breaker (RCCB), temperature compensated, either with or without auxiliary contacts, and featuring a bimetal actuator which trips the circuit breaker mechanism within a specified time under overcurrent conditions. The switching contact latching system is operated by a bi-stable linear motor controlled by electronic circuitry incorporated within the device. Remote control is achieved through the use of a conventional single pole manually operated aircraft style thermal circuit breaker which connects the control input of the RCCB to ground.

With the control circuit breaker (ICU) in the ON position, the RCCB will switch on. When the control circuit breaker is switched off, the RCCB will change to the OFF condition. If power is applied to a previously de-energised RCCB, the device will adopt the same switching status as the control circuit breaker. If the RCCB trips thermally in the event of a load circuit fault, the electronic circuitry will also cause the control circuit breaker to trip, thereby providing a visual indication through the position of the circuit breaker actuator.

Approved to MIL-PRF-83383.

**Typical applications**

Aircraft electrical systems and equipment, and other high performance applications.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Variation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4930</td>
<td>01</td>
<td>standard, with auxiliary contacts</td>
</tr>
<tr>
<td></td>
<td>02</td>
<td>with modified terminal barrier and auxiliary contacts</td>
</tr>
<tr>
<td></td>
<td>03</td>
<td>standard, without auxiliary contacts</td>
</tr>
<tr>
<td></td>
<td>04</td>
<td>with modified terminal barrier but without auxiliary contacts</td>
</tr>
</tbody>
</table>

**Current ratings**

<table>
<thead>
<tr>
<th>I_N/A</th>
<th>E-T-A part number</th>
<th>MIL part number</th>
<th>E-T-A part number</th>
<th>MIL part number</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4930-01-5A</td>
<td>M83383/02-01</td>
<td>4930-03-5A</td>
<td>M83383/01-01</td>
</tr>
<tr>
<td>7.5</td>
<td>4930-01-7.5A</td>
<td>M83383/02-02</td>
<td>4930-03-7.5A</td>
<td>M83383/01-02</td>
</tr>
<tr>
<td>10</td>
<td>4930-01-10A</td>
<td>M83383/02-03</td>
<td>4930-03-10A</td>
<td>M83383/01-03</td>
</tr>
<tr>
<td>15</td>
<td>4930-01-15A</td>
<td>M83383/02-04</td>
<td>4930-03-15A</td>
<td>M83383/01-04</td>
</tr>
<tr>
<td>20</td>
<td>4930-01-20A</td>
<td>M83383/02-05</td>
<td>4930-03-20A</td>
<td>M83383/01-05</td>
</tr>
<tr>
<td>25</td>
<td>4930-01-25A</td>
<td>M83383/02-06</td>
<td>4930-03-25A</td>
<td>M83383/01-06</td>
</tr>
<tr>
<td>35</td>
<td>4930-01-35A</td>
<td>M83383/02-07</td>
<td>4930-03-35A</td>
<td>M83383/01-07</td>
</tr>
<tr>
<td>40</td>
<td>4930-01-40A</td>
<td>M83383/02-08</td>
<td>4930-03-40A</td>
<td>M83383/01-08</td>
</tr>
<tr>
<td>50</td>
<td>4930-01-50A</td>
<td>M83383/02-09</td>
<td>4930-03-50A</td>
<td>M83383/01-09</td>
</tr>
<tr>
<td>60</td>
<td>4930-01-60A</td>
<td>M83383/02-10</td>
<td>4930-03-60A</td>
<td>M83383/01-10</td>
</tr>
<tr>
<td>75</td>
<td>4930-01-75A</td>
<td>M83383/02-11</td>
<td>4930-03-75A</td>
<td>M83383/01-11</td>
</tr>
<tr>
<td>80</td>
<td>4930-01-80A</td>
<td>M83383/02-12</td>
<td>4930-03-80A</td>
<td>M83383/01-12</td>
</tr>
<tr>
<td>100</td>
<td>4930-01-100A</td>
<td>M83383/02-13</td>
<td>4930-03-100A</td>
<td>M83383/01-13</td>
</tr>
</tbody>
</table>

**Approvals**

MIL-PRF-83383

**Technical data** \(T_A = 25 \) °C, \(U_e = DC\ 28\ V\) or \(AC\ 115 V/400\ Hz\)

- **Operating data** \(U_e = AC\ 115 V\ 400 Hz\) (AC 104...126 V); \(DC\ 28\ V\) (DC 18...36 V)
- **Current rating range** \(I_N\) 5...100 A (see ordering information)
- **Bias current** typically 2.5 mA at DC 28 V typically 25 mA at AC 115 V
- **Switching current/switching period** for internal linear motor typically 3.4 A / 28 ms at DC typically 2.8 A / 17 ms at AC
- **Overload disconnection** see table 2
- **Trip limits** see table 2
- **Control current** \(I_{ICU}\) typically 0.4 mA
- **ON/OFF-cycling time** (e.g. additional relay contact in ICU circuit) ON > 80 ms / OFF > 80 ms
- **Voltage ratings** \(DC\ 28\ V,\ AC\ 115\ V\) (400 Hz)
- **Current ratings** resistive load: 3 A / inductive load 1.5 A lamp load: 0.5 A
### Remote Control Circuit Breaker 4930 (RCCB)

#### General data

- **Typical life endurance**: 50,000 operations at \( I_N \) (inductive or resistive)
- **Ambient temperature**: \(-54\ldots+71\) °C (\(-65\ldots+160\) °F)
- **Dielectric strength** (IEC 60664 and 60664A)
  - between main terminals: AC 1,500 V
  - main terminal to mounting area: AC 1,500 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Vibration (sinusoidal)**: 10 g (55–2000 Hz), ± 0.76 mm (10–55 Hz) to MIL-STD 202, method 204, condition C
- **Vibration (random)**: 10-2000 Hz, 0.15 g/Hz, square value 13.5 g; 5 Hz/axis loaded with 0.9 \( I_N \)
- **Shock**: 25 g (11 ms, half sinusoidal) to MIL-STD 202, method 213, condition J ISO 7137 (RTCA/DO-160 C, part 7)
- **Corrosion**: 48 hours at 5% salt mist to MIL-STD 202, method 101, condition B ISO 7137 (RTCA/DO-160 C, part 14, category S)
- **Humidity**: 240 hours at 95% RH to MIL-STD 202, method 106/ISO 7137 (RTCA/DO-160 C, part 6, category B)
- **Sand and dust**: to MIL-STD 202, method 110, test condition A
- **Fungus**: to MIL-STD 810 D, method 508.3, 28 days
- **Altitude**: ≤ 15,000 m above sea level
- **EMI requirements**: to MIL-STD 461, class 1 D
- **Mass**: 5...25 A approx. 315 g
  - 35...100 A approx. 319 g
- **Dimensions**: max. 82.5 x 31.9 x 108.2 mm
  - (max. 3.25 x 1.256 x 4.26 inch)
- **Terminals, connections**: see table 3

#### Table 1: Standard current ratings and typical voltage drop values

<table>
<thead>
<tr>
<th>Current ratings (A)</th>
<th>Voltage drop at rated current (mV)</th>
<th>Current ratings (A)</th>
<th>Voltage drop at rated current (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>450</td>
<td>7.5</td>
<td>360</td>
</tr>
<tr>
<td>10</td>
<td>347</td>
<td>15</td>
<td>225</td>
</tr>
<tr>
<td>20</td>
<td>225</td>
<td>35</td>
<td>225</td>
</tr>
</tbody>
</table>

#### Table 2: Typical time/current characteristics

![Time/Current Characteristic Graph]

#### Table 3: Terminals, connections

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Thread A</th>
<th>Mounting torque</th>
<th>B (mm/in.)</th>
<th>C (mm/in.)</th>
<th>Nut</th>
<th>Lock washer</th>
<th>Flat washer</th>
</tr>
</thead>
<tbody>
<tr>
<td>5...25</td>
<td>0.190-32 UNF-2A</td>
<td>2 Nm</td>
<td>12.7/.500</td>
<td>12.7/.500</td>
<td>AN315-3R</td>
<td>MS 35338-43</td>
<td>NAS 1149F0322P</td>
</tr>
<tr>
<td>35...100</td>
<td>0.250-28 UNF-2A</td>
<td>4.1 Nm</td>
<td>15.5/.610</td>
<td>15.5/.610</td>
<td>AN315-4R</td>
<td>MS 35338-44</td>
<td>NAS 1149F0463P</td>
</tr>
</tbody>
</table>
Remote Control Circuit Breaker 4930 (RCCB)

**Dimensions**

**Type 4930-01 (M 83383/02)**
-3 (M 83383/01)

**Type 4930-02/ -04**

**Terminal configuration**

<table>
<thead>
<tr>
<th>Pin no.</th>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>LINE</td>
<td>power supply DC 28 V, AC 115 V / 400 Hz</td>
</tr>
<tr>
<td>A2</td>
<td>LOAD</td>
<td>load is connected to ground GND</td>
</tr>
<tr>
<td>3</td>
<td>ICU</td>
<td>control input, when grounded, RCCB = “ON”</td>
</tr>
<tr>
<td>4</td>
<td>Backup power</td>
<td>AC 115 V / 400 Hz (same AC phase as LINE) or DC 28 V</td>
</tr>
<tr>
<td>5A, 5B</td>
<td>GND</td>
<td>ground potential</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>not connected</td>
</tr>
<tr>
<td>S1, S2, S3</td>
<td>AUX</td>
<td>auxiliary change over contacts</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (millimeter = mm).
High Performance Thermal Circuit Breaker 5140

Description

Three pole, aircraft style thermal circuit breaker with trip-free mechanism and push/pull on/off manual actuation. An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US configurations. Temperature compensated, with optional auxiliary contacts. The robust design is well suited to extremely harsh conditions. In the event of an overload in one, two or three phases all three poles will be disconnected.

Typical applications

Land vehicles, aircraft, watercraft, special vehicles.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5140</td>
<td>High performance thermal circuit breaker with temperature compensation</td>
</tr>
</tbody>
</table>

- **Mounting**: G threadneck panel mounting
- **Threadneck design**:
  1. M12x0.75x7 alu, blackened, 1 location pin
  2. M12x0.75x7 alu, blackened, 2 location pins
  3. 7/16-32UNx7 alu, blackened, 1 location pin
  4. 7/16-32UNx7 alu, blackened, 2 location pins

- **Number of poles**: 3-pole, protected
- **Hardware for Threadneck**:
  1. hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, mounted
  2. hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, bulk
  3. hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, mounted
  4. hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, bulk

- **Terminal design (main terminals)**:
  1. J1 screw terminals with inch thread (8-32UNC-2B)
  2. J2 screw terminals with inch thread (8-32UNC-2B) on one side, busbar terminals on other side, with hole bent at 60°
  3. J3 screw terminals with inch thread (8-32UNC-2B) on one side, busbar terminals on other side, with hole bent at 40°

- **Characteristic curve**: M1 thermal 1.1-1.45 \( I_n \)

- **Terminal screws**:
  - B Phillips cylinder head screw 8-32UNC-2Ax6
  - K hex screw with Phillips head 8-32UNC-3Ax7.6, mounted
  - M hex screw with Phillips head 8-32UNC-3Ax7.6, bulk

- **Without accessories**
  - Z without accessories

- **Terminal washers**:
  - 0 without lock washer
  - 5 lock washer 4.3/9 mounted
  - 6 lock washer 4.3/9 bulk

- **Auxiliary contact**:
  - S0 without auxiliary contact
  - S1 with aux. contact (N/C) (female contact for male contacts to EN3155-016M2018)
  - S5 as S1 but polarized

- **Barrier**: with barrier
  - G green
  - N black

- **Current ratings**: 20...50 A

Technical data

- **Voltage rating**: 3 AC 200 V (400 Hz); DC 28 V
- **Current rating range**: 20...50 A
- **Auxiliary circuit**: 0.5 A, DC 28 V
- **Typical life**: 5,000 operations mechanical and 2,500 operations at \( I_n \)
- **Ambient temperature**: -55...+125 °C (-67...+257 °F)
- **Temperature compensation**: -55...+90 °C (-67...+194 °F)
- **Insulation co-ordination (IEC 60664)**:
  - Rated impulse withstand voltage: 1.5 kV
  - Pollution degree: 3
- **Dielectric strength test voltage**: 1,500 V
- **Operating area**: 1,500 V
- **Main to aux. circuit**: 1,500 V
- **Insulation resistance**: > 100 MΩ (DC 500 V)
- **Interrupting capacity**: \( I_{cn} \) 2,000 A
- **Degree of protection (IEC 60529)**:
  - Operating area: IP40
  - Terminal area: IP00
- **Vibration (sineoidal)**: ± 0.76 mm (5-80 Hz)
  - 10 g (80-500 Hz), 5 g (500-2000 Hz)
  - to EN 2350 Abschn. 5.3.1 and ISO 7137
- **Vibration (random)**: 0.04 g/Hz (40-500 Hz)
  - 5.8 g rms (10-2000 Hz)
  - to ISO 7137
- **Acceleration**: 17 g, to EN 2350 para 5.3.3 and ISO 2669
- **Shock**: 50 g (11 ms), to EN 2350 para 5.3.2 and ISO 7137
- **Corrosion**: 48 hours at 5 % salt mist to EN 2350 para 5.4.2 and ISO 7137
- **Humidity**: 48 hours at 95 % RH, to EN 2350 para 5.4.3 and ISO 7137
- **Altitude**: ≤ 15,000 m above sea level
- **Mass**: ca. 144 g with accessories and without auxiliary contact
- ca. 150 g with accessories and with auxiliary contact

Ordering example

5140 - G 1 3 - J1 M1 - M 6 S5 T G - 20 A
### High Performance Thermal Circuit Breaker 5140

#### Standard current ratings and typical volt drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Volt drop per pole (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>150</td>
</tr>
<tr>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>30</td>
<td>150</td>
</tr>
<tr>
<td>35</td>
<td>150</td>
</tr>
<tr>
<td>40</td>
<td>120</td>
</tr>
<tr>
<td>45</td>
<td>120</td>
</tr>
<tr>
<td>50</td>
<td>120</td>
</tr>
</tbody>
</table>

#### Approvals

- ASNE 0459
- NSA 931323 / prEN2665-004
- ASNE 0733-005 / prEN 3662-005
- ASNE 0733-006 / prEN 3662-006

### Dimensions

#### 5140-G132-J1M1-K550TN (NSA 931 323; prEN 2665-004)

- Tightening torque max. 4 Nm
- Terminal screw H8-32UNC-3A×7.6 to FED-STD-H08/2A with lock washer 4.3/9 tightening torque max. 1.7 Nm
- Lock washer M12DIC
- Lock washer M12DC

#### 5140-G132-J1M1-KSSSTG (ASNE 0733-005; prEN 3662-005)

- Tightening torque max. 4 Nm
- Terminal screw H8-32UNC-3A×7.6 to FED-STD-H08/2A with lock washer 4.3/9 tightening torque max. 1.7 Nm
- Lock washer M12DIC
- Lock washer M12DC

This is a metric design and millimeter dimensions take precedence (mm).
High Performance Thermal Circuit Breaker 5140

Dimensions

5140-G132-J2M1-K5S0TN (ASNE 0459)

5140-G232-J3M1-K5S5TG (ASNE 0733-006; prEN 3662-006)

Internal connection diagrams

Typical time/current characteristics

This is a metric design and millimeter dimensions take precedence.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Man Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

Issue B

www.e-t-a.com
**Accessories**

**splash cover/hex nut assembly with O ring** (IP66 and IP67)

* X 200 801 15  black chromated nut M12x0.75x6, black cover

**actuator extension** (black) to be fitted on the push button

* X 200 803 01  (approved to VG 95345, part 23)

**identification collar** to be snapped on the push button

* Y 307 004 01  black
* Y 307 004 02  white
* Y 307 004 03  red
* Y 307 004 04  green
* Y 307 004 05  blue

---

This is a metric design and millimeter dimensions take precedence (inch). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

Three pole, miniaturised, aircraft style thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US (AS 14154) configurations. Advanced two-chamber design minimises contact contamination to provide fail-safe operation. Temperature compensated with optional auxiliary contacts, and fully approved for use on a wide range of aircraft and equipment. For single pole version see type 483.

Typical applications

Aircraft systems and equipment (fixed wing and helicopters); other extra low voltage wiring applications; defence equipment; communications systems.

Standard current ratings and typical volt drop values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Volt drop per pole (mV)</th>
<th>Current rating (A)</th>
<th>Volt drop per pole (mV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>750</td>
<td>7.5</td>
<td>230</td>
</tr>
<tr>
<td>2</td>
<td>520</td>
<td>10</td>
<td>190</td>
</tr>
<tr>
<td>2.5</td>
<td>400</td>
<td>15</td>
<td>190</td>
</tr>
<tr>
<td>3</td>
<td>360</td>
<td>20</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>350</td>
<td>25</td>
<td>170</td>
</tr>
<tr>
<td>5</td>
<td>260</td>
<td>30</td>
<td>160</td>
</tr>
</tbody>
</table>

Approvals

Approvals:
LN 29887
VG 95345, part 11
prEN 2996
AS 14154
QPL

Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>3 AC 200 V (400 Hz); DC 28 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating range</td>
<td>1...30 A</td>
</tr>
<tr>
<td>Auxiliary circuit</td>
<td>0.5 A, DC 28 V</td>
</tr>
<tr>
<td>Typical life</td>
<td>20,000 operations mechanical</td>
</tr>
<tr>
<td></td>
<td>10,000 operations at IN (≤ 25 A)</td>
</tr>
<tr>
<td></td>
<td>4,000 operations at IN (30 A)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-55...125 °C (≤ -67...257 °F) ≤ 15 A</td>
</tr>
<tr>
<td></td>
<td>-55...90 °C (≤ -67...194 °F) &gt; 15 A</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664 and 60664A)</td>
<td>rated impulse withstand voltage pollution degree 1.5 kV 3</td>
</tr>
<tr>
<td>Dielectric strength (IEC 60664 and 60664A)</td>
<td>test voltage</td>
</tr>
<tr>
<td>operating area</td>
<td>AC 1,500 V</td>
</tr>
<tr>
<td>pole/pole</td>
<td>AC 1,500 V</td>
</tr>
<tr>
<td>main to aux. circuit</td>
<td>AC 1,500 V</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Interrupting capacity Icn</td>
<td>3 AC 200 V (400 Hz);</td>
</tr>
<tr>
<td></td>
<td>≤ 4 A</td>
</tr>
<tr>
<td></td>
<td>1,000 A</td>
</tr>
<tr>
<td></td>
<td>5 A</td>
</tr>
<tr>
<td></td>
<td>2,000 A</td>
</tr>
<tr>
<td></td>
<td>7.5...25 A</td>
</tr>
<tr>
<td></td>
<td>2,500 A</td>
</tr>
<tr>
<td></td>
<td>30 A</td>
</tr>
<tr>
<td></td>
<td>1,500 A</td>
</tr>
<tr>
<td>DC 28 V</td>
<td>1...25 A</td>
</tr>
<tr>
<td></td>
<td>6,000 A</td>
</tr>
<tr>
<td></td>
<td>30 A</td>
</tr>
<tr>
<td></td>
<td>4,000 A</td>
</tr>
<tr>
<td>Degree of protection (IEC 60529/DIN 40050)</td>
<td>operating area IP40</td>
</tr>
<tr>
<td></td>
<td>terminal area IP00</td>
</tr>
<tr>
<td>Vibration (sinusoidal)</td>
<td>10 g (57-2000 Hz), ± 0.76 mm (5-57 Hz) to VG 95210, sheet 19, IEC 60668-2-6, test Fc, ISO 7137</td>
</tr>
<tr>
<td>Vibration (random)</td>
<td>16.4 g rms, 0.2 g Hz ± 1.5 dB, to VG 95210, sheet 29, IEC 60668-2-6, test Fc, ISO 7137</td>
</tr>
<tr>
<td>Acceleration</td>
<td>17 g, to ISO 2669</td>
</tr>
<tr>
<td>Shock</td>
<td>50 g (11 ms), to VG 95210, sheet 28, IEC 60668-2-27, test Ea, ISO 7137</td>
</tr>
<tr>
<td>Corrosion</td>
<td>96 hours at 5 % salt mist to VG 95210, sheet 2, IEC 60668-2-11, test Ka, ISO 7137</td>
</tr>
<tr>
<td>Humidity</td>
<td>240 hours at 95 % RH, to VG 95210, sheet 7, IEC 60668-2-3, test C/ISO 7137</td>
</tr>
<tr>
<td>Explosion</td>
<td>to VG 95210, sheet 10, MIL-STD-202, meth. 109</td>
</tr>
<tr>
<td>Altitude</td>
<td>≤ 25,000 m above sea level</td>
</tr>
<tr>
<td>Mass</td>
<td>max. 67 g with auxiliary contact</td>
</tr>
<tr>
<td>max. 63 g without auxiliary contact</td>
<td></td>
</tr>
<tr>
<td>Mass reduction through aluminium threadneck approx. 3 g</td>
<td></td>
</tr>
</tbody>
</table>
Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>583</th>
</tr>
</thead>
<tbody>
<tr>
<td>ordering example</td>
<td></td>
</tr>
<tr>
<td>Metric threadneck M12x1 and terminal design -K14 (M4x6), listed by the German Materialamt der Bundeswehr to VG 95345 T11.</td>
<td></td>
</tr>
<tr>
<td>Metric threadneck M12x1 and terminal design -K14 (M4x6) with auxiliary contact -Si, listed by the German Materialamt der Bundeswehr to VG 95345 T11.</td>
<td></td>
</tr>
<tr>
<td>Threadneck size 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to AS 14154.</td>
<td></td>
</tr>
</tbody>
</table>
High Performance Thermal Circuit Breaker 583-...

Dimensions 583-G411-K1M1-A1S0TN (VG 95345 T11)

Dimensions 583-G111-K1M1-A1S1UN (VG 95345 T11)

Dimensions 583-G533-J1M1-B2S0XN (AS14154)

Other main terminal and threadneck designs

terminal design -J2

recommended barrier:
-T or -X
for -S0
(without auxiliary contacts)
-U or -X
for -S1 or -S5
(with auxiliary contacts)

terminal design -J3

recommended barrier:
-T for -S0
(without auxiliary contacts)
-U for -S1 or -S5
(with auxiliary contacts)

mounting -G6
**Typical time/current characteristics**

![Graph showing typical time/current characteristics]

*This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.*

**Internal connection diagrams**

- **with auxiliary contact**
  - EN 2996-004
  - Line A1 B1 C1
  - Line A2 B2 C2

- **with auxiliary contact**
  - VG 95345 T11
  - Line A1 B1 C1 T11

- **with polarized auxiliary contact**
  - EN 2996-005
  - Line A1 B1 C1 3

**Accessories**

- **Splash cover/hex nut assembly with O ring** (IP66 and IP67) (approved to VG 95345, part 23)
  - X 200 801 08 nickel plated nut, transparent cover
  - X 200 801 03 matt black finish nut, black cover
  - X 200 801 09 matt black finish nut 7/16-32, black cover

- **Splash cover black/hex nut assembly with O ring** (IP54) only for threadneck nut M12 (to VG 95345, sheet 23)
  - X 200 802 01 nickel plated nut
  - X 200 802 02 matt black finish nut

- **Actuator extension** (black) to be fitted on the push button (approved to VG 95345, T23)
  - X 200 803 01

- **Identification collar** to be snapped on the push button
  - Y 307 004 01 black
  - Y 307 004 02 white
  - Y 307 004 03 red
  - Y 307 004 04 green
  - Y 307 004 05 blue

- **Lock out ring** to block the push button in OFF position
  - Y 307 005 01 red
  - Y 307 005 02 black
Description

Single, two and three pole isolators to EN 60947 / IEC 60947 with toggle actuation. Designed for rail, panel or surface mounting. Options include auxiliary contacts and remote electrical disconnection. For circuit breaker versions see types 410, 520, 530.

Typical applications

Control systems, industrial equipment.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>911</td>
<td>single pole switch</td>
</tr>
<tr>
<td>912</td>
<td>double pole switch</td>
</tr>
<tr>
<td>913</td>
<td>three pole switch</td>
</tr>
</tbody>
</table>

**Terminal design**

- **K** main terminal
- up to 32 A: pressure plate B5-DIN 46288
- up to 63 A: pressure plate B6-DIN 46288
- up to 125 A: terminal screws DIN 46206, sheet 2, form 1, thread M6

**Mounting**

1. surface mounting
2. rail or panel mounting (rail DIN EN 50022-35x7.5)
3. rail or panel mounting (rail DIN EN 50035-G32)
4. panel mounting only
5. mounting brackets – surface mounting

**Auxiliary contacts (terminals M3.5 or blade terminals (FA)**

- **Si** one each N/O and N/C (not for 911-FA)
- **Si1** one N/C (11,12) (not for 911-FA)
- **Si2** one N/O (13,14)
- **2Si** two each N/O and N/C – types 912, 913 only (not for 912-FA)
- **3Si** three each N/O and N/C – type 913 only (not for 913-FA)

**Remote trip (optional)**

- **FA 12** remote disconnection, for DC 12 V
- **FA 24** remote disconnection, for DC 24 V

**Current ratings**

- **32** 63, 125 A

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>911-K</td>
<td>63 A ordering example</td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

<table>
<thead>
<tr>
<th>Current rating (A)</th>
<th>Internal resistance (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>≤ 0.002 per pole</td>
</tr>
<tr>
<td>63</td>
<td>≤ 0.002 per pole</td>
</tr>
<tr>
<td>125</td>
<td>≤ 0.002 per pole</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating</td>
<td>AC 240 V; 3 AC 415 A; 3 AC 500 V; DC 110 V</td>
</tr>
<tr>
<td>Current rating range</td>
<td>32 A, 63 A, 125 A</td>
</tr>
<tr>
<td>Auxiliary contact rating</td>
<td>6 A at AC 240 V or DC 28 V; 1 A at DC 110 V</td>
</tr>
<tr>
<td>Electrical remote disconnection (FA)</td>
<td>operating voltage DC 12 V or DC 24 V</td>
</tr>
<tr>
<td></td>
<td>approx. 18 A or 12 A</td>
</tr>
<tr>
<td></td>
<td>max. pulse time switching time 10 ms &lt; tON &lt; 20 ms /tOFF &gt; 10 s</td>
</tr>
<tr>
<td></td>
<td>&lt; 20 msec</td>
</tr>
<tr>
<td>Typical life</td>
<td>10,000 operations at I N</td>
</tr>
<tr>
<td></td>
<td>20,000 operations mechanical</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-40...+75 °C (-40...+167 °F)</td>
</tr>
<tr>
<td>Insulation co-ordination</td>
<td>rated impulse withstand voltage 6 kV</td>
</tr>
<tr>
<td></td>
<td>pollution degree 3</td>
</tr>
<tr>
<td>Dielectric strength (IEC 60664 and 60664A)</td>
<td>test voltage AC 3,300 V</td>
</tr>
<tr>
<td></td>
<td>pole/pole AC 3,300 V</td>
</tr>
<tr>
<td></td>
<td>main to aux. circuit AC 2,200 V</td>
</tr>
<tr>
<td></td>
<td>aux. circuit 11-12 to 13-14 AC 1,000 V</td>
</tr>
<tr>
<td>Insulation resistance (IEC 60529/DIN 40050)</td>
<td>&gt; 100 MΩ (DC 500 V)</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>back up fuse max. 125 A</td>
</tr>
<tr>
<td>Vibration (IEC 60682-2-9)</td>
<td>5 g (57-200 Hz), ± 0.38 mm (10-57 Hz) to IEC 60687-2-6, test Fc</td>
</tr>
<tr>
<td></td>
<td>10 frequency cycles/axis</td>
</tr>
<tr>
<td>Shock (IEC 60687-2-6)</td>
<td>25 g (11 ms)</td>
</tr>
<tr>
<td></td>
<td>to IEC 60687-2-6, test Ea</td>
</tr>
<tr>
<td>Corrosion (IEC 60687-2-2)</td>
<td>96 hours at 5 % salt mist</td>
</tr>
<tr>
<td></td>
<td>to IEC 60687-2-11, test Ka</td>
</tr>
<tr>
<td>Humidity (IEC 60687-2-3)</td>
<td>240 hours at 95 % RH</td>
</tr>
<tr>
<td></td>
<td>to IEC 60687-2-3, test Ca</td>
</tr>
<tr>
<td>Mass (IEC 60687-2-4)</td>
<td>approx. 220 g single pole</td>
</tr>
<tr>
<td></td>
<td>approx. 440 g double pole</td>
</tr>
<tr>
<td></td>
<td>approx. 660 g three pole</td>
</tr>
</tbody>
</table>
Isolation Switches 911/912/913-...

**Dimensions**

<table>
<thead>
<tr>
<th>Current rating</th>
<th>Cross section (see DIN 46288)</th>
<th>Max. tightening torque</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 32 A M5</td>
<td>≤ 2 mm² to ≤ 10 mm²</td>
<td>2.0 Nm</td>
</tr>
<tr>
<td>≤ 63 A M6</td>
<td>≤ 4 mm² to ≤ 16 mm²</td>
<td>2.5 Nm</td>
</tr>
<tr>
<td>≤125 A M6</td>
<td>≤ 6 mm² to 16 mm²</td>
<td>2.5 Nm</td>
</tr>
</tbody>
</table>

Surface mounting suffix: -1

Rail mounting (EN 50022-35x7.5) suffix: -2

**Internal connection diagrams**

911

912-K

913-K

rail mounting (EN 50035-G32) suffix: -3

Panel mounting suffix: -4

Mounting brackets - surface mounting suffix: -5

 Covers, labels, sealing screws etc. can be fitted on the front of the housing.

This is a metric design and millimeter dimensions take precedence (mm) inch

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
## Auxiliary contact arrangement with multipole switches

**Double pole devices**

- **Si**
- **2 Si**

**Three pole devices**

- **Si**
- **2 Si**
- **3 Si**

## Accessories

### Terminal insulation cover

**X 211 705 01**

(1 set = 2 pcs per pole)

- Protected against brush contact *

### For series 911 ≤ 125 A

**Water splash cover translucent with fixing plate and screws (IP54)**

**X 211 118 01**

- **Si**
- **2 Si**
- **3 Si**

### For series 911 - 240 A and 912

**Water splash cover translucent with fixing plate and screws (IP54)**

**X 211 119 01**

- **Si**
- **2 Si**
- **3 Si**

* to DIN 57106T100/VDE 0106 T100

---

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Single or two pole isolation switches to IEC 60947/EN 60947 with toggle actuation. Options include auxiliary contacts, a moulded flame retardant enclosure for added environmental protection (with or without rotary action external operating knob), and remote operation - disconnection only, or disconnection and re-connection. A version for use in hazardous areas (e.g. petroleum and chemical tankers) is available to special order.

**Typical applications**

Vehicles of all types (including tankers), boats, battery powered systems.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>921</td>
<td>single pole switch</td>
</tr>
<tr>
<td>922</td>
<td>double pole switch</td>
</tr>
<tr>
<td>B3</td>
<td>without external operating knob, for use only with single pole devices</td>
</tr>
<tr>
<td>B31</td>
<td>with external operating knob, for use only with single pole devices</td>
</tr>
<tr>
<td>B32</td>
<td>without external operating knob, for use only with double pole devices</td>
</tr>
<tr>
<td>B33</td>
<td>with external operating knob, for use with double pole devices</td>
</tr>
<tr>
<td>B34</td>
<td>with external operating knob, for use only with double pole devices with remote-re-connection facility</td>
</tr>
<tr>
<td>B35</td>
<td>with external operating knob, for use only with single pole devices with remote-re-connection facility</td>
</tr>
<tr>
<td>C3</td>
<td>without external operating knob, 1-pole, IP65</td>
</tr>
<tr>
<td>C32</td>
<td>without external operating knob, 2-pole, IP65</td>
</tr>
</tbody>
</table>

**Terminal design**

- K12: for single pole version, enclosures B3, B31, B35
- K60: for single pole version
- K61: for double pole version
- K62: for double pole version
- K71: compulsory and only for C3 housing
- K72: for double pole version, enclosures B32, B33, B34
- K76: compulsory and only for C32 housing

**Auxiliary contacts (blade terminals 6.3x0.8)**

- SI2: one N/O
- SI6: one N/O, two N/O
- 2SI2: two N/O
- SI10: one each N/O and N/C

**Remote operation**

- FA: remote disconnection
- FC: electrical remote disconnection (FA) and re-connection (FE)
- BC-FA: electrical remote disconnection and manual remote re-connection (not for enclosure - B., or - C.)

**Voltage ratings**

- DC 12 V; DC 24 V

**Current ratings**

- 240 A type 921
- 120 A type 922

**Voltage**

- 12 AC/DC 12 V
- 24 AC/DC 24 V

**Cool voltage**

- 12 AC/DC 12 V
- 24 AC/DC 24 V

**Degree of protection**

- Type 921
  - operating area: IP40
  - terminal area: IP54
  - IP65 with enclosure - C-

**Technical data**

- **Voltage rating**: DC 12 V; DC 24 V
- **Current rating range**: 240 A type 921, single pole
  - 120 A type 922, double pole
- **Auxiliary contact rating**: 6 A at DC 24 V
- **Electrical remote disconnection (-FA)**:
  - operating voltage: DC 12 V or DC 24 V
  - approx. 18 A or approx. 12 A
  - max. pulse time: 10 ms < t ON < 20 ms
  - t OFF > 10 s < 20 ms
- **Electrical remote re-connection (-FE)**:
  - operating voltage: DC 12 V or DC 24 V
  - approx. 30 A or approx. 15 A
  - max. pulse time: 0.1 s < t ON < 1.2 s
  - t OFF > 60 s < 100 ms
- **Typical life**: 10,000 operations at I N
  - 20,000 operations mechanical
- **Ambient temperature**: -40...+75 °C (-40...+167 °F)
- **Insulation co-ordination (IEC 60664 and 60664A)**:
  - rated impulse withstand voltage
  - 6 kV
- **Dielectric strength (IEC 60664 and 60664A)**:
  - test voltage
  - AC 3,300 V
  - AC 2,200 V
- **DC 12 V or DC 24 V**
  - mains to aux. circuit
  - aux. circuits 11-12
  - to 13-14
  - AC 1,000 V
- **Insulation resistance**:
  - > 100 MΩ (DC 500 V)

**Switching capacity**

- Type 921
  - 2,500A for 1s at +23°C
  - 600A for 1min at +23°C
  - 600A for 2min at -23°C
  - 600A for 1min at -23°C
  - 600A for 90s at 0°C
- Type 922
  - 1,500A for 1s at +23°C
  - 600A for 30s at +23°C
  - 600A for 1min at -23°C

**Degree of protection**

- IEC 529/DIN 40050
  - operating area: IP40
  - terminal area: IP54
  - IP65 with enclosure - C-

**Vibration**

- 5 g (57-200 Hz), ± 0.38 mm (10-57 Hz)
  - to IEC 60068-2-6, test Fc
  - 10 frequency cycles/axis

**Shock**

- 25 g (11 ms), to IEC 6068-2-27, test Ea

**Corrosion**

- 96 hours at 5 % salt mist
  - to IEC 6068-2-11, test Ka

**Humidity**

- 240 hours at 95 % RH,
  - to IEC 6068-2-3, test Ca

**Mass**

- approx. 900 g
  - base unit
  - + approx. 1,000 g C housing
  - + approx. 750 g B housing
  - + approx. 400 g remote disconnection
  - + approx. 100 g remote re-connection

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.
Battery Isolation Switches 921/922

Dimensions

Moulded enclosure IP 65 -C3

Moulded enclosure IP54 -B3

1-pole

2-pole

921-K12-5-BC-FA...

921-K60-FA

This is a metric design and millimeter dimensions take precedence (mm) inch

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Battery Isolation Switches 921/922

Dimensions types 922

**922-K72-5-....-FC**

- M10x25 tightening torque max. 4 Nm
- Dimensions: 61 x 2.40 x 2.24
- Internal connection diagrams:
  - Remote control connector acc. to DIN 72582
  - Recommended link for FA coil protection pre-wired at the factory

**922-K61-5-....-FC**

- M10x25 tightening torque max. 4 Nm
- Dimensions: 92 x 2.24 x 3.62
- Internal connection diagrams:
  - Remote control connector acc. to DIN 72582
  - Recommended link for FA coil protection pre-wired at the factory

**921**

- Dimensions: 114 x 4.49 x 4.97
- Internal connection diagrams:
  - Remote control
  - Load
  - Battery load
  - Recommended link for FA coil protection pre-wired at the factory

**922**

- Dimensions: 118 x 4.49 x 4.97
- Internal connection diagrams:
  - Remote control
  - Load
  - Battery load
  - Recommended link for FA coil protection pre-wired at the factory

**921-C3-....**

- Dimensions: 92 x 2.24 x 3.62
- Internal connection diagrams:
  - Remote control connector acc. to DIN 72582
  - Aux. contacts connector acc. to DIN 72582

**922-C32-....**

- Dimensions: 92 x 2.24 x 3.62
- Internal connection diagrams:
  - Remote control connector acc. to DIN 72582
  - Aux. contacts connector acc. to DIN 72582

This is a metric design and millimeter dimensions take precedence.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Battery Isolation Switches 921/922

Terminals with housing C3.

Rubber caps and cable fasteners are supplied with the product.

Shock directions

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Single pole, miniaturised aircraft simulator switch with extremely fast magnetic trip time. Blade, screw and wire wrap terminals. Aircraft style threadneck and push/pull button with white trip indicator ring. Current rating marked on the push button according to customer’s request by adhesive labels or marking inserts.

Typical applications

Simulators.

Ordering information

Type No. 9510 switch with magnetic instantaneous trip for flight simulators

Mounting method and style

G threadneck mounting with standard push button
L threadneck mounting with long push button

Threadneck design

1 M12x1x6.3
2 7/16-32UNx6.3

Number of poles

1 single pole

Accessories for threadneck

0 without accessories
1 hex nut M12x1, aluminium, lock washer ø12/ ø15 (crinkle) fitted
2 hex nut M12x1, aluminium, serrated lock washer ø12.1/ø17.2, fitted
3 hex nut 7/16-32UN, aluminium, toothed washer ø11.3/ø14.9, fitted (MS 3533-141)
9 front plate with mounting thread 6-32UNC-2B for threadneck 7/16-32 UN, threaded sleeve 7/16-32 UN

Terminal configuration

J screw terminals with inch thread
1 6-32UNC-2B, silver plated bent 45° inwards
3 6-32UNC-2B, silver plated, with socket, bent 45° inwards
P blade terminals
1 A6.3x0.8 DIN 46244, silver plated
W wire wrap terminal
4 pin size 1.2x1.2 EN 60352-1, gold plated, with socket
Z 0 without terminals

Rated voltage

F0 DC 24 V
F1 DC 28 V
F2 DC 48 V
F4 DC 12 V

Accessories (terminal screws)

B Phillips screw 6-32UNC-2Ax4.8 fitted (MS 51957-25)
Z without accessories

Accessories (terminal washers)

0 without accessories
2 3.6 split washer fitted (MS 35338-136)

Internal circuit

R2 with logic diode, contacts gold plated

Colour of the push button

S black
G green
A green, for marking insert
B black, for marking insert
0 without marking
1 hot-stamped marking, can be read when locating pin is above
2 hot-stamped marking, can be read when locating pin is at the bottom
9 without marking insert

Current ratings

0.5...150 A

Voltage rating

DC 12 V
DC 24 V
DC 28 V
DC 48 V

Trip current

< 450 mA
< 160 mA
< 200 mA
< 340 mA

Trip time

< 25 ms
< 25 ms
< 25 ms
< 20 ms

Min. switching voltage

at +23 °C/+73.4 °F
DC 25 V
DC 28 V

Internal resistance

157 Ω

Typical life

10,000 operations at DC 24, 28 or 48 V

Temperature range

-30...+60 °C (-22...+140 °F)

Insulation resistance

> 100 MΩ (DC 500 V)

Degree of protection

Operating area IP40
Terminal area IP00

Vibration (sinusoidal)

3 g (57-500 Hz), ± 0.23 mm (10-57 Hz)
10 cycles/frequency axis

Shock

5 g (11 ms),
to DIN IEC 60068-2-27, test Ea

Humidity

240 hours at 95 % RH, 40 °C
to DIN IEC 60068-2-3, test Ca

Mass

23 g without hardware
26 g with hardware

9510 - G 1 1 - J 1 F1 - B0 R2 S0 - 10 A ordering example
Simulator switch, magnetic operation 9510-...

Dimensions

9510-G...-J1...-B2...

tightening torque max. 3.5 Nm
M12x1 or
7/16-32UNC-2A THD

-9510-G...

-7/16-32UNC-2A x 4.8/.189
(MS 51957-25)
with lock washer (MS 35338-136)
plug-in terminals
lightning torque:
0.9 Nm factory mounted
0.4 Nm mounted by customer

Other main terminal designs

-P1...

blade terminal
DIN 46244-A6.3-0.8 (QC .250)
plug-in terminals

-J3...

terminal screw
6-32UNC-2A x 4.8/.189
(MS 51957-25)
with lock washer (MS 35338-136)
plug-in/pull-out terminal module (max. 25 times)
tightening torque 1 Nm

-W4...

wire wrap pin 1.2 x 1.2 / .047 x .047
EN 60352-1
plug-in/pull-out terminal module (max. 25 times)

Internal connection diagram

This is a metric design and millimeter dimensions take precedence (mm) inch
Label (black) for push/pull button (S0 or G0)

<table>
<thead>
<tr>
<th>Part number</th>
<th>Rated current (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y 307 082 01</td>
<td>0.5</td>
</tr>
<tr>
<td>Y 307 082 02</td>
<td>1/2</td>
</tr>
<tr>
<td>Y 307 082 03</td>
<td>1</td>
</tr>
<tr>
<td>Y 307 082 04</td>
<td>1.5</td>
</tr>
<tr>
<td>Y 307 082 05</td>
<td>1 1/2</td>
</tr>
<tr>
<td>Y 307 082 06</td>
<td>2</td>
</tr>
<tr>
<td>Y 307 082 07</td>
<td>3</td>
</tr>
<tr>
<td>Y 307 082 08</td>
<td>5</td>
</tr>
<tr>
<td>Y 307 082 09</td>
<td>7.5</td>
</tr>
<tr>
<td>Y 307 082 10</td>
<td>7 1/2</td>
</tr>
<tr>
<td>Y 307 082 11</td>
<td>10</td>
</tr>
<tr>
<td>Y 307 082 12</td>
<td>15</td>
</tr>
<tr>
<td>Y 307 082 13</td>
<td>20</td>
</tr>
<tr>
<td>Y 307 082 14</td>
<td>25</td>
</tr>
<tr>
<td>Y 307 082 15</td>
<td>30</td>
</tr>
<tr>
<td>Y 307 082 16</td>
<td>35</td>
</tr>
<tr>
<td>Y 307 082 17</td>
<td>40</td>
</tr>
<tr>
<td>Y 307 082 18</td>
<td>50</td>
</tr>
<tr>
<td>Y 307 082 19</td>
<td>60</td>
</tr>
<tr>
<td>Y 307 082 20</td>
<td>70</td>
</tr>
<tr>
<td>Y 307 082 21</td>
<td>75</td>
</tr>
<tr>
<td>Y 307 082 22</td>
<td>80</td>
</tr>
<tr>
<td>Y 307 082 23</td>
<td>90</td>
</tr>
<tr>
<td>Y 307 082 24</td>
<td>100</td>
</tr>
<tr>
<td>Y 307 082 25</td>
<td>120</td>
</tr>
<tr>
<td>Y 307 082 26</td>
<td>125</td>
</tr>
<tr>
<td>Y 307 082 27</td>
<td>150</td>
</tr>
<tr>
<td>Y 307 082 28</td>
<td>2.5</td>
</tr>
<tr>
<td>Y 307 082 29</td>
<td>2 1/2</td>
</tr>
<tr>
<td>Y 307 082 31</td>
<td>7</td>
</tr>
</tbody>
</table>

Plug-in screw terminal, bent at 45° inwards (2 pcs needed per unit)
- Y 307 187 02 terminal silver plated
- Y 304 508 02 Phillips screw 6-32 UNC-2Ax4.8 (MS 51957-25)
- Y 304 509 01 split washer (MS 35338-36)

Plug-in blade terminal (2 pcs needed per unit)
- Y 307 202 02 P10 terminal silver plated

Plug-in/pull-out screw terminals with socket, bent at 45° inwards
- X 222 173 11 terminals silver plated

Plug-in/pull-out wire wrap terminals with socket
- X 222 174 12 terminals gold plated

Splash cover/hex nut assembly with O ring (IP66 and IP67)
- X 200 801 03 matt black finish nut M12x1x1.8, black cover
- X 200 801 08 nickel plated nut M12x1x1.8, transparent cover
- X 200 801 09 matt black finish nut 7/16-32x1x1.8, black cover
- X 200 801 10 matt black finish nut 7/16-32x1x1.8, transparent cover

Actuator extension (black) to be fitted on the push button
- (approved to VG 95345, T23)
  - X 200 803 01

Identification collar to be snapped on the push button
- Y 307 004 01 black
- Y 307 004 02 white
- Y 307 004 03 red
- Y 307 004 04 green
- Y 307 004 05 blue

Lock out ring to block the push button in OFF position
- Y 307 005 01 red
- Y 307 005 02 black
Accessories

Hex nut M12x1
Y 300 116 04

Hex nut 7/16-32
Y 304 506 03

Lock washer Ø12 / Ø15
Y 300 118 03

Serrated lock washer Ø12.1 / Ø17.2
Y 302 911 01

Toothed washer Ø11.3 / Ø14.9 (MS 35333-141)
Y 304 507 01

Front plate with mounting thread 6-32UNC-2B
for threadneck 7/16-32UN
Y 301 516 21

Threaded sleeve
Y 307 281 02

Extracting tool of marking insert
Y 307 301 01

Marking inserts (push button configuration A or B)

<table>
<thead>
<tr>
<th>hot stamped</th>
<th>green</th>
<th>current rating (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y 307 280 01</td>
<td>Y 307 280 02</td>
<td>without</td>
</tr>
<tr>
<td>X 222 175 01</td>
<td>X 222 176 01</td>
<td>0.5</td>
</tr>
<tr>
<td>X 222 175 02</td>
<td>X 222 176 02</td>
<td>1/2</td>
</tr>
<tr>
<td>X 222 175 03</td>
<td>X 222 176 03</td>
<td>1</td>
</tr>
<tr>
<td>X 222 175 04</td>
<td>X 222 176 04</td>
<td>1.5</td>
</tr>
<tr>
<td>X 222 175 05</td>
<td>X 222 176 05</td>
<td>1 1/2</td>
</tr>
<tr>
<td>X 222 175 06</td>
<td>X 222 176 06</td>
<td>2</td>
</tr>
<tr>
<td>X 222 175 07</td>
<td>X 222 176 07</td>
<td>3</td>
</tr>
<tr>
<td>X 222 175 08</td>
<td>X 222 176 08</td>
<td>5</td>
</tr>
<tr>
<td>X 222 175 09</td>
<td>X 222 176 09</td>
<td>7.5</td>
</tr>
<tr>
<td>X 222 175 10</td>
<td>X 222 176 10</td>
<td>7 1/2</td>
</tr>
<tr>
<td>X 222 175 11</td>
<td>X 222 176 11</td>
<td>10</td>
</tr>
<tr>
<td>X 222 175 12</td>
<td>X 222 176 12</td>
<td>15</td>
</tr>
<tr>
<td>X 222 175 13</td>
<td>X 222 176 13</td>
<td>20</td>
</tr>
<tr>
<td>X 222 175 14</td>
<td>X 222 176 14</td>
<td>25</td>
</tr>
<tr>
<td>X 222 175 15</td>
<td>X 222 176 15</td>
<td>30</td>
</tr>
<tr>
<td>X 222 175 16</td>
<td>X 222 176 16</td>
<td>35</td>
</tr>
<tr>
<td>X 222 175 17</td>
<td>X 222 176 17</td>
<td>6</td>
</tr>
<tr>
<td>X 222 175 18</td>
<td>X 222 176 18</td>
<td>40</td>
</tr>
<tr>
<td>X 222 175 19</td>
<td>X 222 176 19</td>
<td>50</td>
</tr>
<tr>
<td>X 222 175 20</td>
<td>X 222 176 20</td>
<td>60</td>
</tr>
<tr>
<td>X 222 175 21</td>
<td>X 222 176 21</td>
<td>70</td>
</tr>
<tr>
<td>X 222 175 22</td>
<td>X 222 176 22</td>
<td>75</td>
</tr>
<tr>
<td>X 222 175 23</td>
<td>X 222 176 23</td>
<td>80</td>
</tr>
<tr>
<td>X 222 175 24</td>
<td>X 222 176 24</td>
<td>90</td>
</tr>
<tr>
<td>X 222 175 25</td>
<td>X 222 176 25</td>
<td>100</td>
</tr>
<tr>
<td>X 222 175 26</td>
<td>X 222 176 26</td>
<td>120</td>
</tr>
<tr>
<td>X 222 175 27</td>
<td>X 222 176 27</td>
<td>125</td>
</tr>
<tr>
<td>X 222 175 28</td>
<td>X 222 176 28</td>
<td>150</td>
</tr>
<tr>
<td>X 222 175 29</td>
<td>X 222 176 29</td>
<td>2.5</td>
</tr>
<tr>
<td>X 222 175 30</td>
<td>X 222 176 30</td>
<td>2 1/2</td>
</tr>
<tr>
<td>X 222 175 31</td>
<td>X 222 176 31</td>
<td>7</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The battery master switch E-1032-... allows remotely controlled connection and disconnection of the battery. In the event of reverse connection the battery will be disconnected from the vehicle electrical system.

Typical applications

Commercial vehicles

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>E-1032</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td></td>
</tr>
<tr>
<td>NA1</td>
<td>single pole</td>
</tr>
<tr>
<td>NA2</td>
<td>double pole</td>
</tr>
<tr>
<td>Enclosure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C with moulded enclosure IP65</td>
</tr>
<tr>
<td>Isolation switch</td>
<td></td>
</tr>
<tr>
<td>921</td>
<td>single pole switch</td>
</tr>
<tr>
<td>922</td>
<td>double pole switch</td>
</tr>
<tr>
<td>Voltage rating</td>
<td></td>
</tr>
<tr>
<td>DC 24 V</td>
<td></td>
</tr>
<tr>
<td>DC 12 V</td>
<td></td>
</tr>
<tr>
<td>Variant No.</td>
<td>e.g. special versions, mounting plate. Designation determined by manufacturer</td>
</tr>
</tbody>
</table>

E-1032 - NA1 - C 921 - DC 24 V - ... ordering example

Technical data

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>DC 24 V</th>
<th>DC 12 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>18 - 32 V</td>
<td>9 - 16 V</td>
</tr>
<tr>
<td>OFF</td>
<td>15 - 32 V</td>
<td>8.5 - 16 V</td>
</tr>
<tr>
<td>The switching function is no longer ensured when the voltage falls below the minimum values. The switch will not change its position when the voltage falls down to 0 V (automatic locking).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current ratings</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>240 A single pole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>120 A double pole</td>
<td></td>
</tr>
<tr>
<td>Overload capacity</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,500 A for 1 s at 23 °C, single pole</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1,500 A for 1 s at 23 °C, double pole</td>
<td></td>
</tr>
<tr>
<td>Current consumption of the electronics</td>
<td>≤ 15 mA</td>
<td></td>
</tr>
<tr>
<td>(with the control circuit connected)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switching current at U_l</td>
<td>DC 24 V: approx. 15A/100 ms approx. 12A/100 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC 12 V: approx. 20A/100 ms approx. 10A/100 ms</td>
<td></td>
</tr>
<tr>
<td>Control circuit</td>
<td>4 - 6 mA ON</td>
<td></td>
</tr>
<tr>
<td>Control switch (accessory)</td>
<td>with coding resistance</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC 24 V: 1 kΩ</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DC 12 V: 330 Ω</td>
<td></td>
</tr>
<tr>
<td></td>
<td>without coding resistance to ADR for external actuation</td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40...+75 °C (-40...+167 °F)</td>
<td></td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>If polarized incorrectly, the Master Switch will switch off immediately, disconnecting the entire vehicle electrical system. After approx. 30 s the circuit breaker of the ON coil will trip.</td>
<td></td>
</tr>
<tr>
<td>Retractability</td>
<td>When the Battery Master Switch is mechanically switched off, it will be reset immediately by the electronics.</td>
<td></td>
</tr>
<tr>
<td>Typical life</td>
<td>10,000 operations at I_l, 20,000 operations, mechanical</td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>housing IP65, terminal studs with rubber cap IP54</td>
<td></td>
</tr>
<tr>
<td>IEC 60529/DIN40050</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibration</td>
<td>5 g (57-200 Hz), ± 0.38 mm (10-57 Hz) to IEC 6068-2-6, test Fc, 10 frequency cycles/axis</td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>25 g (11 ms) direction 1, 2, 3, 4, 15 g (11 ms) direction 5, 6 to IEC 6068-2-27, test Ea</td>
<td></td>
</tr>
<tr>
<td>Corrosion</td>
<td>96 h at 5 % salt mist, to IEC 6068-2-11, test Ka</td>
<td></td>
</tr>
<tr>
<td>Humidity</td>
<td>240 h at 95 % RH, to IEC 6068-2-78, test Cab</td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>Main terminals: blade terminals with cable lugs for M10 terminal studs</td>
<td></td>
</tr>
<tr>
<td>Control cable</td>
<td>connector to DIN 72585</td>
<td></td>
</tr>
</tbody>
</table>

Auxiliary contact for auxiliary relay max. 6 A (circuit not protected)

Mass | single pole: approx. 3,500 g with enclosure, double pole: approx. 3,700 g with enclosure,
Battery Master Switch E-1032-...

