

# TMC

## Thermomagnetic circuit breaker for mounting on a DIN rail



Data sheet  
100695\_en\_03

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### 1 Description

Single or multi-position thermomagnetic circuit breaker with lever actuation, DIN rail mounting, trip-free mechanism that cannot be influenced, various characteristic curves, all-pole tripping.

The circuit breakers meet the requirements of circuit breaker standard EN 60934 (IEC 60934): S-type, TM.

Typical areas of application are telecommunications systems, power supply units, industrial switchgear and control systems, and rail vehicles.

The ideal characteristic curve shown here illustrates the curve of the thermomagnetic trigger characteristic. The time-delayed tripping protects the thermal part of the characteristic curve against overload. The magnetic part of the circuit breaker responds without delay to high overload and short-circuit currents and trips within a few milliseconds.



Figure 1 Ideal characteristic curve

- ① Thermal tripping range
- ② Magnetic tripping range



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This data sheet is valid for all products listed on the following page:

## 2 Ordering data

### Thermomagnetic circuit breaker

| Description   | Type                   | Order No. | Pcs./Pkt. |
|---|------------------------|-----------|-----------|
| Thermomagnetic circuit breaker, with universal foot for mounting on  | TMC... (see order key) |           | 6         |

### Accessories

| Description  | Type        | Order No.            | Pcs./Pkt. |
|--|-------------|----------------------|-----------|
| <b>Insertion bridge</b> , insulated, 80-pos. <br>( $I_{max}$ : 50 A)<br>(For central supply $I_N$ : 80 A) | EB 80-12    | 3009338              | 1         |
| <b>Zack marker strip</b> , 10-section, for labeling the center of the terminal block   | ZB 6        | See CLIPLINE catalog |           |
| <b>UniCard sheets</b> , for labeling terminal blocks using a Zack marker strip groove, 96-section, can be labeled with BLUEMARK and CMS-P1-PLOTTER, color: white                           | UC-TM 5     | 0818108              | 10        |
| <b>Screwdriver</b>   | SZS 0,6X3,5 | 1205053              | 10        |

### 2.1 Order key

| Type | Main current paths   | Characteristic curves  | Auxiliary contact versions  | Nominal current  |
|------|--|--|---|--|
| TMC  | <b>1</b> ≙ Single-pos.<br><b>2</b> ≙ Two-pos.<br><b>3</b> ≙ Three-pos. | <b>F1</b> ≙ Thermal $1.05 \times I_N \dots 1.4 \times I_N$ ,<br>magnetic $2 \times I_N \dots 4 \times I_N$ DC (fast-blow),<br><b>only for DC applications</b><br><b>M1</b> ≙ Thermal $1.05 - 1.4 I_N$ ,<br>magnetic $6 \times I_N \dots 12 \times I_N$ AC,<br>$7.8 \times I_N \dots 15.6 \times I_N$ DC<br>(medium-blow) | <b>100</b> ≙ Single-pos.: 1 N/O contact<br><b>200</b> ≙ Single-pos.: 1 N/C contact<br><b>120</b> ≙ Two-pos.: 1 N/O contact, 1 N/C contact<br><b>122</b> ≙ Three-pos.: 1 N/O contact, 2 N/C contacts | 0.2 A    2.5 A<br>0.3 A    3 A<br>0.4 A    4 A<br>0.5 A    5 A<br>0.6 A    6 A<br>0.8 A    8 A<br>1 A      10 A<br>1.2 A    12 A<br>2A      15A<br>16A |

### Ordering example

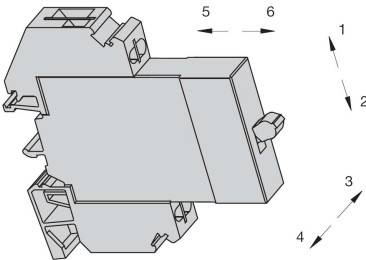
TMC with 1-pos. main current path, one N/O contact, medium-blow characteristic curve, and a nominal current of 2 A: **TMC 1 M1 100 2A**

## 3 Technical data

### Technical data

|                                     |  |
|-------------------------------------|--|
| Nominal voltage                     | 250 V AC (65 V DC),<br>3 433 V AC (50/60 Hz)         |
| Nominal current range               | 0.2 A ... 16 A, see order key                        |
| Auxiliary circuit                   | 240 V AC (65 V DC), 1 A                              |
| Service life                        | 10,000 cycles with $1 \times I_N$ , inductive        |
| Ambient temperature                 | -30°C ... +60°C (T 60)                               |
| Insulation coordination (IEC 60664) | 2.5 kV/2, increased insulation in the actuation area |
| Dielectric strength                 |  |
| Actuation area                      | 3000 V AC test voltage                               |
| Main to auxiliary circuit           | 3000 V AC test voltage                               |
| Position to position                | 1500 V AC test voltage                               |
| Insulation resistance               | > 100 MΩ (500 V DC)                                  |

**Technical data**

|                                    |   |
|------------------------------------|---|
| Switching capacity $I_{cn}$        |   |
| TMC...0,2 A ... TMC...5 A          | 400 A   |
| TMC...6 A ... TMC...16 A           | 800 A   |
| Characteristic curve F1 and M1     | 2500 A (at 32 V DC)   |
| Switching capacity $I_N$ (UL 1077) | $I_N = 0.2 A \dots 16 A$  |
| 1 and 2-pos.                       | 277 V AC/5000 A   |
| 3-pos.                             | 480 V AC/5000 A   |
| 1 and 2-pos.                       | 65 V DC/2000 A  |
| Degree of protection (IEC 60529)   |   |
| Actuation area                     | IP30  |
| Connection area                    | IP20  |
| Vibration resistance               |   |
| Characteristic curve F