**Dimensions**

**E-1032-NA1-... 1 pole**

<table>
<thead>
<tr>
<th>Connector to DIN 72585</th>
<th>Slot for mounting M6</th>
<th>M10 tightening torque max. 20 Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.787</td>
<td>0.376</td>
<td>1.22</td>
</tr>
<tr>
<td>0.99</td>
<td>0.47</td>
<td>0.31</td>
</tr>
<tr>
<td>0.71</td>
<td>0.27</td>
<td>0.31</td>
</tr>
<tr>
<td>0.57</td>
<td>0.27</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**E-1032-NA2-... 2 pole**

<table>
<thead>
<tr>
<th>Connector to DIN 72585</th>
<th>Slot for mounting M6</th>
<th>M10 tightening torque max. 20 Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.787</td>
<td>0.376</td>
<td>1.22</td>
</tr>
<tr>
<td>0.99</td>
<td>0.47</td>
<td>0.31</td>
</tr>
<tr>
<td>0.71</td>
<td>0.27</td>
<td>0.31</td>
</tr>
<tr>
<td>0.57</td>
<td>0.27</td>
<td>0.31</td>
</tr>
</tbody>
</table>

**Rubber cap**

Rubber caps and cable fasteners are supplied with the product.

**Internal connection diagrams**

**Power connection**

- Connector acc. to DIN 72582
- 3 pole
- Batt
- Generator D+
- 86
- 87
- 30
- 15
- Batt

**Shock directions**

Please follow the instructions for installation

This is a metric design and millimeter dimensions take precedence (mm) inch
Battery Master Switch E-1032-...

Accessories

ADR switch with safety cover
0Z223Z000141 12 V
0Z223Z000142 24 V

ADR switch without rubber boot
0Z223Z000143

ADR switch with rubber boot
0Z223Z000144

1. Female connector
X 221 378 02 2-way
X 221 378 01 3-way
X 221 378 03 4-way

2. Jack for female connector
Y 306 501 01

3. Seal
Y 306 502 01

4. 180° cover for sheathed cable
Y 306 500 01

5. 90° cover for corrugated conduit NW10
Y 306 499 01

6. 90° cover for sheathed cable
Y 306 499 02

Manufacturer: AMP

Standard connector set OZ112Z000179, comprising:

(AMP-parts) suitable for single/double pole Battery Master Switch E-1032-..., DC 12 V and DC 24 V

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Designation</th>
<th>Ref. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>female connector, 3-pole</td>
<td>X 221 378 01</td>
</tr>
<tr>
<td>1</td>
<td>female connector, 2-pole</td>
<td>X 221 378 02</td>
</tr>
<tr>
<td>5+1 replacem.</td>
<td>jack for female connector</td>
<td>Y 306 501 01</td>
</tr>
<tr>
<td>5+1 replacem.</td>
<td>seal</td>
<td>Y 306 502 01</td>
</tr>
<tr>
<td>2</td>
<td>90° cover corrugated conduit NW10</td>
<td>Y 306 499 01</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Battery Isolation Switches E-1073-437 and E-1073-921/-922

Description

Single pole circuit breaker type 437 or single/two pole isolation switches types 921/922 featuring an additional electronic function module which limits the duration of the supply to the remote disconnect and reconnect coils, avoiding damage in the event of unusual operating circumstances. Available with undervoltage monitoring option to protect batteries from the effects of deep discharge, status output for undervoltage, auto reset feature.

Typical applications

Battery and cable protection for all types of vehicle (including electric), battery powered systems.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
<th>Voltage rating</th>
<th>Control mode</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1073-1</td>
<td>1 single pole circuit breaker (2-pole upon request)</td>
<td>DC 12 V</td>
<td>00</td>
<td>typically &lt; 1 mA</td>
</tr>
<tr>
<td>E-1073-2</td>
<td>2 double pole battery isolation switch</td>
<td>DC 24 V</td>
<td>00</td>
<td>(when switched off or button operated)</td>
</tr>
</tbody>
</table>

Enclosure design (optional)

- B3: moulded housing, for use with single pole devices
- B33: moulded housing, for use with double pole devices
- B34: moulded housing, external operating knob, for use with double pole devices (not with auto reset)
- B35: moulded housing, external operating knob, for use with single pole devices (not with auto reset)

Technical data – Electronic module

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>DC 12 V</th>
<th>DC 24 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating range</td>
<td>ON 10.3 - 16 V</td>
<td>18 - 32 V</td>
</tr>
<tr>
<td></td>
<td>OFF 9 - 16 V</td>
<td>16 - 32 V</td>
</tr>
<tr>
<td>Correct switching performance is not guaranteed if the voltage falls below the minimum value.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature range</td>
<td>electronic control unit</td>
<td>-40...+80 °C (-40...+176 °F)</td>
</tr>
<tr>
<td>Operating current</td>
<td>ON approx. 30 A</td>
<td>approx. 15 A</td>
</tr>
<tr>
<td></td>
<td>OFF approx. 10 A</td>
<td>approx. 20 A</td>
</tr>
<tr>
<td>Excitation time</td>
<td>ON typically 100 ms</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF typically 20 ms</td>
<td></td>
</tr>
<tr>
<td>Switching frequency</td>
<td>0.1 Hz max.</td>
<td></td>
</tr>
<tr>
<td>Power consumption</td>
<td>of electronic control unit</td>
<td>typically &lt; 1 mA</td>
</tr>
<tr>
<td></td>
<td>(when switched off or button operated)</td>
<td></td>
</tr>
<tr>
<td>Control inputs</td>
<td>E-1073-1.1:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>»E/A« (ON/OFF), »U-AUS« (undervoltage protection OFF), »A-W« (auto reset)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-1073-2.2:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>»T-EIN« (button ON), »T-AUS« (button OFF), max. 32 V</td>
<td></td>
</tr>
<tr>
<td>Undervoltage protection</td>
<td>voltage</td>
<td>DC 12 V: 11.0 V ± 0.2 V</td>
</tr>
<tr>
<td></td>
<td>OFF (low)</td>
<td>DC 24 V: 22.8 V ± 0.2 V</td>
</tr>
<tr>
<td></td>
<td>power consumption</td>
<td>DC 12 V: typically 1 mA</td>
</tr>
<tr>
<td></td>
<td>OFF typically 5 mA</td>
<td></td>
</tr>
<tr>
<td>EMC</td>
<td>according to DIN 40839/ISO 7637</td>
<td></td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>If polarized incorrectly, the Battery Isolation Switch will operate immediately. The circuit breaker will trip after a few seconds.</td>
<td></td>
</tr>
<tr>
<td>Undervoltage protection sensitivity</td>
<td>switching thresholds</td>
<td>DC 12 V: 11.0 V ± 0.2 V</td>
</tr>
<tr>
<td></td>
<td>OFF (low)</td>
<td>DC 24 V: 22.8 V ± 0.2 V</td>
</tr>
<tr>
<td></td>
<td>trip time</td>
<td>typically 40 sec</td>
</tr>
<tr>
<td>Undervoltage status output</td>
<td>corresponding to 2 W lamp load, short-circuit proof</td>
<td></td>
</tr>
<tr>
<td>Automatic reset</td>
<td>»A-W«, (optional with E-1073-1...)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>with series 921/922 only</td>
<td></td>
</tr>
<tr>
<td>Control current supply</td>
<td>»US2«, with E-1073-2...</td>
<td></td>
</tr>
<tr>
<td></td>
<td>for T-EIN/T-AUS</td>
<td></td>
</tr>
<tr>
<td>Terminals</td>
<td>control terminals</td>
<td>blade terminals 6.3x0.8 mm</td>
</tr>
<tr>
<td>Mass, with circuit breaker or isolation switch</td>
<td>approx. 2,000 g without enclosure</td>
<td>approx. 2,500 g with enclosure</td>
</tr>
</tbody>
</table>

The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Technical data of switch or circuit breaker

see types 437, 921 or 922

4

www.e-t-a.com

E-1073-437

Battery and cable protection for all types of vehicle (including electric), battery powered systems.

Ordering example

E-1073-437 1 1 02 - 437 - B3  - K12 - 07 - Si01 - 240 A
Battery Isolation Switches E-1073-437 and E-1073-921/-922

Features

● Multiple functions in one unit
● High performance circuit breaker providing battery and cable protection from overloads and short-circuits.
● Master switch for ON/OFF operation
● Electrical remote control
● Undervoltage protection with status output
● Auxiliary contacts (e.g. for generator disconnection)
● Active reverse polarity protection of the entire vehicle electrical system
● Current ratings to 240 A (higher voltage ratings to special order)
● Closed-circuit current consumption < 1 mA

Technical description

E-T-A circuit breaker/battery isolation switches combined with electronic control unit E-1073 will meet a wide range of requirements.

Circuit breaker/battery isolation switches

The main switching contacts will open the plus, the minus or both poles according to model and application.

● Series E-1073-....437
  Single pole thermal-magnetic circuit breaker for current ratings up to 240 A, to protect the vehicle electrical system from overloads and short circuits.
● Series E-1073-...-921
  Single pole battery isolation switch for current ratings up to 240 A.
● Series E-1073-...922
  Double pole battery isolation switch for current ratings up to 120 A.

Electronic control unit

An electronic control unit enables the basic on/off function and two additional functions. The system voltage is connected across terminals +UB/-UB to provide the supply to the control unit and a feed is taken from +US1 for the remotely sited operating switch(es). The quiescent current drain is typically less than 1 mA, with a short duration excursion during excitation of the ON/OFF coils.

Basic function

Switch ON/OFF

Operation of the ON control switch will energise the switch-on coil for approximately 100 ms causing the main switching contacts to latch closed. Operation of the OFF control switch will cause the disconnect coil to trigger the release of the switching mechanism within approximately 20 ms. Both coil circuits are current limited to prevent damage through overheating.

Manual operation

An optional external operating knob is available to provide manual control in addition to electrical ON/OFF operation.

Reverse polarity protection

In the event of reverse polarity connection, the electronic control unit will immediately operate the battery switch to isolate the entire electrical system. The circuit breaker will trip after a short delay to protect the operating coils and must be re-set once the fault has been corrected.

Control functions

Type 1  E-1073-.1.. with ON/OFF switch

ON/OFF control switch input (»E/A«)

The battery isolation switch can be operated on or off by an external control switch to plus.

Undervoltage protection (optional)

This optional feature protects the battery from deep discharge should electrical loads be left on.

The battery is automatically disconnected whenever the voltage falls below a critical value for more than 40 s. The unit is reset by operation of the control switch. Sustained undervoltage after reconnection causes the unit to disconnect again after approx. 40 s.

Overriding the undervoltage protection (»U-AUS«)

Undervoltage protection may be overridden if required by connecting control output »U-AUS« to plus terminal or terminal 15.

Undervoltage status output (»UST«)

Undervoltage is signalled immediately via the minus-switching, short-circuit proof transistor output (2 W lamp load).

Auto reset (»A-W«), optional with series 921 and 922

Immediate reset after unwanted mechanical disconnection (e.g. upon excessive vibration) is provided by the integral electronic control.

Type 2  E-1073-.2.. with ON/OFF button

ON/OFF control inputs (»T-ON/T-OFF«)

ON/OFF function is provided by two external switches with a central control function, i.e. several systems can be operated simultaneously.

Additional control current supply (»+US2«)

If several circuit breakers/battery isolation switches are operated in parallel, switches can be supplied with control current from any of the electronic control units available. This power source is short-circuit proof, protected from noise voltages and will operate for 20 inputs.

Additional control input »ON/OFF Test« (»E/A«)

This control input can be used for maintenance purposes. The battery isolation switch is switched on when plus voltage is applied, and switched off when plus voltage is removed.

Note

The circuit breaker should be in the OFF condition when connecting or replacing the battery.

Observe instructions for installation!
Battery Isolation Switches E-1073-437 and E-1073-921/-922

Dimensions

E-1073-....-437/-921-....K12-....

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimension</th>
<th>Dimension</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal strip</td>
<td>122</td>
<td>141</td>
<td>9</td>
</tr>
<tr>
<td>M10x25 tightening torque max. 4 Nm</td>
<td>2.24</td>
<td>167</td>
<td>57</td>
</tr>
</tbody>
</table>

E-1073-....-437/-921-....K60-....

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimension</th>
<th>Dimension</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal strip</td>
<td>122</td>
<td>141</td>
<td>9</td>
</tr>
<tr>
<td>M10x25 tightening torque max. 4 Nm</td>
<td>2.24</td>
<td>167</td>
<td>57</td>
</tr>
</tbody>
</table>

E-1073-....-922-....K72-....

<table>
<thead>
<tr>
<th>Component</th>
<th>Dimension</th>
<th>Dimension</th>
<th>Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal strip</td>
<td>122</td>
<td>141</td>
<td>9</td>
</tr>
<tr>
<td>M10x25 tightening torque max. 4 Nm</td>
<td>2.24</td>
<td>167</td>
<td>57</td>
</tr>
</tbody>
</table>

Dimensions – Enclosures

-B3, single pole

-B34, double pole with operating knob

-B35, single pole with operating knob

-B32, double pole

Connection diagrams

E-1073-1-....-437/-921/-922 control function ON/OFF switch

E-1073-2-....-437/-921/-922 control function ON/OFF button

This is a metric design and millimeter dimensions take precedence.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

Issue B

www.e-t-a.com
For road vehicles, e.g. buses and coaches
Series E-1073-1102-437-B3-K12-07-Si01-240 A

In this application, the E-T-A combined battery switch/circuit breaker has several functions:

- High performance circuit breaker rated at 240 A, providing battery and cable protection from overloads and short circuits.
- Isolation switch, for ON/OFF operation (e.g. for main system disconnection).
- Remote control via external, low-current circuit.
- Undervoltage protection from battery deep discharge should electrical loads be left on.
- Early under voltage signalisation via a warning lamp (undervoltage status output), located as required.
- Auxiliary contact to disconnect the generator field.
- Reverse polarity protection through immediate disconnection of the entire vehicle electrical system if the battery is incorrectly connected.

These functions allow the number of components and cables required to be reduced, with significant space and weight saving benefits.

For rail vehicles, e.g. underground carriages
Series E-1073-1233-437-K60-06-Si01-200 A

In this application, the E-T-A combined battery switch/circuit breaker has two functions:

- High performance circuit breaker providing battery and cable protection from overloads and short circuits.
- Isolation switch between battery and loads.

In this application, an ON/OFF remote control switch can be provided in both the first and last carriages. This will enable all batteries to be disconnected from the power distribution system by the operation of one control, irrespective of its location. In the same way, all batteries can be re-connected by the operation of a single control switch. This is extremely helpful during coupling/de-coupling of carriages for example. In addition the E/A test input permits the operation of individual battery switch/circuit breakers during maintenance.

This is a metric design and millimeter dimensions take precedence (mm)

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Monostable power relay for single pole disconnection with a variety of versions available. Due to the possible combinations of the different configurations as well as due to different modes of mounting the power relay D1 is suitable for many applications.

Commercial vehicles, agricultural engines, watercraft, construction vehicles, motor homes and industrial trucks.

## Technical data

<table>
<thead>
<tr>
<th>Current rating</th>
<th>100 A, 200 A, 300 A</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coil data</strong></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>DC 12 V, DC 24 V, DC 48 V</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>9...16 V, 18...32 V, 36...54 V</td>
</tr>
<tr>
<td>Max. starting voltage (entire temperature range)</td>
<td>9 V, 14 V, 36 V</td>
</tr>
<tr>
<td>Isolating voltage</td>
<td>≤ 2 V, ≤ 4 V, ≤ 8 V</td>
</tr>
<tr>
<td>Cooldown</td>
<td>0.4 A, 0.2 A</td>
</tr>
<tr>
<td>Coil power</td>
<td>approx. 10 W, approx. 7 W upon request, approx. 10 W, approx. 10 W</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-40 °C...+85 °C</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td></td>
</tr>
<tr>
<td>interior</td>
<td>IP67 (0.2 bar: 1 min) to IEC 529 and IP6K9K to DIN 40050 part 9 and IEC 529</td>
</tr>
<tr>
<td>terminals</td>
<td>IP00 to IEC 529</td>
</tr>
<tr>
<td>Vibration</td>
<td>5 g (50-2000 Hz)</td>
</tr>
<tr>
<td>Shock</td>
<td>10 g (11 msec)</td>
</tr>
<tr>
<td>Resistance to</td>
<td>oil, fuel, hydraulic fluids</td>
</tr>
<tr>
<td>Housing</td>
<td>galvanized steel, tin-plated or lacquered optional</td>
</tr>
<tr>
<td>Mounting method</td>
<td>side mount, optionally large or small foot mount</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td>special version with suppressor diode and/or blow magnet</td>
</tr>
<tr>
<td>Terminal thread</td>
<td>100 A: M8, 200 A: M8 or M10, 300 A: M10</td>
</tr>
<tr>
<td>Mounting position</td>
<td>any</td>
</tr>
<tr>
<td>Switching element</td>
<td>contacts AgSnO</td>
</tr>
<tr>
<td>Min. insulation resistance</td>
<td>100 MΩ</td>
</tr>
<tr>
<td>Insulation resistance after load</td>
<td>50 MΩ</td>
</tr>
<tr>
<td>High voltage resistance</td>
<td>1,050 V for 1 min</td>
</tr>
<tr>
<td>Max. initial contact voltage drop</td>
<td>150 mV</td>
</tr>
<tr>
<td>Contact voltage drop after endurance</td>
<td>175 mV</td>
</tr>
<tr>
<td>ON duty</td>
<td>100 %</td>
</tr>
<tr>
<td><strong>Overload</strong></td>
<td>100 A: 800 A for 1 s, 200 A for 20 s, 200 A: 1,600 A for 1 s, 400 A for 20 s, 300 A: 2,400 A for 1 s, 600 A for 20 s</td>
</tr>
<tr>
<td><strong>Typical life</strong></td>
<td>75,000 cycles (at DC 28 V)</td>
</tr>
<tr>
<td>mechanically</td>
<td>1,500,000 cycles</td>
</tr>
<tr>
<td><strong>Starting time incl. bounce duration</strong></td>
<td>max. 40 ms</td>
</tr>
<tr>
<td><strong>Bounce duration</strong></td>
<td>max. 5 ms</td>
</tr>
<tr>
<td><strong>Release time</strong></td>
<td>max. 20 ms (without suppressor diode)</td>
</tr>
<tr>
<td><strong>Cable cross section at rated load</strong></td>
<td>100 A: min. 50 mm², 200 A: min. 70 mm², 300 A: min. 95 mm²</td>
</tr>
<tr>
<td><strong>Mass</strong></td>
<td>approx. 810 g (side mount, small foot mount), approx. 935 g (large foot mount)</td>
</tr>
</tbody>
</table>
Power Relay PR60

Ordering information

Type no. PR60

Contact type
1 make contact
2 break contact

Coil resistance
1 12 V
2 24 V
3 48 V

Current rating
1 100 A
2 200 A
3 300 A (only for make contacts)

Design of main terminals
1 M8 (for current ratings 100 A and 200 A)
2 M10 (for current ratings 200 A and 300 A)

Contact design
2 AgSn0 (standard)

Options
0 without
2 suppressor diode
3 blow magnet, recommended for voltages ≥ 40 V
4 suppressor diode and blow magnet

Other suppressor circuits of coil terminals upon request

Housing
1 galvanised steel (standard)
2 tin-plated
3 lacquered (upon request)

Mounting method
1 side mount (standard)
2 small foot mount
3 large foot mount

Schematic diagram

make-contact

<table>
<thead>
<tr>
<th>88</th>
<th>88a</th>
</tr>
</thead>
<tbody>
<tr>
<td>86+</td>
<td>85-</td>
</tr>
</tbody>
</table>

suppressor diode (option)

break-contact

<table>
<thead>
<tr>
<th>88</th>
<th>88a</th>
</tr>
</thead>
<tbody>
<tr>
<td>86+</td>
<td>85-</td>
</tr>
</tbody>
</table>

suppressor diode (option)

Dimensions

Current rating 100 A: terminal thread M8
Current rating 200 A: terminal thread M8 or M10
Current rating 300 A: terminal thread M10
Nominal dimensions without direct tolerance indication: IT 14 DIN ISO 286

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Power Relay PR60

Dimensions

Current rating 100 A: terminal thread M8
Current rating 200 A: terminal thread M8 or M10
Current rating 300 A: terminal thread M10
Nominal dimensions without direct tolerance indication: IT 14 DIN ISO 286

PR60-...-...-3 with blow magnet

Accessories

Suppressor diode
X 223 02 901

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Electronic Circuit Breaker ESS1 for System SVS1

Description

The electronic circuit breaker ESS1 is designed to ensure selective disconnection of individual loads in industrial systems which are powered by a DC 24 V switch mode power supply. Selectivity means that the ESS1 responds faster to overload or short circuit conditions than the power supply.

The ESS1 has four major tasks:

1. In the event of an overload or short circuit in a load circuit, even the shortest break-down of the output voltage of the power supply to values below 18 V must be prevented under all circumstances. Otherwise all other components fed by the power supply will respond unpredictably to the voltage dip. Result: reset, re-start, standstill of components or whole system. The voltage dip is caused by the characteristic overcurrent behaviour of the power supply (straight characteristic curve, fold-back curve, hiccup mode etc.).

2. Selective protection/disconnection must be ensured even at worst-case overload conditions. Long feed lines prevent the occurrence of a significant short circuit current (see table 1).

3. The current limited switch-on of loads with high input capacitance must be ensured without increase of rated current adjustment. Electronic DC 24 V components contain big input capacitors for suppression or back-up of voltage dips.

4. Fault indication

Features

- Electronic circuit breaker for protecting system components (sensors, actuators, field bus couplers, control units etc.) which are powered by a DC 24 V switch mode power supply.
- Connection of all load types (resistive, inductive, capacitive).
- Alternative current ratings (3 A or 6 A) can be selected by means of the switch on the device.
- Overload- and short-circuit proof switching output with active limitation of inrush and short-circuit currents.
- Overload-dependent trip characteristics (“thermal-magnetic circuit breaker style”, but much narrower trip curve tolerances).
- Power Mosfet switching output, high side switch.
- Additional disconnection by electromechanical switch in the event of overload.
- RED actuator button: reset or manual trip.
- Visual status indication: GREEN LED: O.K. signal YELLOW LEDS (40, 60, 80, 100 % of rated current): load current indication RED LED (110 %): flashing or lighted after tripping
- Fault indication through auxiliary contact (N/C, break contact).
- Integral thermal circuit breaker (with VDE, UL, CSA approval) serving as a fail-safe element in the load circuit and providing reverse polarity protection.
- Option: control input

Technical data (ambient = 25 °C, operating voltage US = DC 24 V)

<table>
<thead>
<tr>
<th>Operating data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage US</td>
<td>DC 24 V (DC 18...32 V)</td>
</tr>
<tr>
<td>Current rating I_N</td>
<td>3 A or 6 A (selected by means of a switch)</td>
</tr>
<tr>
<td>Current consumption I_0</td>
<td>typically 13 mA</td>
</tr>
<tr>
<td>OK signal</td>
<td>GREEN LED lighted when operating voltage is applied</td>
</tr>
</tbody>
</table>

| Reverse polarity protection U_P | integral with the device -> internal fail-safe-element tripped (see “Reset” on connection side), LEDs are unlit |
| Load circuit |   |
| Load output | Power-MOSFET switching output (high side switch) |
| Max. data of load (100 % ON duty) | DC 24 V / 3 A (resistive, inductive, capacitive, lamp load) |
| Voltage drop at I_N | typically 220 mV / 3 A |
| typically 440 mV / 6 A |
| Overload disconnection | typically 1.1 x I_N |
| Trip times | see time/current characteristic curve: |
| t_1: I_load > 1.05...2 x I_N | typ. 5 s, LED RED (110 %) flashing until disconnection occurs |
| t_2: I_load > 2 x I_N | typ. 5 s...100 ms, LED RED (110 %) lighting after disconnection, fault indication F closed |
| Short-circuit current I_K | active current limitation max. 2 x I_N |
| (6 A or 12 A) |
| Trip time t_K (at I_K) | typically 100 ms |
| Temperature disconnection: | internal temperature monitoring with physical isolation, LED RED (110 %) lighting after disconnection, fault indication F |
| Load current indication | 4 YELLOW LEDs (40, 60, 80, 100 %) or 1 RED LED (110 %) signalling utilization of the set current rating in % (e. g. higher than 40 %) |
| Starting delay t_start | typically 1 s upon application of US after each switch-on |
| Free-wheeling circuit | integral bi-directional transil diode; external free-wheeling diode recommended for inductive loads |
| Disconnection of load circuit | single pole (switch contact) |
| - by manual operation of the RED button |
| - upon electronic fault disconnection (overload, short-circuit) |

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Technical data** \( (T_{\text{ambient}} = 25 \, ^\circ \text{C}, \text{operating voltage } U_S = \text{DC } 24 \, \text{V}) \)

Several load outputs must not be connected in parallel

**Control circuit (option)**

Control input EC/EO - to customer requirement:
- possibly physically isolated via opto coupler/
- control voltage \( U_D \) / control current \( I_D \)
- switching frequency \( f_{\text{max}} \) / control signal (\( U_D = >>1<< \))
- Switching times \( t_{\text{on}}, t_{\text{off}} \) / leakage current / protection

**Fault indication**

- Fault indication \( F \) potential-free auxiliary contact (SC-S0), break contact (N/C), DC 30 V / max. 1 A
- Status of fault indication: Contact closed in the event of power failure or when the switch (RED button) has tripped upon:
  - overload/short-circuit in the load circuit (RED LED lights). The fault indicated by that LED is stored until the RED operating button is reset.
  - manual disconnection of the device

**Signal delay**

- typically 150 ms

**Reverse polarity of \( U_S \)**

- internal fail-safe element will trip

**General data**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>0...40 °C (without condensation, see EN 60204-1)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-20...+70 °C</td>
</tr>
<tr>
<td>Blade terminals</td>
<td>6.3 mm to DIN 46244-A6.3-0.8</td>
</tr>
<tr>
<td>for E-T-A Power distribution system SVS1-xx-...</td>
<td></td>
</tr>
<tr>
<td>Backup fuse for ESS1</td>
<td>not required because of the integral redundant fail-safe element (thermal E-T-A circuit breaker)</td>
</tr>
<tr>
<td>Housing material</td>
<td>aluminium</td>
</tr>
<tr>
<td>Mounting of housing</td>
<td>Plug-in for distribution system SVS1 for symmetric rail mounting</td>
</tr>
<tr>
<td>Vibration</td>
<td>3 g, test to IEC 60068-2-6 test Fc</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>Housing: IP20 DIN 40050/IEC 529 Terminals: IP00 DIN 40050/IEC 529</td>
</tr>
<tr>
<td>EMC (EMC directive, CE logo)</td>
<td>Emission: EN 50081-1 Susceptibility: EN 61000-6-2</td>
</tr>
<tr>
<td>Dimensions (W x H x D)</td>
<td>17.5 x 100 x 55 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 80 g</td>
</tr>
</tbody>
</table>

**Ordering information**

**Type No.**

<table>
<thead>
<tr>
<th>ESS1</th>
<th>Electronic Circuit Breaker for DC 24 V applications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Version</strong></td>
</tr>
<tr>
<td></td>
<td>0 standard</td>
</tr>
<tr>
<td></td>
<td><strong>Control input</strong></td>
</tr>
<tr>
<td>0</td>
<td>without control input</td>
</tr>
<tr>
<td>1</td>
<td>with control input 8.5 V...30 V (option)</td>
</tr>
<tr>
<td></td>
<td><strong>Signal output</strong></td>
</tr>
<tr>
<td>0</td>
<td>without auxiliary contact</td>
</tr>
<tr>
<td>1</td>
<td>with auxiliary contact (N/O)</td>
</tr>
<tr>
<td></td>
<td><strong>Input voltage</strong></td>
</tr>
<tr>
<td></td>
<td>DC 24 V voltage rating DC 24 V (18...32 V)</td>
</tr>
<tr>
<td></td>
<td><strong>Current rating</strong></td>
</tr>
<tr>
<td></td>
<td>3 A/6 A adjustable (by slide switch)</td>
</tr>
</tbody>
</table>

**Ordering example**

ESS1 - 0 0 1 - DC 24 V - 3 A/6 A

**Basic circuit diagram**

Shown on the switched-off and de-energised condition. The red reset button is in the tripped (OFF) position, the auxiliary contacts of the fault indication (SC-S0) are closed.
Explanation of the characteristic curve:

- The trip time is typically 5 s in the range between 1.05 and 2 x I_{th}.
- Electronic current limitation starts at 2 x I_{th} which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload until disconnection will not exceed two times the current rating.
- Without the current limitation activated at 2 x I_{th} a much higher overload current would flow in the event of an overload or short circuit.
- Trip time after activation of current limitation is between 5 s and 100 ms (short circuit).

Terminal wiring diagram

Dimensions

This is a metric design and millimeter dimensions take precedence.
Matrix of the ESS1 switching conditions

<table>
<thead>
<tr>
<th>Operating mode (unit without Control input)</th>
<th>Trouble-free operation</th>
<th>Overload: (I_{max} = 1.1 \ldots 2 \times I_{N})</th>
<th>Short-circuit: (I_{max} &gt; 3 \times I_{N})</th>
<th>temperature disconnection (&gt; 150 °C / 302 °F)</th>
<th>Internal-failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load output</td>
<td>ON = conductive</td>
<td>OFF = non-conductive</td>
<td>OFF = non-conductive</td>
<td>OFF = non-cond.</td>
<td></td>
</tr>
<tr>
<td>Load circuit 1-pole discon. (through switching contact)</td>
<td>no</td>
<td>yes, after approx. 5 s</td>
<td>yes, after approx. 60 ms</td>
<td>yes, after approx. 80 ms</td>
<td></td>
</tr>
</tbody>
</table>

- With manual operation (RED button pulled): fault indication F, RED LED also lighted.
- Upon response of the internal temperature control (chip temperature of power semiconductors is +150 °C / +302 °F for a short period of time) the load current is disconnected. The circuit breaker trips and the red LED (I > 110 %) is lighted.

If the ESS1 is to be switched off again, a short cooling down period must be taken into account due to the temperature hysteresis of the semiconductor chip. The cooling down period will be approx. 5 sec dependent on the energy absorption (behaviour similar to thermal circuit breaker).

**) Electronic control unit defective - internal fail-safe element has tripped (see »reset« on terminal side of the ESS1).

<table>
<thead>
<tr>
<th>Operating mode (unit without Control input)</th>
<th>Trouble-free operation</th>
<th>Overload: (I_{max} = 1.1 \ldots 2 \times I_{N})</th>
<th>Short-circuit: (I_{max} &gt; 3 \times I_{N})</th>
<th>temperature disconnection (&gt; 150 °C / 302 °F)</th>
<th>Internal-failure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load output</td>
<td>ON = conductive</td>
<td>OFF = non-conductive</td>
<td>OFF = non-conductive</td>
<td>OFF = non-cond.</td>
<td></td>
</tr>
<tr>
<td>Load circuit 1-pole discon. (through switching contact)</td>
<td>no</td>
<td>yes, after approx. 5 s</td>
<td>yes, after approx. 60 ms</td>
<td>yes, after approx. 80 ms</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indication</th>
<th>GREEN LED O. K.-signal</th>
<th>lighted</th>
<th>lighted</th>
<th>lighted</th>
<th>lighted</th>
<th>not lighted</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED LED (I &gt; 110 % von Iₙ)</td>
<td>not lighted</td>
<td>LED flashes for approx. 5 sec, LED flashes momentarily, lighted after tripping</td>
<td>LED flashes for approx. 5 sec, LED flashes momentarily, lighted after tripping</td>
<td>LED flashes momentarily, lighted after tripping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>YELLOW LEDs</td>
<td>0...4 LEDs lighted, dependent on load current</td>
<td>none of the LEDs lighted after tripping</td>
<td>none of the LEDs lighted after tripping</td>
<td>none of the LEDs lighted after tripping</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fault indication F</td>
<td>open</td>
<td>closed</td>
<td>closed</td>
<td>closed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RED actuator/ reset button</td>
<td>ON</td>
<td>tripped</td>
<td>tripped</td>
<td>tripped</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Electronic Circuit Breaker ESS1 for DC 24 V

<table>
<thead>
<tr>
<th>Specific conductivity of copper (\rho_0 = 0.0178) (Ohm x mm²) / m</th>
<th>voltage drop of ESS1 and tolerance of trip point (typically 1.1 x (I_N) = 1.05...1.25 x (I_N)) have been taken into account.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(U_S = DC 19.2) V (= 80 % v. 24 V)</td>
<td></td>
</tr>
<tr>
<td>ESS1-selected rating (I_N) (in A)</td>
<td>3 (\rightarrow) 6</td>
</tr>
<tr>
<td>trip current (I_{lop}) max. = 1.25 (\times I_N) (in A)</td>
<td>3.75 (\rightarrow) 7.5</td>
</tr>
<tr>
<td>(R_{max}) in Ohm = ((U_S / I_{lop}) - 0.050)</td>
<td>5.07 (\rightarrow) 2.51</td>
</tr>
</tbody>
</table>

The ESS1 reliably trips from 0 Ohm to max. circuitry resistance \(R_{max}\)

<table>
<thead>
<tr>
<th>Cable cross section (A) in mm²</th>
<th>0.14</th>
<th>0.25</th>
<th>0.34</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>cable length (L) in meter (= single length)</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
<td>down</td>
</tr>
</tbody>
</table>

| R₅ | 1.27 | 0.71 | 0.52 | 0.36 | 0.24 | 0.18 | 0.12 |
| 2.54 | 1.42 | 1.05 | 0.71 | 0.47 | 0.36 | 0.24 |
| 3.81 | 2.14 | 1.57 | 1.07 | 0.71 | 0.53 | 0.36 |
| 5.09 | 2.85 | 2.09 | 1.42 | 0.95 | 0.71 | 0.47 |
| 6.36 | 3.56 | 2.62 | 1.78 | 1.19 | 0.89 | 0.59 |
| 7.63 | 4.27 | 3.14 | 2.14 | 1.42 | 1.07 | 0.71 |
| 8.90 | 4.98 | 3.66 | 2.49 | 1.66 | 1.25 | 0.83 |
| 10.17 | 5.70 | 4.19 | 2.85 | 1.90 | 1.42 | 0.95 |
| 11.44 | 6.41 | 4.71 | 3.20 | 2.14 | 1.60 | 1.07 |
| 12.71 | 7.12 | 5.24 | 3.56 | 2.37 | 1.78 | 1.19 |
| 19.07 | 10.68 | 7.85 | 5.34 | 3.56 | 2.67 | 1.78 |
| 25.34 | 14.24 | 10.47 | 7.12 | 4.75 | 3.56 | 2.37 |
| 31.79 | 17.80 | 13.09 | 8.90 | 5.93 | 4.45 | 2.97 |
| 38.14 | 21.36 | 15.71 | 10.68 | 7.12 | 5.34 | 3.56 |
| 44.50 | 24.92 | 18.32 | 12.46 | 8.31 | 6.23 | 4.15 |
| 50.86 | 28.48 | 20.94 | 14.24 | 9.49 | 7.12 | 4.75 |
| 57.21 | 32.04 | 23.56 | 16.02 | 10.68 | 8.01 | 5.34 |
| 63.57 | 35.60 | 26.18 | 17.80 | 11.87 | 8.90 | 5.93 |

Example 1: max. length at 1.5 mm² and 3 A 214 m

Example 2: max. length at 1.5 mm² and 6 A 106 m

Example 3: mixed wiring: (Control cabinet – sensor/actuator level) \(R_1 = 40\) m in 1.5 mm² and \(R_2 = 5\) m in 0.25 mm²:

\(R_1 = 0.95\) Ohm, \(R_2 = 0.71\) Ohm

Total \((R_1 + R_2) = 1.66\) Ohm
The E-T-A power distribution system SVS1 is designed to accommodate the electronic circuit breaker series ESSx. It distributes the current supplied by a switch mode power supply up to 40 A to 4, 8, 12 or 16 channels. Mains connection is via screw terminals. The individual circuit breakers can be plugged in. Loads are connected via cage clamp screwless terminals. The power distribution includes integral wiring of the signalisation of the individual channels which can be combined to group signals A and B. The SVS1 can be snapped onto a DIN symmetrical rail.

### Features

- Power distribution system for short-circuit limited DC 24 V applications up to max. 40 A continuous load
- Three screw terminals (max. 10 mm²/AWG 8) for:
  - DC 24 V (+) (green)
  - DC 24 V (-) (green)
  - FE (functional earth) (green)
- Modular design ESS1-positions:
  - SVS1-16-...: 16 channels - SVS1-12-...: 12 channels
  - SVS1-08-...: 8 channels - SVS1-04-...: 4 channels
- Load outputs (L) per channel:
  - (LB) group output (+) internally bridged across all channels (for special applications)
  - (L+) load output (+), per channel
  - (-) DC 24 V (-)
  - (FE) functional earth
- Signal output (S) per channel:
  - (S0) single output
  - (SA) signal group A
  - (SB) signal group B
- 2 Group signal outputs (output or further connection):
  - (SAS) signal group A -> group signal
  - (SBS) signal group B -> group signal
  - (SCS) common return wire for groups A/B
  - (protected by a 1 Amp. E-T-A Circuit Breaker F/SCS)
- Option: control input (E) - not used -

### Ordering information

<table>
<thead>
<tr>
<th>Type</th>
<th>Power distribution system</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVS1</td>
<td>Short-circuit limited DC 24 V applications</td>
</tr>
<tr>
<td></td>
<td>Max. 40 A continuous load</td>
</tr>
<tr>
<td></td>
<td>3 screw terminals max. 10 mm²/AWG 8 for</td>
</tr>
<tr>
<td></td>
<td>- DC 24 V (+) / DC 24 V (-) / functional earth FE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version, number of channels (K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04 4 channels (K1...K4)</td>
</tr>
<tr>
<td>08 8 channels (K1...K8)</td>
</tr>
<tr>
<td>12 12 channels (K1...K12)</td>
</tr>
<tr>
<td>16 16 channels (K1...K16)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load outputs (L) per channel</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2 load (+), load (-) (on request)</td>
</tr>
<tr>
<td>L3 load (+), (-), FE (on request)</td>
</tr>
<tr>
<td>L4 4 load outputs per channel</td>
</tr>
<tr>
<td>(LB) group output (+) internally bridged across all channels</td>
</tr>
<tr>
<td>(L+) load output (+), per channel</td>
</tr>
<tr>
<td>(-) DC 24 V (-)</td>
</tr>
<tr>
<td>(FE) functional earth</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signal outputs (S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S0 without signal outputs (option)</td>
</tr>
</tbody>
</table>
| S1 - with signal output (S) per channel:
  - (S0) single output
  - (SA) signal group A
  - (SB) signal group B
  - with group signal outputs:
    - (SAS) signal group A group signal
    - (SBS) signal-group B group signal
    - (SCS) common return wire for groups A/B |

<table>
<thead>
<tr>
<th>Control input (E)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E0 without control input</td>
</tr>
<tr>
<td>E1 with control input (E) per channel (option)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fitting variants</th>
</tr>
</thead>
<tbody>
<tr>
<td>C0 not fitted</td>
</tr>
<tr>
<td>C1 complete with screwless spring-loaded terminals max. 2.5 mm² (AWG 14) without connector sleeve</td>
</tr>
</tbody>
</table>

**SVS1 - 16 - L4 - S1 - E0 - C1** ordering example
Dimensions SVS1-16

Connection diagram SVS1-(n)

This is a metric design and millimeter dimensions take precedence (mm).
Dimensions SVS1-16, fitted with ESS1

Schematic diagram SVS1-(n)

This is a metric design and millimeter dimensions take precedence.
Example of signal group

Signal output of channel K4:
Insulated wire bridge (accessory) placed:

[S0] ⊕ [SB]

This means that [S0] of K4 has been assigned to the signal group B [SB].

K4 = 117

Accessories

Insulated wire bridge
Y 303 881 08

- Group connection of signal outputs ([S0] - [SA] or [S0] - [SB])
- Group connection of control inputs (option)

This is a metric design and millimeter dimensions take precedence (mm). All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Electronic circuit breaker type ESS20-0.. is designed to ensure selective disconnection of individual loads in systems which are powered by a DC 24 V switch-mode power supply.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through selective disconnection the ESS20-0.. responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by a combination of active current limitation and well-proven circuit breaker technology including physical isolation. The ESS20-0.. limits the highest possible current to 1.8 or 1.5 times the selected rated current of the circuit breaker. Thus it is possible to switch on capacitive loads of up to 20,000 μF lamp loads, but they are disconnected only in the event of an overload or short circuit.

For optimal adjustment to the application conditions the current rating of the ESS20-0.. can be selected in fixed values from 0.5 A..10 A and in adjustable variants 1 A/2 A or 3 A/6 A. Failure and status indication are provided by a bicolour LED and an integral signal contact.

The ESS20-0.. features a width of only 12.5 mm and can be plugged into the E-T-A power distribution system Module 17plus and SVS02/SVS04 (for ESS20-003) ensuring ease of installation and saving space in control cabinets.

Features

- Selective load protection with physical isolation in the event of a fault.
- All types of loads can be connected (small DC motors etc. on request).
- Active current limitation (1.8 or 1.5 times rated current I_N = 8 A or 10 A) for safe connection of capacitive loads up to 20,000 μF and on overload/short circuit.
- Electronic trip characteristic.
- Reliable overload disconnection with 1.1 x I_N plus, even with long load lines or small cable cross sections (see table 2).
- Selectable current ratings (fixed values 0.5 A...10 A or two steps: 1 A/2 A or 3 A/6 A).
- Manual ON/OFF button (push-push actuation).
- Clear status and failure indication.
- Width per unit only 12.5 mm.
- Plug-in mounting utilising power distribution system Module 17plus or SVS02/SVS04 (for ESS20-003), see product group 7.

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1077</td>
<td>DC 24 V</td>
<td>0.5...10 A</td>
</tr>
</tbody>
</table>

Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.

Technical data (T_ambient = 25 °C, operating voltage U_S = DC 24 V)

Operating data

- Operating voltage U_S: DC 24 V (18...32 V)
- Current rating I_N: fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A switchable: 1 A/2 A or 3 A/6 A
- Power consumption: typically 13 mA
- Trip current (bimetal): typically 0.3 A
  - (only in the event of a failure, before physical isolation)
- Status indication by means of bicolour LED:
  - GREEN: unit is ON, power-MOSFET is switched on
  - ORANGE: in the event of overload or short circuit until physical isolation
  - LED not lighted: push button in OFF position
- Potential-free signal contact (change-over contact)
- OFF-position of push button

Load circuit

- Load output: Power-MOSFET switching output (high side switch)
- Max. data of load with side-by-side mounting see table 1
- Voltage drop at I_N: see table 1
- Overload disconnection: typically 1.1 x I_N (1.05...1.35 x I_N)
- Short-circuit current I_K: typically 1.8 x I_N / active current limitation
- Trip time for physical isolation: see time/current characteristics
  - typically 5 sec at I_load > 1.1 x I_N
  - typically 5 sec...100 ms at I_load > 1.8 x I_N or 1.5 x I_N
- Temperature disconnection: internal temperature monitoring with physical isolation
- Low voltage monitoring load output: ON at U_S >16 V
  - OFF at U_S < 8 V
- Starting delay t_start: typically 0.3 sec after every switch-on and after applying U_S
- Disconnection of load circuit: single pole (switch contact)
  - by push-push actuation of the blue push button
  - upon electronic fault disconnection (overload, short circuit)
  - with reverse polarity
- Free-wheeling circuit: external free-wheeling diode recommended with inductive load
- Several load outputs must not be connected in parallel.
Technical data (Tambient = 25 °C, operating voltage UG = DC 24 V)

<table>
<thead>
<tr>
<th>Fault indication, signal output</th>
<th>Fault indication</th>
<th>potential-free auxiliary contact change-over (SC-SO / SC-SI) simultaneously with physical isolation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>max. DC 30 V / 0.5 A, min. 10 V / 10 mA</td>
</tr>
<tr>
<td>Signal output ESS20-001</td>
<td>blue push button in ON position: signal contact SC-SI is closed</td>
<td></td>
</tr>
<tr>
<td>(single signalisation N/O)</td>
<td>blue push button in OFF position: signal contact SC-SI is open</td>
<td></td>
</tr>
<tr>
<td>Signal output ESS20-003</td>
<td>blue push button in ON position: signal contact SC-SO is closed (SC-SI is open)</td>
<td></td>
</tr>
<tr>
<td>(group signalisation N/C)</td>
<td>blue push button in OFF position: signal contact SC-SO is open (SC-SI is closed)</td>
<td></td>
</tr>
<tr>
<td>Visual indication</td>
<td>LED lighted in ORANGE (until physical isolation)</td>
<td></td>
</tr>
</tbody>
</table>

General data

Backup fuse for ESS20-0.. not required because of the integral redundant fail-safe element (thermal E–T–A circuit breaker)

Blade terminals 6.3 mm to DIN 46244-A6.3-0.8

Housing material plastics material

Mounting of housing plug-in mounting utilising power distribution system Module 17plus or SVS02

Ambient temperature 0...+50 °C (without condensation, see EN 60204-1)

Storage temperature -20...+70 °C

Humidity 96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721

Vibration 3 g, test to IEC 60068-2-6 test Fc

Degree of protection housing: IP30 DIN 40050 terminals: IP00 DIN 40050

EMC (EMC directive, CE logo) emission: EN 50081-1 susceptibility: EN 61000-6-2

Insulation co-ordination (IEC 60934) 0.5 kV/2 pollution degree 2 re-inforced insulation in operating area

Dielectric strength operating area (see dimensions)

installation area test voltage AC 1000 V

load circuit-signal contact test voltage 500 V

Insulation resistance (OFF condition) > 100 MΩ (DC 500 V) [LINE (+) – LOAD (+)]

Approvals UL 1077, File E67320 Supplementary Protectors for use in Electrical Equipment CE logo

Dimensions (W x H x D) 12.5 x 105 x 60 mm

Mass approx. 65 g

Table 1: voltage drop, current limitation, max. load current

<table>
<thead>
<tr>
<th>Current rating I0</th>
<th>Typically voltage drop U0 volts</th>
<th>Active current limitation (typically)</th>
<th>Max. load current at 100 % ON duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>U0 volts</td>
<td>I0</td>
<td>1.8 x I0</td>
<td>0.5 A</td>
</tr>
<tr>
<td>0.5 A</td>
<td>100 mV</td>
<td>1.8 x I0</td>
<td>0.5 A</td>
</tr>
<tr>
<td>1 A</td>
<td>140 mV</td>
<td>1.8 x I0</td>
<td>1 A</td>
</tr>
<tr>
<td>2 A</td>
<td>180 mV</td>
<td>1.8 x I0</td>
<td>2 A</td>
</tr>
<tr>
<td>3 A</td>
<td>240 mV</td>
<td>1.8 x I0</td>
<td>3 A</td>
</tr>
<tr>
<td>4 A</td>
<td>300 mV</td>
<td>1.8 x I0</td>
<td>4 A</td>
</tr>
<tr>
<td>6 A</td>
<td>280 mV</td>
<td>1.8 x I0</td>
<td>6 A</td>
</tr>
<tr>
<td>8 A</td>
<td>200 mV</td>
<td>1.5 x I0</td>
<td>8 A</td>
</tr>
<tr>
<td>10 A</td>
<td>200 mV</td>
<td>1.5 x I0</td>
<td>10 A</td>
</tr>
<tr>
<td>1 A/2 A</td>
<td>140 mV/280 mV</td>
<td>1.8 x I0</td>
<td>1 A/2 A</td>
</tr>
<tr>
<td>3 A/6 A</td>
<td>240 mV/480 mV</td>
<td>1.8 x I0</td>
<td>3 A/6 A</td>
</tr>
</tbody>
</table>

Attention: when mounted side-by-side without convection the ESS20-0.. should not carry more than 80 % of its rated load with 100 % ON duty because of the integral thermal circuit breaker.
Terminal wiring diagrams (e. g. adjustable 3 A/6 A)

ESS20-001-...

ESS20-002-...

ESS20-003-...

Basic circuit diagrams (e. g. adjustable 3 A/6 A)

ESS20-001-... (single signalisation N/O)

ESS20-002-... (single signalisation N/C)

ESS20-003-... (group signalisation with change over)
Time/Current characteristic curve ($T_A = 25 \, ^\circ\text{C}$)

- The trip time is typically 5 s in the range between 1.1 and 1.8 x $I_{N}$.
- Electronic current limitation starts at typically 1.8 x $I_{N}$ which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload until disconnection will not exceed 1.8 x $I_{N}$ times the current rating. Trip time is between 100 ms (short circuit current $I_K$) and 5 sec (at overload with high line attenuation).
- Without the current limitation activated at typically 1.8 x $I_{N}$ a considerably higher overload current would flow in the event of an overload or short circuit.
- After detection of an overload or short circuit the LED changes colour from GREEN to ORANGE. The LED will no longer be lighted after the circuit breaker has tripped.
- Resetting the circuit breaker is not possible before the integral bimetal has cooled down (approx. 10 sec).

Table 2: Reliable trip of ESS20

<table>
<thead>
<tr>
<th>Cable cross section $A$ in mm$^2$</th>
<th>0.14</th>
<th>0.25</th>
<th>0.34</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>cable length $L$ in meter (= single length)</td>
<td>5</td>
<td>1.27</td>
<td>0.71</td>
<td>0.52</td>
<td>0.36</td>
<td>0.24</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2.54</td>
<td>1.42</td>
<td>1.05</td>
<td>0.71</td>
<td>0.47</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>3.81</td>
<td>2.14</td>
<td>1.57</td>
<td>1.07</td>
<td>0.71</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>5.09</td>
<td>2.85</td>
<td>2.09</td>
<td>1.42</td>
<td>0.95</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>6.36</td>
<td>3.56</td>
<td>2.62</td>
<td>1.78</td>
<td>1.19</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>7.63</td>
<td>4.27</td>
<td>3.14</td>
<td>2.14</td>
<td>1.42</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>8.90</td>
<td>4.98</td>
<td>3.66</td>
<td>2.49</td>
<td>1.66</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>10.17</td>
<td>5.70</td>
<td>4.19</td>
<td>2.85</td>
<td>1.90</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>11.44</td>
<td>6.41</td>
<td>4.71</td>
<td>3.20</td>
<td>2.14</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>12.71</td>
<td>7.12</td>
<td>5.24</td>
<td>3.56</td>
<td>2.37</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>14.00</td>
<td>7.85</td>
<td>5.85</td>
<td>4.05</td>
<td>3.56</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>15.29</td>
<td>8.56</td>
<td>6.47</td>
<td>4.75</td>
<td>3.56</td>
<td>2.67</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>16.59</td>
<td>9.26</td>
<td>7.17</td>
<td>5.45</td>
<td>4.45</td>
<td>2.97</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>17.90</td>
<td>10.0</td>
<td>7.85</td>
<td>6.16</td>
<td>5.34</td>
<td>3.56</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>19.21</td>
<td>10.71</td>
<td>8.54</td>
<td>6.86</td>
<td>6.23</td>
<td>3.97</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>20.52</td>
<td>11.41</td>
<td>9.24</td>
<td>7.56</td>
<td>7.12</td>
<td>4.97</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>21.83</td>
<td>12.11</td>
<td>9.93</td>
<td>8.26</td>
<td>8.01</td>
<td>5.97</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>23.14</td>
<td>12.81</td>
<td>10.64</td>
<td>8.96</td>
<td>8.90</td>
<td>6.97</td>
</tr>
<tr>
<td></td>
<td>95</td>
<td>24.45</td>
<td>13.51</td>
<td>11.34</td>
<td>9.66</td>
<td>9.80</td>
<td>7.97</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>25.76</td>
<td>14.21</td>
<td>12.04</td>
<td>9.36</td>
<td>10.70</td>
<td>8.87</td>
</tr>
</tbody>
</table>

Example 1: max. length at 1.5 mm$^2$ and 3 A 214 m  
Example 2: max. length at 1.5 mm$^2$ and 6 A 106 m  
Example 3: mixed wiring: R1 = 40 m in 1.5 mm$^2$ and R2 = 5 m in 0.25 mm$^2$; (Control cabinet – sensor/actuator level) R1 = 0.95 Ohm, R2 = 0.71 Ohm Total (R1 + R2) = 1.66 Ohm

Reliable trip of ESS20 with different cable lengths and cross sections

<table>
<thead>
<tr>
<th>Resistivity of copper $\rho_0 = 0.0178$ (Ohm x mm$^2$) / m</th>
<th>0.0178</th>
<th>0.0178</th>
<th>0.0178</th>
<th>0.0178</th>
<th>0.0178</th>
<th>0.0178</th>
<th>0.0178</th>
</tr>
</thead>
<tbody>
<tr>
<td>voltage drop of ESS20 and tolerance of trip point (typically 1.1 x $I_N = 1.05...1.35$ x $I_N$)</td>
<td>3.75</td>
<td>7.5</td>
<td>ESS20 trips after 3...5 s</td>
<td>5.07</td>
<td>2.51</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Example 1: max. length at 1.5 mm$^2$ and 3 A 214 m  
Example 2: max. length at 1.5 mm$^2$ and 6 A 106 m  
Example 3: mixed wiring: R1 = 40 m in 1.5 mm$^2$ and R2 = 5 m in 0.25 mm$^2$; (Control cabinet – sensor/actuator level) R1 = 0.95 Ohm, R2 = 0.71 Ohm Total (R1 + R2) = 1.66 Ohm

For more information, visit www.stevenengineering.com.

Source: Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

Module 17plus is a power distribution system for use with electronic circuit breaker ESS20-0-.. Each module accommodates two breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.

The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected.

Electrical connections are by means of spring-loaded terminals. The reference potential for the ESS20-0-.. (Gnd pin 11) is also looped through and connected to the terminals at the sides.

The integral make contact of the ESS20-001 (SC-SI) can be tapped at terminal 12 of the relevant channel (individual signalisation). The integral make contact of the ESS20-002 (SC-SI) can be tapped at terminal 12 of the relevant channel (individual signalisation).

All internal wirings for the ground potential and the group signal are established by the modular mounting of the individual Modules 17plus. Meets the requirements of UL60950.

Ordering information

17PLUS-Q02-00 Module 17plus, centre piece, two-way
17PLUS-QA0-LR one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

Pin configuration, fitted with ESS20-0-..

<table>
<thead>
<tr>
<th>ESS20-0-.. Module 17 plus</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE (+) (1)</td>
<td></td>
</tr>
<tr>
<td>GND (11)</td>
<td></td>
</tr>
<tr>
<td>SC (13)</td>
<td></td>
</tr>
<tr>
<td>S0 (14)</td>
<td></td>
</tr>
<tr>
<td>SI (12)</td>
<td></td>
</tr>
<tr>
<td>LOAD (+) (2)</td>
<td></td>
</tr>
</tbody>
</table>

Technical data

Connection

Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.

LINE feed (1)

spring-loaded terminals for 1.5-10 mm² (AWG 10), SD 2 (0.8x4.0)

LOAD output (2)

spring-loaded terminals for 0.25-4 mm² (AWG 12), SD 1 (0.6x3.5)

Reference potential Gnd/group signal terminals (11 or 13, 14):

spring-loaded terminals for 0.25-2.5 mm² (AWG 14), SD 1 (0.6x3.5)

individual signal terminal (12)

spring-loaded terminal for 0.25-1.5 mm² (AWG 16), SD 0 (0.4x2.5)

Test probe for testing the group signal for line interruption: ≤ 2 mm ø

Voltage rating (without ESS20-0-..): AC 433 V; DC 65 V

Current rating (without ESS20-0-..)

LINE feed (1) 50 A

LOAD output (2) 25 A

Reference potential Gnd (11) 10 A

Individual signal (12) 1 A (with ESS20-0-..: 0.5 A)

Group signal (13-14) 1 A (with ESS20-0-..: 0.5 A)

Internal resistance values (without ESS20-0-..)

LINE-LOAD (1-2) ≤ 5 mΩ

Group signal (13-14) per module ≤ 8 mΩ per pole + 5 mΩ for each additional module

Busbar for power distribution

insulated busbar

(but still red): \( I_{\text{max}} \) 32 A

non-insulated busbar: \( I_{\text{max}} \) 50 A

(The non-insulated busbar, too, meets brush contact safety standards when fitted.)

Dielectric strength of Module 17plus (without ESS20-0-..)

between main circuits (without busbar): 1,500 V

main circuit to auxiliary circuit: 1,500 V

between auxiliary circuits: 1,500 V

Mass: Module 17plus (centre piece) termial blocks (pair) approx. 85 g

approx. 30 g

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
## Dimensions

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Width</td>
<td>105 mm</td>
</tr>
<tr>
<td>Height</td>
<td>102 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>49 mm</td>
</tr>
</tbody>
</table>

- Slot for fitting labels from Phoenix, Weidmüller, Wieland
- Symmetrical rail EN 50022-35x7.5

## Installation

3. Snap on right-side and left-side terminal blocks.
4. Cut busbar to required length and fit on supply side of the modules.
5. Connect line feed with spring-loaded terminals.
6. Plug in ESS20-003.

## Connection Diagrams

### ESS20-001

- Module 1
- Module 2
- Busbar
- Connection and disconnection of cables with screw driver

### ESS20-003

- Module 1
- Module 2
- Busbar
- Connection diagram for ESS20-003

---

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
## Accessories

### Busbar 32 A
- X 222 005 01 blue insulation, 500 mm/19.68 in.
- X 222 005 02 red insulation, 500 mm/19.68 in.
- X 222 005 03 grey insulation, 500 mm/19.68 in.

### Busbar 50 A
- Y 307 016 01 non-insulated, 500 mm/19.68 in.
- Y 307 016 11 non-insulated, 500 mm/19.68 in.

### End bracket
- X 222 004 01

### Jumper
- X 222 066 01

### Screw terminal for busbar
- X 211 156 01 non insulated

### Labels
- marking area 6 x 10 mm (packing unit 10 pcs = 1 strip)
- part. no. Y 307 942 01

---

## Accessories for ESS20-0..

### Retaining clip Y 307 754 01

### Mounting of retaining clip

ESS20 with retaining clip Y 307 754 01 for power distribution system module 17plus

Removal of retaining clip Y 307 754 01

This is a metric design and millimeter dimensions take precedence.
**Accessories for ESS20-0..**

**Single mounting sockets**

(up to 16 A max. load)

17-P10-Si
17-P70-Si

- polarized blade terminal DIN 46244-A6.3-0.8 (QC .250)
- blade terminal DIN 46244 part 2 C profile (2xA2.8-0.8) (QC 2x.115)
- slot for fitting labels from Phoenix, Weidmüller
- adapter X20040901
- symmetrical rail EN 50022-35x7.5
- G-profile EN 50035-G32

**Busbar (10-way)** (supplied as a complete package)

(for max. 100 A continuous load), more positions available on request

X 211 157 01 with terminal
X 211 157 02 without terminal

- Phoenix terminal AKG 35 max. cross section 35 mm² (AWG 2)
- cylinder head screw M4x4 ISO1207 nickel plated
- washer A 4.3 DIN 125 nickel plated
- female connector
- Cu rail, tin-plated
- pressure-relief joint (1.1 mm (.043 in.) thick constriction)

**Insulating sleeving for busbar (10-way)**

Y 303 824 01

This is a metric design and millimeter dimensions take precedence.

**2-way mounting socket**

23-P10-Si

(retaining clip Y 300 581 03 available on request)

- polarized blade terminals DIN 46244-A6.3-0.8 (QC .250)
- connector bus links -P10

X 210 588 01/ 1.5 mm², (AWG 16), brown (up to 13 A max. load)
X 210 588 02/ 2.5 mm², (AWG 14), black (up to 20 A max. load)
X 210 588 03/ 2.5 mm², (AWG 14), red (up to 20 A max. load)
X 210 588 04/ 2.5 mm², (AWG 14), blue (up to 20 A max. load)

100 quick-connect tabs 6.3 (.250)
DIN 46247 tinned brass, insulated

**Pin selection, fitted with ESS20-0..**

**ESS20-0..  17-P10-Si**

- LINE (+) [2(k)]
- GND [12]
- SC [24]
- S0 [20]
- SI [11]
- LOAD (+) [1]

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com
**Electronic Circuit Breaker with reset input ESS20-1..**

**Description**

The special device ESS20-1.. is a further extension of the product line "electronic circuit breakers". Type ESS20-1.. has a width of only 12.5 mm and selectively protects all DC 24 V loads through a combination of active electronic current limitation and well-proven circuit breaker technology including physical isolation and manual actuation. The ESS20-1.. can be plugged into the E-T-A power distribution socket Module 17plus, ensuring ease of installation and a significant reduction of wiring time.

DC 24 V switch-mode power supplies (10 A...40 A), which are widely used in automation industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads.

The ESS20-1.. helps to overcome this problem as it responds to the overload condition faster than the switch-mode power supply. The highest possible overcurrent is limited to 1.8 or 1.5 times rated current. Thus it is possible to switch on capacitive loads up to 20,000 μF but they are disconnected only in the event of an overload or short circuit. For optimal adjustment to the application conditions the current rating of the ESS20-1.. can be selected in fixed values from 0.5 A...10 A and in switchable variants 1 A/2 A or 3 A/6 A.

Upon detection of overload or short circuit in the load circuit the MOSFET of the load output will be blocked and current flow in the load circuit will be interrupted. MOSFET and load circuit may be reset by means of the electronic reset input or manually by actuating the push-button (PUSH-PUSH operation). The load circuit may also be physically isolated during start-up of the equipment, e. g. for measuring purposes.

**Features**

- Selective load protection, electronic trip curve
- Active current limitation (1.8 or 1.5 times rated current I_N = 8 A or 10 A) with connection of capacitive loads up to 20,000 μF and at overload/short circuit.
- Reliable overload disconnection with 1.1 x I_N plus, even with long load lines or small cable cross sections (see table 2).
- Selectable current ratings (fixed values 0.5 A...10 A or two steps: 1 A/2 A or 3 A/6 A).
- Manual ON/OFF button (push-push actuation) with physical isolation
- Clear status and failure indication through LED and signal output
- Electronic reset input
- Integral fail-safe element
- Width per unit only 12.5 mm
- Plug-in mounting utilising power distribution system Module 17 plus

**Technical Data**


<table>
<thead>
<tr>
<th>Description</th>
<th>Operating data</th>
<th>Status indication by means of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load output</td>
<td>Operating voltage U_S DC 24 V (18...32 V)</td>
<td>bicolour LED:</td>
</tr>
<tr>
<td>Max. data of load</td>
<td>Current rating I_N fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A switchable: 1 A/2 A or 3 A/6 A</td>
<td>GREEN: unit is ON, load circuit/power-MOSFET is switched on, signal output on, supplying +DC 24 V</td>
</tr>
<tr>
<td>Load circuit</td>
<td>Closed circuit current I_S typically 22 mA</td>
<td>ORANGE: in the event of overload or short circuit until electronic disconnection</td>
</tr>
<tr>
<td>Load output</td>
<td></td>
<td>RED: unit switched off electronically, load circuit/power MOSFET off, status output blocked, undervoltage (U_S &lt; 8 V), after switch-on until end of switch-on delay, OFF: switched off manually with push-button, unit off load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>signal output SF:</td>
</tr>
<tr>
<td>Max. data of load</td>
<td></td>
<td>- 1 signalisation per channel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- load &quot;ON&quot; SF = +DC 24 V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- load &quot;OFF&quot; SF = 0 V</td>
</tr>
<tr>
<td>Load output</td>
<td></td>
<td>ON/OFF position of push button</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Load circuit | Voltage drop U_ON at I_N see table 1 | |
| Disconnection at overload typically 1.1 x I_N (1.05...1.35 x I_E) | |
| Short circuit current I_K typically 1.8 x I_N / active current limitation see table 1 | |
| Trip time for physical isolation for electronic disconnection see table 1: |
| Temperature disconnection internal temperature monitoring with electronic disconnection |
| Low voltage monitoring of load output with hysteresis, no reset necessary |
| Starting delay t_start typically 0.5 sec after every switch-on and after applying U_S |
| Physical isolation single pole (switch contact) of load circuit |

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1077</td>
<td>DC 24 V</td>
<td>0.5...10 A</td>
</tr>
</tbody>
</table>

Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.

Free-wheeling circuit
- external free-wheeling diode recommended with inductive load

Several load outputs
- must not be connected in parallel

Signal output SF
- plus-switching signal output per unit, applies US to terminal 12 of module 17plus
- Ratings: DC 24 V / max. 0.5 A (short-circuit proof)

Signal output SF ON
- signal output has +24 V level if
  - the load output has continuity (ON condition of load)
- signal output SF OFF
  - signal output has 0 V level if
    - the load output is electronically blocked (fault condition or switch-on delay)
    - the blue push button is in OFF position
    - no operating voltage US is connected.

The signal output is connected to ground via a pull-down resistor (10 kΩ).

Reset input
- Reset input RE
  - terminal 13 or 14 of module 17plus
  - Caution: unused slots +DC 24 V impulse.
  - The reset signal will have to be fitted with jumpers

Reset input level:
- max. +DC 32 V
- high > DC 8 V...
- low < DC 3 V...
- current consumption at +DC 24 V typically 2.6 mA
- min. pulse length 10 ms

General data
- Fail-safe element
  - back-up fuse for ESS21 not required as it has an integral redundant fail-safe element
    (thermal E-T-A circuit breaker); push button in OFF position with tripped fail-safe element
- Blade terminals
  - 6.3 mm to DIN 46244-A6.3-0.8
- Housing material
  - plastics
- Mounting
  - plug-in type for E-T-A power distribution socket Module 17plus
- Ambient temperature
  - 0°C...+50 °C (without moisture condensation, cf. EN 60204-1)
- Storage temperature
  - -20°C...+70 °C
- Humidity
  - 96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab.
  - climate class 3K3 to EN 60721
- Vibration
  - 3 g, test to IEC 60068-2-6 test Fc
- Protection class
  - housing: IP30 DIN 40050,
  - terminals: IP00 DIN 40050
- EMC requirements
  - emitted interference: EN 50081-1
  - immunity: EN 61000-6-2
- Insulation co-ordination
  - (IEC 60934)
  - 0.5 kV/2
  - re-inforced insulation in operating area
- Dielectric strength
  - operating area
  - installation area
    - (see dimensions)
    - test voltage AC 1.000 V
    - test voltage AC 500 V
- Insulation resistance
  - (off condition of push button)
  - > 100 MΩ (DC 500 V) between [LINE (+) – LOAD (+)]
- Approvals
  - UL 1077, File E67320
  - Supplementary Protectors for use in Electrical Equipment
  - CE logo
- Dimensions (B x H x T)
  - 12.5 x 105 x 60 mm
- Mass
  - 65 g

Table 1: voltage drop, current limitation, max. load current

<table>
<thead>
<tr>
<th>current rating</th>
<th>typically voltage drop</th>
<th>active current limitation (typically)</th>
<th>max. load current at 100 % ON duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ih</td>
<td>US at Ih</td>
<td>T US = 40 °C</td>
<td>T US = 50 °C</td>
</tr>
<tr>
<td>0.5 A</td>
<td>100 mV</td>
<td>1.8 x Ih</td>
<td>0.5 A</td>
</tr>
<tr>
<td>1 A</td>
<td>140 mV</td>
<td>1.8 x Ih</td>
<td>1 A</td>
</tr>
<tr>
<td>2 A</td>
<td>180 mV</td>
<td>1.8 x Ih</td>
<td>2 A</td>
</tr>
<tr>
<td>3 A</td>
<td>140 mV</td>
<td>1.8 x Ih</td>
<td>3 A</td>
</tr>
<tr>
<td>4 A</td>
<td>190 mV</td>
<td>1.8 x Ih</td>
<td>4 A</td>
</tr>
<tr>
<td>6 A</td>
<td>280 mV</td>
<td>1.8 x Ih</td>
<td>6 A</td>
</tr>
<tr>
<td>8 A</td>
<td>220 mV</td>
<td>1.5 x Ih</td>
<td>8 A</td>
</tr>
<tr>
<td>10 A</td>
<td>280 mV</td>
<td>1.5 x Ih</td>
<td>10 A</td>
</tr>
<tr>
<td>1 A/2 A</td>
<td>140 mV/280 mV</td>
<td>1.8 x Ih</td>
<td>1 A/2 A</td>
</tr>
<tr>
<td>3 A/6 A</td>
<td>140 mV/280 mV</td>
<td>1.8 x Ih</td>
<td>3 A/6 A</td>
</tr>
</tbody>
</table>

Attention: when mounted side-by-side without convection the ESS20-1.. should not carry more than 80 % of its rated load with 100 % ON duty because of the integral thermal circuit breaker.

Ordering information

Type
- ESS20
  - Electronic Circuit Breaker with current limitation (e.g. typically 1.8 x In or 1.5 x In, see table 1)

Version
- 1 without physical isolation in the event of a failure
- 2 with reset input RE
- 4 status output SF (single signalisation, plus switching)

Operating voltage
- DC 24 V
- rated voltage DC 24 V

<table>
<thead>
<tr>
<th>Current rating</th>
<th>0.5 A</th>
<th>1 A</th>
<th>2 A</th>
<th>3 A</th>
<th>4 A</th>
<th>6 A</th>
<th>8 A</th>
<th>10 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal output</td>
<td>1 A/2 A</td>
<td>1 A/2 A</td>
<td>1 A/2 A</td>
<td>1 A/2 A</td>
<td>3 A/6 A</td>
<td>3 A/6 A</td>
<td>3 A/5 A</td>
<td></td>
</tr>
</tbody>
</table>

ESS20 - 1 2 4    - DC 24 V   -3 A/6 A  ordering example (recommended type)

Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.

Table 1: voltage drop, current limitation, max. load current
Electronic Circuit Breaker with reset input ESS20-1...

Terminal wiring diagram ESS20-124 (e. g. switchable 3 A/6 A)

Basic circuit diagram ESS20-124 (e. g. switchable 3 A/6 A)

Dimensions

This is a metric design and millimeter dimensions take precedence.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Table 2: Reliable trip of ESS20

<table>
<thead>
<tr>
<th>Cable cross section A in mm²</th>
<th>0.14</th>
<th>0.25</th>
<th>0.34</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>cable length L in meter (= single length)</td>
<td>5</td>
<td>10</td>
<td>15</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>1.27</td>
<td>2.54</td>
<td>3.81</td>
<td>5.09</td>
<td>6.36</td>
<td>7.63</td>
<td>8.90</td>
</tr>
<tr>
<td></td>
<td>0.71</td>
<td>1.42</td>
<td>2.14</td>
<td>2.85</td>
<td>3.56</td>
<td>4.27</td>
<td>4.98</td>
</tr>
<tr>
<td></td>
<td>0.52</td>
<td>1.05</td>
<td>1.57</td>
<td>2.09</td>
<td>2.62</td>
<td>3.14</td>
<td>3.66</td>
</tr>
<tr>
<td></td>
<td>0.36</td>
<td>0.71</td>
<td>1.07</td>
<td>1.42</td>
<td>1.78</td>
<td>2.14</td>
<td>2.49</td>
</tr>
<tr>
<td></td>
<td>0.24</td>
<td>0.47</td>
<td>0.71</td>
<td>0.95</td>
<td>1.19</td>
<td>1.42</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>0.18</td>
<td>0.36</td>
<td>0.53</td>
<td>0.71</td>
<td>0.89</td>
<td>1.07</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>0.12</td>
<td>0.24</td>
<td>0.36</td>
<td>0.47</td>
<td>0.59</td>
<td>0.71</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rmax in Ohm = (U₀ / I₉) - 0.050</td>
<td>5.07</td>
<td>2.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ESS20 reliably trips from 0 Ohm to max. circuitry resistance Rmax.

Example 1: max. length at 1.5 mm² and 3 A max. length at 3 A 214 m

Example 2: max. length at 1.5 mm² and 6 A max. length at 6 A 106 m

Example 3: mixed wiring:
R1 = 40 m in 1.5 mm² and R2 = 5 m in 0.25 mm²:
R1 = 0.95 Ohm, R2 = 0.71 Ohm
Total (R1 + R2) = 1.66 Ohm
Module 17plus is a power distribution system for use with electronic circuit breaker ESS20-1..
Each module accommodations two breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.
The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected.
Electrical connections are by means of spring-loaded terminals. The reference potential for the ESS20-1.. (GND pin 11) is also looped through and connected to the terminals at the sides.
The integral signal output SF of the ESS20-124 may be picked off at terminal 12 of the corresponding channel (single signalisation). The reset input RE may be connected via terminal 13 or 14. Meets the requirements of UL60950.

Ordering information

<table>
<thead>
<tr>
<th>17PLUS-Q02-00</th>
<th>Module 17plus, centre piece, two-way</th>
</tr>
</thead>
<tbody>
<tr>
<td>17PLUS-QA0-LR</td>
<td>one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.</td>
</tr>
</tbody>
</table>

Pin configuration, fitted with ESS20-1..

<table>
<thead>
<tr>
<th>ESS20-124 Module 17 plus</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE (+) (1)</td>
</tr>
<tr>
<td>GND (11)</td>
</tr>
<tr>
<td>RE (13)</td>
</tr>
<tr>
<td>RE (14)</td>
</tr>
<tr>
<td>SF (12)</td>
</tr>
<tr>
<td>LOAD (+) (2)</td>
</tr>
</tbody>
</table>

Technical data

Connection

- Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
- Spring-loaded terminals for 1.5-10 mm² (AWG 10), SD 2 (0.8x4.0) and 0.25-4 mm² (AWG 12), SD 1 (0.6x3.5)

LINE feed (1)

- Spring-loaded terminals for 1.5-10 mm² (AWG 10), SD 2 (0.8x4.0)

LOAD output (2)

- Spring-loaded terminals for 0.25-4 mm² (AWG 12), SD 1 (0.6x3.5)

Reference potential GND/group signal

- Spring-loaded terminals for 0.25-2.5 mm² (AWG 14), SD 1 (0.6x3.5)

Individual signal terminal (12)

- Spring-loaded terminal for 0.25-1.5 mm² (AWG 16), SD 0 (0.4x2.5)

Test probe for testing the group signal for line interruption: ≤ 2 mm ø

Voltage rating

- (without ESS20-1..): AC 433 V; DC 65 V

Current rating

- (without ESS20-1..)
  - LINE feed (1): 50 A
  - LOAD output (2): 25 A
  - Reference potential GND (11): 10 A
  - Individual signal (12): 1 A (with ESS20-1..: 0.5 A)
  - Group signal (13-14): 1 A (with ESS20-1..: 0.5 A)

Internal resistance values

- (without ESS20-1..)
  - LINE-LOAD (1-2): ≤ 5 mΩ
  - Group signal (13-14) per module: ≤ 8 mΩ per pole + 5 mΩ for each additional module

Busbar for power distribution

- Insulated busbar (blue or red): I_{max} = 32 A
- Non-insulated busbar (blue or red): I_{max} = 50 A
- (The non-insulated busbar, too, meets brush contact safety standards when fitted.)

Dielectric strength of Module 17plus (without ESS20-1..)

- Between main circuits (without busbar): 1,500 V
- Between main circuit to auxiliary circuit: 1,500 V
- Between auxiliary circuits: 1,500 V

Mass: Module 17plus (centre piece) terminal blocks (pair)

- approx. 85 g
- approx. 30 g
**Dimensions**

- **Slot for fitting labels from Phoenix, Weidmüller, Wieland**
- **Symmetrical rail EN 50022-35x7.5**
- **G-profile EN 50035-30x7.5**
- **Slot for busbar**
- **Right-side terminal block**
- **Left-side terminal block**

**Connection diagram pour ESS20-124**

- **Module 1**
- **Module 2**
- **Side busbar LINE 1 LINE 1 LINE 1 LINE 1**
- **Busbar**
- **Left-side terminal block**
- **Right-side terminal block**

11 GND
12 Terminal for signalisation SF (+DC 24 V)
13, 14 Reset input PE
*Caution: unused slots have to be fitted with jumpers

**Installation example**

3. Snap on right-side and left-side terminal blocks.
4. Cut busbar to required length and fit on supply side of the modules.
5. Connect line feed with spring-loaded terminals.
6. Plug in ESS20-1...

Connection and disconnection of cables with screwdriver
Accessories for ESS20-1..

- **Busbar 32 A**
  - X 222 005 01 blue insulation, 500 mm/19.68 in.
  - X 222 005 02 red insulation, 500 mm/19.68 in.
  - X 222 005 03 grey insulation, 500 mm/19.68 in.

- **Busbar 50 A**
  - Y 307 016 01 non-insulated, 500 mm/19.68 in.

- **Busbar 50 A**
  - Y 307 016 11 non-insulated, 500 mm/19.68 in.

- **End bracket**
  - X 222 004 01

- **Screw terminal for busbar**
  - X 211 156 01 non insulated

- **Jumper**
  - X 222 066 01

- **Labels**
  - marking area 6 x 10 mm
  - (packing unit 10 pcs = 1 strip)
  - part. no. Y 307 942 61

- **Retaining clip Y 307 754 01**

- **ESS20 with retaining clip Y 307 754 01**
  - for power distribution system module 17plus

- **Removal of retaining clip Y 307 754 01**

---

This is a metric design and millimeter dimensions take precedence.
Accessories for ESS20-1..

**Single mounting sockets**
- (up to 16 A max. load)
  - 17-P10-Si
  - 17-P70-Si

**2-way mounting socket**  
23-P10-Si
(retaining clip Y 300 581 03 available on request)

**6-way mounting socket**  
63-P10-Si

**Busbar (10-way)**
(supplied as a complete package)
(for max. 100 A continuous load), more positions available on request
- X 211 157 01 with terminal
- X 211 157 02 without terminal

**Pin selection, fitted with ESS20-124**

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

**Single mounting sockets**
- (with adapter)
  - 17-P10-Si-20025
  - 17-P70-Si-20025

**2-way mounting socket**
- 23-P10-Si

**6-way mounting socket**
- 63-P10-Si

---

**Insulating sleeving for busbar (10-way)**
- Y 303 824 01

---

**Busbar (10-way)**
(supplied as a complete package)
(for max. 100 A continuous load), more positions available on request
- X 211 157 01 with terminal
- X 211 157 02 without terminal

**Polarized blade terminals**
- DIN 46244-A6.3-0.8

**Polarized recess**

**Pin selection, fitted with ESS20-124**

This is a metric design and millimeter dimensions take precedence. All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Electronic Circuit Protector ESX10

Description

Electronic circuit protector type ESX10 is designed to ensure selective disconnection of DC 24 V load systems.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through selective disconnection the ESX10 responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by active current limitation. The ESX10 limits the highest possible current to values between 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on capacitive loads of up to 20,000 μF lamp loads, but they are disconnected only in the event of an overload or short circuit.

For optimal alignment with the characteristics of the application the current rating of the ESX10 can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact.

The ESX10, with a width of only 12.5 mm, can be plugged into the E-T-A power distribution socket Module 17plus ensuring ease of installation and saving space in control cabinets.

Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The MOSFET and the load circuit may be re-activated via the remote electronic reset input or manually by means of the ON/OFF button. When starting up the system, the load circuit may also be manually disconnected.

Features

● Selective load protection, electronic trip characteristics.
● Active current limitation for safe connection of capacitive loads up to 20,000 μF and on overload/short circuit.
● Current ratings 0.5 A...12 A.
● Reliable overload disconnection with 1.1 x IIN plus, even with long load lines or small cable cross sections (see table 3).
● Manual ON/OFF button (S1).
● Control input IN+ for remote ON/OFF signal (option).
● Clear status and failure indication through LED, status output SF or Si contact F.
● Electronic reset input RE (option).
● Integral fail-safe element.
● Width per unit only 12.5 mm.
● Plug-in mounting utilising power distribution system Module 17plus or SVSxx optionally (see product group 7)

Technical data (Tambient = 25 °C, operating voltage US = DC 24 V)

<table>
<thead>
<tr>
<th>Operating data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage US</td>
<td>DC 24 V (18...32 V)</td>
</tr>
<tr>
<td>Current rating IIN</td>
<td>fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A</td>
</tr>
<tr>
<td>Closed current I0</td>
<td>ON condition: typically 20...30 mA depending on signal output</td>
</tr>
<tr>
<td>Status indication by means of</td>
<td>● multicolour LED:</td>
</tr>
<tr>
<td></td>
<td>● GREEN: unit is ON, power-MOSFET is switched on</td>
</tr>
<tr>
<td></td>
<td>● status output SF ON, supplies + DC 24 V</td>
</tr>
<tr>
<td></td>
<td>● ORANGE: in the event of overload or short circuit until electronic disconnection</td>
</tr>
<tr>
<td></td>
<td>● RED: - unit electronically disconnected</td>
</tr>
<tr>
<td></td>
<td>- load circuit/Power-MOSFET OFF</td>
</tr>
<tr>
<td></td>
<td>- OFF: - manually switched off (S1 = OFF)</td>
</tr>
<tr>
<td></td>
<td>- after switch-on till the end of the delay period</td>
</tr>
<tr>
<td></td>
<td>- status output SF (option)</td>
</tr>
<tr>
<td></td>
<td>- potential-free signal contact F (option)</td>
</tr>
<tr>
<td></td>
<td>- ON/OFF/ condition of switch S1</td>
</tr>
</tbody>
</table>

Load circuit

| Load output | Power-MOSFET switching output (high side switch) |
| Overload disconnection | typically 1.1 x IN (1.05...1.35 x IN) |
| Short-circuit current ITC | active current limitation (see table 1) |
| Trip time for electronic disconnection | see time/current characteristics |
| | typically 3 s at ILOAD > 1.1 x IN |
| | typically 3 s...100 ms at ILOAD > 1.8 x IN |
| | (or 1.5 x IN/1.3 x IN) |
| Temperature disconnection | internal temperature monitoring with electronic disconnection |
| Low voltage monitoring load output | with hysteresis, no reset necessary |
| Starting delay tSTART | typically 0.5 sec after every switch-on |
| Disconnection of load circuit | electronic disconnection |
| Free-wheeling circuit | external free-wheeling diode |
| Several load outputs | must not be connected in parallel |

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 2367</td>
<td>DC 24 V</td>
<td>0.5...12 A</td>
</tr>
</tbody>
</table>

Attention:

● The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10 used.
● Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10.

For optimal alignment with the characteristics of the application the current rating of the ESX10 can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact.

The ESX10, with a width of only 12.5 mm, can be plugged into the E-T-A power distribution socket Module 17plus ensuring ease of installation and saving space in control cabinets.

Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The MOSFET and the load circuit may be re-activated via the remote electronic reset input or manually by means of the ON/OFF button. When starting up the system, the load circuit may also be manually disconnected.

Features

● Selective load protection, electronic trip characteristics.
● Active current limitation for safe connection of capacitive loads up to 20,000 μF and on overload/short circuit.
● Current ratings 0.5 A...12 A.
● Reliable overload disconnection with 1.1 x IIN plus, even with long load lines or small cable cross sections (see table 3).
● Manual ON/OFF button (S1).
● Control input IN+ for remote ON/OFF signal (option).
● Clear status and failure indication through LED, status output SF or Si contact F.
● Electronic reset input RE (option).
● Integral fail-safe element.
● Width per unit only 12.5 mm.
● Plug-in mounting utilising power distribution system Module 17plus or SVSxx optionally (see product group 7)

Technical data (Tambient = 25 °C, operating voltage US = DC 24 V)

<table>
<thead>
<tr>
<th>Operating data</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage US</td>
<td>DC 24 V (18...32 V)</td>
</tr>
<tr>
<td>Current rating IIN</td>
<td>fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A</td>
</tr>
<tr>
<td>Closed current I0</td>
<td>ON condition: typically 20...30 mA depending on signal output</td>
</tr>
<tr>
<td>Status indication by means of</td>
<td>● multicolour LED:</td>
</tr>
<tr>
<td></td>
<td>● GREEN: unit is ON, power-MOSFET is switched on</td>
</tr>
<tr>
<td></td>
<td>● status output SF ON, supplies + DC 24 V</td>
</tr>
<tr>
<td></td>
<td>● ORANGE: in the event of overload or short circuit until electronic disconnection</td>
</tr>
<tr>
<td></td>
<td>● RED: - unit electronically disconnected</td>
</tr>
</tbody>
</table>
| | - load circuit/Pow...
**Electronic Circuit Protector ESX10**

### Technical data (Tambient = 25°C, operating voltage US = DC 24 V)

#### Status output SF

**Electrical data**
- plus-switching signal output, connects US to terminal 12 of module 17plus
- nominal data: DC 24 V / max. 0.2 A (short circuit proof)
- status output is internally connected to GND with a 10 kOhm resistor

#### Status OUT

- ESX10-104/-106/-124 (signal status OUT), at US = +24 V
  - 0 V = S1 is ON, load output connected through 0 V / S1 is ON, load output blocked and/or switch S1 is OFF

#### Signal output F

**Electrical data**
- potential-free signal contact
- max. DC 30 V / max. 0.2 A (short circuit proof)

**ON condition LED green**
- voltage US applied, switch S1 is in ON position
- no overload, no short circuit

**OFF condition LED off**
- device switched off (switch S1 in ON position) or no operating voltage US applied

**Fault condition LED orange**
- overload condition > 1.1 x IN up to electronic disconnection

**Fault condition LED red**
- electronic disconnection upon overload or short circuit
  - device switched off with control signal
  - switch S1 is in ON position

**ESX10-101**
- single signal, make contact SC/SC-SI open

**ESX10-102**
- single signal, break contact SC/SC-SI closed

**ESX10-103**
- group signal change-over contact
  - contact SC/SC-SO open, SC-SI closed
  - contact SC/SC-SO closed

**ESX10-105/-106/-115/-125**
- group signal, make contact
  - contact SC/SC-SO open

**Fault**
- signal output fault conditions:
  - no operating voltage US
  - ON/OFF switch S1 is in OFF position
  - red LED lighted

---

### Technical data (Tambient = 25°C, operating voltage US = DC 24 V)

#### Reset input RE

**Electrical data**
- voltage: max. +DC 32 V
- high > DC 3 V ≤ DC 32 V
- low ≤ DC 3 V > 0 V
- power consumption typically 2.6 mA (+DC 24 V)
- min. pulse duration typically 10 ms

**Reset signal RE**
- (equal terminal 13,14 or 12 of Module 17plus)
  - Caution: unused slots have to be fitted with jumpers

#### Control input IN+

**Electrical data**
- see reset input RE

**Control signal IN+**
- +24V level (HIGH): device will be switched on by a remote ON/OFF signal
- 0 V level (LOW): device will be switched off by a remote ON/OFF signal

**Switch S1 ON/OFF**
- unit can only be switched on with S1 if a HIGH level is applied to IN+

### General data

**Fail-safe element:**
- backup fuse for ESX10 not required because of the integral redundant fail-safe element

**Blade terminals:**
- 6.3 mm to DIN 46244-A6.3-0.8

**Housing:**
- moulded

**Mounting:**
- plug-in mounting utilising power distribution system Module 17plus or SVSxx

**Insulation co-ordination:**
- 0.5 kV/2 pollution degree 2 (EMC directive, CE logo)
- susceptibility: EN 61000-6-2

**Degree of protection housing:**
- IP30 DIN 40050

**Vibration:**
- 3 g, test to IEC 60068-2-6 test Fc

**Insulation co-ordination (IEC 60934):**
- 0.5 kV/2 pollution degree 2

**IEC 60934:**
- re-inforced insulation in operating area

**IEC 60204-1:**
- dielectric strength max. DC 32 V (load circuit)

**Degree of protection (OFF condition):**
- housing: IP30 DIN 40050
  - terminals: IP00 DIN 40050

**EMC (EMC directive, CE logo):**
- emission: EN 61000-6-3
- susceptibility: EN 61000-6-2

**Insulation resistance (OFF condition):**
- n/a, only electronic disconnection

**Approvals:**
- UL 2367, File E306740
- Solid State Overcurrent Protectors
- CE logo

**Dimensions (W x H x D):**
- 12.5 x 70 x 60 mm

**Mass:**
- approx. 40 g

---

Table 1: voltage drop, current limitation, max. load current

<table>
<thead>
<tr>
<th>Current rating (Iₘ)</th>
<th>Typically voltage drop (USₘ / Iₘ)</th>
<th>Active current limitation (Iₘ)</th>
<th>Max. load current at 100 % ON duty (Tᵢ = 40 °C, Tᵢ = 50 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 A</td>
<td>70 mV</td>
<td>1.8 x Iₘ</td>
<td>0.5 A / 0.5 A</td>
</tr>
<tr>
<td>1 A</td>
<td>80 mV</td>
<td>1.8 x Iₘ</td>
<td>1 A / 1 A</td>
</tr>
<tr>
<td>2 A</td>
<td>130 mV</td>
<td>1.8 x Iₘ</td>
<td>2 A / 2 A</td>
</tr>
<tr>
<td>3 A</td>
<td>80 mV</td>
<td>1.8 x Iₘ</td>
<td>3 A / 3 A</td>
</tr>
<tr>
<td>4 A</td>
<td>100 mV</td>
<td>1.8 x Iₘ</td>
<td>4 A / 4 A</td>
</tr>
<tr>
<td>6 A</td>
<td>130 mV</td>
<td>1.8 x Iₘ</td>
<td>6 A / 5 A</td>
</tr>
<tr>
<td>8 A</td>
<td>120 mV</td>
<td>1.5 x Iₘ</td>
<td>8 A / 7 A</td>
</tr>
<tr>
<td>10 A</td>
<td>150 mV</td>
<td>1.5 x Iₘ</td>
<td>10 A / 9 A</td>
</tr>
<tr>
<td>12 A</td>
<td>180 mV</td>
<td>1.3 x Iₘ</td>
<td>12 A / 10.8 A</td>
</tr>
</tbody>
</table>

Attention: when mounted side-by-side without convection the ESX10-10+ should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.
Electronic Circuit Protector ESX10

Ordering information

Type No. ESX10  Electronic Circuit Protector for DC 24 V applications
Version 1  standard, without physical isolation in the event of a failure

Signal input
0  without signal input
1  with control input IN+, only ESX10-115
2  with reset input RE, only ESX10-124, ESX10-125, ESX10-127

Signal outputs
0  without, only ESX10-100
1  signal output F (single signal, N/O), only ESX10-101
2  signal output F (single signal, N/C), only ESX10-102
3  signal output F (group signal, change-over), only ESX10-103
4  status output SF (+24 V = OK), only ESX10-104, ESX10-124
5  signal output F (group signal, N/O), ESX10-105, ESX10-115, ESX10-125
6  signal output F (group signal, N/O), status output SF +24 V = OK, only ESX10-106
7  status output inverted, 0 V = OK, only ESX10-127

Operating voltage
DC 24 V  rated voltage DC 24 V

Current rating
0.5 A
1 A
2 A
3 A
4 A
5 A
6 A
8 A
10 A
12 A

ESX10 - 1 0 5  - DC 24 V - 6 A  ordering example

Table 2: ESX10 - product version

<table>
<thead>
<tr>
<th>version</th>
<th>signal input</th>
<th>signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESX10 - 100</td>
<td>control input ON/OFF +24 V</td>
<td>single signal N/O</td>
</tr>
<tr>
<td></td>
<td>reset input +24 V</td>
<td>single signal N/C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>group signal N/O</td>
</tr>
<tr>
<td></td>
<td></td>
<td>group signal change-over</td>
</tr>
<tr>
<td></td>
<td></td>
<td>status OUT +24 V = OK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>status OUT 0 V = OK</td>
</tr>
<tr>
<td>-101</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-102</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-103</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-104</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-105</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-106</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-115</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-124</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>-127</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Please note:
- The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10 used.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10.

Terminal wiring diagram ESX10-124

Description of ESX10 signal inputs and outputs (wiring diagrams) see next page.
**ESX10 Signal inputs / outputs (wiring diagram)**

**ESX10 signal inputs / outputs (wiring diagrams)**

Signal contacts are shown in the OFF or fault condition.

**ESX10-100**
without signal input/output

**ESX10-101**
without signal input
with signal output F (single signal, N/O)

**ESX10-102**
without signal input
with signal output F (single signal, N/C)

**ESX10-103**
without signal input
with signal output F (group signal, change-over)

**ESX10-104**
without signal input
with status output SF (+24V = load output ON)

**ESX10-105**
without signal input
with signal output F (group signal, N/O)

**ESX10-106**
without signal input
with signal output F (group signal, N/O)
with status output SF (+24V = load output ON)

**ESX10-115---**
with control input IN+ (+DC 24V)
with signal output F (group signal, N/O)

**ESX10-124---**
with reset input RE (+DC 24V)
with status output SF (+24V = load output ON)

**ESX10-125---**
with reset input RE (+DC 24V)
with signal output F (group signal, N/O)

**ESX10-127---**
with reset input RE (+DC 24V)
with status output SF inverted, 0V = load output ON

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com

Issue B
Electronic Circuit Protector ESX10

Time/Current characteristic curve ($T_A = 25 \, ^\circ C$)

- The trip time is typically 3 s in the range between 1.1 and 1.8 x $I_k$.*
- Electronic current limitation occurs at typically 1.8 x $I_k$* which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed 1.8 x $I_k$* times the current rating. Trip time is between 100 ms (short circuit current $I_k$) and 3 sec (at overload with high line attenuation).
- Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.

Table 3: Reliable trip of ESX10

<table>
<thead>
<tr>
<th>Cable cross section A in mm²</th>
<th>0.14</th>
<th>0.25</th>
<th>0.34</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>1.27</td>
<td>0.71</td>
<td>0.52</td>
<td>0.36</td>
<td>0.24</td>
<td>0.18</td>
<td>0.12</td>
</tr>
<tr>
<td>10</td>
<td>2.54</td>
<td>1.42</td>
<td>1.05</td>
<td>0.71</td>
<td>0.47</td>
<td>0.36</td>
<td>0.24</td>
</tr>
<tr>
<td>15</td>
<td>3.81</td>
<td>2.14</td>
<td>1.57</td>
<td>1.07</td>
<td>0.71</td>
<td>0.53</td>
<td>0.36</td>
</tr>
<tr>
<td>20</td>
<td>5.09</td>
<td>2.85</td>
<td>2.09</td>
<td>1.42</td>
<td>0.95</td>
<td>0.71</td>
<td>0.47</td>
</tr>
<tr>
<td>25</td>
<td>6.36</td>
<td>3.56</td>
<td>2.62</td>
<td>1.78</td>
<td>1.19</td>
<td>0.89</td>
<td>0.59</td>
</tr>
<tr>
<td>30</td>
<td>7.63</td>
<td>4.27</td>
<td>3.14</td>
<td>2.14</td>
<td>1.42</td>
<td>1.07</td>
<td>0.71</td>
</tr>
<tr>
<td>35</td>
<td>8.90</td>
<td>4.98</td>
<td>3.66</td>
<td>2.49</td>
<td>1.66</td>
<td>1.25</td>
<td>0.83</td>
</tr>
<tr>
<td>40</td>
<td>10.17</td>
<td>5.70</td>
<td>4.19</td>
<td>2.85</td>
<td>1.90</td>
<td>1.42</td>
<td>0.95</td>
</tr>
<tr>
<td>45</td>
<td>11.44</td>
<td>6.41</td>
<td>4.71</td>
<td>3.20</td>
<td>2.14</td>
<td>1.60</td>
<td>1.07</td>
</tr>
<tr>
<td>50</td>
<td>12.71</td>
<td>7.12</td>
<td>5.24</td>
<td>3.56</td>
<td>2.37</td>
<td>1.78</td>
<td>1.19</td>
</tr>
<tr>
<td>75</td>
<td>19.07</td>
<td>10.68</td>
<td>7.85</td>
<td>5.34</td>
<td>3.56</td>
<td>2.67</td>
<td>1.78</td>
</tr>
<tr>
<td>100</td>
<td>25.34</td>
<td>14.24</td>
<td>10.47</td>
<td>7.12</td>
<td>4.75</td>
<td>3.56</td>
<td>2.37</td>
</tr>
<tr>
<td>125</td>
<td>31.79</td>
<td>17.80</td>
<td>13.09</td>
<td>8.90</td>
<td>5.93</td>
<td>4.45</td>
<td>2.97</td>
</tr>
<tr>
<td>150</td>
<td>38.14</td>
<td>21.36</td>
<td>15.71</td>
<td>10.68</td>
<td>7.12</td>
<td>5.34</td>
<td>3.56</td>
</tr>
<tr>
<td>175</td>
<td>44.50</td>
<td>24.92</td>
<td>18.32</td>
<td>12.46</td>
<td>8.31</td>
<td>6.23</td>
<td>4.15</td>
</tr>
<tr>
<td>200</td>
<td>50.86</td>
<td>28.48</td>
<td>20.94</td>
<td>14.24</td>
<td>9.49</td>
<td>7.12</td>
<td>4.75</td>
</tr>
<tr>
<td>225</td>
<td>57.21</td>
<td>32.04</td>
<td>23.56</td>
<td>16.02</td>
<td>10.68</td>
<td>8.01</td>
<td>5.34</td>
</tr>
<tr>
<td>250</td>
<td>63.57</td>
<td>35.60</td>
<td>26.18</td>
<td>17.80</td>
<td>11.87</td>
<td>8.90</td>
<td>5.93</td>
</tr>
</tbody>
</table>

Example 1: max. length at 1.5 mm² and 3 A 214 m
Example 2: max. length at 1.5 mm² and 6 A 106 m
Example 3: mixed wiring:
- R1 = 40 m in 1.5 mm² and R2 = 5 m in 0.25 mm²:
  - Control cabinet – sensor/actuator level: R1 = 0.95 Ohm, R2 = 0.71 Ohm  Total (R1 + R2) = 1.66 Ohm

Resistivity of copper $\rho_0 = 0.0178$ (Ohm x mm²) / m

$U_S = DC 19.2 \, V$ (= 80 % v. 24 V) voltage drop of ESX10 and tolerance of trip point (typically 1.1 x $I_k = 1.05 \ldots 1.35$ x $I_k$) have been taken into account.

The ESX10 reliably trips from 0 Ohm to max. circuitry resistance $R_{max}$

Example 1: max. length at 1.5 mm² and 3 A 214 m
Example 2: max. length at 1.5 mm² and 6 A 106 m
Example 3: mixed wiring:
- R1 = 40 m in 1.5 mm² and R2 = 5 m in 0.25 mm²:
  - Control cabinet – sensor/actuator level: R1 = 0.95 Ohm, R2 = 0.71 Ohm  Total (R1 + R2) = 1.66 Ohm

Resistivity of copper $\rho_0 = 0.0178$ (Ohm x mm²) / m

$U_S = DC 19.2 \, V$ (= 80 % v. 24 V) voltage drop of ESX10 and tolerance of trip point (typically 1.1 x $I_k = 1.05 \ldots 1.35$ x $I_k$) have been taken into account.
Electronic Circuit Protector ESX10

Dimensions

- Operating area: 60 x 2.36 mm
- Mounting area: 70 x 40.8 mm
- Reverse plug-in protection: 6 x 6.8 = 40.8 mm
- Blade terminals: 6 x 6.8 = 40.8 mm

This is a metric design and millimeter dimensions take precedence (mm). In the interest of improved design, performance, and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

www.e-t-a.com

All dimensions without tolerances are for reference only. In the interest of improved design, performance, and cost effectiveness, the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Module 17plus is a power distribution system for use with electronic circuit protectors ESX10. Each module accommodates two protectors with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of spring-loaded terminals. The reference potential for the ESX10 (GND pin 11) is also looped through and connected to the terminal blocks at the sides. The integral status output SF of the ESX10-104/-106/-124/-127 can be tapped at terminal 12 of the relevant channel (single signalisation). The reset input RE may be connected via terminal 13 or 14 (ESX10-124/-127) or terminal 12 (ESX10-125). The integral control input IN+ of ESX10-115 is connected via terminal 12. Depending on the version a potential-free signal contact is available (ESX10-101/-102/-103/-104/-105/-106/-115/-125). Meets the requirements of UL60950.

Ordering information

17PLUS-Q02-00 Module 17plus, centre piece, two-way
17PLUS-QA0-LR one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

Pin configuration, fitted with ESX10-124 (Example)

<table>
<thead>
<tr>
<th>ESX10-124 Modul 17plus</th>
<th>Operating voltage PLUS, DC 24 V</th>
<th>Operating voltage MINUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE (+) (1)</td>
<td>reset input RE</td>
<td></td>
</tr>
<tr>
<td>GND (11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RE (13)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RE (14)</td>
<td>reset input RE</td>
<td></td>
</tr>
<tr>
<td>SF (12)</td>
<td>status output SF</td>
<td></td>
</tr>
<tr>
<td>LOAD (+) (2)</td>
<td>protected load output</td>
<td></td>
</tr>
</tbody>
</table>

Technical data

Connection

<table>
<thead>
<tr>
<th>LINE feed (1)</th>
<th>LOAD output (2)</th>
<th>Reference potential GND/ group signal terminals (11 or 13, 14):</th>
<th>single signal terminal (12)</th>
<th>Test probe for testing the group signal for line interruption: ≤ 2 mm Ø</th>
</tr>
</thead>
<tbody>
<tr>
<td>spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.</td>
<td>spring-loaded terminals for</td>
<td>spring-loaded terminals for</td>
<td>spring-loaded terminal for</td>
<td>≤ 2 mm Ø</td>
</tr>
<tr>
<td>1.5-10 mm² (AWG 10), SD 2 (0.8x4.0)</td>
<td>0.25-4 mm² (AWG 12), SD 1 (0.6x3.5)</td>
<td>0.25-2.5 mm² (AWG 14), SD 1 (0.6x3.5)</td>
<td>0.25-1.5 mm² (AWG 16), SD 0 (0.4x2.5)</td>
<td></td>
</tr>
</tbody>
</table>

Voltage rating

<table>
<thead>
<tr>
<th>Voltage rating (without ESX10)</th>
<th>AC 433 V; DC 65 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating (without ESX10)</td>
<td></td>
</tr>
<tr>
<td>LINE feed (1)</td>
<td>50 A</td>
</tr>
<tr>
<td>LOAD output (2)</td>
<td>25 A</td>
</tr>
<tr>
<td>Reference potential GND (11)</td>
<td>10 A</td>
</tr>
<tr>
<td>single signal (12)</td>
<td>1 A (with ESX10: 0.5 A)</td>
</tr>
<tr>
<td>Group signal (13-14)</td>
<td>1 A (with ESX10: 0.5 A)</td>
</tr>
</tbody>
</table>

Internal resistance values (without ESX10)

| LINE-LOAD (1-2) | ≤ 5 mΩ |
| Group signal (13-14) per module | ≤ 8 mΩ per pole |
| +5 mΩ for each additional module |

Busbar for power distribution

<table>
<thead>
<tr>
<th>Insulated busbar</th>
<th>non-insulated busbar:</th>
</tr>
</thead>
<tbody>
<tr>
<td>(blue or red):</td>
<td>I_max 32 A</td>
</tr>
<tr>
<td>(The non-insulated busbar, too, meets brush contact safety standards when fitted.)</td>
<td>I_max 50 A</td>
</tr>
</tbody>
</table>

Dielectric strength of Module 17plus (without ESX10)

| between main circuits (without busbar): | 1,500 V |
| between main circuit to auxiliary circuit: | 1,500 V |
| between auxiliary circuits: | 1,500 V |

Mass: Module 17plus (centre piece) terminal blocks (pair)

| approx. 85 g | approx. 30 g |

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
### Dimensions

<table>
<thead>
<tr>
<th>Slot for fitting labels from Phoenix, Weidmüller, Weiland</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-profile EN 50035-32</td>
</tr>
<tr>
<td>Symmetrical rail EN 50022-35x7.5</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence.

### Installation example

3. Snap on right-side and left-side terminal blocks.
4. Cut busbar to required length and fit on supply side of the modules.
5. Connect line feed with spring-loaded terminals.

---

**Connection and disconnection of cables with screw driver**

---

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
Connection diagram for ESX10-...

Module 17plus with ESX10-100
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 13, 14 looped through
- Jumper right-side terminal block

Module 17plus with ESX10-101
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 12 output single signalisation per channel (N/O)
- 13, 14 feed single signalisation
- Jumper right-side terminal block

Module 17plus with ESX10-102
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 12 output single signalisation per channel (N/C)
- 13, 14 feed single signalisation
- Jumper right-side terminal block

Module 17plus with ESX10-103
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 12, 13, 14 terminal group signalisation (change-over)
  (13-12 N/C, 13-14 N/O)
- Jumper right-side terminal block

Module 17plus with ESX10-104
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 12 status indication SP +24V=OK
- 13, 14 looped through
- Jumper right-side terminal block

Module 17plus with ESX10-105
- Side busbar
- Module 1
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Module 2
  - Line 1
  - Line 1
  - Line 1
  - Line 1
  - Busbar
- Left-side terminal block
- 11 GND
- 13, 14 terminal group signalisation (N/O)
### Accessories for ESX10

#### Busbar 32 A
- **X 222 005 01** blue insulation, 500 mm/19.68 in.
- **X 222 005 02** red insulation, 500 mm/19.68 in.
- **X 222 005 03** grey insulation, 500 mm/19.68 in.

#### Busbar 50 A
- **Y 307 016 01** non-insulated, 500 mm/19.68 in.

#### Busbar 50 A
- **Y 307 016 11** non-insulated, 500 mm/19.68 in.

#### End bracket
- **X 222 004 01** Screw terminal for busbar
- **X 211 156 01** non-insulated

#### Jumper
- **X 222 066 01**

#### Screw terminal for busbar
- **X 211 156 01** non-insulated

#### Retaining clip Y 307 754 01

#### Mounting of retaining clip
ESX10 with retaining clip Y 307 754 01
for power distribution system module 17plus

#### Removal of retaining clip Y 307 754 01
ESX10 - Accessories for ESX10

Single mounting sockets
(up to 16 A max. load)
17-P10-Si 17-P70-Si
polarized blade terminal DIN 46244-A6.3-0.8 (DC .250)
blade terminal DIN 46244 part 1.2 C profile (2x0.8) (DC 2x.110)
slot for fitting labels from Phoenix, Weidmüller

Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load,
more positions available on request
X 211 157 01 with terminal
X 211 157 02 without terminal

ESX10 - Accessories for ESX10

2-way mounting socket
63-P10-Si
(retaining clip Y 300 581 03 available on request)

Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load,
more positions available on request
X 211 157 01 with terminal
X 211 157 02 without terminal

Pin selection, fitted with ESX10-124 (Example)

Table 4: ESX10-... - Pin assignment 17-P10-Si

<table>
<thead>
<tr>
<th>ESX10-124 17-P10-Si</th>
<th>17-P10-Si</th>
<th>17-P70-Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>[2(k)] LINE (+)</td>
<td>[12] GND</td>
<td>[24]</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>group SF</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>changeover</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>N/O</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>[20]</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
<tr>
<td>LINE (+) DC = +24 V</td>
<td>GND</td>
<td>not assigned</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence.
Electronic Circuit Protector ESX10-T

Description

Electronic circuit protector type ESX10-T is designed to ensure selective disconnection of DC 24 V load systems.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through selective disconnection the ESX10-T responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by active current limitation. The ESX10-T limits the highest possible current to 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on capacitive loads of up to 20,000 μF, but they are disconnected only in the event of an overload or short circuit.

For optimal alignment with the characteristics of the application the current rating of the ESX10-T can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact. Remote operation is possible by means of a remote reset signal or a remote ON/OFF control signal. The manual ON/OFF button allows separate actuation of individual load circuits.

The ESX10-T, with a width of only 12.5 mm, can be snapped onto symmetrical rails ensuring ease of installation and saving space in control cabinets.

Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The load circuit can be re-activated via the remote electronic reset input, control input or manually by means of the ON/OFF button.

Features

- Selective load protection, electronic trip characteristics.
- Active current limitation for safe connection of capacitive loads up to 20,000 μF and on overload/short circuit.
- Current ratings 0.5 A...12 A.
- Reliable overload disconnection with 1.1 x IN plus, even with long load lines or small cable cross sections (see table 3).
- Manual ON/OFF button (S1).
- Control input IN+ for remote ON/OFF signal (option).
- Electronic reset input RE (option).
- Clear status and failure indication through LED, status output SF
- Integral fail-safe element adjusted to current rating.
- Width per unit only 12.5 mm.
- Rail mounting
- Ease of wiring through busbar LINE+ and 0 V as well as signal bars and bridges.

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage rating</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 2367</td>
<td>DC 24 V</td>
<td>0.5...12 A</td>
</tr>
<tr>
<td>UL 1604</td>
<td>DC 24 V</td>
<td>0.5...12 A</td>
</tr>
<tr>
<td>UL 508 / cUL 508</td>
<td>DC 24 V</td>
<td>0.5...12 A</td>
</tr>
<tr>
<td>CSA C22.2 No: 213 (class I, division 2) pending</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CSA C22.2 No: 142 pending</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Technical data

| (Tambient = 25 °C, operating voltage U_S = DC 24 V) |
| Operating data |
| Operating voltage U_S | DC 24 V (18...32 V) |
| Current rating I_N | fixed current ratings: 0.5, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A |
| Closed current I_0 | ON condition: typically 20...30 mA depending on signal output |
| Status indication by means of |
| ● multicolour LED: GREEN: unit is ON, power-MOSFET is switched on |
| ● status output SF ON, supplies + DC 24 V |
| ORANGE: in the event of overload or short circuit the unit/Power-MOSFET OFF |
| RED: - unit electronically disconnected |
| - load circuit/Power-MOSFET OFF |
| OFF: - manually switched off (S1 = OFF) |
| - or device is dead |
| - undervoltage (U_S < 8 V) |
| - after switch-on till the end of the delay period |
| ● status output SF (option) |
| ● potential-free signal contact F (option) |
| ● ON/OFF/ condition of switch S1 |

Load circuit

| Load output |
| Power-MOSFET switching output (high side switch) |
| Overload disconnection |
| typically 1.1 x I_N (1.05...1.35 x I_N) |
| Short-circuit current I_S |
| active current limitation (see table 1) |
| Trip time for electronic disconnection |
| see time/current characteristics |
| typically 3 s at I_load > 1.1 x I_N |
| typically 3 s...100 ms at I_load > 1.8 x I_N |
| (or 1.5 x I_N/1.3 x I_N) |
| Temperature disconnection |
| internal temperature monitoring with electronic disconnection |
| Low voltage monitoring load output |
| with hysteresis, no reset required load "OFF" at U_S < 8 V |
| Starting delay t_start |
| typically 0.5 sec after every switch-on and after applying U_S |
| Disconnection of load circuit |
| electronic disconnection |
| Free-wheeling circuit |
| external free-wheeling diode recommended with inductive load |
| Several load outputs must not be connected in parallel |
Technical data ($T_{ambient}=25°C$, operating voltage $U_S=DC\ 24\ V$)

### Status output SF

**ESX10-TB-114/-124/**

#### Electrical data
- plus-switching signal output, connects $U_S$ to terminal 12 of module 17plus nominal data: DC 24 V / max. 0.2 A (short circuit proof)
- status output is internally connected to GND with a 10 kOhm resistor

#### Status OUT
- ESX10-TB-114/-124 (signal status OUT), at $U_S = +24\ V$
- $+24\ V = S1$ is ON, lead output connected through 0 V = S1 is ON, load output blocked and/or switch S1 is OFF
- red LED lighted

#### OFF condition
- 0 V level at status output when:
  - switch S1 is in ON position, but device is still in switch-on delay
  - switch S1 is OFF, or control signal OFF, device is switched off
  - no operating voltage $U_S$

#### Signal output F
- ESX10-TB-101/-102

#### Electrical data
- potential-free signal contact max. DC 30 V/0.5 A, min. 10 V/10 mA

#### ON condition LED green
- voltage $U_S$ applied, switch S1 is in ON position
- no overload, no short circuit

#### OFF condition LED off
- device switched off (switch S1 is in OFF position)
- no voltage $U_S$ applied

#### Fault condition LED orange
- overload condition > 1.1 x $I_N$ up to electronic disconnection

#### Fault condition LED red
- electronic disconnection upon overload or short circuit
- device switched off with control signal (switch S1 is in ON position)
- single signal, make contact contact SC/SO-SI open

#### ESX10-TB-101
- single signal, break contact contact SC/SO-SI closed

#### Fault
- signal output fault conditions:
  - no operating voltage $U_S$
  - ON/OFF switch S1 is in OFF position
  - red LED lighted (electronic disconnection)

#### Reset input RE
- ESX10-TB-124/-127

#### Electrical data
- voltage: max. +DC 32 V
- high > DC 8 V < DC 32 V
- low < DC 3 V > 0 V
- power consumption typically 2.6 mA (+DC 24 V)
- min. pulse duration typically 10 ms

#### Reset signal RE (terminal 22)
- The electronically blocked ESX10-TB-124/-127 may remotely be reset via an external momentary switch due to the falling edge of a +24 V pulse.
- A common reset signal can be applied to several devices simultaneously.
- Switched on devices remain unaffected.

### Control input IN+

**ESX10-TB-114**

#### Electrical data
- see reset input RE +24 V level (HIGH); device will be switched on by a remote ON/OFF signal
- 0 V level (LOW); device will be switched off by a remote ON/OFF signal

#### Control signal IN+ (terminal 21)
- unit can only be switched on with S1 if a HIGH level is applied to IN+.

#### Switch S1 ON/OFF
- n/a, only electronic disconnection

#### Table 1: voltage drop, current limitation, max. load current

<table>
<thead>
<tr>
<th>Current rating $I_N$</th>
<th>Typically voltage drop</th>
<th>Active current limitation</th>
<th>Max. load current at 100 % ON-duty</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.5\ A$</td>
<td>70 mV</td>
<td>1.8 x $I_N$</td>
<td>0.5 A</td>
</tr>
<tr>
<td>1 A</td>
<td>80 mV</td>
<td>1.8 x $I_N$</td>
<td>1 A</td>
</tr>
<tr>
<td>2 A</td>
<td>130 mV</td>
<td>1.8 x $I_N$</td>
<td>2 A</td>
</tr>
<tr>
<td>3 A</td>
<td>80 mV</td>
<td>1.8 x $I_N$</td>
<td>3 A</td>
</tr>
<tr>
<td>4 A</td>
<td>100 mV</td>
<td>1.8 x $I_N$</td>
<td>4 A</td>
</tr>
<tr>
<td>6 A</td>
<td>130 mV</td>
<td>1.8 x $I_N$</td>
<td>6 A</td>
</tr>
<tr>
<td>8 A</td>
<td>120 mV</td>
<td>1.5 x $I_N$</td>
<td>8 A</td>
</tr>
<tr>
<td>10 A</td>
<td>150 mV</td>
<td>1.5 x $I_N$</td>
<td>10 A</td>
</tr>
<tr>
<td>12 A</td>
<td>180 mV</td>
<td>1.3 x $I_N$</td>
<td>12 A</td>
</tr>
</tbody>
</table>

Attention: when mounted side-by-side without convection the ESX10-T should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.
**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>ESX10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Electronic Circuit Protector, with current limitation</td>
</tr>
</tbody>
</table>

**Mounting and design**

<table>
<thead>
<tr>
<th>Mounting and design</th>
<th>TA</th>
<th>TB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>rail mounting, without signal contact</td>
<td>rail mounting, with signal contact and slot for busbars and jumpers</td>
</tr>
</tbody>
</table>

**Version**

<table>
<thead>
<tr>
<th>Version</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>standard, without physical isolation in the event of a failure</td>
</tr>
</tbody>
</table>

**Signal input**

<table>
<thead>
<tr>
<th>Signal input</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without signal input</td>
<td>with reset input RE, only ESX10-T-124, ESX10-T-127</td>
</tr>
</tbody>
</table>

**Signal outputs**

<table>
<thead>
<tr>
<th>Signal output</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>without signal output</td>
<td>signal contact N/O</td>
<td>signal contact N/C</td>
<td>status output SF (only ESX10-T-114, ESX10-T-124)</td>
<td>inverse status output SF (only ESX10-T-127)</td>
</tr>
</tbody>
</table>

**Operating voltage**

<table>
<thead>
<tr>
<th>DC 24 V</th>
<th>rated voltage DC 24 V</th>
</tr>
</thead>
</table>

**Current rating**

<table>
<thead>
<tr>
<th>0.5 A</th>
<th>1 A</th>
<th>2 A</th>
<th>3 A</th>
<th>4 A</th>
<th>5 A</th>
<th>6 A</th>
<th>8 A</th>
<th>10 A</th>
<th>12 A</th>
</tr>
</thead>
</table>

**ESX10 - TA**

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>0</th>
<th>0</th>
<th>DC 24 V</th>
<th>6 A</th>
<th>ordering example</th>
</tr>
</thead>
</table>

**Schematic diagram ESX10-TB-124 (Example)**

Description of ESX10-T signal inputs and outputs (wiring diagrams) see next page.

**Please note:**

- The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10-T used.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10-T.

**Table 2: ESX10-T - product version**

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Signal input</th>
<th>Signal output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Signal output F (Signal contact)</td>
<td>Status output SF</td>
</tr>
</tbody>
</table>

**Terminal wiring diagram ESX10-TB-124 (Example)**
**Electronic Circuit Protector ESX10-T**

**Installation guidelines and safety instructions**

**Dimensions**

![Diagram of the ESX10-T device]

**Information on UL approvals**

- UL1604
  - File E320024
  - Operating Temperature Code T5
  - This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only

**WARNING:**
- Exposure to some chemicals may degrade the sealing properties of materials used in the following device: relay

**Sealant Material:**
- Generic Name: Modified diglycidyl ether of bisphenol A
- Supplier: Fine Polymers Corporation
- Type: Epi Fine 4616L-160PK

**Casing Material:**
- Generic Name: Liquid Crystal Polymer
- Supplier: Sumitomo Chemical
- Type: E4008, E4009, or E6008

**RECOMMENDATION:**
- Periodically inspect the device named above for any degradation of properties and replace if degradation is found

**WARNING – EXPLOSION HAZARD:**
- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous
- Substitution of any components may impair suitability for Class I, Division 2

**UL2367**
- Non-hazardous use - UL File E306740

**UL 508 / cUL 508**
- File E322549
- Class 2
  - Meets requirement for Class 2 current limitation (ESX10-T...-0.5 A / 1 A / 2 A / 3 A)
  - CSA C22.2 No: 213 (Class I, Division 2) pending
  - CSA C22.2 No: 142 pending

---

**Instruction leaflet**

**Electronic Circuit Protector ESX10-T**

- UL1604
  - This device is suitable for use in Class I, Div 2, Groups A, B, C, D; TC T5; UL File E320024

**Warnings:**
1. Remove power before disconnecting device.
2. Components substitutions may impair suitability of Class I, Div 2.
3. Chemical exposure may degrade internal relay’s sealing property.

**UL2367**
- Non-hazardous use - UL File E306740

Refer to data sheet / installation guidelines for installation and safety instructions.

---

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
ESX10-T Signal inputs / outputs (wiring diagram)

**ESX10-TA-100**
without signal input/output

**ESX10-TB-101**
without signal input with signal output F (single signal, N/O)

**ESX10-TB-102**
without signal input with signal output F (single signal, N/C)

- Operating condition: 13-14 closed
- Fault condition: 13-14 open

---

**ESX10-TB-114**
with control input IN+ (+DC 24 V) with status output SF (+24 V = load output ON)

**ESX10-TB-124**
with reset input RE (+DC 24 V ↓) with status output SF (+24 V = load output ON)

**ESX10-TB-127**
with reset input RE (+DC 24 V ↓) with inverse status output SF (0 V = load output ON)

- Operating condition: SF +24 V = OK
- Fault condition: SF 0 V
The trip time is typically 3 s in the range between 1.1 and 1.8 $I_N^{*1)}$.

Electronic current limitation occurs at typically 1.8 $I_N^{*1)}$ which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed 1.8 $I_N^{*1)}$ times the current rating. Trip time is between 100 ms and 3 sec (depending on overload or short circuit).

Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.

![Time/Current characteristic curve ($T_A = 25 \, ^\circ C$)](chart.png)

### Table 3: Reliable trip of ESX10-T

<table>
<thead>
<tr>
<th>Cable cross section $A$ in mm$^2$</th>
<th>0.14</th>
<th>0.25</th>
<th>0.34</th>
<th>0.5</th>
<th>0.75</th>
<th>1</th>
<th>1.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable length $L$ in meter (= single length)</td>
<td>5</td>
<td>1.27</td>
<td>0.71</td>
<td>0.52</td>
<td>0.36</td>
<td>0.24</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>2.54</td>
<td>1.42</td>
<td>1.05</td>
<td>0.71</td>
<td>0.47</td>
<td>0.36</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>3.81</td>
<td>2.14</td>
<td>1.57</td>
<td>1.07</td>
<td>0.71</td>
<td>0.53</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>5.09</td>
<td>2.85</td>
<td>2.09</td>
<td>1.42</td>
<td>0.95</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>6.36</td>
<td>3.56</td>
<td>2.62</td>
<td>1.78</td>
<td>1.19</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>30</td>
<td>7.63</td>
<td>4.27</td>
<td>3.14</td>
<td>2.14</td>
<td>1.42</td>
<td>1.07</td>
</tr>
<tr>
<td></td>
<td>35</td>
<td>8.90</td>
<td>4.98</td>
<td>3.66</td>
<td>2.49</td>
<td>1.66</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>10.17</td>
<td>5.70</td>
<td>4.19</td>
<td>2.85</td>
<td>1.90</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>11.44</td>
<td>6.41</td>
<td>4.71</td>
<td>3.20</td>
<td>2.14</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>12.71</td>
<td>7.12</td>
<td>5.24</td>
<td>3.56</td>
<td>2.37</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td>14.01</td>
<td>7.81</td>
<td>5.75</td>
<td>4.19</td>
<td>3.56</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>15.30</td>
<td>8.51</td>
<td>6.24</td>
<td>4.71</td>
<td>3.66</td>
<td>2.78</td>
</tr>
<tr>
<td></td>
<td>65</td>
<td>16.59</td>
<td>9.21</td>
<td>6.75</td>
<td>5.24</td>
<td>3.87</td>
<td>2.88</td>
</tr>
<tr>
<td></td>
<td>70</td>
<td>17.88</td>
<td>9.91</td>
<td>7.25</td>
<td>5.75</td>
<td>4.08</td>
<td>3.08</td>
</tr>
<tr>
<td></td>
<td>75</td>
<td>19.17</td>
<td>10.61</td>
<td>7.76</td>
<td>6.24</td>
<td>4.29</td>
<td>3.28</td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>20.46</td>
<td>11.31</td>
<td>8.25</td>
<td>6.75</td>
<td>4.50</td>
<td>3.49</td>
</tr>
<tr>
<td></td>
<td>85</td>
<td>21.75</td>
<td>12.01</td>
<td>8.75</td>
<td>7.25</td>
<td>4.71</td>
<td>3.70</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>23.04</td>
<td>12.71</td>
<td>9.25</td>
<td>7.75</td>
<td>4.92</td>
<td>3.90</td>
</tr>
<tr>
<td></td>
<td>95</td>
<td>24.33</td>
<td>13.41</td>
<td>9.75</td>
<td>8.25</td>
<td>5.13</td>
<td>4.11</td>
</tr>
<tr>
<td></td>
<td>100</td>
<td>25.62</td>
<td>14.12</td>
<td>10.25</td>
<td>8.75</td>
<td>5.34</td>
<td>4.32</td>
</tr>
<tr>
<td></td>
<td>105</td>
<td>26.91</td>
<td>14.82</td>
<td>10.75</td>
<td>9.25</td>
<td>5.55</td>
<td>4.53</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>28.20</td>
<td>15.52</td>
<td>11.25</td>
<td>9.75</td>
<td>5.76</td>
<td>4.74</td>
</tr>
<tr>
<td></td>
<td>115</td>
<td>29.49</td>
<td>16.22</td>
<td>11.75</td>
<td>10.25</td>
<td>5.97</td>
<td>4.95</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>30.78</td>
<td>16.92</td>
<td>12.25</td>
<td>10.75</td>
<td>6.18</td>
<td>5.16</td>
</tr>
<tr>
<td></td>
<td>125</td>
<td>32.07</td>
<td>17.63</td>
<td>12.75</td>
<td>11.25</td>
<td>6.39</td>
<td>5.37</td>
</tr>
<tr>
<td></td>
<td>130</td>
<td>33.36</td>
<td>18.33</td>
<td>13.25</td>
<td>11.75</td>
<td>6.60</td>
<td>5.58</td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>34.65</td>
<td>19.04</td>
<td>13.75</td>
<td>12.25</td>
<td>6.81</td>
<td>5.79</td>
</tr>
<tr>
<td></td>
<td>140</td>
<td>35.94</td>
<td>19.74</td>
<td>14.25</td>
<td>12.75</td>
<td>7.02</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>145</td>
<td>37.23</td>
<td>20.45</td>
<td>14.75</td>
<td>13.25</td>
<td>7.23</td>
<td>6.21</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>38.52</td>
<td>21.15</td>
<td>15.25</td>
<td>13.75</td>
<td>7.44</td>
<td>6.42</td>
</tr>
<tr>
<td></td>
<td>155</td>
<td>39.81</td>
<td>21.86</td>
<td>15.75</td>
<td>14.25</td>
<td>7.65</td>
<td>6.63</td>
</tr>
<tr>
<td></td>
<td>160</td>
<td>41.10</td>
<td>22.56</td>
<td>16.25</td>
<td>14.75</td>
<td>7.86</td>
<td>6.84</td>
</tr>
</tbody>
</table>

Example 1: max. length at 1.5 mm$^2$ and 3 A 214 m

Example 2: max. length at 1.5 mm$^2$ and 6 A 106 m

Example 3: mixed wiring: $R_1 = 40$ m in 1.5 mm$^2$ and $R_2 = 5$ m in 0.25 mm$^2$: 
- Control cabinet – sensor/actuator level: $R_1 = 0.95$ Ohm, $R_2 = 0.71$ Ohm 
- Total $(R_1 + R_2) = 1.66$ Ohm
The ESX10-T features an integral power distribution system.

Mounting examples for ESX10-T

Mounting procedure:
Before wiring insert busbars into protector block.
Connection diagrams and application examples ESX10-T

Signal contacts are shown in OFF or fault condition.

ESX10-TA-100

ESX10-TB-101

group signalling (series connection)
ESX10-TB-102
Single signalling with common line entry

ESX10-TB-124
Single signalling with common reset
Connection diagrams and application examples ESX10-T

Application examples: feed in module with concurrent protection of auxiliary circuit

Auxiliary contacts are shown in the OFF of fault condition

ESX10-TB-101
Group signalisation (series connection)
Type ESX10-TA-100-DC24V-0.5A can be used as a feed in module including protection of auxiliary circuit

ESX10-TB-102
Single signalisation with common line entry
Type ESX10-TA-100-DC24V-0.5A can be used as a feed in module including protection of auxiliary circuit

(Connect diagram details and application examples shown)
Description

The ESX10-T features an integral power distribution system. The following wiring modes are possible with various pluggable current and signal busbars:

- **LINE + (DC 24 V)**
- **0 V**
  
  **Caution:** The electronic devices ESX10-T require a 0 V connection
- signal contacts
- reset inputs

### Busbars for LINE+ and 0 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Current Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. load with one line entry</td>
<td>$I_{\text{max}}$ 50 A</td>
</tr>
<tr>
<td>(recommended: centre line entry)</td>
<td></td>
</tr>
<tr>
<td>max. load with two line entries</td>
<td>$I_{\text{max}}$ 63 A</td>
</tr>
<tr>
<td>grey insulation, length: 500 mm</td>
<td></td>
</tr>
</tbody>
</table>

X 222 611 02

### Signal busbars for signal contacts and reset inputs

<table>
<thead>
<tr>
<th>Description</th>
<th>Current Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. load with one line entry</td>
<td>$I_{\text{max}}$ 1 A</td>
</tr>
<tr>
<td>with one series connection of signal contacts</td>
<td>$I_{\text{max}}$ 0.5 A</td>
</tr>
<tr>
<td>grey insulation, length: 500 mm</td>
<td></td>
</tr>
</tbody>
</table>

X 222 005 03

### Jumpers for signal contacts

<table>
<thead>
<tr>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>grey insulation</td>
<td>21 mm</td>
</tr>
</tbody>
</table>

X 222 005 13
	packing unit: 10 pcs

### Insulated wire bridge

<table>
<thead>
<tr>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>optional as jumper for ESX10-TB-101</td>
<td></td>
</tr>
<tr>
<td>for group signalisation (series connection)</td>
<td></td>
</tr>
</tbody>
</table>

X 222 984 01
	packing unit: 10 pcs

### Busbars for LINE+ and 0 V

<table>
<thead>
<tr>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>grey insulation</td>
<td></td>
</tr>
<tr>
<td>max. number of plug-on operations</td>
<td>10</td>
</tr>
</tbody>
</table>

X 222 611 34, (3-unit-block ESX10-T), length: 34.5 mm

X 222 611 47, (4-unit-block ESX10-T), length: 47 mm

X 222 611 59, (5-unit-block ESX10-T), length: 59.5 mm
	packing unit: 10 pcs

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
The E-T-A Solid State Remote Power Controller (SSRPC) E-1048-60 is an opto decoupled transistorised switching device providing both protection and signalisation. It may be used wherever safe switching and protection of resistive, inductive or lamp loads in DC voltage systems is required.

**Features**
- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -600) and in the OFF and ON condition (version -602)
- Physically isolated fault indication.
- Compact plug-in type

**Typical applications**
- Automation - interface module providing inexpensive power amplification at PLC outputs
- optimum protection of individual loads by monitoring the load circuit
- Protection and control of motors, solenoids, lamps

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1048</td>
<td>Solid State Remote Power Controller</td>
</tr>
<tr>
<td>600</td>
<td>wire break indication in OFF condition (standard)</td>
</tr>
<tr>
<td>602</td>
<td>with permanent wire break monitoring</td>
</tr>
<tr>
<td></td>
<td>Voltage rating DC 24 V (standard)</td>
</tr>
</tbody>
</table>

**Technical data (Tambient = 25 °C; at UN)**
- **Load circuit**
  - Voltage rating US: DC 24 V (18...36 V)
  - Current rating IN: 0.5 A; 1 A; 2 A; 4 A (other ratings to special order)
  - Closed-circuit current IContr typically 0.3 mA
  - Min. load current: standard version: Iload > 1 mA
  - Wire break indication in OFF condition
    - Option: wire break indication in OFF and ON condition
  - Wire break in OFF cond. Rload > typ. 500 kΩ
  - Wire break in ON cond. Iload < typ. 130 mA (0.5/1 A unit)
    - Iload < typ. 500 mA (2/4 A unit)
  - Voltage drop UDS max: 0.15 V; 0.3 V; 0.1 V; 0.2 V
  - Switch-on/switch-off time ton/toff typ. 300 µs/700 µs with resistive load
  - Overload disconnection approx. 1.5 x IN (±0.3) after approx. 100 ms
  - Short-circuit current: max. 25 A (0.5 A and 1 A current ratings), max. 75 A (with 2 A and 4 A current ratings)
  - Short-circuit disconnection < 250 µs

- **Control circuit**
  - Voltage rating: DC 24 V
  - Voltage controlled input UE: DC 0 V < low level < 5 V
  - DC 8.5 V < high level < 36 V
  - Input current IE: 1...10 mA (8.5...36 V)
  - Max. switching frequency fmax: 500 Hz
  - Reset time after short-circuit/overload disconnection 1 ms

- **Fault indication output F (opto coupler)**
  - Voltage rating range: DC 5...36 V
  - Voltage rating range: DC 5...36 V
  - Max. load current: 100 mA (2U < 2 V), with reverse polarity protection
  - Error indication: output F+ / F- conductive
  - Wire break in load circuit
  - After short-circuit/overload disconnection

- **Parallel connection possible, as leakage current < 10 μA**

**General data**
- Temperature range: 0 °C...+60 °C
- Insulation voltage (IEC 60864/VDE 0110) 2.5 kVrms
- Mass: 28 g

Where remote control, wire break and LED indication is not required, please contact us for a thermal-magnetic circuit breaker (e.g. types 2210, 3600, 3900).
Technical description

At the appropriate input level (>8.5 V), the opto decoupled input in the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply (U_0).

The transistor will switch off when
- the control voltage (U_c) is removed
- there is a short-circuit/overload in the load circuit.

Status indication is provided by two LEDs (red and green).

Thermal-magnetic style overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.

The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets (see Accessories).

Control circuit

**ON condition:**
If a voltage higher than 8.5 V is applied to the input terminals (-IN, +IN), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, the green LED will be lighted.

**OFF condition:**
A control voltage lower than 5 V will switch the output transistor off.

Load circuit

The load circuit switches depending on the control signal ("0" or "1"). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250 µs whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

Fault indication output
The fault indication circuit (F+, F-) is opto decoupled from the load and control circuit.

In the OFF condition, this circuit will provide wire break indication, with the transistor output being open.

In the ON condition, the circuit will provide short-circuit and overload monitoring and indication.

Visual fault indication by red LED.

Status indication

<table>
<thead>
<tr>
<th>Status indication</th>
<th>Fault indication output (opto coupler)</th>
<th>LED green</th>
<th>LED red</th>
</tr>
</thead>
<tbody>
<tr>
<td>non-conductive, no duty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>conductive, normal duty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>overload or short circuit at the output (and with option wire break indication in ON condition)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>wire break, in the OFF position</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dimensions

![Solid State Remote Power Controller E 1048-60](image)

This is a metric design and millimeter dimensions take precedence (mm).
Functional diagrams E-1048-60.

**Functional diagram E-1048-60.**
wire break indication

<table>
<thead>
<tr>
<th>Version</th>
<th>E-1048-600 wire breakage monitoring only in OFF condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uₚ</td>
<td>Operating voltage is applied</td>
</tr>
<tr>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**LED green**

**output**

| 1 |                                                          |
|   |                                                          |

**Error indication**

**wire break**

Error

---

**Functional diagram E-1048-60.**
overload /short-circuit indication

<table>
<thead>
<tr>
<th>Version</th>
<th>E-1048-602 wire breakage monitoring in ON and OFF condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uₚ</td>
<td>Operating voltage is applied</td>
</tr>
<tr>
<td>IN</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

**LED green**

**output**

| 1 |                                                          |
|   |                                                          |

**LED red**

**opto coupler**

**Error indication**

**overload /short-circuit**

Error

* Fault indication is reset when control voltage is switched off, whether the failure is still active or not.

IN = input set / output = switched through

LED lights
**Single mounting sockets**

(with adapter)
17-P10-Si
17-P10-Si-20025
17-P70-Si
17-P70-Si-20025
(retaining clip Y 300 581 11 available on request)

---

**Busbar (10-way)**

(supplied as a complete package)

for type 17 socket
(for max. 100 A continuous load),
more positions available on request

X 211 157 02 with terminal
X 211 157 01 without terminal

---

**Insulating sleeving for busbar (10-way)**

Y 303 824 01

---

**Pin selection 17-P10-Si fitted with E-1048-60.**

---

**Accessories for E 1048-60.**

---

**2-way mounting socket**

23-P10-Si

(retaining clip Y 300 581 03 available on request)

---

**6-way mounting socket**

63-P10-Si

---

**Connector bus links -P10**

X 210 588 02/ 2.5 mm², (AWG 16), brown
(up to 13 A max. load)
X 210 588 03/ 2.5 mm², (AWG 14), red
(up to 20 A max. load)
X 210 588 04/ 2.5 mm², (AWG 14), black
(up to 20 A max. load)

---

**2 mounting clips**

Y 300 504 02
(2 pcs needed per unit)

---

**Installation drawing with mounting clips Y 300 504 02**

---

All dimensions without tolerances are for reference only. In the interest of improved design,
performance and cost effectiveness the right to make changes in these specifications without
notice is reserved. Product markings may not be exactly as the ordering codes. Errors and
omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com
Description

The E-T-A Solid State Remote Power Controller E-1048-7.. is a transistorised switching device providing both protection and signalisation. It is suitable for all applications where the capabilities of the existing PLC outputs are not sufficient or where no protection against overload and short circuit or wire breakage monitoring of connected loads is provided. The use of a costly, high-capacity output card becomes superfluous when only one or two powerful outputs are necessary.

Using the SSRPC E-1048-7.., in combination with the module 17plus creates a new, very flexible system capable of being subsequently changed or extended. Busbars, pre-wired signal contacts and spring-loaded terminals reduce installation times considerably (see accessories).

Typical applications

Automation
- Interface module providing inexpensive power amplification at PLC outputs
- Optimum protection of individual loads by monitoring the load circuit

Protection and control of
- Motors
- Solenoids
- Lamps

Features

- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A; 5 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -700 and -710) and in the OFF and ON condition (version -702 and -712)
- Fault storage: version -700/-710:
  - Wire break indication in OFF condition
- Optional: wire break indication in OFF and ON condition
- Wire break indication in OFF cond. in ON cond.
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -700 and -710) and in the OFF and ON condition (version -702 and -712)
- Fault storage: version -710; -712 and -713
- Physically isolated fault indication
- Compact plug-in type
- Plug-in design for use with power distribution system module 17plus
- Integral pre-wiring of common supply and signal contacts

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>SSRPC for PLC outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1048</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>feature description</th>
</tr>
</thead>
<tbody>
<tr>
<td>700</td>
<td>wire break indication in OFF condition (standard)</td>
</tr>
<tr>
<td>710</td>
<td>wire break indication in OFF condition and fault storage</td>
</tr>
<tr>
<td>702</td>
<td>permanent wire break indication</td>
</tr>
<tr>
<td>712</td>
<td>permanent wire break indication and fault storage</td>
</tr>
<tr>
<td>703</td>
<td>without wire break indication</td>
</tr>
<tr>
<td>713</td>
<td>without wire break indication with fault storage</td>
</tr>
</tbody>
</table>

Technical data ($T_{ambient} = 25^\circ C$; at $U_N$)

<table>
<thead>
<tr>
<th>Load circuit</th>
<th>Voltage rating $U_S$</th>
<th>DC 24 V (18...36 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current rating $I_N$</td>
<td>DC 24 V (18...36 V)</td>
<td></td>
</tr>
<tr>
<td>(other ratings to special order)</td>
<td>0.5 A; 1 A; 2 A; 4 A; 5 A</td>
<td></td>
</tr>
<tr>
<td>Closed-circuit current $I_{Contr}$</td>
<td>typically 0.3 mA</td>
<td></td>
</tr>
<tr>
<td>Min. load current</td>
<td>Version -700/-710:</td>
<td></td>
</tr>
<tr>
<td>wire break indication in OFF condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optional: wire break indication in OFF and ON condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>wire break indication in OFF cond.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R_{load}$ typically 500 k$\Omega$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{load}$ &lt; typ. 130 mA (0.5/1 A unit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{load}$ &lt; typ. 500 mA (2/4/5 A unit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage drop $U_{offmax}$</td>
<td>0.15 V; 0.3 V; 0.1 V; 0.2 V; 0.3 V</td>
<td></td>
</tr>
<tr>
<td>Switch-on/switch-off time $t_{on/off}$ typ.</td>
<td>300 µs/700 µs with resistive load</td>
<td></td>
</tr>
<tr>
<td>Overload disconnection</td>
<td>approx. 1.5 ($\pm$ 0.3) x $I_N$ after approx. 100 ms</td>
<td></td>
</tr>
<tr>
<td>Short-circuit current</td>
<td>max. 25 A (with 0.5 A and 1 A current ratings)</td>
<td></td>
</tr>
<tr>
<td>(self-limiting)</td>
<td>max. 75 A (with 2 A/4 A/5 A current ratings)</td>
<td></td>
</tr>
<tr>
<td>Short-circuit disconnection</td>
<td>&lt; 250 µs</td>
<td></td>
</tr>
</tbody>
</table>

Control input

<table>
<thead>
<tr>
<th>Control level</th>
<th>Voltage rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control level</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Voltage controlled input $U_E$</td>
<td>DC 0 V &lt; low level &lt; 5 V</td>
</tr>
<tr>
<td>Input current $I_E$</td>
<td>1...10 mA (8.5...36 V)</td>
</tr>
<tr>
<td>Max. switching frequency $f_{max}$</td>
<td>1 kHz</td>
</tr>
<tr>
<td>Reset time after short-circuit/overload disconnection</td>
<td>1 ms</td>
</tr>
</tbody>
</table>

Fault indication output F

| max. switching voltage | DC 150 V |
| max. interrupting capacity | DC 30 W |
| limiting continuous current | 1 A |

General data

| Temperature range | 0 °C...+60 °C |
| Insulation voltage | DC 500 V > 10 MΩ |

Mass | 28 g |
Technical description

At the correct input voltage (> 8.5 V), the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply (US).

The transistor will switch off when
- the control voltage (U_control) is removed
- there is a short-circuit/overload in the load circuit.

Simulated thermal-magnetic overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.

The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets or module 17plus (see Accessories).

Control circuit

ON condition:
If a voltage higher than 8.5 V is applied to the input terminals (+IN against GND), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, status indication by yellow LED.

OFF condition:
A control voltage lower than 5 V will switch the output transistor off.

Load circuit

The load circuit switches depending on the control signal (“0” or “1”). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250 µs whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

Fault indication output F

The fault indication circuit is physically isolated from the load and control circuits via a relay.

In the OFF condition, this circuit (with closed contact) will provide wire break indication, with the transistor output being open.

The versions with fault storage (-702/-712 and -713) store the fault signal until the control voltage is re-applied.

Visual fault indication by red LED.

Dimensions

This is a metric design and millimeter dimensions take precedence (mm) over inch.

Connection diagram

Typical time/current characteristics (T_A = 25 °C)

0.5 A and 1 A

2 A and 4 A
Functional diagram E-1048-7..
wire break indication

Version
Uₕ
IN
1
0
LED yellow
1
0
output
LED red
relay
Error indication
wire break

Functional diagram E-1048-7..
overload / short-circuit indication

Version
Uₕ
IN
1
0
LED yellow
1
0
output
LED red
relay
Error indication
overload / short-circuit

E-1048-7x0
wire breakage monitoring only in OFF condition
Operating voltage is applied

E-1048-7x0
overload / short-circuit indication
Operating voltage is applied

E-1048-7x0
wire breakage monitoring in ON and OFF condition
Operating voltage is applied
Connection diagram

Solid State Remote Power Controller E-1048-700 with Module 17plus

Wiring diagram

Separate power supply for load, PLC I/O and signal loop

Caution: If there is no firm chassis earth connection when using several separate power supplies, the connected fault indication loop may lead to intermittent operation of the SSRPC and resultant operational hazards.

Wiring diagram

Common power supply for load, PLC I/O and signal loop
**Module 17plus** is a power distribution system for use with SSRPC E-1048-7.. for PLC outputs.

Each module accommodates two SSRPCs with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of spring-loaded terminals. The reference potential for the electronic amplifiers (GND pin 11) is also looped through and to the terminals connected at the sides. Control of the amplifiers (IN+), referenced to GND, is per channel via the separate terminal 12 beside the LOAD terminal. The SSRPC has an integral signal contact (break contact) used for group signalisation. Therefore the terminals of all break contacts are connected in series in the module 17plus and are connected to the terminal blocks via two terminals (13, 14). The module is designed to accommodate a probe for series connection continuity tests. When multipole circuit breakers are fitted auxiliary contacts are required for each pole. Individual circuit breaker signalisation is achieved through use of the break contacts (which close in the event of failure) connected in parallel by means of terminals on each module. The signalling circuitry between modules and the internal prewiring for the potential is automatically connected when the modules are linked together.

Meets the requirements of UL60950.

**Ordering information**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17PLUS-Q02-00</td>
<td>Module 17plus, centre piece, two-way</td>
</tr>
<tr>
<td>17PLUS-QA0-LR</td>
<td>one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.</td>
</tr>
</tbody>
</table>

**Technical data**

- **Connection**
  - Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
  - **LINE feed (1):**
    - spring-loaded terminals for 1.5-10 mm², (AWG 20 - AWG 10) SD 2 (0.8x4.0)
  - **LOAD output (2):**
    - spring-loaded terminals for 0.25-4 mm², (AWG 24 - AWG 12) SD 1 (0.6x3.5)
  - **Reference potential GND and terminals (11, 13, 14):**
    - spring-loaded terminals for 0.25-2.5 mm², (AWG 24 - AWG 14) SD 1 (0.6x3.5)
  - **control IN+ terminal (12):**
    - spring-loaded terminal for 0.25-1.5 mm², (AWG 24 - AWG 16) SD 0 (0.4x2.5)

- **Test probe for testing the group signal for line interruption:** ≤ 2 mm ø

- **Voltage rating**
  - (without SSRPC): AC 433 V; DC 65 V

- **Current rating**
  - (without SSRPC)
    - **LINE feed (1):** 50 A
    - **LOAD output (2):** 25 A
    - **Reference potential GND (11):** 10 A
    - **Control IN+ (12):** 1 A
    - **Group signal (13-14):** 1 A

- **Internal resistance values**
  - (without SSRPC)
    - **LINE-LOAD (1-2):** ≤ 5 mΩ
    - **Group signal (13-14):** ≤ 8 mΩ/pole + 5 mΩ for each additional module

- **Busbar for power distribution**
  - insulated busbar (blue or red): I_max 32 A
  - non-insulated busbar: I_max 50 A
  - (The non-insulated busbar, too, meets brush contact safety standards when fitted.)

- **Dielectric strength**
  - between main circuits (without busbar): 1,500 V
  - main circuit to auxiliary circuit: 1,500 V
  - between auxiliary circuits: 1,500 V

- **Mass:**
  - Module 17plus (centre piece) approx. 85 g
  - terminal blocks (pair) approx. 30 g
**Dimensions**

This is a metric design and millimeter dimensions take precedence (mm).

**Installation example**

Installation:
3. Snap on right-side and left-side terminal blocks.
4. Cut busbar to required length and fit on supply side of the modules.
5. Connect line feed with spring-loaded terminals.
6. Plug in SSRPC E-1048-7...

**Connection diagram**

Connection and disconnection of cables with screw driver.

**Pin selection, fitted with E-1048-7..**

<table>
<thead>
<tr>
<th></th>
<th>Module 17plus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>E-1048-7..</strong></td>
<td></td>
</tr>
<tr>
<td>LINE +</td>
<td>(2)</td>
</tr>
<tr>
<td>GND</td>
<td>(5)</td>
</tr>
<tr>
<td>F 7</td>
<td>(7)</td>
</tr>
<tr>
<td>F 6</td>
<td>(6)</td>
</tr>
<tr>
<td>In+</td>
<td>(4)</td>
</tr>
<tr>
<td>LOAD</td>
<td>(1)</td>
</tr>
</tbody>
</table>
### Accessories

<table>
<thead>
<tr>
<th><strong>Busbar 32 A</strong></th>
<th><strong>Busbar 50 A</strong></th>
<th><strong>Retaining clip for SSRPC E-1048-7..</strong></th>
<th><strong>Labels</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>X 222 005 01</td>
<td>Y 307 016 01</td>
<td>recommended for fitting the devices</td>
<td>marking area 6 x 10 mm (packing unit 10 pcs = 1 strip)</td>
</tr>
<tr>
<td>X 222 005 02</td>
<td>Y 307 016 11</td>
<td></td>
<td>part. no. Y 307 942 61</td>
</tr>
<tr>
<td>X 222 005 03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>blue insulation, 500 mm/19.68 in.</td>
<td>non-insulated, 500 mm/19.68 in.</td>
<td>Y 300 581 11</td>
<td></td>
</tr>
<tr>
<td>red insulation, 500 mm/19.68 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>grey insulation, 500 mm/19.68 in.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**End bracket**

X 222 004 01

**Screw terminal for busbar**

X 211 156 01 non insulated

**Jumper**

X 222 066 01

**Signal bridge**

X 222 066 01

<table>
<thead>
<tr>
<th><strong>Retaining clip for SSRPC E-1048-7..</strong></th>
<th><strong>Labels</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>recommended for fitting the devices</td>
<td>marking area 6 x 10 mm (packing unit 10 pcs = 1 strip)</td>
</tr>
<tr>
<td>Y 300 581 11</td>
<td>part. no. Y 307 942 61</td>
</tr>
</tbody>
</table>

---

This is a metric design and millimeter dimensions take precedence.  

<table>
<thead>
<tr>
<th><strong>mm</strong></th>
<th><strong>inch</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>2.36</td>
</tr>
<tr>
<td>4.4</td>
<td>0.17</td>
</tr>
<tr>
<td>0.11</td>
<td>0.004</td>
</tr>
<tr>
<td>1</td>
<td>0.04</td>
</tr>
<tr>
<td>1.18</td>
<td>0.07</td>
</tr>
<tr>
<td>3.74</td>
<td>0.15</td>
</tr>
<tr>
<td>11.5</td>
<td>0.45</td>
</tr>
<tr>
<td>1.36</td>
<td>0.05</td>
</tr>
</tbody>
</table>

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Accessories for E-1048-7..**

**Single mounting sockets**
- (with adapter)
- 17-P10-Si (up to 16 A max. load)
- 17-P70-Si (retaining clip Y 300 581 11 available on request)

**Busbar (10-way)** (supplied as a complete package)
- (for type 17 socket)
- more positions available on request
- X 211 157 01 with terminal
- X 211 157 02 without terminal

**Insulating sleeving for busbar (10-way)**
- Y 303 824 01

**Pin selection 17-P10-Si, fitted with E-1048-7..**

<table>
<thead>
<tr>
<th>E-1048-7..</th>
<th>17-P10-Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE +</td>
<td>(2)</td>
</tr>
<tr>
<td>GND</td>
<td>(5)</td>
</tr>
<tr>
<td>F 7</td>
<td>(7)</td>
</tr>
<tr>
<td>F 6</td>
<td>(6)</td>
</tr>
<tr>
<td>IN+</td>
<td>(4)</td>
</tr>
<tr>
<td>LOAD</td>
<td>(1)</td>
</tr>
</tbody>
</table>

**2-way mounting socket**
- 23-P10-Si
- (retaining clip Y 300 581 03 available on request)

**6-way mounting socket**
- 63-P10-Si
- (retaining clip Y 300 581 03 available on request)

**Connector bus links - P10**
- X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

**2 mounting clips**
- Y 300 504 02
- (2 pcs needed per unit)

**Installation drawing with mounting clips Y 300 504 02**

**This is a metric design and millimeter dimensions take precedence ( mm ).**

---

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

---

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

The Smart Power Relay E-1048-8C is a remotely controllable electronic load disconnecting relay with three functions in a single unit:
- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin CUBIC version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together
- an electro-mechanic relay, control cable and integral contact
to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

Now type E-1048-8C combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8C is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:
- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load.

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to be maintained even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.


<table>
<thead>
<tr>
<th>Parameter</th>
<th>Version 1</th>
<th>Version 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leakage current in OFF condition</td>
<td>1 A / 2 A / 3 A / 5 A / 7.5 A / 10 A</td>
<td>15 A / 20 A / 25 A</td>
</tr>
<tr>
<td>Free-wheeling diode</td>
<td>integral</td>
<td>integral</td>
</tr>
<tr>
<td>Delay time t_on / t_off</td>
<td>typ. 5 ms / typ. 1.5 ms (EMC filter in control input)</td>
<td>——</td>
</tr>
</tbody>
</table>
Wire breakage monitoring in ON and OFF condition of load

- OFF-condition (version 1):
  - load > typically 10 kΩ
- OFF-condition (version 2):
  - load < typically 0.2 x Iₙ
- ON-condition:
  - load > typically 10 kΩ
  - indication via group fault signalisation FM (switching output)

Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear
(possible options:
- wire breakage indication only in ON condition
- wire breakage indication only in OFF condition
- no wire breakage indication)

- disconnection of load, indication via group signal SF
- no automatic re-start
- after remedy of the fault unit has to be reset via control input IN+

Short circuit, overload in load circuit

- indication via group fault signalisation SF (switching output)

Control input IN+

- Control voltage IN+: 0...5 V = "OFF", 8.5...32 V = "ON"
- Control current Iₑ: 1...10 mA (8.5...DC 32 V)

Reset in the event of a failure

- reset via external control signal (low)
- reset via external control signal (high) at control input IN+
- via reset of supply voltage

Dimmer operation (e.g. PWM signal)

- possible, see max. switching frequency

Switching frequency at resistive or inductive load: max. 100 Hz

Status and diagnostic functions

Control signal AS

- transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A
- 0 V-level: when unit is set (at IN+ = 8.4...32 V)

Group signal SF

- transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A
- 0 V-level with overload and short circuit disconnection, wire breakage indication

Analogue output UI

- voltage output 0–5 V proportional to load current:
  - 1 V = 0.2 x Iₙ
  - 5 V = 1.0 x Iₙ
  - 5 V... typically 6.5 V = overload range tolerance (for load > 0.2 x Iₙ)
  - ± 8 % of Iₙ
- max. output current 5 mA
- load resistance > 1 kΩ against GND

Trip times

- definition of t₉₀: response time when switching on a load:
  - t₉₀ = typically 20 ms
- reached 90% of final value

Visual status indication

- control signal AS LED yellow
- group fault signal SF LED red

General data

Reverse polarity protection

- Control circuit: yes
- Load circuit: no (due to integral free-wheeling diode)
- Status outputs: interference voltage resistance max. DC 32 V

Temperature range

- ambient temperature: -40...+85 °C
- without load reduction (60 °C at 25 A)
- for other temperature ranges please see ordering key

Tests

- Humid heat: combined test, 9 cycles with functional test
test to DIN EN 60068-2-30, Z/AD
- Temperature change: min. temperature -40 °C, max. temperature +90 °C
test to DIN IEC 60068-2-14, Nb
- Vibration (random): 6 g eff. (10 Hz...2,000 Hz)
test to DIN EN 60068-2-64
- Shock: 25 g/11 ms, 10 shocks
test to DIN EN 60068-2-27
- Corrosion: test to DIN EN 60068-2-52, severity 3
test to DIN IEC 60068-2-14, Nb
- Protection class: housing -8C4 IP30 to DIN 40050,
housing -8C5 IP54 to DIN 40050,
higher protection class upon request
- EMC requirements:
  - emitted interference EN 50081-1
  - noise immunity EN 61000-6-2
  - Automotive directive:
    - emitted interference, noise immunity:
      72/245/EWG und 2006/28/EG

Terminals of CUBIC version

- (7 pin, standard): 5 blade terminals 6.3 mm x 0.8 mm and 2 blade terminals 2.8 mm x 0.6 mm to DIN 46244

Mounting:

- on automotive relay socket 7 pole or 9 pole

Housing CUBIC

- max. dimensions: 30 x 30 x 40 mm when plugged in
- 30 x 30 x 51.6 mm including terminals

Materials

- CUBIC: housing PA66-GF30
- base plate PA6-GF30

Mass

- approx. 23 g...43 g, depending on version

Approvals

- CE, e1 logo:
  - according to EU, EMC and automotive directives, approvals no. e1 033880
**Smart Power Relay E-1048-8C. (CUBIC)**

### Ordering Information

<table>
<thead>
<tr>
<th>Type</th>
<th>E-1048-8C</th>
<th>Smart Power Relay DC 12/24 V - 1 A...20 A (25 A) in CUBIC housing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Housing / temperature range</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 with housing -40 °C...+85 °C (60 °C at I_N = 25 A)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 with housing -40 °C...+85 °C (60 °C at I_N = 25 A)</td>
<td>increased environmental requirements (IP protection class etc.)</td>
</tr>
<tr>
<td></td>
<td><strong>Control input</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C with control input (+ control 8.5...32 V)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>LEDs</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 without</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 LEDs: AS yellow, SF red</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Status output minus-switching</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>A without</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D with AS and SF</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Contents of group fault signal SF / LED indication SF</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 without</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 short circuit / overload</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 short circuit / overload + wire breakage off</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 short circuit / overload + wire breakage on</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 short circuit / overload + wire breakage off + wire breakage on</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Analogue output</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V0 without</td>
<td></td>
</tr>
<tr>
<td></td>
<td>V1 0...5 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Characteristic curve</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 200 ms standard switch-off delay with overload</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Voltage rating</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>U3 DC 12/24 V</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Current ratings / colour of label</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 A / black</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 A / grey</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 A / purple</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 A / light-brown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7.5 A / brown</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10 A / red</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15 A / blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 A / yellows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25 A / white</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Ordering example 1:</strong> “DELUXE”-version 7 pin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-1048-8C 5 C 3 D 4 V1 - 4 U3 - 20 A</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Ordering example 2:</strong> “BASIC”-version 4 pin</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E-1048-8C 4 C 0 A 0 V0 - 4 U3 - 5 A</td>
<td></td>
</tr>
</tbody>
</table>
Smart Power Relay E-1048-8C. (CUBIC)

Typical time/current characteristics ($T_A = 25 \, ^{\circ}\text{C}$)

**Version 1:** 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)

**Version 2:** 15 A, 20 A and 25 A (standard 200 ms)

Connection diagram

Pin selection (7 pin = “DELUXE”)

E-1048-8C. Cubic

- AS (1) control signal (LED yellow)
- LINE + (2) plus $U_S$ (DC 12 V/24 V)
- SF (3) group fault signal (LED red)
- IN+ (4) control input
- U(I) (5) 0 ... 5 V analogue output
- GND (6) minus $U_S$
- LOAD (8) load output

Pin selection (4 pin = “BASIC”)

E-1048-8C. Cubic

- LINE + (2) plus $U_S$ (DC 12 V/24 V)
- IN+ (4) control input
- GND (5) minus $U_S$
- LOAD (8) load output

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

The Smart Power Relay E-1048-8I.- is a remotely controllable electronic load disconnecting relay with three functions in a single unit:

- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin INLINE version is designed for use with various E-T-A terminal blocks, e.g. 17-P10-Si. A choice of current ratings is available from 1 A through 20 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:
- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

Now type E-1048-8I. combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8I. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:
- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of an overload or short circuit, the trip curve is also suitable for smaller motor loads.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 20 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e.g. red = 10 A, see ordering information.

Technical Data (TU = 25 °C, US = DC 24 V) (TU = ambient temperature at UN)

<table>
<thead>
<tr>
<th>Power supply LINE +</th>
<th>Type</th>
<th>DC power supply with small Ri, battery and generator etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage ratings UN</td>
<td>DC 12 V / DC 24 V</td>
<td></td>
</tr>
<tr>
<td>Operating voltage US</td>
<td>DC 9...32 V</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load circuit LOAD</th>
</tr>
</thead>
</table>
| Load output
Max. current rating IN |
| Types of loads |

<table>
<thead>
<tr>
<th>Current rating range IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A...15 A (fixed ratings)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>over up to 85 °C ambient without load reduction, 20 A up to 70 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Induced current consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Io of the unit (OFF condition)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Typical voltage drop UON at rated current IN (at 25 °C)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>IN</th>
<th>UON</th>
<th>IN</th>
<th>UON</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A</td>
<td>50 mV</td>
<td>7.5 A</td>
<td>90 mV</td>
</tr>
<tr>
<td>2 A</td>
<td>55 mV</td>
<td>10 A</td>
<td>110 mV</td>
</tr>
<tr>
<td>3 A</td>
<td>60 mV</td>
<td>15 A</td>
<td>60 mV</td>
</tr>
<tr>
<td>5 A</td>
<td>80 mV</td>
<td>20 A</td>
<td>60 mV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Switching point</th>
</tr>
</thead>
<tbody>
<tr>
<td>typically 1.3 x IN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Trip time (standard curve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>typically 200 ms with switch-on onto overload and/or load increase on duty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Temperature disconnection</th>
</tr>
</thead>
<tbody>
<tr>
<td>power transistor &gt; 150 °C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>After trip</th>
</tr>
</thead>
<tbody>
<tr>
<td>- resettable via external control signal (low-high) at control input IN+</td>
</tr>
<tr>
<td>- reset of supply voltage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Parallel connection of channels</th>
</tr>
</thead>
<tbody>
<tr>
<td>for loads of 20 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Leakage current in OFF condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>version 1: max. 100 µA</td>
</tr>
<tr>
<td>version 2: max. 500 µA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Free-wheeling diode for connected load</th>
</tr>
</thead>
<tbody>
<tr>
<td>integral</td>
</tr>
<tr>
<td>version 1: max. 40 A</td>
</tr>
<tr>
<td>version 2: max. 100 A</td>
</tr>
</tbody>
</table>
### Technical Data (TU = 25 °C, US = DC 24 V) (TU = ambient temperature at Uug)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay time t\textsubscript{on} / t\textsubscript{off} (resistive load)</td>
<td>typically 5 ms / typically 1.5 ms (EMC filter in control input)</td>
</tr>
<tr>
<td>Wire breakage monitoring in ON and OFF condition of load</td>
<td>wire breakage thresholds: in OFF-condition (version 1): ( R\text{load} &gt; 100 \text{k}\Omega ), in OFF-condition (version 2): ( R\text{load} &gt; 10 \text{k}\Omega ), in ON-condition: ( I\text{load} &lt; 0.2 \times I_N )</td>
</tr>
<tr>
<td>Short circuit, overload in load circuit</td>
<td>indication via group fault signalisation FM (switching output) Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear. (possible options: - wire breakage indication only in ON condition - wire breakage indication only in OFF condition - no wire breakage indication) - disconnection of load, indication via group signal SF - no automatic re-start - after remedy of the fault unit has to be reset via control input IN+</td>
</tr>
<tr>
<td>Control input IN+</td>
<td>Control voltage IN+ 0...5 V = &quot;OFF&quot;, 8.5...32 V = &quot;ON&quot; Control current I\textsubscript{C} 1...10 mA (8.5...32 V) Reset in the event of a failure - reset via external control signal (low - high) at control input IN+ - via reset of supply voltage possible, see max. switching frequency Dimmer operation (e.g. PWM signal)</td>
</tr>
<tr>
<td>Switching frequency at resistive or inductive load</td>
<td>max. 100 Hz</td>
</tr>
<tr>
<td>Status and diagnostic function</td>
<td>Control signal AS transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A 0 V-level: when unit is set (at IN+ = 8.4...32 V) Group signal SF transistor output minus switching (LSS), open collector, short circuit and overload proof, load max. DC 32 V/2 A 0 V-level with overload and short circuit disconnection, wire breakage indication analogue output U(I) voltage output 0-5 V proportional to load current: 1 V = 0.2 \times I_N 5 V = 1 \times I_N 5 V... typically 6.5 V = overload range tolerance: (for I\text{load} &gt; 0.2 \times I_N) \pm 8 % \text{ of } I_N max. output current 5 mA load resistance &gt; 1 \text{k}\Omega against GND response time when switching on a load: t\textsubscript{10} = typically 20 ms response time of load change on duty: t\textsubscript{90} = typically 1 ms</td>
</tr>
<tr>
<td>Visual status indication</td>
<td>Control signal AS LED yellow Group fault signal SF LED red</td>
</tr>
</tbody>
</table>

### General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reverse polarity protection</td>
<td>Control circuit yes Load circuit no (due to integral free-wheeling diode) Status outputs interference voltage resistance max. DC 32 V</td>
</tr>
<tr>
<td>Temperature range</td>
<td>ambient temperature - standard: -40...+85 °C without load reduction (70 °C at 20 A) - for other temperature ranges please see ordering key</td>
</tr>
<tr>
<td>Tests</td>
<td>Humid heat combined test, 9 cycles with functional test test to DIN EN 60068-2-30, Z/AD Temperature change min. temperature -40 °C, max. temperature +90 °C test to DIN IEC 60068-2-14, Nb Vibration (random) in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz) test to DIN EN 60068-2-64 Shock 25 g/11 ms, 10 shocks test to DIN EN 60068-2-27 Corrosion test to DIN EN 60068-2-52, severity 3 housing IP30 to DIN 40050 higher protection class upon request EMC requirements EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EW6 und 95/54/E6</td>
</tr>
<tr>
<td>Terminals of INLINE version (7 pin, standard)</td>
<td>7 blade terminals 6.3 mm x 0.8 mm to DIN 46244-A6.3-0.8 contact material CuZn37F37 copper-plated and tin-plated Mounting: - E-T-A socket type 17-P10-Si (max. load 16 A) - on a pc board with 6.3 mm receptacles Housing max. dimensions INLINE: 11.5 x 50 x 56 mm when plugged in 11.5 x 50 x 66 mm including terminals Materials INLINE: Ultramid approx. 23 g...33 g, depending on version Approvals CE, e1 logo according to EU, EMC and automotive directives</td>
</tr>
</tbody>
</table>

### Reverse polarity protection

- Control circuit: yes
- Load circuit: no (due to integral free-wheeling diode)
- Status outputs: interference voltage resistance max. DC 32 V

### Temperature range

- Ambient temperature: standard: -40...+85 °C without load reduction (70 °C at 20 A)
- For other temperature ranges please see ordering key

### Tests

- Humid heat: combined test, 9 cycles with functional test
- Temperature change: min. temperature -40 °C, max. temperature +90 °C
- Vibration (random): in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz)
- Shock: 25 g/11 ms, 10 shocks
- Corrosion: test to DIN EN 60068-2-52, severity 3
- Housing: IP30 to DIN 40050
- Higher protection class upon request

### EMC requirements

- EMC directive: emitted interference EN 50081-1
- Noise immunity: EN 61000-6-2
- Automotive directive: emitted interference, noise immunity: 72/245/EW6 und 95/54/E6

### Terminals of INLINE version (7 pin, standard)

- 7 blade terminals 6.3 mm x 0.8 mm to DIN 46244-A6.3-0.8
- Contact material: CuZn37F37 copper-plated and tin-plated
- Mounting: - E-T-A socket type 17-P10-Si (max. load 16 A)
- On a pc board with 6.3 mm receptacles

### Housing

- Max. dimensions: INLINE: 11.5 x 50 x 56 mm when plugged in 11.5 x 50 x 66 mm including terminals
- Materials: INLINE: Ultramid approx. 23 g...33 g, depending on version

### Approvals

- CE, e1 logo: according to EU, EMC and automotive directives
Smart Power Relay E-1048-8I. (INLINE)

**Ordering Information**

**Type**

**E-1048-8I**  
Smart Power Relay DC 12 V/24 V - 1 A...20 A
  in INLINE housing

**Housing / temperature range**

<table>
<thead>
<tr>
<th>Housing / temperature range</th>
<th>with control input (+ control 8.5...32 V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>0 without LEDs</td>
</tr>
<tr>
<td>4</td>
<td>2 LEDs: AS yellow, SF red</td>
</tr>
</tbody>
</table>

**Contents of group fault signal SF / LED indication SF**

A without
D with AS and SF

**Analogue output**

V0: without
V1: 0...5 V

**Characteristic curve**

200 ms (switch-off delay with overload)

**Voltage rating**

U3: DC 12/24 V

**Current ratings / colour of label**

1 A / black
2 A / grey
3 A / purple
5 A / light-brown
7.5 A / brown
10 A / red
15 A / blue
20 A / yellow

**Available configurations:**

- **part number (without options = "BASIC")**
  - E-1048-8I 3  - C 0 A 0 V0 - 4 U3 - ... A

- **part number (various options)**
  - E-1048-8I 4  - C 0 A 0 V0 - 4 U3 - ... A
  - E-1048-8I 4  - C 0 A 1 V0 - 4 U3 - ... A
  - E-1048-8I 4  - C 3 D 1 V0 - 4 U3 - ... A
  - E-1048-8I 4  - C 3 D 3 V0 - 4 U3 - ... A
  - E-1048-8I 4  - C 3 D 4 V0 - 4 U3 - ... A

- **part number (all options = "DELUXE")**
  - E-1048-8I 4  - C 3 D 4 V1 - 4 U3 - ... A

**Dimensions (all options = “DELUXE”)**

![Dimension Diagram](image)

This is a metric design and millimeter dimensions take precedence.

**Connection diagram (all options = “DELUXE”)**

![Connection Diagram](image)

* Optionally available:
  - signal outputs AS / SF
  - analogue output U(I)

**Pin selection**

<table>
<thead>
<tr>
<th>E-1048-8L</th>
<th>17-P10-Si</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE + (2)</td>
<td>(2) [2[k]]</td>
</tr>
<tr>
<td>GND (5)</td>
<td>(5) [12]</td>
</tr>
<tr>
<td>SF (7)</td>
<td>(7) [24]</td>
</tr>
<tr>
<td>U(I) (3)</td>
<td>(3) [20]</td>
</tr>
<tr>
<td>AS (6)</td>
<td>(6) [23]</td>
</tr>
<tr>
<td>IN+ (4)</td>
<td>(4) [11]</td>
</tr>
<tr>
<td>LOAD (1)</td>
<td>(1) [1]</td>
</tr>
</tbody>
</table>
Typical time/current characteristics ($T_A = 25 \, ^\circ C$)

**Version 1:** 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)

**Version 2:** 15 A and 20 A (standard 200 ms)
Single mounting sockets (up to 16 A max. load)
17-P10-Si
17-P10-Si (with adapter)
17-P10-Si (retaining clip Y 300 581 11 available on request)

2-way mounting socket
23-P10-Si
(remaining clip Y 300 581 03 available on request)

6-way mounting socket
63-P10-Si

Busbar (10-way) (supplied as a complete package)
for type 17 socket
(for max. 100 A continuous load,
more positions available on request)
X 211 157 01 with terminal
X 211 157 02 without terminal

Phoenix terminal AKG 35
max. cross section 35 mm² (AWG 2)

cylinder head screw
M4x6 ISO127
nickel plated

Insulating sleeving for busbar (10-way)
Y 303 824 01

This is a metric design and millimeter dimensions take precedence (mm).

All dimensions without tolerances are for reference only. In the interest of improved design,
performance and cost effectiveness the right to make changes in these specifications without
notice is reserved. Product markings may not be exactly as the ordering codes. Errors and
omissions excepted.
Description

The Smart Power Relay E-1048-8D. is a remotely controllable electronic load disconnecting relay with two functions in a single unit:

- electronic relay
- electronic overcurrent protection

The 4 pin DICE version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:
- an electro-mechanic relay, control cable and integral contact
- to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection

Now type E-1048-8D. combines these two functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.

Applications

Type E-1048-8D. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:
- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load.

Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of a short circuit (ENTRY version) or overload/short circuit (ENTRYprotect version).
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.

Technical Data (T_{amb.} = 25 °C, U_N = DC 24 V)

<table>
<thead>
<tr>
<th>Power supply LINE +</th>
<th>DC power supply with small R_i battery and generator etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage ratings U_N</td>
<td>DC 12 V / DC 24 V</td>
</tr>
<tr>
<td>Operating voltage U_S</td>
<td>DC 9...32 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load circuit LOAD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load output</td>
</tr>
<tr>
<td>Max. current rating I_N</td>
</tr>
<tr>
<td>Types of loads</td>
</tr>
<tr>
<td>resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)</td>
</tr>
<tr>
<td>Current rating range I_N</td>
</tr>
<tr>
<td>up to 85 °C ambient without load reduction, 25 A up to 60 °C</td>
</tr>
<tr>
<td>ENTRY version</td>
</tr>
<tr>
<td>ENTRYprotect version</td>
</tr>
<tr>
<td>Load output with short circuit protection</td>
</tr>
<tr>
<td>Load output with short circuit and overload protection (typically 200 ms at I_{load} &gt; typically 1.3 x I_0)</td>
</tr>
<tr>
<td>I_N = 1 A...10 A: see trip curve 1</td>
</tr>
<tr>
<td>I_N = 15 A...25 A: see trip curve 2</td>
</tr>
</tbody>
</table>

<p>| Induced current consumption I_0 of the unit (OFF condition) |</p>
<table>
<thead>
<tr>
<th>I_N</th>
<th>U_{ON}</th>
<th>I_N</th>
<th>U_{ON}</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A</td>
<td>50 mV</td>
<td>10 A</td>
<td>110 mV</td>
</tr>
<tr>
<td>2 A</td>
<td>55 mV</td>
<td>15 A</td>
<td>70 mV</td>
</tr>
<tr>
<td>3 A</td>
<td>60 mV</td>
<td>20 A</td>
<td>90 mV</td>
</tr>
<tr>
<td>5 A</td>
<td>80 mV</td>
<td>25 A</td>
<td>120 mV</td>
</tr>
<tr>
<td>7.5 A</td>
<td>90 mV</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Switching point (only ENTRYprotect) |
| (-40 °C...+85 °C: 1.1...1.5 x I_0) |
| typically 200 ms with switch-on onto overload and/or load increase on duty |
| I_N = 1 A...10 A: typically 75 A |
| I_N = 15 A...25 A: typically 350 A |

| Temperature disconnection |
| After trip |
| power transistor > 150 °C |
| - re-settable via external control signal (low-high) at control input IN+ |
| - reset of supply voltage |

| Parallel connection of channels for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section). |

| Leakage current in OFF condition |
| I_N = 1 A...10 A: max. 100 µA |
| I_N = 15 A...25 A: max. 500 µA |

Applications:

Type E-1048-8D. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load.
Smart Power Relay E-1048-8D. (DICE)

Technical Data (TU = 25 °C, US = DC 24 V) (TU = ambient temperature at UN)

- Free-wheeling diode for connected load:
  - Iu = 1 A...10 A: max. 40 A
  - Iu = 15 A...25 A: max. 100 A

- Delay time t_on / t_off:
  - typically 0.5 ms / typically 1.5 ms (EMC filter in control input)

- Short circuit, overload in load circuit:
  - disconnection of load
  - no automatic re-start
  - after remedy of the fault unit has to be reset via control input IN+

- Control input IN+:
  - Control voltage IN+:
    - 0...5 V = “OFF”, 8.5...32 V = “ON”
  - Control current Ic:
    - typically 1 mA at 12 V / typically 5 mA at 24 V
  - Reset in the event of a failure:
    - reset via external control signal (low - high) at control input IN+
    - via reset of supply voltage

- Dimmer operation (e.g. PWM signal):
  - possible, see max. switching frequency

- Switching frequency at resistive or inductive load:
  - max. 100 Hz

- Rising edge of IN+:
  - < 5 ms

General data

- Reverse polarity protection:
  - Control circuit: yes
  - Load circuit: no (due to integral free-wheeling diode)

- Temperature range:
  - ambient temperature:
    - standard: -40...+85 °C
    - without load reduction (60 °C at 25 A)

Tests

- Humid heat:
  - combined test, 9 cycles with functional test
  - test to DIN EN 60068-2-30, Z/AD

- Temperature change:
  - min. temperature: -40 °C
  - max. temperature: +90 °C
  - test to DIN IEC 60068-2-14, Nb

- Vibration (random):
  - in operation, with temperature change
    - 6 g eff. (10 Hz...2,000 Hz)
  - test to DIN EN 60068-2-64

- Shock:
  - 25 g/11 ms, 10 shocks
  - test to DIN EN 60068-2-27

- Corrosion:
  - test to DIN EN 60068-2-52, severity 3

- Protection class:
  - housing: -8D4 IP30 to DIN 40050
  - housing: -8D5 IP54 to DIN 40050, higher protection class upon request

- EMC requirements:
  - EMC directive:
    - emitted interference EN 50081-1
    - noise immunity EN 61000-6-2
  - Automotive directive:
    - emitted interference, noise immunity:
      - 72/245/EWG und 95/54/EG

- Terminals (4 pin):
  - 4 blade terminals 6.3 mm x 0.8 mm
  - contact material CuZn37F4

- Mounting:
  - on automotive relay socket 4-pole

- Housing:
  - max. dimensions:
    - 30 x 30 mm when plugged in
    - 30 x 30 x 41.6 mm including terminals
  - Materials:
    - housing PA66-GF30
    - base plate PA6-GF30
  - Mass:
    - approx. 20 g

Approvals

- CE:
  - according to EMC directive

Ordering Information

Type

E-1048-8D

- Smart Power Relay DC 12 V/24 V, 1 A...25 A
- in DICE housing

Housing / temperature range

- 4 with housing -40 °C...85 °C (60 °C at Iu = 25 A)
- 5 with housing -40 °C...85 °C (60 °C at Iu = 25 A)
- increased environmental requirements (IP protection class etc.)

Control input

C0 with control input (+ control 8.5...32 V)

Options

A0 without options

Characteristic curve

Options:

- ENTRY, short circuit protected
- ENTRYprotect, 200 ms standard switch-off delay with overload, short circuit protected

Voltage rating

U3 DC 12/24 V

Current ratings / colour of label

- 1 A / black
- 2 A / grey
- 3 A / purple
- 5 A / light-brown
- 7.5 A / brown
- 10 A / red
- 15 A / blue
- 20 A / yellow
- 25 A / white

E-1048-8D 4 - C0 A0 - 0 U3 - 10 A ordering example: ENTRY version 4 pin

Dimensions DICE (4 pin version)

- footprint to ISO 7888
- 2, 4, 6 and 8 - blade terminals 6.3 x 0.8
- max. dimensions 30 x 30 x 30 mm when plugged in
- 30 x 30 x 41.6 mm including terminals
- housing PA66-GF30
- base plate PA6-GF30
- mass approx. 20 g

This is a metric design and millimeter dimensions take precedence.

www.e-t-a.com

Issue B

6 - 30

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Smart Power Relay E-1048-8D. (DICE)

Typical time/current characteristics ($T_A = 25 \, ^\circ\text{C}$)

**Trip curve 1 “ENTRYprotect”**
1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)

**Trip curve 2 “ENTRYprotect”**
15 A, 20 A and 25 A (standard 200 ms)

Connection diagram

Pin selection DICE (4 pin)

E-1048-8D. DICE

- LINE + (1) plus $U_S$ (DC 12 V/24 V)
- IN+ (4) control input
- GND (5) minus $U_S$
- LOAD (8) load output

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The E-T-A Remote Power Controller E-1071-073 is an electronic ON/OFF control module with protective functions and is suitable for resistive and inductive loads such as solenoids in rolling mills and other large plant applications. It is specifically used in plant modernization where the load circuit supply should be maintained at DC 24 V.

Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants.

Features

- Solid-state relay with protective functions
- Solid-state switching avoids contact arcing and welding
- Inrush current limitation
- Overload and short-circuit proof output
- Low control power
- Control current indication by LED
- Auxiliary contact

Ordering information

Type No.
E-1071 - 073 - DC 24 V - 3.0 A, ordering example

Technical data (Tambient = 25 °C, US = DC 24 V)

- Voltage rating UN: DC 24 V
- Operating voltage US: DC 20...48 V
- Current rating IN: 3 A
- Current consumption typically 17 mA
- Residual ripple for all voltages max. 5 % (3 phase bridge)
- Reverse polarity protection U_S (terminals 1 and 2)
- Physical isolation 2-pole
- - by circuit breaker hand release
- - approx. 5 s after overload disconnection
- Load circuit
  - Load output: NPN transistor, minus switching
  - Load rating: DC 24 V/0.2...3 A
  - Voltage drop at IN: max. 1.75 V
  - Overload disconnection approx. 1.1 x IN
  - Storage time t_s (at 2xIN) typically 20 ms (see storage time curve)
  - Short-circuit limitation approx. 2.5 x IN
  - Short-circuit response delay approx. 4 μs
  - Load current monitoring GREEN LED lights at Iload > 0.2 A
  - Leakage current (UContr = "0") max. 3 mA
  - Free-wheeling diode integral
- Control circuit
  - Control: opto coupler in control input
  - Control voltage UContr: "0" = 0...5 V
  - Control current IContr: 1 = 8.5...35 V
  - Switching frequency f_max: 100 Hz
  - Control signal (UContr = "1") YELLOW LED lights (IS flowing)
- Protection reverse polarity protection (diode)
- Signal output
  - Fault indication auxiliary contact (N/O)
  - - max. DC 30 V/3 A
  - - physically isolated
  - - closed with the circuit breaker tripped
- General data
  - Ambient temperature 0...+60 °C (without condensation)
  - Terminals screw terminals 2 x 2.5 mm² to DIN 46288
  - Housing clamping plate: polycarbonate GV, blue cover: polycarbonate, black
  - Mounting symmetric rail to EN 50022-35
  - Self-extinguishing properties to UL 94: V = 0; VDE 0304: grade 1
  - Degree of protection (IEC 529/DIN 40050) IP20 housing, terminals
  - Mounting dimensions approx. 45 x 74 x 128 mm
  - Mass approx. 240 g
In principle, the E-T-A SSRPC E-1071-073 operates like conventional electro-mechanical relays, with additional protective and signal functions. The control input replaces the magnetic coil and the power transistor replaces the main contact.

Control circuit
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal “1”) is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuit
The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

Status indication
Status indication is provided by 2 LEDs (yellow and green) on the front of the housing.

YELLOW LED = correct control voltage
The LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED = correct load current
The green LED indicates when the load current is higher than 0.2 A.

Faults such as too high a load resistance, wire break, poor contact, or overload/short-circuit, are available when only the yellow LED indicates. SSRPC E-1071-073 includes two current measuring terminals (2 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit.

### Storage time characteristic curve $t_s$ ($T_A = 25 ^\circ C$)

<table>
<thead>
<tr>
<th>Current limitation ($I_N$)</th>
<th>Time in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>200</td>
</tr>
<tr>
<td>2</td>
<td>1000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theoretical overcurrent factor ($45 \times I_N$)</th>
<th>Time in ms</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000</td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>20</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>50</td>
<td>500</td>
</tr>
<tr>
<td>25</td>
<td>1000</td>
</tr>
</tbody>
</table>

### Operating modes

<table>
<thead>
<tr>
<th>Operating status</th>
<th>Fault-free operation</th>
<th>Short-circuit on the load</th>
<th>Wire break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input $U_{Contr}$</td>
<td>“0”</td>
<td>“1”</td>
<td>“1”</td>
</tr>
<tr>
<td>YELLOW LED - control current</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GREEN LED - load current monitoring</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Auxiliary contact</td>
<td>open</td>
<td>open</td>
<td>closed</td>
</tr>
<tr>
<td>Remarks</td>
<td>load OFF</td>
<td>load ON</td>
<td>circuit breaker tripped</td>
</tr>
</tbody>
</table>

1 - LED indicates
0 - LED does not indicate
### Dimensions

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Operating Voltage</th>
<th>Load</th>
<th>Control Voltage</th>
<th>Auxiliary Contact</th>
<th>Not Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DC 20...48 V</td>
<td>+</td>
<td>+U&lt;sub&gt;Contr&lt;/sub&gt;</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DC 20...48 V</td>
<td>-</td>
<td>-U&lt;sub&gt;Contr&lt;/sub&gt;</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Description

The E-T-A Solid State Remote Power Controller E-1071-128 is an electronic ON/OFF control module with protective and signalling functions. It is suitable for inductive loads (solenoids, magnetic brakes) when the load circuit supply cannot be increased to the voltage level required (e.g., DC 36 V). The operating status of the controller/load connected is continuously indicated and signalled via opto coupler.

Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants where check-back signals for process control systems are needed.

Features

- Overcurrent and short-circuit proof switching output with electronic current limitation
- Switch-off current largely independent of operating voltage
- Inrush current limitation
- Physical isolation between control and load circuit via opto coupler
- Low control power; control current indication by LED
- Solid state switching avoids contact arcing and welding
- 2-pole physical isolation upon overload or when tripped manually
- Opto decoupled ON and fault indication by LED
- Setting of minimum current on front of housing, with minimum current indication (set at approx. 50 % of the load current rating)
- Current measuring terminals on front of housing
- Reverse polarity protection in control and load circuit

Ordering Information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>E-1071</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating of load</td>
<td>DC 24 V</td>
<td></td>
</tr>
<tr>
<td>Current rating</td>
<td>3.0 A</td>
<td></td>
</tr>
</tbody>
</table>

Technical data (Tambient = 25 °C, US = DC 24 V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating UN</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Operating voltage US</td>
<td>DC 20...48 V</td>
</tr>
<tr>
<td>Current rating IN</td>
<td>3 A</td>
</tr>
<tr>
<td>Current consumption (US = DC 24 V, UContr = &quot;0&quot;)</td>
<td>typically 15 mA</td>
</tr>
<tr>
<td>Residual ripple for all voltages</td>
<td>max. 5 % (3 phase bridge)</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>US (terminals 1 and 2)</td>
</tr>
<tr>
<td>Physical isolation</td>
<td>2-pole</td>
</tr>
<tr>
<td>- by manual release (circuit breaker)</td>
<td></td>
</tr>
<tr>
<td>- approx. 5 s after overload disconnection</td>
<td></td>
</tr>
<tr>
<td>Load circuit Load output</td>
<td>NPN transistor, minus switching</td>
</tr>
<tr>
<td>Load rating</td>
<td>DC 24 V/0.2...3 A</td>
</tr>
<tr>
<td>Voltage drop at IN</td>
<td>max. 2 V</td>
</tr>
<tr>
<td>Overload disconnection</td>
<td>approx. 1.1 x IN</td>
</tr>
<tr>
<td>Storage time ts (at 2xIN)</td>
<td>typically 20 ms (see storage time curve)</td>
</tr>
<tr>
<td>Short-circuit limitation</td>
<td>approx. 2.5 x IN</td>
</tr>
<tr>
<td>Short-circuit response delay</td>
<td>approx. 4 μs</td>
</tr>
<tr>
<td>Load current monitoring Imin</td>
<td>GREEN LED lights at Iload &gt; 0.2 Imin</td>
</tr>
<tr>
<td>(MIN monitoring, to be set by potentiometer at 50 % of the load current rating)</td>
<td>switch position i: 0.1...1.1 A</td>
</tr>
<tr>
<td>- switch position II: 1.1...2.1 A</td>
<td></td>
</tr>
<tr>
<td>Current measuring terminals</td>
<td>2 x 2 mm dia. (shunt 0.1 Ω ± 1 %)</td>
</tr>
<tr>
<td>Leakage current (UContr = &quot;0&quot;)</td>
<td>max. 3 mA</td>
</tr>
<tr>
<td>Free-wheeling diode</td>
<td>integral</td>
</tr>
</tbody>
</table>

Control circuit

- Control voltage UContr = "0": 0...5 V
- Control voltage UContr = "1": 8.5...35 V

Control current IContr | typically 5 mA |

Switching frequency fmax | 10 Hz |

Control signal (UContr = "1") | YELLOW LED lights (IContr flowing) |

Protection reverse polarity protection (diode)

Status outputs

- 2 signal outputs
  - ON indication/fault indication
    - physically isolated by opto coupler
    - transistor outputs plus switching
    - max. DC 33 V/100 mA per output
    - integral free-wheeling diode
    - 20 ms time delay (eliminating false signals before the minimum current is reached)
  - ON indication (terminal 8) UContr = "0": output non-conductive
  - ON indication (terminal 8) UContr = "1": output connecting plus potential (terminal 10) to terminal 8
  - fault: output non-conductive
  - integral free-wheeling diode
  - 20 ms time delay (eliminating false signals before the minimum current is reached)
- Fault indication (terminal 9)
Technical description

In principle, the E-T-A SSRPC E-1071-128 operates like conventional electro-mechanical relays, with additional protective and signalling functions. The control input replaces the magnetic coil and the power transistor replaces the main contact. ON and fault indication outputs have more complex functions and may not be compared with auxiliary contacts.

Control circuit
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal “1”) is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuit
The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

Signal circuit
The signal circuit includes two opto couplers signalizing either correct ON duty or a fault. These signals may be computer processed.

- The ON signal output indicates correct operating in the ON condition. This output is conductive when control voltage is available
- The load current is higher than the set minimum current
- The circuit breaker has not tripped
- There is no wire break.

- The fault signal output signalizes the fault source which must be eliminated. This output is non-conductive when the circuit breaker has tripped on overload or short-circuit

 Status outputs

<table>
<thead>
<tr>
<th>ON Terminal 8</th>
<th>Fault Terminal 9</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>wire break or load current &lt; minimum current (switched on) or short-circuit (switched on)</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>fault-free operation (switched off)</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>fault-free operation (switched on)</td>
</tr>
</tbody>
</table>

1 - status output carries plus potential
0 - status output carries minus potential
Solid State Remote Power Controller E-1071-128

Dimensions

![Image of dimensions]

This is a metric design and millimeter dimensions take precedence.

Basic circuit diagram

![Image of basic circuit diagram]

Terminal selection

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>operating voltage +U_S: DC 20...48 V</td>
</tr>
<tr>
<td>2</td>
<td>operating voltage -U_S</td>
</tr>
<tr>
<td>3</td>
<td>load (+)</td>
</tr>
<tr>
<td>4</td>
<td>load (-)</td>
</tr>
<tr>
<td>5</td>
<td>auxiliary voltage -U_A for status outputs</td>
</tr>
<tr>
<td>6</td>
<td>control voltage +U_C: max. DC 35 V</td>
</tr>
<tr>
<td>7</td>
<td>control voltage -U_C</td>
</tr>
<tr>
<td>8</td>
<td>ON status output (max. 100 mA)</td>
</tr>
<tr>
<td>9</td>
<td>fault status output (max. 100 mA)</td>
</tr>
<tr>
<td>10</td>
<td>auxiliary voltage +U_A for status outputs: max. DC 33 V</td>
</tr>
</tbody>
</table>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
The E-T-A Solid State Remote Power Controller E-1071-343 is a double relay with protective function both for resistive and inductive DC 48 V loads. It is particularly suitable to control upward/downward and forward/backward movements. Failure of one channel will also cause the other channel to disconnect.

Typical applications
- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected after failure of one of the circuits.

Features
- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
  - approx. 5 s after electronic fault disconnection
  - by manual release
- Both part units are disconnected upon isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>SSRPC 343 double unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1071</td>
<td>DC 48 V - 3 A / 3 A</td>
</tr>
<tr>
<td>E-1071 -</td>
<td>DC 48 V - 3 A / 3 A</td>
</tr>
</tbody>
</table>

Technical data (Tambient = 25 °C, U_S = DC 48 V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating U_N</td>
<td>DC 48 V</td>
</tr>
<tr>
<td>Operating voltage U_S</td>
<td>DC 36...60 V</td>
</tr>
<tr>
<td>Current rating I_N</td>
<td>3 A/3 A (2 A + 2 A)</td>
</tr>
<tr>
<td>Current consumption I_S</td>
<td>typically 21 mA</td>
</tr>
<tr>
<td>Residual ripple for all voltages</td>
<td>max. 5 % (3 phase bridge)</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>U_S (terminals 1 and 2)</td>
</tr>
<tr>
<td>Physical isolation</td>
<td>2-pole</td>
</tr>
<tr>
<td>- by manual circuit breaker release</td>
<td>approx. 5 s after overload disconnection</td>
</tr>
<tr>
<td>- upon thermal response</td>
<td>(approx. +130 °C)</td>
</tr>
<tr>
<td>Load circuits (I/II)</td>
<td>NPN transistor, minus switching</td>
</tr>
<tr>
<td>Voltage drop at I_N</td>
<td>DC 48 V/0...3 A per channel with parallel duty of both channels: max. 4 A</td>
</tr>
<tr>
<td>Overload disconnection</td>
<td>max. 1.8 V</td>
</tr>
<tr>
<td>Storage time t_s (at 2xI_N)</td>
<td>approx. 1.1 x I_N</td>
</tr>
<tr>
<td>typically 20 ms (see storage time curve)</td>
<td>approx. 4 μs</td>
</tr>
<tr>
<td>Short-circuit limitation</td>
<td>approx. 2.5 x I_N</td>
</tr>
<tr>
<td>Short-circuit response delay</td>
<td>approx. 4 μs</td>
</tr>
<tr>
<td>Load current monitoring</td>
<td>GREEN LED lights at I_Load &gt; 0.1 A</td>
</tr>
<tr>
<td>Free-wheeling diode</td>
<td>max. 3 mA</td>
</tr>
<tr>
<td>Control circuits (I/II)</td>
<td>opto coupler in control input</td>
</tr>
<tr>
<td>Control voltage U_Contr</td>
<td>“0” = 0...5 V</td>
</tr>
<tr>
<td>Control current</td>
<td>“1” = 8.5...35 V</td>
</tr>
<tr>
<td>Typically 5 mA</td>
<td>100 Hz</td>
</tr>
<tr>
<td>Switching frequency f_max</td>
<td>RED LED lights (I_L flowing)</td>
</tr>
<tr>
<td>Protection</td>
<td>reverse polarity protection (diode)</td>
</tr>
<tr>
<td>Signal output</td>
<td>auxiliary contact (N/O)</td>
</tr>
<tr>
<td>Fault indication</td>
<td>- max. DC 30 V/3 A</td>
</tr>
<tr>
<td>- physically isolated</td>
<td>- closed when the circuit breaker has tripped</td>
</tr>
<tr>
<td>General data</td>
<td>zero...+60 °C (without condensation)</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>screw terminals 2 x 2.5 mm² to DIN 46288</td>
</tr>
<tr>
<td>Terminals</td>
<td>clamping plate: polycarbonate GV, blue cover: polycarbonate, black</td>
</tr>
<tr>
<td>Housing</td>
<td>symmetric rail to EN 50022-35</td>
</tr>
<tr>
<td>Mounting</td>
<td>to UL 94; V = 0; VDE 0304; grade 1</td>
</tr>
<tr>
<td>Self-extinguishing properties</td>
<td>IP20 housing, terminals</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>(IEC 529/DIN 40050)</td>
</tr>
<tr>
<td>Mounting dimensions</td>
<td>45 x 74 x 128 mm</td>
</tr>
<tr>
<td>Mass</td>
<td>approx. 320 g</td>
</tr>
</tbody>
</table>

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

Issue B
www.e-t-a.com 6 - 41
Under normal operating conditions, the E-T-A SSRPC E-1071-343 allows the connection and disconnection of the load outputs of two channels independent of each other.

**Control circuits (I/II)**
The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (≥ control signal “1”) is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

**Load circuits (I/II)**
The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

**Status outputs**
Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

**RED LED**
ON indication (I/II)
The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

**GREEN LED**
Current flow indication (I/II)
The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-343 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

---

**Technical description**

**Storage time characteristic curve \( t_s \) (\( T_A = 25 \, ^\circ C \))**

**Operating modes**

<table>
<thead>
<tr>
<th>Operating status</th>
<th>Fault-free operation</th>
<th>Short-circuit on the load</th>
<th>Wire break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>“0”</td>
<td>“1”</td>
<td>“1”</td>
</tr>
<tr>
<td>RED LED - Control current</td>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GREEN LED - Load current monitoring</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Auxiliary contact</td>
<td>open</td>
<td>open</td>
<td>closed</td>
</tr>
<tr>
<td>Remarks</td>
<td>load OFF</td>
<td>load ON</td>
<td>both load circuits disconnected</td>
</tr>
</tbody>
</table>

1 - LED indicates
0 - LED does not indicate
### Terminal selection

1. **Operating voltage** +U\textsubscript{S}: DC 36...60 V
2. **Operating voltage** -U\textsubscript{S}
3. **Load** (+) (carrying plus potential)
   **CAUTION**: Do not connect to GND/-U\textsubscript{S}
4. **Load** I (-)
5. **Load** II (-)
6. **Control voltage** I +U\textsubscript{Contr}: max. DC 35 V
7. **Control voltage** I, II -U\textsubscript{Contr}
8. **Auxiliary contact**
9. **Auxiliary contact**
10. **Auxiliary voltage** II +U\textsubscript{Contr}: max. DC 35 V

---

### Basic circuit diagram

![Basic circuit diagram](image)

This is a metric design and millimeter dimensions take precedence. (mm)

### Dimensions

![Dimensions](image)
The E-T-A Solid State Remote Power Controller E-1071-353 is a double relay with protective function both for resistive and inductive DC 24 V loads. It is particularly suitable to control upward/downward and forward/backward movements. Failure of one channel will also cause the other channel to disconnect.

Typical applications
- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected upon failure of one of the circuits.

Features
- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
- Both part units are disconnected upon the isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

Technical data ($T_{ambient} = 25 ^\circ C, U_S = DC 24 V$)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating $U_N$</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Operating voltage $U_S$</td>
<td>DC 20...48 V</td>
</tr>
<tr>
<td>Current rating $I_N$</td>
<td>3 A / 3 A (2 A + 2 A)</td>
</tr>
<tr>
<td>Current consumption ($U_S = DC 24 V, U_{Contr} = &quot;0&quot;)$</td>
<td>typically 30 mA</td>
</tr>
<tr>
<td>Residual ripple for all voltages $U_S$</td>
<td>max. 5 % (3 phase bridge)</td>
</tr>
<tr>
<td>Reverse polarity protection $U_N$</td>
<td>2-pole</td>
</tr>
<tr>
<td>Physical isolation</td>
<td>- by manual circuit breaker release</td>
</tr>
<tr>
<td>- approx. 5 s after overload disconnectation</td>
<td>approx. 5 s after overload disconnection</td>
</tr>
<tr>
<td>- upon thermal response</td>
<td>(approx. +130 °C)</td>
</tr>
<tr>
<td>Load circuits (I/II)</td>
<td>NPN transistor, minus switching</td>
</tr>
<tr>
<td>Load voltage</td>
<td>DC 24 V/0.2...3 A per channel with parallel duty of both channels: max. 4 A (e.g. 2 A + 2 A)</td>
</tr>
<tr>
<td>Voltage drop at $I_N$</td>
<td>max. 1.8 V</td>
</tr>
<tr>
<td>Overload disconnection</td>
<td>approx. 1.1 x $I_N$</td>
</tr>
<tr>
<td>Storage time $t_{storage}$ (at 2x$I_N$)</td>
<td>typically 20 ms (see storage time curve)</td>
</tr>
<tr>
<td>Short-circuit limitation</td>
<td>approx. 2.5 x $I_N$</td>
</tr>
<tr>
<td>Short-circuit response delay</td>
<td>approx. 4 μs</td>
</tr>
<tr>
<td>Load current monitoring</td>
<td>GREEN LED lights at $I_{load} &gt; 0.1 A$</td>
</tr>
<tr>
<td>Current measuring terminals</td>
<td>max. 3 mA</td>
</tr>
<tr>
<td>Leakage current ($U_{Contr} = &quot;0&quot;)$</td>
<td>max. 3 mA</td>
</tr>
<tr>
<td>Free-wheeling diode</td>
<td>integral</td>
</tr>
<tr>
<td>Control circuits (I/II)</td>
<td>opto coupler in control input</td>
</tr>
<tr>
<td>Control voltage $U_{Contr}$</td>
<td>&quot;0&quot; = 0...5 V</td>
</tr>
<tr>
<td>&quot;1&quot; = 8.5...35 V</td>
<td></td>
</tr>
<tr>
<td>Control current $I_{Contr}$</td>
<td>typically 5 mA</td>
</tr>
<tr>
<td>Switching frequency $f_{max}$</td>
<td>100 Hz</td>
</tr>
<tr>
<td>Control signal ($U_{Contr} = &quot;1&quot;)$</td>
<td>RED LED lights ($I_{Contr}$ flowing)</td>
</tr>
<tr>
<td>Protection</td>
<td>reverse polarity protection (diode)</td>
</tr>
<tr>
<td>Signal output</td>
<td>auxiliary contact (N/O)</td>
</tr>
<tr>
<td>Fault indication</td>
<td>- max. DC 30 V/3 A</td>
</tr>
<tr>
<td>- physically isolated</td>
<td></td>
</tr>
<tr>
<td>- closed when the circuit breaker has tripped</td>
<td></td>
</tr>
</tbody>
</table>

General data
- Ambient temperature 0...+60 °C (without condensation)
- Terminals screw terminals 2 x 2.5 mm² to DIN 46288
- Housing clamping plate; polycarbonate GV, blue cover; polycarbonate, black
- Mounting symmetric rail to EN 50022-35
- Self-extinguishing properties to UL 94 V: 0; VDE 0304: grade 1
- IP20 housing, terminals
- Mounting dimensions 45 x 74 x 128 mm
- Mass approx. 320 g

Ordering information

<table>
<thead>
<tr>
<th>Type No. E-1071 - 353</th>
<th>SSRPC double unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating of load</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Current rating</td>
<td>3 A / 3 A</td>
</tr>
</tbody>
</table>

E-1071-353 - DC 24 V - 3 A / 3 A ordering example
**Technical description**

Under normal operating conditions, the E-T-A SSRPC E-1071-353 allows the connection or disconnection of the load outputs of two channels independent of each other.

**Control circuits (I/II)**

The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (≥ control signal “1”) is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

**Load circuits (I/II)**

The load circuit is switched ON or OFF according to the control signal (“0” or “1”), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

**Status outputs**

Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

**RED LED**

ON indication (I/II)

The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

**GREEN LED**

Current flow indication (I/II)

The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-353 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

---

**Storage time characteristic curve \( t_s \) (\( T_A = 25 ^\circ C \))**

![Graph of storage time characteristic curve](image)

**Operating modes**

<table>
<thead>
<tr>
<th>Operating status</th>
<th>Fault-free operation</th>
<th>Short-circuit on the load</th>
<th>Wire break</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>“0”</td>
<td>“1”</td>
<td>“1”</td>
</tr>
<tr>
<td>RED LED</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>GREEN LED</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Load current monitoring</td>
<td>open</td>
<td>closed</td>
<td>open</td>
</tr>
<tr>
<td>Remarks</td>
<td>load OFF</td>
<td>load ON</td>
<td>both load circuits disconnected</td>
</tr>
</tbody>
</table>

1 - LED indicates
0 - LED does not indicate
**Dimensions**

This is a metric design and millimeter dimensions take precedence.

**Basic circuit diagram**

**Terminal selection**

1. operating voltage + U_S: DC 20...48 V
2. operating voltage -U_S
3. load (+) (carrying plus potential)
   CAUTION: Do not connect to GND/-U_S
4. load I (-)
5. load II (-)
6. control voltage I +U_Cons: max. DC 35 V
7. control voltage I, II -U_Cons
8. auxiliary contact
9. auxiliary contact
10. auxiliary voltage II +U_Cons: max. DC 35 V

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

The E-T-A Solid State Remote Power Controller E-1072-100 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply (IT systems) (see Machinery Directive EN 60204 part 1, para. 9.4.3.1).

**Typical applications**

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionality of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contacts).
- Two pole physical isolation upon overload or when tripped manually.

**Features**

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e.g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon:
  - an overload in the load circuit,
  - short-circuit in the load (load+/load-, load+/US, and load-/+US), followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input "In/Ctrl" with control current indication (YELLOW LED).
- "O.K." and availability indication (GREEN LED).
- "Err1" group fault signalisation – all faults will be signalled:
  - wire breakage in the load circuit
  - earth fault at switching output
  - internal faults
  - overload or short circuit in the load circuit
- "Err2" fault signalisation:
  - only overload or short circuit in the load circuit
  - reset required
- Integral protection against reverse polarity and overvoltage for the control and load circuit.

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1072-100</td>
<td>Solid State Remote Power Controller SSRPC</td>
</tr>
</tbody>
</table>

| Voltage rating | DC 24 V |
| Current rating | 3 A |

| Voltage rating of load | DC 24 V |
| Current rating | 3 A |

**Technical data \(T_{ambient} = 25\, ^\circ C, \, U_S = DC\, 24\, \text{V}\)**

- Voltage rating \(U_N\): DC 24 V
- Operating voltage \(U_S\): DC 19.2...36 V
- Current rating \(I_N\): max. 3 A
- Current consumption \(I_0\): typically 24 mA (\(U_{Contr} = "0"\))
- Power loss \(P_{max}\): typically 3.5 W (\(I_k = 3\, \text{A}\))
- Residual ripple for all voltages: max. 5 % (3 phase bridge)
- Reverse polarity protection \(U_L\): integral -> fault release, LEDs not lighting
- Caution: Ensure free travel of actuator button.
- Insulation voltage: AC 500 V (control circuit, load circuit, fault indication "Err1" and "Err2")
- Load output:
  - two pole switching output (minus and plus switching), MOS transistors
  - max. load data: DC 24 V/3 A (no derating over the entire temperature range)
  - Min. load data: DC 24 V / 50 mA (wire break threshold 30 mA)
- Voltage drop at \(I_N\): typically 0.9 V (\(R\, \text{typical} = 300\, \text{m\Omega}\))
- Switch times (\(t_{in}\) / \(t_{off}\)):
  - typically 2 ms (resistive load)
  - approx. 1.5 x \(t_h\) (typically 3.45 A)
- Load disconnection:
  - typically 400 ms
- Short-circuit current \(I_K\):
  - typically 12 A current limitation
  - typically 50 ms, 2-pole isolation of load circuit after approx. 200 ms
- Trip time (\(t_{load}\): typically 2 x \(t_h\)
  - Short circuit current \(I_K\):
  - typically 12 A current limitation
  - typically 50 ms, 2-pole isolation of load circuit after approx. 200 ms
- Wire break monitoring:
  - with the load switched on or off; RED LED "Error" lighted, group fault signalisation "Err1" (\(U_{Contr} = 0\)) wire break threshold \(R_{load} > 10\, \text{k\Omega}\)
  - minimum current \(I_{load} < 30\, \text{mA}\)
- Leakage current (\(U_{Contr} = 0\)):
  - typically 1 mA
- Free-wheeling circuitry:
  - integral
- Load current measurement (term. 33: +shunt/ term. 34: -shunt):
  - no isolation of load circuit required as a 0.1 %/s 1 % measuring shunt is integral with the device.
- Leakage measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)
- Isolation of load circuit:
  - 2-pole by relay contacts
  - by manual release of RED button
  - approx. 200 ms after electronic tripping due to overload or short circuit ("OFF")

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Technical data (cont’d)

Control circuit
Control “In/Ctrl” internal low-level signal relay in control input (with integral free-wheeling diode)
Control voltage $U_{\text{Contr}}$ “0”: 0...2.4 V
“1”: 18...32 V
Control voltage $I_{\text{Contr}}$ typically 5...10 mA
Switching frequency $f_{\text{max}}$ 10 Hz
Control signal ($U_{\text{Contr}}$ “1”) “In/Ctrl” YELLOW LED lights with $I_{\text{Contr}}$
flowing
Protection reverse polarity protection (diode), overvoltage protection (varistor)

Fault indication “Err1”
group fault signalisation potential-free relay contact N/O, DC 30 V/0.5 mA...1 A
- wire breakage in the load circuit
- load current < 30 mA
- other faults (ground fault in load circuit or internal fault)
- overload/short circuit (= “Err2”)  
- LED RED “Error” lighted
- LED GREEN “O.K.” not lighted
- relay contact “Err1” closed
Signal delay typically 600 ms

“Err2” fault indication potential-free auxiliary contact, make contact N/O, DC 30 V/0.5 mA...1 A
- overload or short circuit in the load circuit
- LED RED “Error” lighted
- LED GREEN “O.K.” not lighted
- relay contact “Err1” closed
- auxiliary contact “Err2” closed
- RED button “OFF”  
- reset required
- load circuit isolated 2-pole
- manual release “OFF”  
- reverse polarity of $U_\beta$ (LEDs not indicating)
Signal delay typically 200 ms

General data
Ambient Temperature 0...+50 °C (without condensation)
Storage temperature -20 ...+70 °C
Terminals COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole
Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC circuit breaker for plus line (term, 41/42):
depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals)
Housing material PA 66-FR
Mounting symmetric rail to EN 50022-35
Vibration 3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050) 3 g, to IEC 60668-2-6 test Fc
IP20 housing
IP20 terminals
EMC emitted interference EN 50081-1 interference suppression EN 61000-6-2
Mounting dimensions 22.5 x 99 x 122 mm (w x h x d)
Mass approx. 130 g

Status matrix

<table>
<thead>
<tr>
<th>Operating status</th>
<th>Fault-free operation</th>
<th>Short circuit/overload in load circuit</th>
<th>Wire break in load circuit</th>
<th>Other faults</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control input</td>
<td>“0”</td>
<td>“1”</td>
<td>“1”</td>
<td>“0”</td>
</tr>
<tr>
<td>Load output</td>
<td>OFF 2-pole non-conductive</td>
<td>ON 2-pole conductive</td>
<td>OFF 2-pole non-conductive</td>
<td>OFF 2-pole non-conductive</td>
</tr>
</tbody>
</table>

| Load circuit isolated 2 pole (via relay contacts) | no | no | yes | no | no | no |

<table>
<thead>
<tr>
<th>Status matrix</th>
<th>Operating modes at:</th>
<th>Typical time/current characteristics ($T_A = 25 \degree C$)</th>
</tr>
</thead>
</table>
| Operating modes at: | reverse polarity: indication of fault “Err2”; LEDs not illuminated! 
- manual release “OFF” (RED button out): indication of fault “Err1” and “Err2”, additionally lighted LED RED “Error”.
- with $U_\beta = 0$ V: not fault indication “Err1” |
| Typical time/current characteristics ($T_A = 25 \degree C$) | ![Typical time/current characteristics graph](image) |

Typical time/current characteristics (TA = 25 °C)
Solid State Remote Power Controller E-1072-100

Dimensions

Connection diagram

Basic circuit diagram

Terminal selection

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description


The E-1072-2.. is a double pole electronic switching amplifier for magnetic valves (hydraulic and pneumatic mechanisms), magnetic brakes and magnetic couplings with rated voltage DC 24 V and a max. current rating of 1 A or 2 A. It combines true circuit breaker characteristics with additional diagnostic functions.

Why use the E-1072-2..

- for double pole switching of actuators (magnetic valves, magnetic brakes) in machinery and equipment
- for monitoring the electronic function of the loads and signal to the PLC
- for preventing a voltage dip of the DC 24 V output voltage in a switch-mode power supply, in the event of a short circuit, as a true 2 pole, remotely controllable electronic circuit breaker
- for protecting the cables of the load circuit
- for status signalling and for visually indicating load circuit faults (LEDs or RED trip button) via potential-free signal contacts
- for double-pole physical isolation of the load circuit - manually or electrically in the event of a failure (short circuit/overload)

Features

- Voltage rating DC 24 V (19.2...36 V)
- Current rating I<sub>N</sub> max. 1 A or 2 A (min. load current 30 mA)
- Activates and monitors DC 24 V magnetic valves
- PLC controllable 2 pole remote power controller with physical isolation of control input
  - Switching output with integral current limitation to 2 x I<sub>N</sub>
  - Disconnection of load in the event of short circuit or overload, followed by double pole physical isolation of load
  - Permanent wire break monitoring of load circuit
  - Group fault signalisation via relay contact “Err1”
  - Additional signal contact “Err2” when integral circuit breaker has tripped due to short circuit or overload in the load circuit
  - LED displays: LED green: OK
  - LED yellow: In/Ctrl (control current indication)
  - Integral reverse polarity protection and overload protection for control and load circuit
  - No back-up fuse required due to integral fail-safe element
  - Track-mountable, width 22.5 mm

Additional feature E-1072-210

- additional “status indication” relay output to facilitate confirmation to a PLC, for example, of activation and a load current > 30 mA.

Additional feature E-1072-220

- Analogue output 4-20 mA proportional to load current enables permanent monitoring of magnetic valve circuits as well as recording of the load current via ET200 sub-assemblies or field bus modules (with analogue input). In addition it is possible to check the inrush current characteristic curve of a magnetic valve to determine whether the armature of the valve has moved or is stuck.

Technical Data (TU = 25 °C, US = DC 24 V) (TU = ambient temperature at UN)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating UN</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Operating voltage U&lt;sub&gt;B&lt;/sub&gt;</td>
<td>DC 19.2...36 V</td>
</tr>
<tr>
<td>Current rating I&lt;sub&gt;N&lt;/sub&gt;</td>
<td>max. 1 A or 2 A</td>
</tr>
<tr>
<td>Current consumption I&lt;sub&gt;0&lt;/sub&gt;</td>
<td>typically 25 mA</td>
</tr>
<tr>
<td>(U&lt;sub&gt;Cont&lt;/sub&gt; = “0”)</td>
<td></td>
</tr>
<tr>
<td>Power loss P&lt;sub&gt;max&lt;/sub&gt;</td>
<td>typically 1.6 W</td>
</tr>
<tr>
<td>Min. load data DC 24 V</td>
<td>two pole switching output</td>
</tr>
<tr>
<td></td>
<td>(minus and plus switching),</td>
</tr>
<tr>
<td></td>
<td>MOS transistors</td>
</tr>
<tr>
<td>Voltage drop at I&lt;sub&gt;N&lt;/sub&gt; with I&lt;sub&gt;N&lt;/sub&gt;=1 A</td>
<td>typically 0.8 V</td>
</tr>
<tr>
<td>Min. load data DC 24 V</td>
<td>typically 1 mA (resistive load)</td>
</tr>
<tr>
<td></td>
<td>approx. 1.15 x I&lt;sub&gt;N&lt;/sub&gt;</td>
</tr>
<tr>
<td>Trip time (I&lt;sub&gt;N&lt;/sub&gt;/3)</td>
<td>typically 1 s</td>
</tr>
<tr>
<td>Short-circuit current I&lt;sub&gt;K&lt;/sub&gt;</td>
<td>typically 2 x I&lt;sub&gt;N&lt;/sub&gt; current limitation</td>
</tr>
<tr>
<td>Trip time (upon I&lt;sub&gt;N&lt;/sub&gt;)</td>
<td>typically 300 ms at I&lt;sub&gt;B&lt;/sub&gt; = 1 A,</td>
</tr>
<tr>
<td></td>
<td>100 ms at I&lt;sub&gt;B&lt;/sub&gt; = 2 A, 2-pole isolation of</td>
</tr>
<tr>
<td></td>
<td>overload circuit after approx. 20 ms</td>
</tr>
<tr>
<td></td>
<td>=&gt; RED LED indicates, fault indication F</td>
</tr>
<tr>
<td></td>
<td>“Err1” and “Err2”</td>
</tr>
<tr>
<td></td>
<td>with the load switched on or off; RED LED</td>
</tr>
<tr>
<td></td>
<td>“Error” lighted, group fault</td>
</tr>
<tr>
<td></td>
<td>signalisation “Err1”</td>
</tr>
<tr>
<td></td>
<td>(U&lt;sub&gt;Cont&lt;/sub&gt; = “0”) wire break threshold P&lt;sub&gt;load&lt;/sub&gt; &gt; 30 kΩ</td>
</tr>
<tr>
<td></td>
<td>(U&lt;sub&gt;Cont&lt;/sub&gt; = “1”) minimum current load &lt; 30 mA</td>
</tr>
<tr>
<td></td>
<td>Supervision of load circuit</td>
</tr>
<tr>
<td></td>
<td>with the load switched on, the</td>
</tr>
<tr>
<td></td>
<td>load current is monitored via the</td>
</tr>
<tr>
<td></td>
<td>two switching outputs GREEN LED indicates (OK signal), load &gt; 30 mA</td>
</tr>
<tr>
<td></td>
<td>Leakage current (U&lt;sub&gt;Cont&lt;/sub&gt; = “0”) typically 1 mA</td>
</tr>
<tr>
<td>Free-wheeling circuitry</td>
<td>integral</td>
</tr>
<tr>
<td>Load current measurement</td>
<td>no isolation of load circuit</td>
</tr>
<tr>
<td>(term. 33:+shunt/</td>
<td>required as a</td>
</tr>
<tr>
<td>term. 34:-shunt)</td>
<td>I&lt;sub&gt;N&lt;/sub&gt; = 1 A; 0.2 Ω/1 %, I&lt;sub&gt;N&lt;/sub&gt; = 2 A; 0.1 Ω/1 %</td>
</tr>
<tr>
<td></td>
<td>measuring shunt is integral with the device.</td>
</tr>
<tr>
<td></td>
<td>Measurement by voltmeter terminal 33 -</td>
</tr>
<tr>
<td></td>
<td>terminal 34 (200 mV = I&lt;sub&gt;N&lt;/sub&gt;)</td>
</tr>
<tr>
<td>Isolation of load circuit</td>
<td>2-pole by relay contacts</td>
</tr>
<tr>
<td></td>
<td>- by manual release of RED button</td>
</tr>
<tr>
<td></td>
<td>- approx. 20 ms after electronic tripping</td>
</tr>
<tr>
<td></td>
<td>due to overload or short circuit (“OFF”)</td>
</tr>
</tbody>
</table>

E-1072-220

6 - 53
Control circuit
- Control "In/Ctrl" internal low-level signal relay in control input (with integral free-wheeling diode) - "In/Ctrl" relay contact "Err1" open - overload or short circuit in the load circuit - overload/short circuit ("Err2") - LED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed

Fault indication "Err1"
- group fault signalisation potential-free relay contact N/O, (closed circuit principle) DC 30 V/5 mA...1 A
- other faults (ground fault in load circuit or internal fault)
- overload/short circuit ("Err2")
- LED RED "Error" lighted
- LED GREEN "O.K." not lighted
- relay contact "Err1" closed

Fault indication "Err2"
- signal contact "Err2" closed
- overload or short circuit in the load circuit
- LED RED "Error" lighted
- LED GREEN "O.K." not lighted
- relay contact "Err1" open
- auxiliary contact "Err2" closed
- RED button "OFF" - reset required
- 2-pole physical isolation in load circuit
- manual release "OFF" - reverse polarity of U<sub>B</sub> (LEDs not indicating)

Signal delay "Err2"
- typically 600 ms fault indication
- potential-free auxiliary contact, make contact N/O,
- DC 30 V/5 mA...1 A

Option –210
- with status indication "BM" potential-free relay contact DC 30 V/5 mA...1 A
- relay contact closed, if I<sub>load</sub> > 30 mA
- relay contact open, with wire breakage and after trip of circuit breaker
- analogue output proportional to load current "ANA" 4-20 mA, max. load 500 Ω on -U<sub>B</sub> (term. 44)
- U<sub>Contr</sub> = "0" -> 4 mA
- U<sub>Contr</sub> = "0" -> 4 mA with 0 A (load current)
- 20 mA with I<sub>B</sub>

Accurancy: ± 5 % of measured value

Option –220
- with additional option: status indication "BM" potential-free relay contact
- DC 30 V/5 mA...1 A
- relay contact closed, if I<sub>load</sub> > 30 mA
- relay contact open, with wire breakage and after trip of circuit breaker
- analogue output proportional to load current "ANA" 4-20 mA, max. load 500 Ω on -U<sub>B</sub> (term. 44)
- U<sub>Contr</sub> = "0" -> 4 mA
- U<sub>Contr</sub> = "0" -> 4 mA with 0 A (load current)
- 20 mA with I<sub>B</sub>

Accuracy: ± 5 % of measured value

General data
- Ambient Temperature: 0...+50 °C (without condensation)
- Storage temperature: -20...+70 °C
- Terminals: COMBICON MSTBO 2.5/4 1x2.5 mm<sup>2</sup> max. 16-pole
- Some are double terminals -> loop-through possibility (continuous load max. 6 A)

Back-up protection for SSRPC
- not required because of integral fail-safe element with VDE approval
- PA 66-FR

Housing material
- Mounting: symmetric rail to EN 50022-35
- Vibration: 3 g, to IEC 60068-2-6 test Fc
- Degree of protection (IEC 529/DIN 40050)
- EMC
- Mounting dimensions: approx. 130 g

Mass

Operating modes at:
- reverse polarity: indication of fault "Err2"; LEDs not illuminated!
- manual release "OFF" (RED button out): indication of fault "Err1" and "Err2", additionally lighted LED RED "Error"
- with U<sub>B</sub> = 0 V: group fault signalisation «Err1» (closed circuit principle)

Ordering information
- Type E-1072 - Solid State Remote Power Controller
- Version 210 with additional option: status indication
- 220 with additional option: analogue output 4-20 mA
- Voltage rating of load DC 24 V
- Current rating 1 A or 2 A

Status matrix
- Operating status
- Fault-free operation
- Short circuit in load circuit
- Wire break in load circuit
- Other faults

<table>
<thead>
<tr>
<th>Control input</th>
<th>0”</th>
<th>1”</th>
<th>0”</th>
<th>1”</th>
<th>0”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load output</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td></td>
<td>2-pole non-conductive</td>
<td>2-pole non-conductive</td>
<td>2-pole non-conductive</td>
<td>2-pole non-conductive</td>
<td>2-pole non-conductive</td>
</tr>
</tbody>
</table>

| Load circuit isolated 2 pole (via relay contacts) | no | no | yes | no | no |

| Load circuit isolated 2 pole (via relay contacts) | no | no | yes | no | no |

| Red button "OFF" | 0 | 0 | 1 | 1 | 1 |
| closed | closed | open | open | open | open |

| RED operating/ reset button | ON | ON | OFF | ON | ON |
| closed | closed | open | open | open | open |

| Analog output option-220 | 4 mA | 4 mA | 20 mA | > 20 mA | 4 mA |
| closed | closed | open | open | open | open |

| Remark | available | load: > 30 mA | < 1 A or 2 A I<sub>load</sub> | RED button to be reset | load: < 30 mA |
| closed | closed | open | open | open | open |

1 = LED lights
0 = LED does not light

Technical Data (TU = 25 °C, U<sub>B</sub> = DC 24 V (TU = ambient temperature at U<sub>B</sub>))
Solid State Remote Power Controller E-1072-2.. Issue B

**Dimensions**

![Dimensions Diagram]

This is a metric design and millimeter dimensions take precedence.

**Connection diagram**

![Connection Diagram]

**Basic circuit diagram -210**

- **In/Ctrl** - LED yellow
- **O.K.** - LED green
- **Error** - LED red
- **Err1** - relay contact
- **Err2** - signal contact
- **BM** - relay contact

Shown in «OFF» condition with no load (U_S = 0 V) and red button tripped.

**Inrush current curve magnetic valve**

![Inrush Current Curve]

1. Inrush current curve if armature of valve has moved and reached its final position.
2. Inrush current curve if armature of valve has not moved.

**Basic circuit diagram -220**

- **In/Ctrl** - LED yellow
- **O.K.** - LED green
- **Error** - LED red
- **Off** - red button
- **Err1** - relay contact
- **Err2** - signal contact
- **ANA** - analogue output

Shown in «OFF» condition with no load (U_S = 0 V) and red button tripped.

---

This is a metric design and millimeter dimensions take precedence.

---

**Inrush current curve magnetic valve**

- **Inrush current curve if armature of valve has moved and reached its final position.
- **Inrush current curve if armature of valve has not moved.**
Terminal selection

<table>
<thead>
<tr>
<th>Level</th>
<th>Terminal</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>+U&lt;sub&gt;Contr&lt;/sub&gt; (Control voltage plus)</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>not used</td>
</tr>
<tr>
<td></td>
<td>13 / 14</td>
<td>-U&lt;sub&gt;Contr&lt;/sub&gt; (Vontrol voltage minus)</td>
</tr>
</tbody>
</table>

[DC 18...32 V]

<table>
<thead>
<tr>
<th>Level</th>
<th>Terminal</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>21</td>
<td>option-210:</td>
</tr>
<tr>
<td></td>
<td>22</td>
<td>option-220: Kl. 21 (+)</td>
</tr>
<tr>
<td></td>
<td>23 / 24</td>
<td>“Err1” group fault signalisation (relay contact)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Terminal</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>31</td>
<td>load (+)</td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>load (-)</td>
</tr>
</tbody>
</table>

[DC 24 V / 1 A (or 2 A)]

<table>
<thead>
<tr>
<th>Level</th>
<th>Terminal</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>41 / 42</td>
<td>“Err2” indication of fault circuit breaker (auxiliary contact)</td>
</tr>
<tr>
<td></td>
<td>43</td>
<td>+U&lt;sub&gt;S&lt;/sub&gt; (operating voltage plus)</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>-U&lt;sub&gt;S&lt;/sub&gt; (operating voltage minus)</td>
</tr>
</tbody>
</table>

[DC 19.2...36 V]

Typical time/current characteristics (T<sub>A</sub> = 25 °C)

- disconnection typ. 1.15 x I<sub>N</sub>
- current limitation typ. 2 x I<sub>N</sub>
- short circuit disconnection typ. 300 ms
- min. 1.05 x I<sub>N</sub>...times rated current
- max. 1.25 x I<sub>N</sub>

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Solid State Remote Power Controller E-1072-CF2

Description

The E-T-A Solid State Remote Power Controller E-1072 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply (“IT systems”) (see Machinery Directive EN 60204 part 1).

Typical applications

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionality of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contact).
- Two pole physical isolation upon overload or when tripped manually.

Features

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e. g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon
  - an overload in the load circuit,
  - short-circuit in the load (load+/load-, load+/–US, and load–/US),
- followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input with control current indication (YELLOW LED).
- OK and availability indication (GREEN LED).
- Short-circuit and overload indication (fault indication F and RED LED).
- Continuous wire break monitoring of the load circuit (fault indication F and ORANGE LED).
- Additional supervision of the power transistors and load output potential (e. g. ground fault) when not energized. Deviation from required state is indicated as an internal fault (fault indication F, RED + ORANGE LEDs).
- Integral reverse polarity and overvoltage protection of control and load circuits.
- Integral fault indication F (wire break, short-circuit, overload, ground fault, internal fault)
  - switch contact (N/O) with external status indication (RED actuator button tripped).
  - internal fault storage (push RED button to reset).

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1072-CF2</td>
<td>Solid State Remote Power Controller SSRPC</td>
</tr>
</tbody>
</table>

- Voltage rating U
  - DC 24 V
- Current rating I
  - 3 A

Technical data (Tambient = 25 °C, US = DC 24 V)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage rating U_N</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Operating voltage U_S</td>
<td>DC 19.2...36 V</td>
</tr>
<tr>
<td>Current rating I_N</td>
<td>max. 3 A</td>
</tr>
<tr>
<td>Current consumption I_0</td>
<td>typically 24 mA</td>
</tr>
<tr>
<td>(U_Corr = &quot;0&quot;)</td>
<td></td>
</tr>
<tr>
<td>Power loss P_max (I=3 A)</td>
<td>typically 3.5 W</td>
</tr>
<tr>
<td>Residual ripple for all voltages</td>
<td>max. 5 % (3 phase bridge)</td>
</tr>
<tr>
<td>Reverse polarity protection U_B</td>
<td>integral -&gt; fault release, LEDs not lighting</td>
</tr>
<tr>
<td>Trip time (Iload = 2 x I_N)</td>
<td>typically 400 ms</td>
</tr>
<tr>
<td>Stock number</td>
<td>typically 2 A current limitation</td>
</tr>
<tr>
<td>Short-circuit current I_C</td>
<td>typically 50 mA, 2-pole isolation of load circuit after approx. 1 s</td>
</tr>
<tr>
<td>Trip time (upon Ib)</td>
<td>-&gt; RED LED indicates, fault indication F with the load switched on or off; RED button trips after approx. 1 s</td>
</tr>
<tr>
<td>Wire break monitoring</td>
<td>-&gt; ORANGE LED indicates, fault indication F (U_Corr = &quot;0&quot;) wire break threshold R_Iload &gt; 120 kΩ (U_Corr = &quot;1&quot;) minimum current I_Iload &lt; 30 mA</td>
</tr>
<tr>
<td>Supervision of load circuit</td>
<td>with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal) I_Iload &gt; 30 mA</td>
</tr>
<tr>
<td>Leakage current (U_Corr = &quot;0&quot;)</td>
<td>typically 1 mA</td>
</tr>
<tr>
<td>Free-wheeling circuitry</td>
<td>integral</td>
</tr>
<tr>
<td>Option (on request); additional quick release (max. 30 W load)</td>
<td></td>
</tr>
<tr>
<td>Load current measurement</td>
<td>no isolation of load circuit required as a</td>
</tr>
<tr>
<td>(term. 33: +shunt/)</td>
<td>0.1 Ω/±1 % measuring shunt is integral with the device.</td>
</tr>
<tr>
<td>(term. 34: -shunt)</td>
<td>Measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)</td>
</tr>
<tr>
<td>Isolation of load circuit</td>
<td>2 pole by relay contacts</td>
</tr>
<tr>
<td>- by manual release of RED button</td>
<td></td>
</tr>
<tr>
<td>- approx. 1 s after electronic fault sensing (wire break, overload, short-circuit, internal fault)</td>
<td></td>
</tr>
</tbody>
</table>
### Technical data (cont’d)

<table>
<thead>
<tr>
<th>Control circuit</th>
<th>Operating modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Operating status</td>
</tr>
<tr>
<td>Control voltage $U_{\text{Contr}}$</td>
<td>Fault-free operation</td>
</tr>
<tr>
<td>Control voltage $I_{\text{Contr}}$</td>
<td>Load short circuited in load circuit</td>
</tr>
<tr>
<td>Switching frequency $f_{\text{max}}$</td>
<td>Wire break</td>
</tr>
<tr>
<td>Control signal ($U_{\text{Contr}^{+}}$)</td>
<td>Internal fault</td>
</tr>
<tr>
<td>Protection</td>
<td></td>
</tr>
</tbody>
</table>

#### Fault indication

<table>
<thead>
<tr>
<th>Fault indication</th>
<th>Potential-free auxiliary contact (hard gold plated N/O contact), DC 30 V/0.5 mA...1 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faults</td>
<td>Contact F1-F2 closed after RED button has tripped upon</td>
</tr>
<tr>
<td>LED</td>
<td>- wire break in load circuit (ORANGE LED indicates)</td>
</tr>
<tr>
<td></td>
<td>- internal fault (RED + ORANGE LEDs indicate) (e.g. ground fault in load circuit, power</td>
</tr>
<tr>
<td></td>
<td>transistor failure)</td>
</tr>
<tr>
<td></td>
<td>Faults indicated by the LEDs remain stored until the RED button is reset!</td>
</tr>
<tr>
<td></td>
<td>- manual release (GREEN LED indicates)</td>
</tr>
<tr>
<td></td>
<td>- reverse polarity of $U_{\text{S}}$ (LEDs not indicating)</td>
</tr>
</tbody>
</table>

#### Signal delay

| typically 1 s |

#### General data

| Ambient Temperature | - 0...+50 °C (without condensation) |
| Storage temperature | - -20...+70 °C |
| Terminals          | COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole |
| Back-up protection | Some are double terminals -> loop-through possibility (continuous load max. 6 A) |
| for SSRPC          | circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals) |
| Housing material   | PA 66-FR |
| Mounting           | symmetric rail to EN 50022-35 |
| Vibration          | 3 g, to IEC 60068-2-6 test Fc |
| Degree of protection | IP20 housing |
| EMC                | IP20 terminals |
| Mounting dimensions | 22.5 x 99 x 122 mm (w x h x d) |
| Mass               | approx. 135 g |

### Technical data (cont’d)

<table>
<thead>
<tr>
<th>Technical data (cont’d)</th>
<th>Operating modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control circuit</td>
<td>Operating status</td>
</tr>
<tr>
<td>Control</td>
<td>Fault-free operation</td>
</tr>
<tr>
<td>Control voltage $U_{\text{Contr}}$</td>
<td>Load short circuited in load circuit</td>
</tr>
<tr>
<td>Control voltage $I_{\text{Contr}}$</td>
<td>Wire break</td>
</tr>
<tr>
<td>Switching frequency $f_{\text{max}}$</td>
<td>Internal fault</td>
</tr>
<tr>
<td>Control signal ($U_{\text{Contr}^{+}}$)</td>
<td></td>
</tr>
<tr>
<td>Protection</td>
<td></td>
</tr>
</tbody>
</table>

#### Fault indication

<table>
<thead>
<tr>
<th>Fault indication</th>
<th>Potential-free auxiliary contact (hard gold plated N/O contact), DC 30 V/0.5 mA...1 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faults</td>
<td>Contact F1-F2 closed after RED button has tripped upon</td>
</tr>
<tr>
<td>LED</td>
<td>- wire break in load circuit (ORANGE LED indicates)</td>
</tr>
<tr>
<td></td>
<td>- internal fault (RED + ORANGE LEDs indicate) (e.g. ground fault in load circuit, power</td>
</tr>
<tr>
<td></td>
<td>transistor failure)</td>
</tr>
<tr>
<td></td>
<td>Faults indicated by the LEDs remain stored until the RED button is reset!</td>
</tr>
<tr>
<td></td>
<td>- manual release (GREEN LED indicates)</td>
</tr>
<tr>
<td></td>
<td>- reverse polarity of $U_{\text{S}}$ (LEDs not indicating)</td>
</tr>
</tbody>
</table>

#### Signal delay

| typically 1 s |

#### General data

| Ambient Temperature | - 0...+50 °C (without condensation) |
| Storage temperature | - -20...+70 °C |
| Terminals          | COMBICON MSTBO 2.5/4 1x2.5 mm² max. 16-pole |
| Back-up protection | Some are double terminals -> loop-through possibility (continuous load max. 6 A) |
| for SSRPC          | circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals) |
| Housing material   | PA 66-FR |
| Mounting           | symmetric rail to EN 50022-35 |
| Vibration          | 3 g, to IEC 60068-2-6 test Fc |
| Degree of protection | IP20 housing |
| EMC                | IP20 terminals |
| Mounting dimensions | 22.5 x 99 x 122 mm (w x h x d) |
| Mass               | approx. 135 g |

### Typical time/current characteristics ($T_A = 25 °C$)

![Typical time/current characteristics graph](image-url)
**Solid State Remote Power Controller E-1072-CF2**

### Dimensions

![Dimensions Diagram]

This is a metric design and millimeter dimensions take precedence. Indicated cable diameters are only for reference. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

### Connection diagram

![Connection Diagram]

**Terminal selection**

<table>
<thead>
<tr>
<th>Level</th>
<th>Terminal</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>11</td>
<td>+U_{Contr} (control voltage plus)</td>
</tr>
<tr>
<td></td>
<td>13/14</td>
<td>-U_{Contr} (control voltage minus)</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>not use</td>
</tr>
<tr>
<td>2</td>
<td>21/22</td>
<td>F1 fault indication (circuit breaker contact)</td>
</tr>
<tr>
<td>2</td>
<td>23/24</td>
<td>F2 fault indication (circuit breaker contact)</td>
</tr>
<tr>
<td>3</td>
<td>31</td>
<td>load (+)</td>
</tr>
<tr>
<td>3</td>
<td>32</td>
<td>load (-)</td>
</tr>
<tr>
<td>3</td>
<td>33/34</td>
<td>load current measurement by voltmeter (shunt 0.1 Ω/1 % integral with device, 100 mV = 1 A) Kl. 33: shunt+ / Kl. 34: shunt-</td>
</tr>
<tr>
<td>4</td>
<td>41/42</td>
<td>+U_{S} (operating voltage plus)</td>
</tr>
<tr>
<td>4</td>
<td>43/44</td>
<td>-U_{S} (operating voltage minus)</td>
</tr>
</tbody>
</table>

**Top side**

- 21 22 23 24: LEVEL 2 (fault indication)
- 11 12 13 14: LEVEL 1 (control input)

**Cable side (bottom)**

- 31 32 33 34: LEVEL 3 (load circuit)
- 41 42 43 44: LEVEL 4 (voltage supply)

---

*Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com*
Power distribution systems - accessories

Connections and terminals

<table>
<thead>
<tr>
<th>Line terminal X 221 503 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>suitable for</td>
</tr>
<tr>
<td>Power-D-Box with sockets pre-wired</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load output terminal protected against reverse polarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 222 847 01</td>
</tr>
<tr>
<td>X 222 625 01</td>
</tr>
<tr>
<td>X 222 848 01</td>
</tr>
<tr>
<td>suitable for</td>
</tr>
<tr>
<td>19BGT-2-X8340-S02</td>
</tr>
<tr>
<td>19BGT-2-X8340-SZ4</td>
</tr>
<tr>
<td>X8340-S02</td>
</tr>
<tr>
<td>X8340-SZ4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Screw terminal X 211 156 01</th>
</tr>
</thead>
<tbody>
<tr>
<td>suitable for</td>
</tr>
<tr>
<td>Module 17plus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Line terminal (max. 63 A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>max. tightening torque 3.0 Nm</td>
</tr>
<tr>
<td>X 221 503 01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Load output terminal proted against reverse polarity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(set: 4 moduled sleeves, 8 blade terminals 6.3 x 0.8 mm)</td>
</tr>
<tr>
<td>X 222 847 01 for cable cross section 0.7 ...2.0 mm²</td>
</tr>
<tr>
<td>X 222 625 01 for cable cross section 2.5 ...4.0 mm²</td>
</tr>
<tr>
<td>X 222 848 01 for cable cross section 4.0 ...6.0 mm²</td>
</tr>
</tbody>
</table>

Caution: cables must not be connected with terminal plugged in

<table>
<thead>
<tr>
<th>Screw terminal for busbar Y 307 016 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>X 211 156 01</td>
</tr>
<tr>
<td>non insulated</td>
</tr>
<tr>
<td>(max. 35 m²)</td>
</tr>
</tbody>
</table>

Connections and terminals

Line terminal X 221 503 01

Suitable for:
- Power-D-Box with sockets pre-wired

Load output terminal protected against reverse polarity

Suitable for:
- 19BGT-2-X8340-S02
- 19BGT-2-X8340-SZ4
- X8340-S02
- X8340-SZ4

Screw terminal X 211 156 01

Suitable for:
- Module 17plus

Caution: cables must not be connected with terminal plugged in

Connections and terminals

Line terminal (max. 63 A)

Suitable for:
- Power-D-Box with sockets pre-wired

Load output terminal protected against reverse polarity

Suitable for:
- 19BGT-2-X8340-S02
- 19BGT-2-X8340-SZ4
- X8340-S02
- X8340-SZ4

Screw terminal for busbar Y 307 016 11

Suitable for:
- Module 17plus

Caution: cables must not be connected with terminal plugged in
### Labels

**Label white Y 307 942 61**

- **Ordering unit:** 10 pcs = 1 strip
- **Suitable for:** Module 17plus

**Label marking area 6 x 10 mm / .629 x .394 in.**

- Y 307 942 61

---

**Label white Y 308 327 01**

- **Ordering unit:** 24 pcs = 1 plate

**Suitable for:**
- 19BGT-2-X83S2
- 19BGT-2-X83S4
- 19BGT-2-X83Z4
- 19BGT-2-X8345

**Label marking area 16 x 13 mm / .629 x .512 in.**

- Y 308 327 01

---

**Label white Y 308 328 01**

- **Ordering unit:** 8 pcs = 1 plate

**Suitable for:**
- 19BGT-2-2210
- 19BGT-2-3600
- 19BGT-2-ESS20
- 19BGT-2-ESX10
- 19BGT-2-X2210

**Label marking area 46 x 13 mm / 1.81 x .512 in.**

- Y 308 328 01
Blanking piece

**Blanking piece Y 308 563 01**

suitable for
19BGT-2-2210
19BGT-2-3600/3900

**Blanking piece Y 308 563 41**

suitable for
19BGT-2-ESS20
19BGT-2-ESX10

**Blanking piece Y 308 563 21**

suitable for
19BGT-2-X8345
19BGT-2-X83S2
19BGT-2-X83S4
19BGT-2-X83Z4
Mounting aids

Retaining clip for electronic circuit breaker ESS20/ESX10 recommended for fitting the devices

Retaining clip Y 307 754 01

suitable for
Module 17 plus mit ESS20
Module 17 plus mit ESX10

Retaining clip for circuit breaker 3600/3900/E-1048/E-1079 recommended for fitting the devices

Retaining clip Y 300 581 11

suitable for
socket type 17...
with 3600
E-1048-6..
E-1048-7..
E-1079-6..
Module 17plus
with 3600
E-1048-6..
E-1048-7..
E-1079-6..

Retaining clip for circuit breaker 2210 recommended for fitting single pole devices

Retaining clip Y 302 974 21

suitable for
socket type 17...
with 2210-...

Retaining clip for circuit breaker 3600/3900/E-1048/E-1079 recommended for fitting the devices

Retaining clip Y 300 581 03

suitable for
socket type 23...
with 3600
3900
E-1048-6..
E-1048-7..
E-1079-6..
socket type 63...
with 3600
3900
E-1048-6..
E-1048-7..
E-1079-6..
Power distribution systems - accessories

Mounting aids

Retaining clip Y 302 974 01
- suitable for socket type 23...
- suitable for socket type 63...
- recommended for fitting single pole devices

Retaining clip for circuit breaker 2210-S...

Screw and washer X 223 019 01
- 1 set with 4 screws
- 4 washers
- in a plastic bag

Screw and washer
- screw for mounting the Power-D-Box (19BGT)

Barrier Y 308 139 01
- suitable for 19BGT-...
- recommended for isolating the load terminals of the Power-D-Box (High-Power)

Barrier

End bracket X 222 004 01
- suitable for Module 17plus
- recommended for fixing on symmetrical rails
**Power distribution systems - accessories**

### Busbars and Jumpers

**Insulated wire bridge**

**X 222 984 01**

- packaging quantity: 10 pcs

**Insulated wire bridge X 222 984 01**

- packaging quantity 1 pc = 10 wire bridges

- suitable for **SVS.**

**Bus bar 32 A**

**X 222 005 01** blue insulated, 500 mm

**X 222 005 02** red insulated, 500 mm

**X 222 005 03** grey insulated, 500 mm

- suitable for **Module 17plus**

**Bus bar 50 A**

**Y 307 016 01** non insulated, 500 mm

- suitable for **Module 17plus**

**Bus bar for line entry on the side**

**Y 307 016 11** non insulated, 500 mm

- suitable for **Module 17plus**

**Jumper**

**X 222 066 01**

- suitable for **Module 17plus**

- **SVS.**

- **19BGT-2-2210**

- **19BGT-2-3600/3900**

- **19BGT-2-ESS20**

- **9BGT-2-ESX10**

- New version see jumper **SB-S11-P1-01-1-1A**
### Busbars and jumpers

#### Jumper SB-S11-P1-01-1-1A

<table>
<thead>
<tr>
<th>Suitable for</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 17 plus</td>
<td>SVS...</td>
</tr>
<tr>
<td>19BGT-2-2210</td>
<td></td>
</tr>
<tr>
<td>19BGT-2-3600/390</td>
<td></td>
</tr>
<tr>
<td>19BGT-2-ESX10</td>
<td></td>
</tr>
</tbody>
</table>

#### Connector bus link -P10

<table>
<thead>
<tr>
<th>Suitable for</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power-D-Box with sockets X 211 530 01</td>
<td></td>
</tr>
</tbody>
</table>

#### Bus bar 50 A X 221 760 11

<table>
<thead>
<tr>
<th>Suitable for</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power-D-Box with sockets</td>
<td></td>
</tr>
</tbody>
</table>

---

**Diagram Description:**
- **Jumper SB-S11-P1-01-1-1A:**
  - Top view of the jumper showing blade terminals and insulations.
  - The jumper is suitable for Power-D-Box with sockets X 211 530 01.

- **Connector bus link -P10:**
  - Suitable for Power-D-Box with sockets X 211 530 01.
  - Connector bus link with tinned brass, insulated blade terminals.

- **Bus bar 50 A X 221 760 11:**
  - Suitable for Power-D-Box with sockets.
  - Bus bar with female connector and bus bar max. 50 A.

---

**Diagram Details:**
- **Jumper SB-S11-P1-01-1-1A:**
  - Illustration of the jumper with terminal positions and dimensions.
  - Dimensions: 70x2.79x25mm.

- **Connector bus link -P10:**
  - Illustration of the connector with dimensions: 10.3x406mm.
  - Connector bus link with dimensions: 70x2.79x25mm.

- **Bus bar 50 A X 221 760 11:**
  - Illustration of the bus bar with dimensions: 70x2.79x25mm.
Power distribution systems - accessories

Tools

Withdrawal tool Y 308 602 01
suitable for
19BGT-2-ESS20
19BGT-2-ESX10

Withdrawal tool X 222 547 02
suitable for
19BGT-2-X8345
X8345-D01

Withdrawal tool X 211 018 01
suitable for
19BGT-2-X2210
X2210-S06...
19" 1U Power-D-Box power distribution system (also for ETSI systems) accommodating plug-in thermal-magnetic circuit breakers type 2210-S or similar types, single or double pole, with or without signal contact.

8 single pole (or 4 double pole) circuit breakers are fitted transversely as vertical pairs, line entry is at the rear by means of screw terminals with 16 (25) mm² cable cross section capacity. Redundant design of the system (2 x 4 single pole circuit breakers) is also available.

The load terminals are connected from the front by means of high current sub-D connectors or by means of screw terminals up to 4 mm². Auxiliary contact terminals can be connected form the rear (serial or parallel connection possible).

For replacing or retrofitting circuit breakers part of the front plate can be removed.

Above and below the circuit breakers are two narrow strips for customer-specific marking. Permanent marking is available ex factory for the front plate as an option.

Max. rating per way is 16 A (due to the derating of the circuit breakers mounted closely side-by-side), max. load of the line entry is 63 A at DC 65 V / AC 250 V.

19" 3U racks (also for ETSI systems) for accommodating plug-in type 2210-S or similar, single pole or multipole, with or without auxiliary contacts.

Up to 60 single pole circuit breakers can be fitted (in 2 rows above each other). Standard version of the rack is supplied without wiring, but customer-specific wiring is possible upon request.

Type and size of line entry, wiring of load outputs, signal contact connection as well as fitting with connecting terminals will be to order.

For replacing or retrofitting circuit breakers part of the front plate can be removed. Unused ways can be covered with blanking pieces.

Above and below the circuit breakers customer-specific marking is possible. Permanent marking is available ex factory for the front plate as an option.

Max. rating per way is 16 A (due to the derating of the circuit breakers mounted closely side-by-side), max. load of the line entry is 63 A at DC 65 V / AC 250 V.

Power distribution system for direct mounting to the rear wall of a control cabinet. Featuring type X8345-D01 power distribution rail with a variable number of modules possible.

Plug-in type 8345 circuit breakers are installed allowing load output currents of up to 125 A per module, with a maximum of 160 A for two adjacent positions.

Line entry is on the side, connected directly to internal busbars with up to 300 A at max. DC 110 V / AC 230 V.

Optional auxiliary contacts are also connected from the side by means of 2.8 mm blade terminals, all contacts are connected in parallel.

Reliable main and load terminal connections are by means of M10/M12 hexagonal screws.

The entire power distribution system is protected against brush contact by a slide-on plexi glass cover.

The system is mounted on the rear wall of a control cabinet by means of aluminium brackets. The system is also available as a version offering system redundancy.

The circuit breakers are hot-swappable without removing the protective cover.

Above and below the circuit breakers customer-specific marking is possible. Permanent marking is available ex factory for the front plate as an option.

1U rack for 19", 23" and ETSI systems for accommodating thermal circuit breakers type 482, single pole with or without auxiliary contact.

The rack is redundantly configurable with up to 8 circuit breakers (A + B supply). Line entry is at the rear by means of screw terminals or optionally by means of pluggable connector technology. The system is also available with only one line entry (1 x 16 circuit breakers).

Load terminals are connected form the side via high current contacts (optionally from the rear via screw terminals). Auxiliary contact terminals are on the side (serial and parallel wiring), optional LED indication is configurable on the front.

For replacing or retrofitting circuit breakers the front plate can be removed. Circuit breakers must be switched off but may be replaced with power on.

Customer-specific marking of the front plate is possible.

Max load of one way is 50 A (please observe derating factor), max. load of the line entry is 2 x 450 A at DC 72 V (optionally AC 230 V or AC 115 V).

Customer-specific solutions / Power-D-Box (customised)
The Power-D-Box is a 2U 19" power distribution system (also for ETSI systems), accommodating plug-in type double pole thermal-magnetic circuit breakers 2210-S with auxiliary contacts. All cable connections are on the front by means of feed-through terminals, partly pluggable.

Line entry is via two fixed feed-through screw terminals up to 10 mm² with cable feed from below, max. line current 50 A. The load outputs are connected via double pole plug-in type screw terminals or alternatively spring-loaded terminals up to 4 mm². Polarisation is colour-coded. Cable feed is from the front. Max. load current is 16 A. All auxiliary contacts are combined as a group signal (series or parallel connection are possible) and also have plug-in type terminals up to 4 mm². All connectors may optionally be fitted with a strain relief by means of wire wraps.

All terminals and circuit breakers are marked correspondingly.

The version shown above accommodates 8 double pole circuit breakers, variations upon request.

The front plate can be removed for replacing the circuit breakers.

Small compact power distribution system on printed circuit board to accommodate 6 plug-in type thermal overcurrent circuit breakers type 1180.

Line entry is on the rear via screw terminals up to 10 mm², max. 16 A (back-up fuse required). Load outputs are connected via a plug-in type screw terminal busbar, cable cross section 2.5 mm², max. 10 A.

Dimensions of the system are 90 x 50 x 96 mm (l x w x d) including the installed circuit breakers.

Numbers of ways, termination as well as mechanical design of the power distribution system can be tailored to customers’ needs.

Max. rated voltage DC 65 V, AC 250 V.

Two Power-D-Boxes, 1U 19" power distribution systems, for use with thermal high-performance circuit breakers type 482.

The power distribution systems feature a redundant design with 2 x 4 ways.

Connection of all cables can be either from the rear or on the front. Line entry is on the right and left sides by means of screw-type feed-through terminals up to 16 mm² cable cross section, max. 100 A per side. Load outputs are also via screw-type feed-through terminals up to 10 mm², max. 50 A per way (please observe derating factor of the circuit breakers).

Plug-in design of the circuit breakers allows easy adaptation to changing loads.

The max. installation depth is less than 180 mm including front and rear screw terminals.

Max. rated voltage is DC 72 V or AC 230 V.
Module 17plus is a power distribution system for use with E-T-A circuit breakers type 2210-S... or 3600-.../3900-... or electronic circuit breaker ESS20 or SSRPC E-1048-7... Each module accommodates two single pole plug-in circuit breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules, but each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of screwless spring loaded terminals.

Suitable electro-mechanical circuit breakers have integral make and break auxiliary contacts. Depending on the application these may be used for either single or group signalisation. For group signalisation, the make contacts (which open in the event of a fault) are connected in series to the terminal blocks of the modules. The module is designed to accommodate a probe for series connection continuity tests. When multipole circuit breakers are fitted auxiliary contacts are required for each pole.

Single signalisation is achieved through use of the break contacts (which close in the event of failure) connected in parallel by means of terminals on each module. Both types of signalisation (individual and group signalisation) are available at the same time if the circuit breakers used provide auxiliary contacts (please note when ordering). The signalling circuitry between modules is automatically connected when modules are linked together.

Meets the requirements of UL60950

### Ordering information

For thermal magnetic circuit breakers types 2210-S, 3600, 3900:
For electronic circuit breaker type ESS20:
For solid state remote power controller E-1048-7-..:

<table>
<thead>
<tr>
<th>Model Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>17PLUS-Q02-00</td>
<td>Module 17plus, centre piece, two-way</td>
</tr>
<tr>
<td>17PLUS-QA0-LR</td>
<td>one each left- and right-side terminal block for supply feed from the side by means of screw terminal</td>
</tr>
</tbody>
</table>

### Technical data

**Connection**

- Spring-loaded terminals for rigid wires and flexible cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
- Line feed (1): spring-loaded terminals for 1.5 – 10 mm², SD 2 (0.8x4.0)
- Load output (2): spring-loaded terminals for 0.25-4 mm², SD 1 (0.6x3.5)
- Signalisation: terminals (11, 13, 14); spring-loaded terminals for 0.25-2.5 mm², SD 1 (0.6x3.5)
- terminal (12); spring-loaded terminal for 0.25-1.5 mm², SD 0 (0.4x2.5)

**Test probe for testing the group signal for line interruption:** ≤ 2 mm ø

**Voltage rating**

- Voltage rating (without circuit breaker): AC 433 V; DC 65 V
- Internal resistances
  - (without circuit breaker)
  - Line feed (1): 50 A
  - Load output (2): 25 A
  - Signalisation
    - Feed (11) (ground with electronic components): 10 A
    - Single output (12): 1 A
    - Group signal (13-14): 1 A

**Current rating**

- Current rating (without circuit breaker)
  - Line feed (1): 50 A
  - Load output (2): 25 A
  - Signalisation
    - Feed (11) (ground with electronic components): 10 A
    - Single output (12): 1 A
    - Group signal (13-14): 1 A

### Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL USA + Canada</td>
<td>AC 250 V; DC 80 V</td>
<td>50 A</td>
</tr>
</tbody>
</table>

(*) Caution: When several devices are mounted together, each should carry only max. 80 % (Iₜₐ ≤ 16 A) or max. 65 % (Iₜₐ > 16 A) of its rating.

Busbar for power distribution

- Insulated busbar (blue or red): Iₜₐ ≤ 16 A
- Non-insulated busbar: Iₜₐ ≤ 16 A

(The non-insulated busbar, too, meets brush contact safety standards when fitted.)

**Dielectric strength**

- between main circuits (without busbar): 1,500 V
- main circuit to auxiliary circuit: 1,500 V
- between auxiliary circuits: 1,500 V

**Mass**

- Module 17plus (centre piece): approx. 85 g
- terminal blocks (pair): approx. 30 g
Module 17plus

Dimensions

- Slot for fitting labels from Phoenix, Weidmüller, Wieland
- Module
- Right-side terminal block
- Left-side terminal block

Installation example

3. Snap on right-side and left-side terminal blocks.
4. Cut busbar to required length and fit on supply side of the modules.
5. Connect line feed with spring-loaded terminals.
6. Plug in circuit breakers.

Connection diagram

Example for circuit breaker types 2210, 3600, 3900

- Module 1
- Module 2
- Side busbar
- LINE 1
- LOAD 2
- Circuit breaker
- Jumper
- Right-side terminal block
- Left-side terminal block

Module 17plus for electronic overcurrent protection

For technical data, dimensions, mounting examples, schematic diagrams and connection diagrams of
- ESS20-0...
- ESS20-1...
- ESX10
- E-1048-7...

For connection diagram for electronic circuit breakers and components please see relevant data sheets of types ESS20, ESS21, E-1048-7..
**Module 17plus**

**Accessories**

**Busbar 32 A**
- X 222 005 01 blue insulation, 500 mm/19.68 in.
- X 222 005 02 red insulation, 500 mm/19.68 in.
- X 222 005 03 grey insulation, 500 mm/19.68 in.

**Busbar 50 A**
- Y 307 016 01 non-insulated, 500 mm/19.68 in.
- Y 307 016 11 non-insulated, 500 mm/19.68 in.

**End bracket**
- X 222 004 01 Screw terminal for busbar
- X 211 156 01 non-insulated (up to 35 mm²)

**Retaining clip for circuit breaker 3600/3900**
recommended for fitting the devices
- Y 300 581 11

**Retaining clip for circuit breaker 2210**
recommended for fitting single pole devices
- Y 302 974 21

**Jumper X 222 066 01**

**Labels**
marking area 6 x 10 mm
(ordering unit 10 pcs = 1 strip)
- Y 307 942 01

This is a metric design and millimeter dimensions take precedence.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Power Distribution System SVS02

Description

The E-T-A power distribution system SVS02 is designed to accommodate the electronic circuit breaker series ESS20-003 or electronic circuit protector ESX10. It distributes the current supplied by a switch mode power supply up to 40 A to 4, 8, 12 or 16 channels. Input connections are via screw terminals. The individual circuit breakers can be plugged in. Loads are connected via spring-loaded screwless terminals. The power distribution includes integral wiring of the signalisation of the individual channels which can be combined to a group signal. The SVS02 can be snapped onto a DIN symmetrical rail.

Suitable for
- ESS20-003
- ESX10-103
- 2210-S21.
- 3600

Ordering information

<table>
<thead>
<tr>
<th>Type</th>
<th>Power distribution system for ESS20-003</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVS02</td>
<td>Suitable for ESS20-003, ESX10-103, 2210-S21, 3600</td>
</tr>
<tr>
<td></td>
<td>Suitable for individual channels which can be combined to a group signal. The power distribution includes integral wiring of the signalisation of the individual channels. Loads are connected via spring-loaded screwless terminals. The individual circuit breakers can be plugged in. Loads are connected via screw terminals.</td>
</tr>
</tbody>
</table>

Ordering information

<table>
<thead>
<tr>
<th>Description</th>
<th>16-P310 - L50 - S15 - E00 - B10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw terminals for power supply DC 24 V</td>
<td></td>
</tr>
<tr>
<td>P310 3 loop-through terminals (X 21) max. 10 mm² for DC 24 V (+) / DC 24 V (-) / FE functional earth</td>
<td></td>
</tr>
<tr>
<td>Load outputs per channel (F1...Fn, n = 04, 08, 12, 16)</td>
<td></td>
</tr>
<tr>
<td>L50 5 load outputs per channel, max. 8 A each</td>
<td></td>
</tr>
<tr>
<td>(L+L) group output (+) internally bridged over all channels</td>
<td></td>
</tr>
<tr>
<td>(L+L) protected load output (+), per channel</td>
<td></td>
</tr>
<tr>
<td>(-) DC 24 V (-)</td>
<td></td>
</tr>
<tr>
<td>(+) DC 24 V (+)</td>
<td></td>
</tr>
<tr>
<td>(FE) functional earth</td>
<td></td>
</tr>
<tr>
<td>Signal outputs</td>
<td></td>
</tr>
<tr>
<td>S15 1 signal terminal (X31) for group signal, 5-pole, complete with plug-in terminal, wiring 5 x max. 2.5 mm² / without connector sleeve, max. 0.5 A:</td>
<td></td>
</tr>
<tr>
<td>(+) internal +DC 24 V supply for signalisation via insulated wire bridge from (+) to (SC)</td>
<td></td>
</tr>
<tr>
<td>(SC) external supply possible +DC 24 V for signalisation</td>
<td></td>
</tr>
<tr>
<td>(SC) signal output group signalisation</td>
<td></td>
</tr>
<tr>
<td>(SC) additional output DC 24 V (+)</td>
<td></td>
</tr>
<tr>
<td>(SC) functional earth</td>
<td></td>
</tr>
<tr>
<td>Control input</td>
<td></td>
</tr>
<tr>
<td>E00 without control input</td>
<td></td>
</tr>
<tr>
<td>Fitting variants</td>
<td></td>
</tr>
<tr>
<td>B10 complete with screwless spring-loaded terminals. (max. 2.5 mm², without connector sleeve)</td>
<td></td>
</tr>
<tr>
<td>B20 complete with plug-in screw terminals (max. 2.5 mm², without connector sleeve)</td>
<td></td>
</tr>
<tr>
<td>Technical data</td>
<td></td>
</tr>
<tr>
<td>Modular Power distribution system for short-circuit limited DC 24 V applications up to max. 40 A continuous load, max. voltage DC 32 V.</td>
<td></td>
</tr>
<tr>
<td>Three screw terminals (max. 10 mm²/AWG 8) for:</td>
<td></td>
</tr>
<tr>
<td>- DC 24 V (+) = X 21 +</td>
<td></td>
</tr>
<tr>
<td>- DC 24 V (-) = X 21 -</td>
<td></td>
</tr>
<tr>
<td>- FE (functional earth) = X 21 FE</td>
<td></td>
</tr>
<tr>
<td>Modular design ESS20-positions F1...F4, F8, ...F12 or ...F16:</td>
<td></td>
</tr>
<tr>
<td>- SVS02-04 / 4 channels / F1...F4 = Kl. X1...X4</td>
<td></td>
</tr>
<tr>
<td>- SVS02-08 / 8 channels / F1...F8 = Kl. X1...X8</td>
<td></td>
</tr>
<tr>
<td>- SVS02-12 / 12 channels / F1...F12 = Kl. X1...X12</td>
<td></td>
</tr>
<tr>
<td>- SVS02-16 / 16 channels / F1...F16 = Kl. X1...X16</td>
<td></td>
</tr>
<tr>
<td>5 load outputs per channel complete with Combincon screwless connectors, wiring 5 x max. 2.5 mm² (AWG 14) without connector sleeve max. 8 A:</td>
<td></td>
</tr>
<tr>
<td>- (L+L) group output (+), internally bridged across all channels</td>
<td></td>
</tr>
<tr>
<td>- (L+L) load output (+), per channel</td>
<td></td>
</tr>
<tr>
<td>- (-) DC 24 V (-)</td>
<td></td>
</tr>
<tr>
<td>- (-) DC 24 V (-)</td>
<td></td>
</tr>
<tr>
<td>- (FE) functional earth</td>
<td></td>
</tr>
<tr>
<td>Signal terminal (X31) for group signal complete with Combincon screwless connectors, wiring 5 x max. 2.5 mm² (AWG 14) without connector sleeve max. 0.5 A (signal contact ESS20):</td>
<td></td>
</tr>
<tr>
<td>- (+) internal +DC 24 V supply for signalisation, via insulated wire bridge from (+) to (SC), protected by CB2</td>
<td></td>
</tr>
<tr>
<td>- (SC) external supply possible +DC 24 V for signalisation, protected by CB1</td>
<td></td>
</tr>
<tr>
<td>- (S0) signal output group signalisation</td>
<td></td>
</tr>
<tr>
<td>- (S0) additional output DC 24 V (+)</td>
<td></td>
</tr>
<tr>
<td>- (FE) additional functional earth</td>
<td></td>
</tr>
<tr>
<td>Selective overcurrent protection CB1 and CB2 for group signalisation of the power distribution system, red LED blinking after CB1 has tripped (see schematic diagram).</td>
<td></td>
</tr>
<tr>
<td>Reset of circuit breakers: momentarily press red actuator button</td>
<td></td>
</tr>
<tr>
<td>Protection class to: IP20</td>
<td></td>
</tr>
<tr>
<td>Insulation co-ordination to IEC 60934: 0.5 kV / pollution degree 2</td>
<td></td>
</tr>
<tr>
<td>Dielectric strength AC 500 V</td>
<td></td>
</tr>
<tr>
<td>Temperature range: 0...50 °C (without condensation)</td>
<td></td>
</tr>
<tr>
<td>for DIN symmetrical rail mounting EN 50022 - 35 x 7.5</td>
<td></td>
</tr>
<tr>
<td>Dimensions: see dimensional drawing</td>
<td></td>
</tr>
</tbody>
</table>
This is a metric design and millimeter dimensions take precedence.

Schematic diagram SVS02-(n) n = 04, 08, 12, 16

*) see application example for insulated wire bridge

LED V1 blinks after CB1 has tripped

CB2: no visual indication

Circuit breakers CB1 and CB2: shown in tripped condition

F1 F2 F3 Fn
Dimensions SVS02-04, fitted with ESS20-003

- Red LED blinks after CB1 has tripped.
- Insulated wire bridge, not fitted (2 pcs enclosed).
- Rail EN 50022-35x7.5 (not supplied).

Screw terminals DC 24 V power supply.
Load outputs screwless spring-loaded terminals.

This is a metric design and millimeter dimensions take precedence (mm).
Power Distribution System SVS02

Dimensions SVS02-04, fitted with ESX10-103

- Insulated wire bridge
- Screw terminals
- Power supply
- Load outputs
- Screwless spring-loaded terminals
**Accessories**

**Insulated wire bridge**

Y 303 881 08

Two insulated wire bridges are supplied with the power distribution system. They may be used for:

- **Channel X31**: Internal +DC 24 V supply for signalisation wire bridge from (+) to (SC)
  - Signal circuit (+) to (SC) protected by CB2
  - Signal circuit (SC) to (SO) protected by CB1

- **Channel X1**: Protected load output (L+L) of CBE position F1 takes over protection of (L+S) terminals of all CBEs F2 up to Fn (n= 04, 08, 12, 16)

**Jumper**

X 222 066 01

**Application example for insulated wire bridge**

Terminal X31 (group signalisation)
- wire bridge from (+) to (SC)
- internal +DCAV feed for signalisation

Thus plus potential of terminal X21+ is connected to (SC)

**Application example for jumper to replace ESS20-003**

The signalling pathway of the group signalisation is as follows:

- Feed-in of +DC 24 V potential in (SC = terminal 31.2)
- Via in-built overcurrent protection CB1
- Via all signal contacts of the fitted circuit breakers type ESS20-003
- Back to signal output of group signalisation (S0 = terminal 31.3)

In operating condition (i.e. all circuit breakers plugged in and functional) the signalling pathway (SC) to (SO) is closed.

If the distribution rail is not completely fitted with ESS20-003, the open pathway (SC) to (S0) may be closed by means of a jumper type X 222 066 01.
## Description

The SVS04 power distribution system for symmetrical DIN rail mounting is designed to distribute power from a switch-mode power supply to 4 or 8 channels. Selective protection of the load output circuits is provided by the plug-in type circuit breakers installed. With a max. load current of 8A per channel and a max. total current of 40A the SVS04 provides ease of wiring in short circuit current limited DC24V applications. Five protected “L+” load outputs per way and 15 or 30 minus terminals significantly reduce wiring time enormously.

Electronic circuit breaker ESS20-003, electronic circuit protector ESX10-103, thermal-magnetic circuit breakers 2210-S21. and 3600 are all suitable for use with the SVS04, plugging directly into the sockets provided for each of the 4 or 8 outputs.

## Technical data

### DC24 V supply

<table>
<thead>
<tr>
<th>DC24 V terminals, 2x3 terminals (screwless terminals max. 10 mm²), for current supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>- DC 24 V (+) = (X21) +/+/+</td>
</tr>
<tr>
<td>- DC 24 V (-) = (X21) -/-/-</td>
</tr>
</tbody>
</table>

Integral loop-through, for wiring and additional connection of an external buffer module.

### F positions

Fitted versions are standard for the SVS04. For the SVS04-08, the plug-in type screw terminals must be ordered separately.

### Load outputs

| 5 x L+ protected per position F1…F4 (F1…F8), led through terminals X1…X4 (X1…X8), max. 2.5 mm² load current max. 8 A per position |

### Signalisation

- signalisation terminal X31, 5-pole, max. 2.5 mm²
- +: DC 24 V feed from terminal X21, protected by integral circuit breaker CB1 total current max. 0.5 A
- group signalisation:
  - S: line feed DC 24 V, insert insulated wire bridge Y 303 881 08 (bulk shipped) between + and GR
  - AS: output of group signalisation
  - two-group signalisation
  - GR: line feed, insert insulated wire bridge Y 303 881 08 (bulk shipped) between + and GR
  - AS: output group A (X5…X8)
  - B: output group B (X1…X4)

### Minus terminals

| 3 x 5 terminals (X22, X23, X24) or 6 x 5 terminals (X22, X23, X24, X25, X26, X27): version K01 |

### Termination

For signalisation, load outputs and minus terminals:

| B10: screwless spring-loaded terminals max. 2.5 mm², with integral test socket |
| B20: plug-in type screw terminals max 2.5 mm², with integral test socket |
| C10: pcb terminal/spring-loaded terminal max. 2.5 mm², with integral test socket |

### General data

- protection class to DIN 40050: IP20
- insulation co-ordination to IEC 60934: 0.5 kV
- pollution degree 2
- dielectric strength AC 500 V
- temperature range: 0…50 °C (without condensation)
- for symmetrical DIN rail mounting ENS0022 – 35 x 7.5
- dimensions: see dimensional drawings

---

**SVS04-08---**
Power Distribution System SVS04

Wiring example: SVS04-04... with ESS20-003 and group signalisation

Signal path of group signalisation from F1 to F4

X31 signalisation terminal
AS signal output group signal
+ +DC 24 V from terminal 21, internally prewired and protected by CB1
S line feed group signalisation with insulation bridge*
SC / SO auxiliary contact ESS20-003, make contact

Wiring example: SVS04-08... with ESS20-003 and group signalisation

Signal path of group signalisation from F1 to F8

X31 signalisation terminal
AS signal output group signal
+ +DC 24 V from terminal 21, internally prewired and protected by CB1
S line feed group signalisation with insulation bridge*
SC / SO auxiliary contact ESS20-003, make contact

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Wiring example: SVS04-04... with ESS20-003 and two-group signalisation

Signal path of two-group signalisation
from F1 to F2 = group B, from F3 to F4 = group A

X31 signalisation terminal
AS signal output group A (F3 ... F4)
B signal output group B (F1 ... F2)
+ +DC 24 V from terminal 21, internally prewired and protected by CB1
GR line feed two-group signalisation with insulation bridge*
SC/SO auxiliary contact ESS20-003, make contact

Wiring example: SVS04-08... with ESS20-003 and two-group signalisation

Signal path of two-group signalisation
from F1 to F4 = group B, from F5 to F8 = group A

X31 signalisation terminal
AS signal output group A (F5 ... F8)
B signal output group B (F1 ... F4)
+ +DC 24 V from terminal 21, internally prewired and protected by CB1
GR line feed two-group signalisation with insulation bridge*
SC/SO auxiliary contact ESS20-003, make contact
Power Distribution System SVS04

Dimensions SVS04-04-... (with 15 minus terminals)

Schematic diagram SVS04-04-... (fitted with ESS20-003)
Dimensions SVS04-04-..., fitted with ESS20-003

- Terminal power supply
- Spring-loaded cage clamps 45° 10mm²
- Load outputs, 5 poles 2.5 mm² depending on fitting version
- Screwless spring-loaded cage clamps
- Plug-in type screw terminals
- red LED flashes when CB1 trips

This is a metric design and millimeter dimensions take precedence (mm) over inch (in).
Dimensions SVS04-08-... (with 15 minus terminals)

- Wire bridge, fully insulated, 3-pole, not fitted, (1 piece enclosed)
- Bridge, fully insulated, 3-pole
- Terminal power supply spring-loaded cage clamps 45° 10 mm²
- Load outputs, 5-pole 2.5 mm² depending on fitting version screwless spring-loaded cage clamps plug-in type screw terminals PCB cage clamps

This is a metric design and millimeter dimensions take precedence.
Dimensions SVS04-08... K01 (with 30 minus terminals)

Schematic diagram SVS04-08... K01 (fitted with ESS20-003)

DC 24 V / max. 40 A

LED V1 flashes upon trip of CB

Circuit breaker CB1 shown in tripped condition
Power Distribution System SVS04

Dimensions SVS04-08... K01, fitted with ESX10-103

- Load outputs, 5-pole, 2.5 mm², depending on fitting version
- Screwless spring-loaded cage clamps
- Plug-in type screw terminals
- PCB cage clamps

- Wire bridge, fully insulated, 2-pole, not fitted (1 piece enclosed)
- Bridge, fully insulated, 3-pole
- Terminal power supply spring-loaded cage clamps 45°, 10 mm²

- Red LED flashes when CB1 trips

- Marked (X)

- Top hat rail EN 50022:35x7.5 (not supplied with product)

- Fitted with ESX10- ...

This is a metric design and millimeter dimensions take precedence (mm).
Accessories

Insulated wire bridge
Y 303 881 08

2 pcs of the insulated wire bridge are supplied with the power distribution system. The insulated wire bridges may be used for:

- terminal X31: internal DC 24 V feed for group signalisation wire bridge from (+) to (S) signal path protected by CB1

- terminal X31: internal DC 24 V feed for two-group signalisation wire bridge from (+) to (GR) signal path protected by CB1

Application example for jumper to replace ESS20-003

The signalling pathway of the group signalisation is as follows:
- feed-in of +DC 24 V potential in X31 (»+« terminal) via in-built overcurrent protection CB1
- via all signal contacts of the fitted circuit breakers type ESS20-003
- back to signal output of group signalisation X31 (»AS«)

In operating condition (i.e. all circuit breakers plugged in and functional) the signalling pathway X31 from »+« to »AS« is closed.

If the distribution rail is not completely fitted with ESS20-003, the open pathway »+« to »AS« may be closed by means of a jumper type X 222 066 01.
**Description**

The SVS09 power distribution system with integral signalling module optimizes DC 24 V distribution at the machine-oriented field level in automated process control, production plants and power plants. Offering 10-plug-in sockets for electronic and thermal-magnetic circuit breakers and an integrated alarm handling function for single and group signalling, the SVS09 distribution board can be cascaded on the master-slave principle to meet specific requirements. This cascading allows transducers, actuators, valves, distributed PLCs, intelligent terminals etc. to be clustered into distinct function groups and to be conveniently incorporated into the plant’s overall alarm monitoring scheme. Particularly for applications with a great number of sensors/actuators, the SVS09 offers possibilities for cost- and space-saving in the design of control cabinets.

Each load circuit that is interrupted by an overload or short circuit trip always generates a single alarm. In addition, a group alarm for the entire SVS09 cascade is induced which will be acknowledged by means of a command element (momentary switch, relay, PLC) either locally in the control cabinet or remotely in the control room. Acknowledging the group alarm immediately reactivates the group signalling function of the SVS09 cascade remobilising it for new incoming short-circuit or overload messages.

The power distribution system SVS09 is mounted on a symmetrical rail and accommodates 10 electronic or thermal-magnetic circuit breakers. All terminals (line entry DC +24 V, GND (-) for self-supply, load outputs L(+), signalling and acknowledgment) are spring-loaded terminals.

**Features and benefits**

- integral distribution, protection and signalling functions
- power distribution and selective protection of DC 24 V load circuits form one source
- single signalling with manual reset on the protective device
- group signalling and acknowledgement by means of momentary switch/signal (local/remote)
- ease of signalling integration into signal concept of the entire system
- cascading of several SVS09 systems on the master-slave principle
- ease of configuration with wire bridges on the master SVS09

**Suitable for the following E-T-A circuit breaker types:**
- electronic circuit breaker ESS20-003..
- electronic circuit protector ESX10-103..
- thermal-magnetic circuit breakers 2210-S21, 3600-P10, 3900-P10 (also with intermediate position)

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVS09-10-C10</td>
<td>Modular power distribution system for short circuit limited DC 24 V applications</td>
</tr>
</tbody>
</table>

**Technical data (\(T_{amb} = 25^\circ C, U_S = DC 24\ V\))**

**Application**

modular power distribution system for short circuit limited DC 24 V applications

**Line entry**

- rated voltage: DC 24 V (19...28 V)
- residual ripple: 6 % max.
- total current: max. 30 A
- DC 24 V (+) = X 21.1+, X 21.2+
- GND (-) = X 22.4-, X 22.3-(for self-supply of circuit breakers)

**F positions**

- 10 ways for circuit breakers, suitable for types ESS20-003, ESX10-103, 2210-S211, 3600-P10, 3900-P10
- SVS09-10 / 10-way / F1...F10 load output /way terminal block X24

**Load outputs per position**

- rated voltage: DC 24 V (19...28 V)
- current: max. 4 A
- number: 1 protected load output L(+) via circuit breaker (Fx)

**Single signalling**

- 10 x single signalling for 10 x F(x) terminal block X23, contacts 30-40, 31-41, 32-42, ...
- potential-free make contacts (N/O)
- error indication: contact open
- OK indication: contact closed
- Empty way: contact closed
- reset: manually on plugged-in circuit breaker

**Group signalling**

- 1 x group signalling pro SVS09-cascade (1 master + 5 slaves) terminal block master X22, contact 13-23, potential-free contact
- error indication: contact closed
- OK indication: contact open
- configuration as Local/Remote-group signal

**Acknowledgment of group signalling**

- 1 x acknowledgment instruction per SVS09-cascade (1 master + 5 slaves) acknowledge only on the master terminal block master X22, contact 10-11, terminal potential-free break contact (N/C) or bridge with bridge: master, acknowledgment locally, momentary switch on SVS09 (module SIGMO)
- break contact N/C: master, acknowledgment locally and remote (momentary switch, relay, external PLC)

1) When mounted side-by-side or fully fitted with thermal-magnetic circuit breaker types 2210, 3600 or 3900, each breaker should only carry 80 % of its rating or a higher rating should be chosen.

2) For failure signalling and for cascading functions on the master-slave principle the plug-in type signalling module SIGMO-09-1xx is required. See accessories.
### Technical data \( T_{amb} = 25 \, ^\circ\text{C}, U_S = \text{DC 24 V} \)

#### Configuration master/slave and group signal

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>master/slave-marking:</td>
<td>with bridge = master, without bridge = slave</td>
</tr>
<tr>
<td>group signal locally/remote</td>
<td>pre-adjustment = only locally, LED on master-SVS09 terminal of external indication element = locally and remote</td>
</tr>
<tr>
<td>acknowledgment of group signal locally/remote</td>
<td>with bridge = master, acknowledgment locally, locally and remote = slave, no acknowledgment</td>
</tr>
</tbody>
</table>

#### Cascading several SVS09 systems

Cascading possible with 1 x master M and max. 5 slaves S1...S5 Loop through the following 4 lines:

- **24 V (+)** supply voltage
  - M-X21:2+ → S1-X21:1+ → S1-X21:2+ → S2-X21:1+...
  - GND (-) self-supply circuit breaker/signallisation
  - M-X22:3- → S1-X22:4- → S2-X22:4-...
  - S (+) group signalisation (+)
    - M-X22:12 → S1-X22:11 → S1-X22:12 → S2-X22:11...
  - S (-) group signalisation (-)

#### Termination

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10</td>
<td>pcb spring-loaded terminals (standard)</td>
</tr>
<tr>
<td></td>
<td>line entry DC 24 V on terminal block X21</td>
</tr>
<tr>
<td></td>
<td>line (+) terminals 1+ und 2+, connection capability (cable cross section)</td>
</tr>
<tr>
<td></td>
<td>0.25 - 10 mm²</td>
</tr>
<tr>
<td></td>
<td>stripped length 12 mm</td>
</tr>
<tr>
<td></td>
<td>configuration, GND (-) (self-supply) and group signal on terminal block X22</td>
</tr>
<tr>
<td></td>
<td>5x double level terminal block</td>
</tr>
<tr>
<td></td>
<td>single signalisation on terminal block X23</td>
</tr>
<tr>
<td></td>
<td>10x double level terminal block</td>
</tr>
<tr>
<td></td>
<td>load outputs on terminal block X24</td>
</tr>
<tr>
<td></td>
<td>5x double level terminal block</td>
</tr>
<tr>
<td></td>
<td>connection capability (cable cross section)</td>
</tr>
<tr>
<td></td>
<td>with and without wire end ferrule 0.25 - 1.5 mm²</td>
</tr>
<tr>
<td></td>
<td>stripped length 7 mm</td>
</tr>
<tr>
<td></td>
<td>plug-in type signalisation module SIGMO-09-1xx</td>
</tr>
<tr>
<td></td>
<td>50-pole Card Edge socket board</td>
</tr>
<tr>
<td>C20</td>
<td>pcb screw terminals (option)</td>
</tr>
</tbody>
</table>

#### General data

- **Mounting:** symmetrical rail to EN 50022 - 35 x 7.5
- **Temperature range:** 0...50 °C (without condensation)
- **Storage temperature:** -20...+70 °C
- **Housing material:** plastic
- **Protection class terminals:** IP20 DIN 40050
- **Protection class pcb:** IP00 DIN 40050 (double-lacquered)
- **Insulation voltage:** DC 250 V (pcb)
- **Dimensions:** see drawings (tolerances to DIN ISO 286 part 1 IT13)
- **Mass:** SVS09-10 approx. 380 g

---

2) The plug-in type signalisation module SIGMO-09-1xx is required for failure signalisation and for the cascading functions on the master/slave principle. See accessories.

3) The SVS09 power distribution system is supplied without wire bridges and can thus be integrated into existing SVS09 cascade as a slave unit without further configuration. The user inserts wire bridges on terminal block X22 of the master.
Power distribution system SVS09

Power distribution system with overcurrent protection and integral signalling logic

1 Configuration master / slave

**X22 20-21**  
master / slave marking  
with bridge:  
master  
without bridge: slave: (factory setting)

**X22 10-11**  
acknowledgment of group signalisation  
with bridge:  
= master; acknowledgment locally  
break contact N/C: = master; acknowledgment locally + remote  
(momentary switch, PLC ... external)  
without bridge:  
= slave: no acknowledgment on slave (factory setting)

2 Fault signalisation

**single signal**:  
terminal block X23  
terminals 30-40, 31-41, 32-42, 33-43, 34-44, 35-45, 36-46, ...  
potential-free contact  
fault:  
OK: contact open  
empty way: contact closed

**group signal**:  
terminal block X22  
locally  
LED on master  
remote  
terminals 13-23, potential-free contact  
fault:  
OK: contact open

3 Cascading

**master → slave → ... slave n**  
loop-through of 4 lines  
24 V (+)  
LINE (supply voltage)  
M-X21:2+ → S1-X21:1+  
X12:2+ → S2-X12:1+  
X12:2+ → S3 ...  
S (+)  
group signalisation  
M-X22:2+ → S1-X22:1+  
X22:2+ → S2-X22:1+  
X22:2+ → S3 ...  
S (-)  
group signalisation  
M-X22:2+ → S1-X22:1+  
X22:2+ → S2-X22:1+  
X22:2+ → S3 ...  
GND (-)  
self-supply circuit breaker / plug-in type SIGMO module  
M-X22:3+ → S1-X22:4+  
X22:3+ → S2-X22:4+  
X22:3+ → S3 ...
**Configuration instruction**

**General information**

- Application individually (1 SVS09-10 as master) or as cascade (1 master + max. 5 slaves)
- Any configuration with wire bridges will only be done on the master.
- The minimum configuration with a master and local signalisation and acknowledgment directly on the SVS09 power distribution system requires wiring of two bridges: X22:20-21 for master identification and X22:10-11 for group acknowledgment.
- Configuration of a cascade is always carried out only on the master with cascades consisting of several SVS09 mounted side-by-side. No adjustments are required on the slaves.
- Devices for status indication and acknowledgment for external signalisation must be connected only to the master. Should several external display elements be required (e.g. LED, acoustic signal), these must also be connected only to the corresponding signal outputs of the master.
- Unused slots do not have to be bridged, they have no influence on the signalisation of the installed circuit breakers. Unused slots forward to OK indication to the signalisation outputs.
- The SVS09 power distribution system invariably requires a plugged-in signalisation module SIGMO-09-xxx (on separate order).

**Individual application**

### Minimal configuration: 1 master with local group signalisation and acknowledgment

<table>
<thead>
<tr>
<th>step</th>
<th>configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mounting: mount SVS09 on the symmetrical rail</td>
</tr>
<tr>
<td>2</td>
<td>connect DC +24 V (+) supply: on terminal block DC 24 V, +24 V to terminal 1+</td>
</tr>
<tr>
<td>3</td>
<td>connect GND (-) supply: ¹) on terminal block X22, GND (-) to terminal 4-</td>
</tr>
<tr>
<td>4</td>
<td>master identification: bridge terminals 20-21 on terminal block X22</td>
</tr>
<tr>
<td>5</td>
<td>group signal locally: pre-adjustment. In the event of group failure the red LED is always lighted (only) on the master.</td>
</tr>
<tr>
<td>6</td>
<td>group acknowledgment locally: bridge terminals 10-11 on terminal block X22, acknowledge manually with red momentary switch on SVS09 (module SIGMO)</td>
</tr>
<tr>
<td>7</td>
<td>single signalisation: connect single signalisation for F1 through F10 on terminal block X23, F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42, ... F10: terminals 39-49, signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed</td>
</tr>
<tr>
<td>8</td>
<td>loads: on terminal block X24: connect loads to be protected to terminals 50 through 64</td>
</tr>
</tbody>
</table>

### 1 master with local and external (remote) group signalisation and acknowledgment

<table>
<thead>
<tr>
<th>step</th>
<th>configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mounting: mount SVS09 on the symmetrical rail</td>
</tr>
<tr>
<td>2</td>
<td>DC +24 V (+) supply: on terminal block DC 24 V, connect +24 V to terminal 1+</td>
</tr>
<tr>
<td>3</td>
<td>GND (-) supply: ¹) on terminal block X22, connect GND (-) to terminal 4-</td>
</tr>
<tr>
<td>4</td>
<td>master identification: bridge terminals 20-21 on terminal block X22</td>
</tr>
<tr>
<td>5</td>
<td>group signal locally and remote: on terminal block X22, connect to external display element to terminals 13-23 (e.g. LED, relay, acoustic signal). In addition the red LED is always lighted on the master with group signal signal: potential-free contact: fault = contact closed, OK = contact open</td>
</tr>
<tr>
<td>6</td>
<td>group acknowledgment locally or remote: on terminal block X22, connect a command element to the terminals 10-11, e.g. momentary switch, relay, PLC signal (potential-free break contact N/C)</td>
</tr>
<tr>
<td>7</td>
<td>single signalisation: on terminal block X23, connect single signalisation for F1 through F10, F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42, ... F10: terminals 39-49 signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed</td>
</tr>
<tr>
<td>8</td>
<td>loads: on terminal block X24: connect loads to be protected to terminals 50 through 64</td>
</tr>
</tbody>
</table>

¹) GND (-) potential serves for self-supply of SVS09 (circuit breaker and SIGMO-module)
### Cascading: 1 master and several (n) slaves (max. 5)

<table>
<thead>
<tr>
<th>step</th>
<th>configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mounting: mount all SVS09 onto symmetrical rail</td>
</tr>
</tbody>
</table>
| 2    | **DC +24 V (+) supply: terminal block DC 24 V**  
- on the master: connect +24 V (+) to terminal 1+ and lead through to terminal 2+ for slave 1  
- on slave 1: connect +24 V (+) of master to terminal 1+ and lead through to terminal 2+ for slave 2  
- on slave n: connect +24 V (+) of slave (n-1) to terminal 1+  
- additional slaves: always lead through +24 V (+) of terminal 2+ for next slave, terminal 1+ |
| 3    | **GND (-) supply:**  
1) **terminal block X22**  
- on the master: connect GND (-) to terminal 4- and lead through at terminal 3- for slave 1  
- on slave 1: connect GND (-) of master to terminal 4- and lead through at terminal 3- for slave 2  
- on slave n: connect GND (-) of slave (n-1) to terminal 4-  
- additional slaves: always lead through GND (-) of terminal 3- for next slave, terminal 4- |
| 4    | **master identification:** bridge terminals 20-21 on the SVS09-master, on terminal block X22  
Note: no adjustments on the slaves required! |
| 5    | **group signal locally:** pre-adjustment. In the event of group fault the red LED is always lighted (only) on the master. |
| 6    | **group acknowledgment locally:** bridge terminals 10-11 on SVS09-master, terminal block X22  
acknowledgment manually with red momentary switch on SVS09-master (module SIGMO)  
Note: no adjustments on the slaves required! |
| 7    | **single signalisation:** on terminal block X23, connect single signalisation for F1 through F10  
signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed |
| 8    | **loads:** on terminal block X24: connect loads to be protected to terminals 50 through 64 |

### 1 master + n slaves: with local and external (remote) group signalisation and acknowledgment

<table>
<thead>
<tr>
<th>step</th>
<th>configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mounting: mount all SVS09 onto symmetrical rail</td>
</tr>
</tbody>
</table>
| 2    | **DC +24 V (+) supply: terminal block DC 24 V**  
- on the master: connect +24 V (+) to terminal 1+ and lead through to terminal 2+ for slave 1  
- on slave 1: connect +24 V (+) of master to terminal 1+ and lead through to terminal 2+ for slave 2  
- on slave n: connect +24 V (+) of slave (n-1) to terminal 1+  
- additional slaves: always lead through +24 V (+) of terminal 2+ for next slave, terminal 1+ |
| 3    | **GND (-) supply:**  
1) **terminal block X22**  
- on the master: connect GND (-) to terminal 4- and lead through at terminal 3- for slave 1  
- on slave 1: connect GND (-) of master to terminal 4- and lead through at terminal 3- for slave 2  
- on slave n: connect GND (-) of slave (n-1) to terminal 4-  
- additional slaves: always lead through GND (-) of terminal 3- for next slave, terminal 4- |
| 4    | **master identification:** bridge terminals 20-21 on the SVS09-master, on terminal block X22  
Note: no adjustments on the slaves required! |
| 5    | **group signal locally and remote:** connect an external display element (e.g. LED, relay, acoustic signal) on master, terminal block X22, to terminals 13-23. In addition the red LED is always lighted in the event of group signal.  
signal: potential-free contact: fault = contact closed, OK = contact open  
Note: no adjustments on the slaves required, group acknowledgment is valid for the entire cascade. |
| 6    | **group acknowledgment locally or remote:** connect a command element on master, terminal block X22, to terminals 10-11, e.g. momentary switch, relay, PLC signal (potential-free break contact N/C)  
Note: no adjustments on the slaves required, group acknowledgment is valid for the entire cascade. |
| 7    | **single signalisation:** on terminal block X23, connect single signalisation for F1 through F10  
signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed |
| 8    | **loads:** on terminal block X24: connect loads to be protected to terminals 50 through 64 |

1) GND (-) potential serves for self-supply of the SVS09  
(circuit breaker and SIGMO module)
Power distribution system SVS09

Schematic diagram

Dimensions SVS09-10-C10

This is a metric design and millimeter dimensions take precedence (mm) inch
Application example: SVS09-10-C10 fitted with ESS20-003

Plug-on module (circuit breaker / signalisation module SIGMO-09-1xx) to be ordered separately.

Application example: SVS09 cascade with 1 master and 1 slave

SVS09-10-C10 master fitted with 10 x ESS20-003
SVS09-10-C10 slave fitted with 5 x 2210-S2 and 5 x 3600
Power distribution system SVS09

Signalisation module SIGMO-09-1xx

Application

Plug-in type signalisation module for the power distribution system SVS09 for group signalisation and acknowledgment for an isolated SVS09 application or a cascade. The SIGMO module ensures a group fault to be indicated after each trip of a circuit breaker on the SVS09. Fault indication can be— depending on the configuration— locally on the power distribution system (red LED) or locally and externally (remotely), e.g. by means of an acoustic signal in the control room. Acknowledgment of the group signal can also be only locally via a momentary switch on the power distribution system, or locally and remotely, e.g. via a momentary switch in the control room. Acknowledgment of the group signal re-activates the group signalisation, so that it is released again and ready for new error messages. The single signalisation and the tripped circuit breaker will be manually reset by actuating the push button of the circuit after remedy of the failure.

Note: Proper function of the signalisation module SIGMO-09-1xx is ensured only in connection with the power distribution system SVS09-10-Cxx.

1) see power distribution system SVS09, basic schematic diagram and configuration instruction.

Ordering information

Type No.

SIGMO signalisation module for SVS09 power distribution system
- plug-in type signalisation module
- DC 24 V-applications
- supply via SVS09

Version for power distribution system

09 SVS09-10 for circuit breakers (F1...F10)

Pcb version

100 standard: plug-in type signalisation module for circuit breaker (F1...F10)
pcb populated, open,

120 option: plug-in type signalisation module for circuit breaker (F1...F10)
pcb populated, encapsulated

SIGMO - 09 - 100 ordering example

Technical data (Tamb = 25 °C, U_S = DC 24 V)

Voltage supply

 rated voltage: DC 24 V (19...28 V)
 residual ripple 5 % max.
supply via SVS09

Current load

 normal operation without trip: 0 mA
max. 150 mA with 10-way fault on SVS09 (all relays loaded)

Contacts

 min. 10 V / 10 mA
max. 28 V / 200 mA...

Status indication and actuation

 LED red: lighted in the event of group fault
 momentary switch red: for local acknowledgment of group signalisation
 remote acknowledgment: terminal of an external command (momentary switch, relay, PLC signal)
 rupture capacity 28 V / 20 mA
 integral free-wheeling diode in SIGMO module

Reverse polarity protection

 Protected against reverse polarity of potentials DC 24 V (+) and GND (-) on the SVS09. No function if connected reversely.

This is a metric design and millimeter dimensions take precedence (mm)inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Power-D-Box 19" power distribution system fitted with E-T-A sockets 63-P10-Si to accommodate thermal-magnetic circuit breakers with each terminal block accepting up to 6 circuit breakers. Other rack types upon request.

Typical applications

Circuit breakers that may be accommodated on Power-D-Box 19" racks fitted with E-T-A sockets 63-P10-Si:

- type 2210  see section 2 - thermal-magnetic overcurrent CBs
- type 3600  see section 2 - thermal-magnetic overcurrent CBs
- type 3900  see section 2 - thermal-magnetic overcurrent CBs
- type E-1048-60.  see section 6 - SSRPCs

Ordering information

X 211 530 01  for  5 E-T-A terminal blocks 63-P10-Si

Technical data

X 211 530 01  2 U

Material: The Power-D-Box 19" power distribution system and the mounting flanges are made of 2 mm thick steel sheet.

Colour: RAL 7032, grey

Connection

By means of one or two 4-pole female multi-pin connectors for max. 4 mm² cables, which may be connected either on the right or left side of the rack.
**Dimensions**

X 211 530 01
19" rack Power-D-Box with 5 E-T-A sockets 63-P10-Si

*Diagram of dimensions with measurements.*

**Accessories**

**Connector bus links -P10**

- X 210 588 01/ 1.5 mm² (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm² (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm² (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm² (AWG 14), blue (up to 20 A max. load)

*Diagram of connector bus links with dimensions.*

**Busbar 50 A for socket 63-P10-Si**

- X 221 760 11

*Diagram of busbar with dimensions.*

---

This is a metric design and millimeter dimensions take precedence.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The compact 19" Power-D-Box features aluminium profiled cross members with an anodised front plate. The panel cutout accommodates up to 30 positions numbered 1 to 30. Blanks cover unused positions, with 6, 12, 24 or 30 being "open".

The rack can be fitted with plug-in type circuit breakers 3600/3900 and 2210, electronic circuit breakers ESS20 or electronic circuit protector ESX10 or E-T-A Solid State Remote Power Controllers (SSRPC) E-1048-600/700. Please specify the correct option according to the ordering information shown, as different depths as well as different heights of the front cut-out must be allowed for.

The devices are plugged into sockets 63-P10-Si (6 positions each). These sockets (S1...S6) are provided with 6.3 mm blade terminals on the rear.

Four busbars (X1...X4) with 6 (signalisation) or 15 (feed) positions each (6.3 mm blade terminals) provide easy terminal connection.

Prewired options available ex factory are:
- Parallel connected feed (2.5 mm²) with separate supply for each socket via busbars X1 and X2.
- Choice of wiring colours: black, red, blue, grey. Outputs are not connected.
- Parallel connected auxiliary contacts (N/C) grouped per socket, 1 mm², via busbars X3 (supply) and X4 (signalisation).
  - Choice of wiring colours: black, red, blue, grey.
- Series connected auxiliary contacts (N/O) of all positions with 1 mm², via busbars X3 (feed) and X4 (signalisation).
  - Choice of wiring colours: black, red, blue, grey.
- Custom designed connection according to specification.

Other fittings, e.g. back-up fuse, separate circuits or redundancy, multipole circuits, screw terminals, custom designed markings etc., are available to special order (please enquire).

A compact printed circuit board with rear screw terminals is available as an alternative to the standard cable wiring (see pages 7 - 45 to 7 - 51).

Technical data

19" Power-D-Box
- length: 84 modules (426.72 mm)
- height: 2 U (88.90 mm)
- depth: 205...295 mm (depending on the selected version)
- material: aluminium, anodized

Front cutout for 30 positions, numbered 1 through 30
- 1 socket = 6 positions (No. 1 - 6)
- 2 sockets = 12 positions (No. 1 - 12)
- 3 sockets = 18 positions (No. 1 - 18)
- 4 sockets = 24 positions (No. 1 - 24)
- 5 sockets = 30 positions (No. 1 - 30)
- blanks cover unused sockets.

Mounting socket
- polarised E-T-A mounting socket type 63-P10-Si (6 positions)
- rear blade terminals 6.3 mm max. load: 16 A continuous

Busbars
- Feed (X1, X2) 15-way for 6.3 mm blade terminals max. current rating: 63 A
- Auxiliary contacts (X3, X4) 6-way for 6.3 mm blade terminals max. current rating: 32 A

Feed
- busbar 50 A per socket (= 6 positions)
- HO7Z-K cables 2.5 mm² with fully insulated 6.3 mm blade terminals to VBG 4
- one cable per socket max. current rating: 20 A

Auxiliary contact wiring
- HO7Z-K cables 1 mm² with fully insulated 6.3 mm blade terminals to VBG 4 max. current rating: 4 A

Wire colour option
- black, red, blue or grey

Voltage rating
- AC 250 V/DC 65 V

Housing ground/earth
- on the inside via M6 screw by means of ring cable lug (two with redundant systems)
Power-D-Box with sockets pre-wired

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>19BGT</th>
<th>19” Power-D-Box with sockets pre-wired</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>1</td>
<td>1 U</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2 U</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>3 U</td>
</tr>
</tbody>
</table>

Prepared for circuit breaker types (supplied separately)

- 2210 for circuit breaker type 2210
- 3600 for circuit breaker type 3600/3900
- 1048 for SSRPC E-1048-600
- ESS20 for electronic circuit breaker type ESS20
- ESX10 for electronic circuit protector type ESX10

Number of positions
- 06: 6-poles
- 12: 12-poles
- 18: 18-poles
- 24: 24-poles
- 30: 30-poles
- nn: number of poles (special version)

Feed prewired

- A0: without
- R0: without, redundant
- A2: line feed pre-wired (2.5 mm²) 1-pole (or 1 circuit)
- R2: line feed pre-wired 1-pole redundant
- A4: line feed pre-wired (2.5 mm²) 2-pole (or 2 circuits)
- R4: line feed pre-wired 2-pole redundant
- A6: line feed pre-wired 3-pole (or 3 circuits)
- R6: line feed pre-wired 3-pole redundant
- A8: line feed pre-wired 4-pole (or 4 circuits)
- R8: line feed pre-wired 4-pole redundant

Wire colour (not with A0 + R0)

1-pole
- SW: black
- RT: red
- BL: blue
- GR: grey

2-pole
- RB: 1st pole red, 2nd pole blue
- RS: 1st pole red, 2nd pole black
- SB: 1st pole black, 2nd pole blue

3-pole
- SW: 1st pole to 3rd pole black
- SB: 1st pole to 2nd pole black, 3rd pole blue

4-pole
- SW: 1st pole to 4th pole black
- SB: 1st pole to 3rd pole black, 4th pole blue

Auxiliary contacts prewired (1 mm²)

- B0: without
- B1: auxiliary contacts connected in series (please consider plug-in device)
- B2: auxiliary contacts connected in parallel (please consider plug-in device)

Wire colour (not with B0)

SW: black
RT: red
BL: blue
GR: grey (standard)
S...: customer-specific version

Dimensions

- Bottom view 19BGT-2-ESS20-30A0-B0
- Top view 19BGT-2-2210-30A0-B0
- Bottom view 19BGT-2-3600-30A0-B0
- Top view 19BGT-2-2210-30A0-B0

This is a metric design and millimeter dimensions take precedence (mm) over inch.

Ordering example

19BGT - 2 - 2210 - 24 A2 SW - B1 GR - S...

www.e-t-a.com
Internal connection diagrams

2210

3600/3900

E-1048-600

Control and Protection Electronic

fault indication circuit

control circuit

green

red

3 from IN=8 A

LINE (+) DC 24 V

ON / OFF

status indication green / orange

rated current Iₚ

SO SI SC LOAD (+)

LOAD (+) load output

GND (-)

electronic control unit

short-circuit overload

current measurement

rated current Iₚ

S1 ON / OFF

status indication green / orange / red

reset input

reset output

SF signal output

electronic control unit

LOAD (+) load output

GND (-)

FAIL-safe

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Power-D-Box with sockets pre-wired

198GT-2-2210/3600-30A0-B1
pre-wiring of signalisation:
group signalisation - series connection
load terminal X22150301
10...16 (25) mm², plug-on type (optional)
busbar X1 (max. 63 A)
F1 F2 F6 F7 F8 F12 F25 F26 F30
1 mm²

198GT-2-2210/3600-30A0-B2
pre-wiring of signalisation:
group signalisation - parallel connection
load terminal X22150301
10...16 (25) mm², plug-on type (optional)
busbar X1 (max. 63 A)
F1 F2 F6 F7 F8 F12 F25 F26 F30
1 mm²

198GT-2-2210/3600-30A2-B0
pre-wiring of line feed,
1-pole protected by return busbar
load terminal X22150301
25 mm², plug-on type (optional)
busbar X1 (max. 63 A)
F1 F2 F6 F7 F8 F12 F25 F26 F30
2.5 mm²

198GT-2-2210/3600-30R2-B0
pre-wiring of line feed,
1-pole protected, redundant
load terminal X22150301
25 mm², plug-in type (optional)
busbar X2 (max. 63 A)
F1 F2 F3 F6 F7 F8 F12 F15 F16 F19 F22 F24 F25 F26 F30
2.5 mm²

198GT-2-2210/3600-30A4-B0
pre-wiring of line feed,
2-pole protected/switched
load terminal X22150301
25 mm², plug-on type (optional)
busbar X1 (max. 63 A)
F1 F2 F3 F6 F7 F8 F12 F15 F16 F19 F22 F24 F25 F26 F30
2.5 mm²

198GT-2-ESS20/ESX10-30A4-B0
pre-wiring of line feed,
1-pole protected
load terminals LOAD(-), blade terminals 6.3 mm
auxiliary contact terminals SC-SC make contact:
blade terminals 6.3 mm
F1 F2 F3 F6 F7 F8 F12 F15 F16 F19 F22 F24 F25 F26 F30
2.5 mm²

Termination

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Power-D-Box with sockets pre-wired**

### Accessories

**Blanking piece for Power-D-Box**  
(types 3600/3900, 2210)  
Y 308 563 01

**Blanking piece for Power-D-Box**  
(types ESS20/ESX10)  
Y 308 563 41

**Withdrawal tool for ESS20/ESX10**  
Y 308 602 01

**Line Terminal (max. 63 A)**  
X 221 503 01  
max. tightening torque 3.0 Nm

**Jumper**  
to bypass looped through unused auxiliary contacts  
(series connection)  
X 222 066 01

Caution: cables must not be connected with terminal plugged in

This is a metric design and millimeter dimensions take precedence (mm) inch

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The compact 2U 19" Power-D-Box with sockets mounted on a pcb and pre-connected features aluminium profiled cross members with an anodised front plate. The panel cutout accommodates up to 30 positions numbered 1 to 30. It is possible to have 6, 12, 18, 24 or 30 prepared slots or to have a redundant distribution with up to 2 x 15 positions.

The Power-D-Box accommodates plug-in type circuit breakers 3600/3900 and 2210, solid state remote power controller E-1048-700, electronic circuit breaker type ESS20 and electronic circuit protector E8X10. The required device must be specified in the ordering information as both different installation depth and pcb pin assignments must be allowed for.

The devices are plugged into corresponding sockets type 63-P10-Si (6 positions each), soldered onto the pcb and pre-connected.

The system is configured with redundancy as standard (2 x 15 positions), but the two groups may be interconnected so as to provide a non-redundant system if required. Line entry within each group is single pole or double pole.

With single pole line entry all slot numbers per group are combined and connected via an M6 terminal stud by means of a ring cable lug.

With double pole line entry, odd and even slot numbers are integrated into separate circuits each of which is connected via 10 mm² screw terminals. This allows use of double pole circuit breakers.

Load outputs are connected by means of screw terminals up to 4 mm² on the rear of the pcb.

The system offers a number of signalisation possibilities and separation for redundancy is also possible:

- series connection of make contacts (group signalisation via closed circuit current)
- parallel connection of break contacts (double sided for group signalisation via closed circuit current)
- parallel connection of break contacts (only one-sided, second side of break contacts will be connected individually with the terminals for single signalisation via closed or open-circuit current)

Termination is on the rear side by means of screw terminals up to 1.5 mm² (group connection) and up to 1 mm² (single signalisation) on the pcb. When using ESS20, ESX10 or E-1048-700, the required Gnd terminals as well as control and reset signals will also be connected via the terminals for group or single signalisation.

Upon request the group distribution (redundancy) can be cancelled by means of jumpers. Additional terminals on the rear side of the rack simplify connection. It is also possible to provide terminals for return lines from the individual loads so as to integrate the necessary external wiring into the rack.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>19&quot;Power-D-Box</td>
<td>length: 84 modules (426.72 mm) height: 2 U (88.90 mm) depth: 205...295 mm depending on the version</td>
</tr>
<tr>
<td>Front cutout for 30 positions, numbered 1 through 30</td>
<td>1 socket = 6 positions (no. 1 - 6) 2 socket = 12 positions (no. 1 - 12) 3 sockets = 18 positions (no. 1 - 18) 4 sockets = 24 positions (no. 1 - 24) 5 sockets = 30 positions (no. 1 - 30)</td>
</tr>
<tr>
<td>Mounting socket</td>
<td>polarised mounting socket type 63-P10-Si (6 positions) , soldered onto the pcb from the rear with wiring</td>
</tr>
<tr>
<td>Contact load</td>
<td>16 A continuously</td>
</tr>
<tr>
<td>Line entry X0 Single pole</td>
<td>2 groups, single pole each (= 2 separate circuits) 2 x 100 A max. via terminal stud M6 for ring cable lug</td>
</tr>
<tr>
<td>Supply feed X0 Double pole</td>
<td>2 groups, double pole each (= 4 separate circuits) 4 x 40 A max. via screw terminal up to 10 mm² (max. 4 x 50 A at max. 40 °C ambient temperature)</td>
</tr>
<tr>
<td>Load outputs X1</td>
<td>30 channels 16 A max. per pole via screw terminals up to 4 mm²</td>
</tr>
<tr>
<td>Signalisation group signalisation X2</td>
<td>series connection of make contacts / parallel connection of break contacts (double sided) in 2 groups (interconnectable by means of wire bridges) max. 1 A total current via screw terminal up to 1.5 mm² max. 0.5 A single current via screw terminal up to 1 mm²</td>
</tr>
<tr>
<td>Rated voltage</td>
<td>AC 250 V; DC 65 V</td>
</tr>
<tr>
<td>Housing ground/earth</td>
<td>on the inside via M6 screw by means of ring cable lug (two with redundant systems)</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>0...50 °C</td>
</tr>
</tbody>
</table>
# Ordering Information

<table>
<thead>
<tr>
<th>Type number</th>
<th>19BGT 19&quot; Power-D-Box with sockets pre-wired on pcb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device prepared for accommodation</td>
<td></td>
</tr>
<tr>
<td>3600</td>
<td>circuit breaker type 3600 or 3900</td>
</tr>
<tr>
<td>2210</td>
<td>circuit breaker type 2210-S</td>
</tr>
<tr>
<td>1048</td>
<td>solid state remote power controller E-1048-700</td>
</tr>
<tr>
<td>ESS20</td>
<td>electronic circuit breaker type ESS20</td>
</tr>
<tr>
<td>ESX10</td>
<td>electronic circuit breaker type ESX10</td>
</tr>
<tr>
<td>Number of positions</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6 poles</td>
</tr>
<tr>
<td>12</td>
<td>12 poles</td>
</tr>
<tr>
<td>18</td>
<td>18 poles</td>
</tr>
<tr>
<td>24</td>
<td>24 poles</td>
</tr>
<tr>
<td>30</td>
<td>30 poles</td>
</tr>
<tr>
<td>Additional wiring and terminals for line feed</td>
<td></td>
</tr>
<tr>
<td>A0</td>
<td>without (only pcb with terminals)</td>
</tr>
<tr>
<td>R0</td>
<td>none (only pcb with terminals, redundant)</td>
</tr>
<tr>
<td>A2</td>
<td>line feed pre-wired 1-pole</td>
</tr>
<tr>
<td>R2</td>
<td>line entry pre-wired single pole redundant</td>
</tr>
<tr>
<td>A3</td>
<td>line feed pre-wired 1-pole</td>
</tr>
<tr>
<td>R3</td>
<td>line feed pre-wired 1-pole + return busbar, redundant</td>
</tr>
<tr>
<td>A4</td>
<td>line feed pre-wired 2-pole connected</td>
</tr>
<tr>
<td>R4</td>
<td>line feed pre-wired 2-pole connected, redundant</td>
</tr>
<tr>
<td>Colour for additional wiring, line feed</td>
<td></td>
</tr>
<tr>
<td>(not with A0 or R0)</td>
<td></td>
</tr>
<tr>
<td>single pole wiring</td>
<td></td>
</tr>
<tr>
<td>SW</td>
<td>black</td>
</tr>
<tr>
<td>RT</td>
<td>red</td>
</tr>
<tr>
<td>BL</td>
<td>blue</td>
</tr>
<tr>
<td>multipole wiring</td>
<td></td>
</tr>
<tr>
<td>R8</td>
<td>1st pole red, 2nd pole blue</td>
</tr>
<tr>
<td>SB</td>
<td>1st pole black, 2nd blue</td>
</tr>
<tr>
<td>Auxiliary contact function</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>auxiliary contacts connected in series</td>
</tr>
<tr>
<td>(group signalisation)</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>auxiliary contacts connected in parallel</td>
</tr>
<tr>
<td>(group signalisation)</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>auxiliary contacts connected in parallel</td>
</tr>
<tr>
<td>(single signalisation)</td>
<td></td>
</tr>
<tr>
<td>B5</td>
<td>as B1, with additional wiring (1 mm²)</td>
</tr>
<tr>
<td>to terminal (not with A0)</td>
<td></td>
</tr>
<tr>
<td>B6</td>
<td>as B2, with additional wiring (1 mm²)</td>
</tr>
<tr>
<td>to terminal (not with A0)</td>
<td></td>
</tr>
<tr>
<td>Colour of additional wiring of auxiliary contacts</td>
<td></td>
</tr>
<tr>
<td>GR</td>
<td>grey (only with B5 or B6)</td>
</tr>
<tr>
<td>L</td>
<td>with printed circuit board (pcb)</td>
</tr>
<tr>
<td>S...</td>
<td>suffix number</td>
</tr>
<tr>
<td>for customer specific version</td>
<td></td>
</tr>
</tbody>
</table>

19BGT - 2 - 2210 - 24 A2 ... - B1 ... - L S... ordering example
Power-D-Box with pcb-mounted sockets

Dimensions

- Line entry max. 100 A
  - Terminal thread M6

- Auxiliary contact single signalling
  - Max. 0.5 A
  - Connection data
    - Rigid: 0.14 - 1.5 mm²
    - Flexible: 0.14 - 1.5 mm²

- Jumper to cancel redundancy

- Line entry max. 100 A
  - Terminal thread M6

- Auxiliary contact group signalling
  - Max. 0.5 A
  - Connection data
    - Rigid: 0.14 - 1.5 mm²
    - Flexible: 0.14 - 1.5 mm²

- Load outputs max. 16 A each
  - Connection data
    - Rigid: 0.2 - 6 mm²
    - Flexible: 0.2 - 4 mm²

- Auxiliary contact group signalling
  - Max. 1 A
  - Connection data
    - Rigid: 0.14 - 1.5 mm²
    - Flexible: 0.14 - 1.5 mm²

- Line entry max. 100 A
  - Terminal thread M6

Pin assignment bus pcb (terminal side)
## Dimensions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Connection Data</th>
<th>Max. Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line entry</td>
<td>Rigid 0.5 - 16 mm², Flexible 0.5 - 10 mm²</td>
<td>100 A (T_{amb} ≤ 40° C)</td>
</tr>
<tr>
<td>Auxiliary contact single signalisation</td>
<td>Rigid 0.14 - 1.5 mm², Flexible 0.14 - 1 mm²</td>
<td>0.5 A</td>
</tr>
<tr>
<td>Load outputs</td>
<td>Rigid 0.2 - 6 mm², Flexible 0.2 - 4 mm²</td>
<td>16 A each</td>
</tr>
<tr>
<td>Auxiliary contact group signalisation</td>
<td>Rigid 0.14 - 1.5 mm², Flexible 0.14 - 1.5 mm²</td>
<td>1 A</td>
</tr>
</tbody>
</table>

### Pin Assignment Bus PCB (Terminal Side)

```
<table>
<thead>
<tr>
<th>Pin Assignment</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X0</td>
<td>30 29 28</td>
</tr>
<tr>
<td>X1</td>
<td>27 26 25</td>
</tr>
<tr>
<td>X2</td>
<td>24 23 22</td>
</tr>
<tr>
<td>X3</td>
<td>21 20 19</td>
</tr>
<tr>
<td>X4</td>
<td>18 17 16</td>
</tr>
<tr>
<td>X5</td>
<td>15 14 13</td>
</tr>
<tr>
<td>X6</td>
<td>12 11 10</td>
</tr>
<tr>
<td>X7</td>
<td>9 8 7</td>
</tr>
<tr>
<td>X8</td>
<td>6 5 4 3 2 1</td>
</tr>
</tbody>
</table>
```

Fitted with ESX10 or 2210

Fitted with ESS20

Ground Stud
Schematic diagrams

### Bus pcb (signalisation B1, B2, B5, B6)

Pin assignment 63-P10-Si
- 1 Line 2: 1 Line (+)
- 2 Load 1: 2 Load (+)
- 12: Gnd (-)
- 13: SI
- 14: SO

### Bus pcb (signalisation B3)
Blanking piece for Power-D-Box
(types 3600/3900, 2210)
Y 308 563 01

Blanking piece for Power-D-Box
(types ESS20/ESX10)
Y 308 563 41

Withdrawal tool for ESS20/ESX10
Y 308 602 01

Jumper
to bypass looped through unused auxiliary contacts
(series connection)
X 222 066 01

This is a metric design and millimeter dimensions take precedence (\textsuperscript{mm}inch).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The Power-D-Box is a compact 2U power distribution system made of aluminium.

The 19BGT-2-X is a compact 19" 2 U power distribution rack incorporating E-T-A plug-in circuit breakers type 2210-S291 (for 19BGT-2-X2210-...), 8340-F (for 19BGT-2-X83S2/..S4/..Z4-...) or 8345-.01-.W0 (for 19BGT-2-X8345-...). These are installed in pre-wired E-T-A power distribution rails type X2210-S, X8340-S02, X8340-S04, X8340-SZ4 or X8345-D01. Options available include separate circuits, redundant circuits and customer-specific marking.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>19&quot; Modular Power-D-Box</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>2 U = 88.90 mm</td>
</tr>
</tbody>
</table>

- Distribution rails (pre-wired)
  - X2210 for X2210-S Economy, max. 12 poles / 2 x 6 poles
  - X83S2 for X8340-S02 Economy, max. 16 poles / 2 x 8 poles
  - X83S4 for X8340-S04 Economy, max. 3 x 4 poles
  - X83Z4 for X8340-SZ4 Economy, max. 16 poles / 2 x 8 poles
  - X8345 for X8345-D01 High-Power, max. 18 poles / 2 x 7 poles

- Number of slots (numbered)
  - 02 2 poles
  - 03 3 poles
  - 04 4 poles
  - 05 5 poles
  - 06 6 poles
  - 07 7 poles
  - 08 8 poles
  - 09 9 poles
  - 10 10 poles
  - 12 12 poles
  - 14 14 poles
  - 16 16 poles
  - 18 18 poles

- Pre-wired supply-feed
  - A0 without, with single power distribution system
  - R0 without, with redundant power distribution system

- Pre-wired auxiliary contacts (0.75 mm²)
  - B0 without
  - S... special version

Technical data

- 19" Power-D-Box
  - length: 426.72 mm
  - height: 2 U (88.90 mm)
  - material: aluminium

- Voltage rating
  - AC 230 V; DC 110 V; DC 80 V; DC 65 V

Details of power distribution systems:

- X2210-S...
  - pages 7 - 57 to 7 - 58
- X8340-S02
  - pages 7 - 65 to 7 - 66
- X8340-S04
  - pages 7 - 67 to 7 - 68
- X8340-SZ4
  - pages 7 - 69 to 7 - 71
- X8345-D01
  - pages 7 - 73 to 7 - 76
Modular Power-D-Box

Dimensions 19BGT-2-X8345 (High-Power)

- not redundant
- Dimensions 19BGT-2-X8345 (High-Power)
  - 584.2 (23") optional
  - 531.4 (ETSI) optional
  - 482.6 (19")

Dimensions 19BGT-2-X2210 (Economy)

Dimensions 19BGT-2-X83S2 (Economy)

Dimensions 19BGT-2-X83S4 / -X83Z4 (Economy)

- 76.2 max. 88.9
- 150

- power distribution system X8340-S24
- power distribution system X8340-S04

This is a metric design and millimeter dimensions take precedence (mm) / inch.
Schematic diagram X2210-S (Economy)

- Distribution rail
- Circuit breaker
- Load
- Terminal block

Schematic diagram X8340-S02 (Economy)

- Module with circuit breaker E-T-A 8340-F...
- Circuit breaker
- Load terminals

Schematic diagram X8340-S04 (Economy)

- Module for 4 circuit breakers
- Ground bridge (optional)
- Screw terminal
- Load terminals

Schematic diagram X8340-SZ4 (Economy)

- Module with power supply left-side
- Ground bridge
- Load terminals

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Schematic diagram X8345-D01 (High Power)**

Module 1

- \( L^- \)
- \( L^+ \)
- Signallation terminal
- 1 11
- 2 12

Module 2

- \( L^- \)
- \( L^+ \)

Module 3

- \( L^- \)
- \( L^+ \)

Module 4

- \( L^- \)
- \( L^+ \)

**Accessories**

Load output terminal protected against reverse polarity
(set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm)
- X 222 847 01 for cable cross section 0.7...2.0 mm²
- X 222 625 01 for cable cross section 2.5...4.0 mm²
- X 222 848 01 for cable cross section 4.0...6.0 mm²

Blanking piece for Power-D-Box (circuit breaker types 8340, 8345)
- Y 308 563 11

Blanking piece for Power-D-Box (circuit breaker types 8340, 8345-D01)
- Y 308 563 21

This is a metric design and millimeter dimensions take precedence (\( \text{mm} \)) over \( \text{inch} \).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description
E-T-A rails distribute electrical power in telecommunications, automation, data and control systems. They have been designed to industry standard requirements and are suitable for mounting in ETSI control cabinets. These distribution rails are supplied with mounting bracket, cover, 6 blanks and withdrawal tool. Live parts in terminal areas are protected against brush contact (VDE 106, part 100).

Typical applications
Telecommunications systems using ETSI racks; process control, measuring and control systems.

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X2210</td>
<td>Module for circuit breaker type 2210-S291-...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Identification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>6 positions</td>
</tr>
</tbody>
</table>

- **Terminal block (intermediate element) (fitted)**
  - 00 without
  - 01 1 x
  - 02 2 x
  - 03 3 x
  - 04 4 x
  - 05 5 x
  - 06 6 x
- **Accessories (fitted)**
  - G without mounting bracket
  - H with mounting bracket
  - J with mounting bracket, cover and 6 blanks
- **R without mounting bracket, with cover and 6 blanks**

X2210 - S 06 06 J ordering example

Accessories

- **Terminal block** X 211 019 01
- **Withdrawal tool** X 211 018 01

Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers to be fitted</td>
<td>2210-S291-P9M2-410005, 2210-S291-P9M2-410033</td>
</tr>
<tr>
<td>Voltage rating</td>
<td>AC 250 V; DC 65 V</td>
</tr>
<tr>
<td>Load</td>
<td>max. 25 A per position, max. 80 A for complete unit</td>
</tr>
<tr>
<td>Signallisation (N/C contact)</td>
<td>AC 240 V / DC 65 V</td>
</tr>
<tr>
<td>Insulation co-ordination (IEC 60664 and 60664A)</td>
<td>Rated impulse withstand voltage 2.5 kV, Pollution degree 2</td>
</tr>
<tr>
<td>Flame retardance (IEC 60695, part 2-2)</td>
<td>Self-extinguishing</td>
</tr>
<tr>
<td>Terminal design</td>
<td>Clamp-type terminal 2.5 to 25 mm² flexible, clamp-type terminal 0.5 to 25 mm² flexible</td>
</tr>
<tr>
<td>Typical volume resistances in main circuit</td>
<td></td>
</tr>
<tr>
<td>input terminal B + (N) to output terminal + (N)</td>
<td>&lt; 1.5x10⁻⁹ Ω</td>
</tr>
<tr>
<td>input terminal B - (U) to female contact 2 (k)</td>
<td>&lt; 1.5x10⁻⁹ Ω</td>
</tr>
<tr>
<td>input terminal B-Sig to female contact 12</td>
<td>&lt; 2x10⁻⁹ Ω</td>
</tr>
<tr>
<td>output terminal - (U) to female contact 1</td>
<td>&lt; 1.5x10⁻⁹ Ω</td>
</tr>
<tr>
<td>output terminal - ⊥ to female contact 11</td>
<td>&lt; 2x10⁻⁹ Ω</td>
</tr>
<tr>
<td>Mass X2210-S0606J</td>
<td>660 g</td>
</tr>
</tbody>
</table>
Dimensions

- Phillips screw M5 DIN 7985 (captive)
- Phillips screw M2.5 DIN 41494 T1.5 (captive)
- 25 mm² conductor size cable to be stripped over 15 mm / .991 in.
- 2.5 mm² conductor size

Installation example

- Distribution rail
- Voltage input
- Terminal bloc
- Circuit breaker
- Mounting bracket
- Load input
- Load
- Terminal bloc
- Cover

Legend:
- S (N) (U)
- + –
- I >

Internal connection diagram

This is a metric design and millimeter dimensions take precedence (mm). In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Thermal-magnetic circuit breaker mounted on Euro Card for 19" rack mounting, with one Euro Card accommodating one or two single pole, double pole or three pole circuit breakers. Convenient toggle actuation enables series 2210 additionally to be used as an ON/OFF switch. A red LED is located in the front frame of the Euro Card, indicating the switching status of the circuit breaker (via the auxiliary circuit).

Typical applications

Process control, measuring and control systems, telecommunications

Technical data

Circuit breaker

Main circuit:
- voltage rating: 3 AC 433 V (50/60 Hz); AC 250 V (50/60 Hz); DC 65 V
- current rating range: 0.1...16 A
- standard current ratings: 0.1 0.2 0.3 0.4 0.5 0.6 0.8 A

Auxiliary circuit:
- voltage rating: AC 240 V; DC 65 V
- current rating: 1 A

Other data: see type 2210-S2..

Front plate

Dimensions
(1 module = 5.08 mm, 1 U = 44.45 mm)

<table>
<thead>
<tr>
<th>Width</th>
<th>one single pole circuit breaker</th>
<th>4 modules</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>one double pole circuit breaker</td>
<td>6 modules</td>
</tr>
<tr>
<td></td>
<td>one three pole circuit breaker</td>
<td>9 modules</td>
</tr>
<tr>
<td></td>
<td>two single pole circuit breakers</td>
<td>4 modules</td>
</tr>
<tr>
<td></td>
<td>two double pole circuit breakers</td>
<td>10 modules</td>
</tr>
<tr>
<td></td>
<td>two three pole circuit breakers</td>
<td>12 modules</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Height</th>
<th>3 U</th>
</tr>
</thead>
</table>

Material: aluminium, anodized

LED

Voltage rating: DC 24 V / DC 60 V
### Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>E2210</th>
</tr>
</thead>
</table>

**Mounting style**

1. 1 x single pole, central mounting (standard)
2. 1 x single pole, top mounting
3. 1 x single pole, bottom mounting
4. 1 x double pole, central mounting (standard)
5. 1 x three pole, central mounting (standard)
6. 2 x single pole, symmetrical mounting (standard)
7. 2 x double pole, symmetrical mounting (standard)
8. 2 x three pole, symmetrical mounting (standard)

**Front plate**

1. aluminum (standard)
2. moulded (Intermas)

**LED**

1. red, DC 24 V (standard)
2. red, DC 60 V
3. green, DC 24 V
4. green, DC 60 V

**Circuit breaker**

**Mounting**

1. panel mounting

**Actuator design**

2. short toggle

**Number of poles**

1. 1-pole protected
2. 2-pole protected
3. 3-pole protected
4. 2-pole, protected on one pole only

**Panel mounting**

1. with M3 thread

**Terminal design (main contacts)**

- P1 blade terminals 6.3-0.8 (standard)
- Characteristic curve**
  - 01 F1 fast acting: therm. 1.01-1.4 x I_n
  - 02 M1 standard delay: therm. 1.01-1.4 x I_n;
  - 03 T1 delayed: therm. 1.01-1.4 x I_n;
  - 04 T2 thermal only: 1.01-1.4 x I_n
  - 05 M3 standard delay, low resistance:
    - therm. 1.4-1.8 x I_n
    - magn. 6-12 x I_n AC; 7.8-15.6 x I_n DC
- F2 fast acting: therm. 1.1-1.4 x I_n
- XX different curves for multipole versions to order*

**Intermediate position**

- H without intermediate position (standard)
- Z with intermediate position

**Auxiliary contacts**

1. with auxiliary contacts (only with 1x1-pole, 2x1-pole)
2. with auxiliary contact only in the last unit of multipole versions

**Auxiliary contact function**

- 1 N/C, 1 N/O (standard)
- 2 N/O (23/24)
- 3 N/C (11/12)
- 4 N/O contact, closed in the intermediate and ON position (-Z only)

**Auxiliary contact-terminal design**

- same as main terminals **

**Current ratings***

- 0.1-16 A

**XX**

- 0.1/0.2 A

- only with 2x1-pole/2x2-pole/2x3-pole

---

*) Clearly add the desired specifications.

**) With mounting styles 6, 7 and 8: both circuit breakers must have the same characteristics.

*** It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

---

### One single pole circuit breaker

#### Dimensions

![Diagram of one single pole circuit breaker](image)

- Terminal selection

  - View X
  - View Y

  - LED G I
  - LED G II

  - multi-pin connector

#### Internal connection diagram

- ON position
- Intermediate position
- Load
- OFF position

---

### Two single pole circuit breakers

#### Dimensions

![Diagram of two single pole circuit breakers](image)

- Terminal selection

  - View X
  - View Y

  - LED G I
  - LED G II

  - multi-pin connector

#### Internal connection diagrams for units G I and G II

- ON position
- Intermediate position
- Load
- OFF position

---

This is a metric design and millimeter dimensions take precedence over inch dimensions.
This is a metric design and millimeter dimensions take precedence (mm).
Sockets for Euro Cards

Description

The following sockets may be used with single pole circuit breakers:

**0Z041Z000004**
24/7-pole mixed socket to DIN 41612 - form M. Connection: 7-pole for 6.3x0.8 mm connectors and 24-pole for 2.8x0.8 mm connectors.

**0Z041Z000007**
24/7-pole mixed socket to DIN 41612 - form M. Connection: 7-pole for 6.3x0.8 mm connectors and 24-pole for 2.8x0.8 mm connectors.

**0Z041Z000005**
A 15-pole socket to DIN 41612, form H, for 6.3x0.8 mm connectors is required in addition to the socket mentioned above, if two double pole or two three pole circuit breakers are fitted on one Euro Card.

Dimensions of sockets for Euro Cards

<table>
<thead>
<tr>
<th>Description</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>0Z041Z000004</td>
<td>Width: 84.9 mm, Height: 3.34 mm, Depth: 3.74 mm, Blade panel: 12.4 mm</td>
</tr>
<tr>
<td>0Z041Z000007</td>
<td>Width: 84.9 mm, Height: 3.34 mm, Depth: 3.74 mm, Blade panel: 12.4 mm</td>
</tr>
<tr>
<td>0Z041Z000005</td>
<td>Width: 84.9 mm, Height: 3.34 mm, Depth: 3.74 mm, Blade panel: 12.4 mm</td>
</tr>
</tbody>
</table>

This is a metric design and millimeter dimensions take precedence (\(\text{mm}\)).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Thermal-Magnetic Circuit Breaker E2215

Description
Thermal-magnetic circuit breaker mounted on Euro Card for 19” rack mounting, with one Euro Card accommodating up to three circuit breakers. Convenient toggle actuation enables series 2215 additionally to be used as an ON/OFF switch. A red LED is located in the front frame of the Euro Card, indicating the switching status of the circuit breaker (via the auxiliary circuit).

Typical applications
Process control, measuring and control systems, telecommunications

Ordering information for circuit breakers only

<table>
<thead>
<tr>
<th>Type No.</th>
<th>E2215</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td></td>
</tr>
<tr>
<td>1 3 x 1-pole, mounted symmetrically (standard)</td>
<td></td>
</tr>
<tr>
<td>2 2 x 1-pole, mounted centrally above and below</td>
<td></td>
</tr>
<tr>
<td>3 2 x 1-pole, mounted above and below</td>
<td></td>
</tr>
<tr>
<td>4 2 x 1-pole, mounted below and centrally</td>
<td></td>
</tr>
<tr>
<td>5 1 x 1-pole, mounted above</td>
<td></td>
</tr>
<tr>
<td>6 1 x 1-pole, mounted centrally</td>
<td></td>
</tr>
<tr>
<td>7 1 x 1-pole, mounted below</td>
<td></td>
</tr>
<tr>
<td>Handle</td>
<td></td>
</tr>
<tr>
<td>1 aluminium handle (standard)</td>
<td></td>
</tr>
<tr>
<td>LED</td>
<td></td>
</tr>
<tr>
<td>1 red LED, DC 24 V (standard)</td>
<td></td>
</tr>
<tr>
<td>Circuit breaker</td>
<td></td>
</tr>
<tr>
<td>Actuator design</td>
<td></td>
</tr>
<tr>
<td>L2 moulded toggle</td>
<td></td>
</tr>
<tr>
<td>Number of poles</td>
<td></td>
</tr>
<tr>
<td>1 single pole protected</td>
<td></td>
</tr>
<tr>
<td>Accessories</td>
<td></td>
</tr>
<tr>
<td>0 without</td>
<td></td>
</tr>
<tr>
<td>Terminal design</td>
<td></td>
</tr>
<tr>
<td>P1 blade terminals A6.3-0.8 (standard)</td>
<td></td>
</tr>
<tr>
<td>Characteristic curve</td>
<td></td>
</tr>
<tr>
<td>01 F1 fast acting: therm. 1.01 x I N; magn. 2-4 x I N DC (DC only)</td>
<td></td>
</tr>
<tr>
<td>02 M1 standard delay: therm. 1.01-1.4 x I N; magn. 5-10 x I N DC; magn. 3.5-8 x I N DC</td>
<td></td>
</tr>
<tr>
<td>03 T1 delayed: therm. 1.01-1.4 x I N; magn. 6-13 x I N AC</td>
<td></td>
</tr>
<tr>
<td>07 T3 delayed: therm. 1.01-1.4 x I N; magn. 9.5-15.5 x I N AC</td>
<td></td>
</tr>
</tbody>
</table>

Technical data

Circuit Breaker
Main circuit:
- voltage rating: AC 250 V (50/60 Hz); DC 48 V
- current rating range: 0.05…10 A
- standard current ratings: 0.1 0.2 0.3 0.4 0.5 0.6 A
  0.8 1 1.5 2 2.5 3 A
- 4 5 6 8 10 A

Auxiliary circuit:
- voltage rating: AC 250 V/DC 28 V
- current rating: 1 A

Other data:
see type 2215

Front plate
Dimensions:
- width: 4 modules (1 module = 5.08 mm)
- height: 3 U (1 U = 44.45 mm)

Material:
aluminium, anodized

LED
Max. voltage rating: DC 24 V

Select the circuit breakers to above ordering information. For further information please refer to group 2.

It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

Please add “Circuit breakers to be mounted on Euro Card” to the circuit breaker designation when ordering so that the applicable suffix number for the special version (E2215-…-L2..) can be determined.

19” racks may also be fitted with one or two circuit breakers by the customer, using industry standard components such as base plates, front plates with handle, sockets. Connection by means of blade terminals 6.3x0.8 mm.

E2215 3 1 1 - L2 1 0 - 02 - S1 1 - 0.1 A ordering example
Thermal-Magnetic Circuit Breaker E2215

**Dimensions**

<table>
<thead>
<tr>
<th>Unit I (GI)</th>
<th>Unit II (GII)</th>
<th>Multi-pin Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td></td>
</tr>
<tr>
<td>ON</td>
<td>OFF</td>
<td></td>
</tr>
</tbody>
</table>

**Terminal selection**

Connection of the Euro Card DIN 41612 with socket type H7/F24-F413.173
Connector of the 19” rack to DIN 41494

**Internal connection diagrams**

Applicable to all circuit breakers GI to GIII

OFF position

ON position

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Distribution rail X8340-S02

Description

Modular distribution rail, each module accommodating 2 magnetic or hydraulic-magnetic circuit breakers type 8340-F... and associated load terminals. Circuit breaker status indication (group signalisation) is via 2 busbars. Power supply is via right- or left-side terminal block. Live parts in the plug-in and supply feed terminal areas are protected against brush contact. Circuit breakers may be replaced with power on.

Typical applications

Telecommunications and cellular communication systems

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8340</td>
<td>Distribution rail for circuit breaker type 8340</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8340</td>
<td>Distribution rail for circuit breaker type 8340</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Rail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Identification number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>02</td>
<td>Modular, for 2 circuit breakers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Left-side</td>
</tr>
<tr>
<td>R</td>
<td>Right-side</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Modules with power supply</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 module, 2-way</td>
</tr>
<tr>
<td>2</td>
<td>2 modules, 2-way each</td>
</tr>
<tr>
<td>3</td>
<td>3 modules, 2-way each</td>
</tr>
<tr>
<td>4</td>
<td>4 modules, 2-way each</td>
</tr>
<tr>
<td>5</td>
<td>5 modules, 2-way each</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signalisation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Without signalisation</td>
</tr>
<tr>
<td>1</td>
<td>Group signalisation</td>
</tr>
<tr>
<td>2</td>
<td>Group signalisation, through-connected for right- or left-side power supply (main current path separated)</td>
</tr>
<tr>
<td>3</td>
<td>Single signalisation</td>
</tr>
</tbody>
</table>

Technical data

For circuit breaker type 8340-F.10-P1...-H...

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 230 V; DC 80 V</td>
<td>Load</td>
</tr>
<tr>
<td>25 A per position; 132 A for complete unit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signalisation (N/C)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 A; AC 230 V; 1 A; DC 80 V per position</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation co-ordination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated impulse withstand voltage 2.5 kV</td>
<td></td>
</tr>
<tr>
<td>Pollution degree 2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flame retardance</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(IEC 60664, part 2-2)</td>
<td>Self-extinguishing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply terminal design (terminal socket)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recessed screw/pressure plate 6...50 mm², stranded feed-in 6...35 mm² with connector sleeve</td>
<td></td>
</tr>
<tr>
<td>Additional blade terminals 6.3x0.8 blade terminals 6.3x0.8</td>
<td></td>
</tr>
<tr>
<td>Load output terminal protected against reverse polarity</td>
<td></td>
</tr>
<tr>
<td>Load (module)</td>
<td>Description</td>
</tr>
<tr>
<td>64 A</td>
<td></td>
</tr>
<tr>
<td>30 A</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signalisation (module)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blade terminals 4.8x0.8</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mass</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal block 144 g</td>
<td></td>
</tr>
<tr>
<td>Power distribution module 96 g</td>
<td></td>
</tr>
<tr>
<td>Cover 12 g</td>
<td></td>
</tr>
</tbody>
</table>

Internal connection diagrams

Load output terminal protected against reverse polarity (set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm²)

X 222 847 01 for cable cross section 0.7...2.0 mm²

X 222 625 01 for cable cross section 2.5...4.0 mm²

X 222 848 01 for cable cross section 4.0...6.0 mm²

Approvals

<table>
<thead>
<tr>
<th>Authority</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1801</td>
<td>AC 250 V; DC 80 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 A</td>
</tr>
</tbody>
</table>

X8340 - S 02 L 5 - 1 01 B ordering example

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
**Distribution rail X8340-S02**

### Dimensions

**Distribution rail, shown with power supply right-side**

X8340-S02R-...

- recessed screw M6
- tightening torque max. 5 Nm
- terminal block

**Distribution rail, ground stud M6 (optional)**

- ground stud terminal
- tightening torque max. 3 Nm

**Distribution rail, single signalisation**

- terminals twisted by 20°
- terminal to DIN 46244 A2.8-0.8

**Distribution rail, shown with power supply left-side**

X8340-S02L-...

- mounting screw M4
- tightening torque max. 1.5 Nm (optional)
- ground bridge in first module (optional)
- ground connection between signalisation and metal base

**Internal connection diagram**

**Group signalisation**

**Single signalisation**

This is a metric design and millimeter dimensions take precedence (mm) inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
**Description**

Distribution rail for one or two modules suitable for ETSI control cabinet and similar applications. One module comprises 4 positions for magnetic or hydraulic-magnetic circuit breakers type 8340-F… and associated line and load terminals. Circuit breaker status indication (group signalisation) is via two busbars. The modular design facilitates the operation of a single distribution rail at two different voltages. Live parts in the plug-in and supply feed terminal areas are protected against brush contact. Expansion or circuit breaker replacement is possible with power on.

**Typical applications**

Telecommunications, measuring and control systems

---

**Ordering information**

<table>
<thead>
<tr>
<th>Type No.</th>
<th>X8340</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution rail for circuit breaker type 8340-F</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>5 rail</th>
</tr>
</thead>
</table>

| Identification number | 04 modular, for 4 circuit breakers |

<table>
<thead>
<tr>
<th>Modules with power supply</th>
<th>1</th>
<th>1 module, 4-way</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 modules, 4-way each</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Accessories</th>
<th>0</th>
<th>without</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>mounting bracket, 2 modules + mounting screw</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>mounting bracket, 2 modules + cover + mounting screw</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>cover</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>mounting bracket, 1 module + cover + mounting screw</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>cover + mounting screw</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>mounting screw</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signalisation</th>
<th>0</th>
<th>without</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>group signalisation + ground connection</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>group signalisation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Order example</th>
<th>X8340 - S 04 2 1 - 1</th>
</tr>
</thead>
</table>

---

**Technical data**

- **For circuit breakers**: 8340-F.10-P...-...H...
- **Voltage rating**: AC 230 V; DC 80 V
- **Load**: 20 A per position, 80 A for module
- **Signalisation (N/C)**: 6 A, AC 230 V, 1 A, DC 80 V per position
- **Insulation co-ordination (IEC 60664 and 60664A)**: Rated impulse withstand voltage 2.5 kV, Pollution degree 2
- **Flame retardance (IEC 60695, part 2-2)**: self-extinguishing
- **Supply terminal design**: recessed screw/pressure plate feed 6...25 mm², stranded or 6...16 mm² with connector sleeve screw-less connectors 0.5...2.5 mm², stranded, with connector sleeve
- **Mass**
  - module: 220 g
  - cover: 35 g
  - bracket: 145 g

---

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 1801</td>
<td>AC 250 V; DC 80 V</td>
<td>80 A</td>
</tr>
</tbody>
</table>
Distribution rail X8340-S04

Dimensions

**X8340-S0422** (right cover not represented)

- Terminal for group signalisation
- Mounting screw M4
- Tightening torque max. 1.5 Nm
- Marking strip
- Load terminals
- Distribution rail
- Supply 1
- Supply 2
- Mounting bracket
- Module
- Cover

**View X**

- Recessed screw M5
- Tightening torque max. 4 Nm
- Marking strip
- 64.6
- 74.2
- 30.5
- 48
- 12
- 3.90
- 0.35
- 1.38
- 1.64
- 1.18
- 9.9
- 3.90
- 3.079
- 0.035
- 0.9
- 4.27
- 108.5
- 4.9
- 158.8
- 6.25
- 1.89
- 0.551
- 3.79
- 81.8
- 6.22
- 3.72
- 99
- 2
- 1
- *E-T-A circuit breaker type 8340-F...
  (not supplied with product)

**X8340-S0414**

- Recessed screw M5
- Tightening torque max. 4 Nm
- Ground bridge (optional)
- Load terminals
- E-T-A circuit breaker type 8340-F...
  (not supplied with product)

Internal connection diagram

Module for 4 circuit breakers

- Supply terminals
- Ground bridge (optional)
- Screw terminal

This is a metric design and millimeter dimensions take precedence (mm) inch.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Distribution rail with modules connected in series. One module provides 4 positions for magnetic or magnetic-hydraulic circuit breakers type 8340-F... and the pertinent line and load terminals on the front and rear side of the rail. Supply feed is either on the right or left side with copper busbars. Trip indication of the circuit breakers (group signalisation) is possible via two signal busbars.

Live parts in the plug-in area of the load terminals are protected against brush contact. Circuit breaker replacement is possible with power on.

### Typical applications

Telecommunications, measuring and control systems

### Technical data

| Plug-in type circuit breakers | 8340-F110-P1...-H... |
| Voltage rating                | AC 230 V; DC 80 V    |
| Load                          | 25 A per position (30 A upon request) 150 A for the rail |
| Signalisation (N/C contact)   | 6 A, AC 230 V 1 A, DC 80 V per position |
| Insulation co-ordination (IEC 60664) | Rated impulse withstand voltage 2.5 kV Pollution degree 2 |
| Flame retardance (IEC 60695, part 2-2) | self-extinguishing |

### Terminal design

- Supply feed: copper busbar 10x3 mm with hole ø 5.3 mm dia.
- Current supply from the rear side (left or right)
- Loads: blade terminals DIN 46244-A6.3x0.8mm
- Load output terminal protected against reverse polarity on front and rear side
- Signalisation: blade terminals DIN 46244-A6.3x0.8mm plug-in direction as circuit breakers, opposite to the main terminal side

### Mass

- Module: 200 g
- Every additional module: 145 g
Distribution rail X8340-SZ4

Dimensions

Distribution rail. Power supply left-side

View X

* E-T-A circuit breaker type 8340-F... (not supplied with product)

Distribution rail X8340-SZ4L1-0A1

This is a metric design and millimeter dimensions take precedence (mm) inch

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Load output terminal protected against reverse polarity
(set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm)
X 222 847 01 for cable cross section 0.7...2.0 mm²
X 222 625 01 for cable cross section 2.5...4.0 mm²
X 222 848 01 for cable cross section 4.0...6.0 mm²

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

Distribution rail comprising series connected circuit breaker mounting modules. Each module accommodates one magnetic or magnetic-hydraulic circuit breaker type 8345 and the associated line and load terminals on the rear side of the rail. Supply feed is either on the right or left side with copper busbars. Trip indication of the circuit breakers (group signalisation) is possible via two signal busbars. Live parts in the plug-in area of the load terminals are protected against brush contact (IP20). Replacement of circuit breakers (switched off) is possible with power on.

Typical applications

Telecommunications, measuring and control systems

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X8345</td>
<td>Distribution rail for circuit breaker type 8345</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Identification number</th>
</tr>
</thead>
<tbody>
<tr>
<td>D rail</td>
<td>01 module for 1 circuit breaker</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Terminal (supply feed)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L left side</td>
<td>R right side</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power distribution modules</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>02 2 modules</td>
<td>03 3 modules</td>
</tr>
<tr>
<td>04 4 modules</td>
<td>05 5 modules</td>
</tr>
<tr>
<td>06 6 modules</td>
<td>07 7 modules</td>
</tr>
<tr>
<td>08 8 modules</td>
<td>09 9 modules</td>
</tr>
<tr>
<td>10 10 modules</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Signalisation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0 without</td>
<td>1 group signalisation</td>
</tr>
<tr>
<td>parallel connection</td>
<td></td>
</tr>
</tbody>
</table>

**Terminal design of main circuitry**

| 01 2xM12 hexagon head screws for single-hole cable lug (300 A) |
| 03 2xM12 bent, hexagon head screws for double-hole cable lug |

**Terminal design of circuit breaker module**

| 01 hexagon head screw M6 for single-hole cable lug |
| 07 hexagon head screw M6 for single-hole cable lug, with barrier |

**Accessories**

| 00 without | 01 19’ mounting bar and screws M5, for module and frame, bulk shipped (length = 431.4 mm) |
| 02 mounting bar (length = 153.8 mm) |

**Marking**

| A standard without marking |

**Technical data**

| Plug-in type circuit breakers | 8345-01.-W0.-D.... and auxiliary contact module X8345-S01KW102-M |

| Voltage rating | DC 110 V other ratings upon request |

| Max. load | 125 A per position (total 160 A for the two neighbouring positions when a breaker rated > 80 A is used), 600 A per complete module |

| Ambient temperature | -30...+60 °C |

| Signalisation (N/C contact) | DC 80 V 0.5 A per position |

<table>
<thead>
<tr>
<th>Insulation co-ordination (IEC 60664)</th>
<th>Rated impulse withstand voltage Pollution degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>(2.5 kV)</td>
<td>2</td>
</tr>
</tbody>
</table>

| Flame retardance (IEC 60695, part 2-2) | self-extinguishing |

**Terminal design supply feed**

copper bar 20x25 mm with M10 thread current supply from the rear side (left or right) (tightening torque max. 15 Nm)

**load**

screw terminals M6 (tightening torque max. 7 Nm) on rear side

**signalisation**

2 blade terminals DIN 46244-A6.3x0.8mm

**Mass**

module approx. 320 g

**Approvals**

<table>
<thead>
<tr>
<th>Authority</th>
<th>Voltage ratings</th>
<th>Current ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL 60950</td>
<td>AC 277 V; DC 110 V</td>
<td>600 A</td>
</tr>
</tbody>
</table>

X8345 - D 01 L 05 + 1 - 01 + 01 -01 A ordering example
**Distribution rail X8345-D01**

### Dimensions

**Signalisation 1**
- Blade terminals IEC 61210 A6,3 x 0,8 with reverse plug-in protection
- Observe installation distances of circuit breaker
- Observe installation distances of circuit breaker

**Observe in installation**
- Hexnut DIN EN ISO 4032 - M5 - 8 - AOP tightening torque for mounting screw M5 max. 3.0 Nm

**Observe in installation**
- Type: 8345-501KW102M

This is a metric design and millimeter dimensions take precedence (mm)

### Internal connection diagrams

#### Module 1
- Signalisation terminal
- L(-)
- L(+)

#### Module 2
- L(-)
- L(+)

#### Module 3
- L(-)
- L(+)

#### Module 4
- L(-)
- L(+)

---

**Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com**
Terminal design

Main circuit 01

hexagon head screw DIN EN ISO 4017 - M12x25 - A4 and washer DIN EN ISO 7092 - 12 - 200HV - A4 mounted tightening torque max 15.0 Nm

left-side supply feed
right-side supply feed also available

Main circuit 03

hexagon head screw DIN EN ISO 4017 - M12x25 - A4 and washer DIN EN ISO 7092 - 12 - 200HV - A4 mounted tightening torque max 15.0 Nm

left-side supply feed
right-side supply feed also available

This is a metric design and millimeter dimensions take precedence (mm) inch

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Distribution rail X8345-D01

Terminal design

Circuit breaker module 01
without barrier

Circuit breaker module 07
with barrier

Accessories

Withdrawal tool
X 222 547 02

This is a metric design and millimeter dimensions take precedence (inches).

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The E-T-A Zero Current Monitor comprises a monitoring circuit with a current transformer and an opto decoupled output circuit with a triac (with AC output circuit) or transistor (with DC output circuit). The current transformer in the monitoring circuit does not only supply the input signal but also the very low power consumption of the Monitor. Zero current monitors are generally used to monitor circuits for wire breakage. The E-T-A Zero Current Monitor E-1076-SR may also be used to switch on an elapsed-hour meter. In this case the opto decoupled triac or transistor output will provide the control signal for the meter as soon as the load to be monitored is switched on.

The E-T-A Zero Current Monitor is supplied in a compact moulded housing with screw terminals for mounting on DIN EN 50022 and DIN EN 50035 rails.

Typical applications

- Wire break monitoring
- Control of elapsed-hour meters
- Life testing (e.g. lamps)
- Monitoring of heater elements (e.g. in furnaces)

Features

- No auxiliary voltage required
- Compact design
- Expandable by external current transformers
- Operation of monitoring circuit > AC 250 V only via additional external current transformer

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>E-1076-SR</th>
<th>Zero Current Monitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitoring range</td>
<td>AC 20 A</td>
<td>load current 0.2 to 20 A</td>
</tr>
<tr>
<td>Output circuit</td>
<td>AC 250 V</td>
<td>AC 12...250 V</td>
</tr>
<tr>
<td></td>
<td>DC 60 V</td>
<td>DC 2...60 V</td>
</tr>
</tbody>
</table>

E-1076-SR    -   AC 20 A AC 250 V

Features

- No auxiliary voltage required
- Compact design
- Expandable by external current transformers
- Operation of monitoring circuit > AC 250 V only via additional external current transformer

Technical data

<table>
<thead>
<tr>
<th>Monitoring circuit</th>
<th>Max. current rating</th>
<th>AC 20 A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load current</td>
<td>I_{\text{min}}, red LED lights when I_{\text{load}} is</td>
<td>\geq 500 mA (E-1076-SR-AC 20 A-AC 250 V)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>\geq 200 mA (E-1076-SR-AC 20 A-DC 60 V)</td>
</tr>
<tr>
<td>Zero current (wire break), red LED does not light when I_{\text{load}} is</td>
<td>&lt; 50 mA</td>
<td></td>
</tr>
<tr>
<td>Load current</td>
<td>I_{\text{max}}, at +25 °C ambient temp. (derating)</td>
<td>20 A</td>
</tr>
<tr>
<td>Voltage rating</td>
<td>U_{\text{N}}</td>
<td>0 - 250 V AC</td>
</tr>
</tbody>
</table>

Output circuit (conductive at I_{\text{load}} > I_{\text{min}})

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>U_{\text{N}}</th>
<th>AC 12...250 V</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 2...60 V</td>
<td>Output current</td>
<td>I_{\text{max}}</td>
</tr>
<tr>
<td>50 mA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

General data

| Insulation resistance | 10 MΩ at 500 V DC |
| Dielectric strength | control circuit to output circuit: 1 kV |
| Mounting | rail DIN EN 50022-35x7.5, or rail DIN EN 50035-G32 |
| Temperature range | 0...+60 °C |
| Degree of protection: | IP20 housing DIN 40050 |
| | IP20 terminals DIN 40050 |
| Terminals | screw terminals |
| Cable size | 1 x 2.5 mm² each (AWG 14) |
| Housing dimensions | 17 x 63 x 64 mm (width x height x depth) |
Output circuit AC 250 V

If no physical isolation is required, the monitoring circuit and the output circuit may be fed by the same power supply. The elapsed-hour meter may be installed either before, or after, the triac.

Output circuit DC 60 V
(e.g. check-back signalling for PLC systems)

Check-back signalling may be tapped either before, or after, the transistor.
Description

The E-T-A Current Protector is designed to monitor the primary current of low-voltage transformers for halogen fittings. After system installation, the admissible current range can be stored by operating the storage button. If the admissible range is exceeded (e.g., by overloads or short-circuit), the Protector will immediately disconnect the system. Underload (e.g., through defective terminal connections) will also cause system disconnection. Fault conditions are indicated by the integral LED. The system can be reconnected by turning the light switch on again once the cause of failure has been remedied.

Typical applications

- Low-voltage halogen lighting systems
- Can generally be used with sensor touch dimmers (please enquire)
- In sub-distribution
- Low-voltage transformers (no electronic transformers)

Features

- Eliminating fire hazard
- Storage of actual lamp load by push button
- LED fault indication
- Suitable for lighting systems with dimmers
- Passive relay for long use
- Mounting on symmetric rail
- Unaffected by inrush currents

Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1078-4</td>
<td>Current Protector for low voltage lighting systems</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Version</th>
<th>Current Protector for low voltage lighting systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>with storage button, capacity up to 400 W</td>
</tr>
<tr>
<td>3</td>
<td>with storage button, capacity up to 600 W</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Housing</th>
<th>Type of protection:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 track-mountable housing</td>
<td>IP20 housing DIN 40050</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage rating</th>
<th>Rated load</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC 230 V</td>
<td>60-300 W lamp capacity AC 230 V</td>
</tr>
<tr>
<td></td>
<td>100-400 W lamp capacity AC 230 V</td>
</tr>
<tr>
<td></td>
<td>300-600 W lamp capacity AC 230 V</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lamp load</th>
<th>Protective function</th>
</tr>
</thead>
<tbody>
<tr>
<td>60...300 W</td>
<td>short-circuit, overload, underload</td>
</tr>
<tr>
<td>100...400 W</td>
<td></td>
</tr>
<tr>
<td>300...600 W</td>
<td></td>
</tr>
</tbody>
</table>

| Monitoring window | typically: ± 40 W |
| Response times typ.: | overload 200 ms...2 s |
|                    | (depending on overload) |
|                    | short-circuit 200 ms |
|                    | underload 3 s |

| Voltage rating | AC 230 V ±10 %, 50 Hz |
| Interrupting capacity | relay contact 8 A |
| Dimmer operation | between 35 and 100 % of the rated load stored |
| Temperature range | 0...+45 °C |
| Degree of protection: | IP20 terminals DIN 40050 |
| Housing | track-mountable housing (for DIN rails) |
| Connection | screw terminals |
| VDE approval | Reg. Nr. 8319 to VDE 0160 |
Dimensions

E-1078-421-...

Basic circuit diagram

Instructions for installation and adjustment

For correct performance, the E-T-A Current Protector shall be used on the primary side before the low-voltage transformer. It should be connected behind the light switch and the dimmer, if any, into the line to the transformer.

Caution: Installation by skilled personnel only!

● Install the low-voltage system with the desired rated capacity.

● Set dimmer, if any, at the maximum value (turn button to right-side stop).

● Switch the light on.

● Keep storage button on the Protector pressed for approx. 5 sec to store the lamp load installed.

● The stored value will be maintained even when the lighting is switched off.

● A new rated load can be set by pressing the storage button again.

Caution:

● Observe max. transformer capacity!

● Eliminate unsymmetrical load on the power feed caused by half-wave operation.

● Use separate power cables when several low-voltage systems are operated in parallel.

Protective functions

Immediate disconnection upon short-circuit and overloads when additional lamps (loads) are connected.

Underload disconnection when lamps (loads) are removed or upon defective terminal connections.

Action in the event of faults:

Switch the lighting system off by means of the light switch. Remedy cause of failure (call in skilled personnel, if necessary!).

Possible faults:

● defective lamps

● loose or broken terminals or screw connections

● short-circuit

● additional lamps

Reset function

● provided when the lighting is reconnected by switching the light switch on. The lamp load is not re-stored.

● If the load conditions have changed after remedying the fault, the Protector will switch off within max. 3 sec after reconnection. To re-store the lamp load, keep the button pressed for approx. 5 sec.
The E-T-A Current Protector is designed to monitor the primary current of low-voltage transformers for halogen fittings. After system installation, the admissible current range can be stored by operating the storage button (or light switch, with type E-1078-482-...). If the admissible range is exceeded (e.g. by overloads or short-circuit), the Protector will immediately disconnect the system. Underload (e.g. through defective terminal connections) will also cause system disconnection. Fault conditions are indicated by the integral LED. The system can be reconnected by turning the light switch on again once the cause of failure has been remedied.

**Description**

The E-T-A Current Protector is designed to monitor the primary current of low-voltage transformers for halogen fittings. After system installation, the admissible current range can be stored by operating the storage button (or light switch, with type E-1078-482-...). If the admissible range is exceeded (e.g. by overloads or short-circuit), the Protector will immediately disconnect the system. Underload (e.g. through defective terminal connections) will also cause system disconnection. Fault conditions are indicated by the integral LED. The system can be reconnected by turning the light switch on again once the cause of failure has been remedied.

**Typical applications**

- Low-voltage halogen lighting systems
- Can generally be used with sensor touch dimmers (please enquire)
- Suitable for installation in transformer housing or close to transformer (in inaccessible areas, E-1078-482-...)
- Low-voltage transformers (no electronic transformers)

**Features**

- Eliminating fire hazard
- Storage of actual lamp load by button (or light switch, with type E-1078-482-...)
- Reset function by light switch
- LED fault indication
- Suitable for lighting systems with dimmers
- Passive relay for long use
- Housing for surface mounting
- Unaffected by inrush currents

**Ordering information**

**Type No.**

E-1078-4 - Current Protector for low voltage lighting systems

**Version**

- 2 - with storage button, capacity up to 400 W
- 3 - with storage button, capacity up to 600 W
- 8 - load storage by light switch, capacity up to 600 W

**Housing**

- 2 - housing for surface mounting
- 3 - without housing (without VDE logo)

**Voltage rating**

- AC 230 V - voltage rating AC 230 V
- AC 120 V - voltage rating AC 120 V (please enquire)

**Rated load**

- 60-300 W lamp capacity 60...300 W (AC 230 V only)
- 100-300 W lamp capacity 100...300 W (AC 120 V only)
- 100-400 W lamp capacity 100...400 W (AC 230 V only)
- 300-600 W lamp capacity 300...600 W (AC 230 V only)

**Technical data**

- **Protective function**: short-circuit, overload, underload
- **Lamp load**:
  - 60...300 W (AC 230 V only)
  - 100...300 W (AC 120 V only)
  - 100...400 W (AC 230 V only)
  - 300...600 W (AC 230 V only)
- **Monitoring window** typically: ± 40 W
- **Response times typ.**:
  - overload 200 ms...2 s (depending on overload)
  - short-circuit 200 ms
  - underload 3 s
- **Voltage rating**
  - AC 230 V ±10 %, 50 Hz
  - AC 120 V ±10 %, 60 Hz
- **Interrupting capacity**
  - relay contact 8 A
- **Dimmer operation**
  - between 35 and 100 % of the rated load stored
- **Temperature range**
  - 0...+60 °C
- **Housing**
  - surface mounted type
- **Degree of protection**
  - IP20 housing DIN 40050
  - IP20 terminals DIN 40050
- **Connection**
  - screw terminals
- **VDE approval**
  - Reg. Nr. 8319 to VDE 0160
- **UL-approval**
  - AC 120 V, 300 W, 60 Hz, to UL 1077

**E-1078-4 2 2 - AC 230 V - 100-400 W ordering example**
For correct performance, the E-T-A Current Protector must be used on the primary side before the low-voltage transformer. It should be connected behind the light switch and the dimmer, if any, into the line to the transformer.

Caution: Installation by qualified personnel only!
- Install the low-voltage system with the desired rated capacity.
- Set dimmer, if any, at the maximum value (turn knob fully clockwise).
- Switch on light.
- Storage of lamp load:
  With version -432/-482 (with storage button):
  Keep storage button pressed for approx. 5 s to store lamp load installed.
  With version -482 (storage by light switch):
  - The lighting will be on for a short time and will go out after max. 0.2 sec (the Protector which has not yet been set senses an overload and disconnects the system).
  - Turn light switch OFF and ON within 0.5 s to store the actual rated load. Storage takes approx. 20 s; do not switch off the lighting during this period!
  - A new rated load can only be set after the Protector has responded to a fault.
- The stored value will be maintained even when the lighting is switched off.

Caution:
- Observe max. transformer capacity!
- Eliminate any unsymmetrical loading of the power feed caused by half-wave operation.
- Use separate power cables when several low-voltage systems are operated in parallel.

Protective functions
Immediate disconnection upon short-circuit and overload when additional lamps (loads) are connected.
Underload disconnection when lamps are removed or in the event of defective terminal connections.

Action in the event of faults:
- Switch off the lighting system by means of the light switch.
- Remedy cause of failure (call in qualified personnel, if necessary!).

Possible faults:
- defective lamps
- loose or broken terminals or screw connectors
- short-circuit
- additional lamps

Reset function of the Protector:
- provided when the lighting is reconnected by switching the light switch on. The lamp load is not re-stored.
- If the load conditions have changed after remediying the fault, the Protector will disconnect within max. 3 s after reconnection of the lighting system.
- Re-storage of lamp load:
  With version -422/-432 (load storage by storage button):
  Keep the storage button pressed for approx. 5 sec.
  With version -482 (load storage by light switch)
  Turn light switch OFF and ON within 0.5 s. Re-storage takes approx. 20 s; do not switch off the lighting system during this period as this will interrupt the storage process.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.
Description

The Combi Safety Protection E-1078-911 allows the simultaneous connection of a washing machine and dryer (for example) without overloading the circuit. The dryer is disconnected during the heating cycle of the washing machine and automatically reconnected when the current consumption of the washing machine drops.

Other equipment combinations such as a dishwasher and a hot-water heater are also made possible, provided that one of the loads connected has an operating mode with a current consumption of less than 2 A (= reconnection threshold).

Typical applications

- Household
- Commercial premises (e.g., medical practices)
- Recreational vehicles

For the first time it is possible to simultaneously connect to the same socket two large appliances such as a washing machine and a hot-water heater and to leave them unattended, without the danger and inconvenience of overloading the supply. There is no need for a second line with socket and circuit breaker.

Features

- Reliable current monitoring when two large appliances are operated simultaneously.

Ordering information

Type No.  
E-1078-911 Combi Safety Protection

Technical data

- Voltage rating: AC 230 V ±10 %, 50 Hz
- Supply current: 16 A
- Load capacity: 3,700 VA
- Socket outlets with earthing contact to DIN 49440
- Voltage rating: H05W-F3G 1.0 mm², approx. 1.4 m long with moulded earthing-pin plug
- Upper response threshold: typically 15.5 ± 1 A
- Lower response threshold: typically 2.0 A ± 1 A
- Hysteresis: typically 13.5 A
- Temperature range: 0...+45 °C
- Environmental duty: suitable for dry, clean conditions
- Socket outlet material: impact-resistant Polypropylene
- Housing dimensions: 255 mm x 60 mm x 40 mm (LxWxH), with provisions for screw fixings
- Mass: approx. 480 g

Caution: Connect appliances with a program memory that is not protected from supply failure, to the "washing machine" outlet!

Approvals

CE mark to demonstrate compliance with applicable directives.
Dimensions

Switching curve

This is a metric design and millimeter dimensions take precedence (mm) over inch (in).
The electronic E-T-A Voltage Monitor E-1079-60 is designed to monitor DC or AC voltages against falling below, or rising above, preset tolerance limits. Two LEDs indicate relay status or overlimits; an opto coupler output provides a physically isolated signal. The device is available either with a (non-conducting) N/O or a (conducting) N/C contact. It is powered by the measuring signal so that there is no need for an additional power supply.

### Features
- Voltage under and over limit monitoring (tolerance window)
- For DC and AC voltages between 5 V and 230 V
- DC and AC voltage output
- N/O or N/C contact (MOSFET)
- Status indication by red and green LEDs
- No need for separate power supply
- Reverse polarity protection
- Compact design (plug-in housing)
- 12 mm wide housing

### Technical data

<table>
<thead>
<tr>
<th>Input voltage $U_E$</th>
<th>Tolerance</th>
<th>Tolerance range $U_{min}$...$U_{max}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 12 V</td>
<td>± 25 %</td>
<td>(9...15 V)</td>
</tr>
<tr>
<td>DC 24 V</td>
<td>± 25 %</td>
<td>(18...30 V)</td>
</tr>
<tr>
<td>DC 48 V</td>
<td>± 25 %</td>
<td>(36...60 V)</td>
</tr>
<tr>
<td>DC 110 V</td>
<td>+10 %/-15 %</td>
<td>(93.5...121 V)</td>
</tr>
<tr>
<td>DC 220 V</td>
<td>+10 %/-15 %</td>
<td>(187...242 V)</td>
</tr>
<tr>
<td>AC 115 V</td>
<td>+10 %/-15 %</td>
<td>(97.8...126.5 V)</td>
</tr>
<tr>
<td>AC 230 V</td>
<td>+10 %/-15 %</td>
<td>(195.5...253 V)</td>
</tr>
</tbody>
</table>

### Ordering information

<table>
<thead>
<tr>
<th>Type No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1079-600</td>
<td>Electronic Voltage Monitor, signal output as N/O contact</td>
</tr>
<tr>
<td>E-1079-601</td>
<td>Electronic Voltage Monitor, signal output as N/C contact</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage rating $U_N$</th>
<th>Load current</th>
<th>Dielectric strength</th>
<th>Reverse polarity protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC 12 V</td>
<td>3 mA DC and AC</td>
<td>260 V DC and AC</td>
<td>No additional protection</td>
</tr>
<tr>
<td>DC 24 V</td>
<td>80 mA DC and AC</td>
<td>250 V DC and AC</td>
<td>No additional protection</td>
</tr>
<tr>
<td>DC 48 V</td>
<td>Voltage drop &lt; 2.0 V with 80 mA load</td>
<td>&lt; 0.8 V with 10 mA load</td>
<td>No additional protection</td>
</tr>
<tr>
<td>DC 110 V</td>
<td>Free-wheeling diode for non-resistive loads in-built</td>
<td>Polarization optional</td>
<td>Response time 200 mA</td>
</tr>
<tr>
<td>DC 220 V</td>
<td>Signalling green LED voltage within set tolerance limits</td>
<td>red LED voltage outside set tolerance limits</td>
<td></td>
</tr>
<tr>
<td>AC 115 V</td>
<td>Accuracy Undervoltage $U_{min}$ -10 % $U_N$...$U_{min}$</td>
<td>Overvoltage $U_{max}$...$U_{max}$ +10 % $U_N$</td>
<td></td>
</tr>
<tr>
<td>AC 230 V</td>
<td>Environmental conditions Temperature range 0...60 °C (without condensation)</td>
<td>Degree of protection to DIN 40050/IEC 529 IP20</td>
<td>Dielectric strength (IEC 664) 4 kVrms</td>
</tr>
<tr>
<td></td>
<td>EMC to EN50081-1 and prEN50082-2</td>
<td>Housing plug-in ultramid housing</td>
<td>Terminals 6.3 mm blade terminals to DIN 46244 to plug into E-T-A socket 17-P10-Si</td>
</tr>
<tr>
<td></td>
<td>Mounting attitude optional, no air gap between devices required</td>
<td>Mass 28 g</td>
<td></td>
</tr>
</tbody>
</table>
**Function**

The operating voltage applied at the input terminals is monitored for upper and lower limits. When the input signal is within tolerance limits, the green LED will indicate and the MOSFET of the signal output has the following operating status:
- N/O contact (-600): MOSFET is active
- N/C contact (-601): MOSFET is inactive

From approx. 5 V to the lower tolerance limit the red LED will indicate. It also indicates when the upper tolerance limit has been exceeded. The output will change its operating status.

**Dimensions**

**E-1079-600**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>2.21</td>
</tr>
<tr>
<td>Width</td>
<td>2.56</td>
</tr>
<tr>
<td>Depth</td>
<td>2.21</td>
</tr>
</tbody>
</table>

**E-1079-601**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>2.21</td>
</tr>
<tr>
<td>Width</td>
<td>2.56</td>
</tr>
<tr>
<td>Depth</td>
<td>2.21</td>
</tr>
</tbody>
</table>
Accessories for E-1079-600/601

Single mounting sockets (with adapter)
(17-P10-Si 17-P10-Si-20025 17-P70-Si 17-P70-Si-20025)
- polarized blade terminal DIN 46244-A6.3-0.8 (QC .250)
- blade terminal DIN 46244 part 2
- C profile (2xA2.8-0.8) (QC 2x.110)
- slot for fitting labels from Phoenix, Weidmüller
- depth 10 mm (.394 in.)
- symmetrical rail EN 50022-35x7.5

Busbar (10-way) (supplied as a complete package)
(17-P10-Si 17-P70-Si)
- for type 17 socket (max. 100 A continuous load), more positions available on request
- X 211 157 01 with terminal
- X 211 157 02 without terminal
- Phoenix terminal AKG 35 max. cross section 35 mm² (AWG 2)
- M4 Cu rail, tin-plated
- cylinder head screw M4x4 ISO1207 nickel plated
- washer A 4.3 DIN 125 nickel plated
- female connector
- pressure-relief joint (1.1 mm (.043 in.) thick constriction)
- M4 X20040901 G-profile EN 50035-G32

2-way mounting socket
23-P10-Si
(retaining clip Y 300 581 03 available on request)
- connector bus links -P10
- X 210 588 01/1.5 mm², (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/2.5 mm², (AWG 14), black (up to 20 A max. load)
- X 210 588 03/2.5 mm², (AWG 14), red (up to 20 A max. load)
- X 210 588 04/2.5 mm², (AWG 14), blue (up to 20 A max. load)
- Y 300 504 02 (2 pcs needed per unit)
- Installation drawing with mounting clips Y 300 504 02
- 100 quick-connect tabs 6.3 (.250)
- DIN 46247 tinned brass, insulated

6-way mounting socket
63-P10-Si
(retaining clip Y 300 581 03 available on request)
- Y 303 824 01
- Y 303 824 02
- Y 303 824 03
- Insulating sleeving for busbar (10-way)
- Y 303 824 01

This is a metric design and millimeter dimensions take precedence (mm) not in.

All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com

www.e-t-a.com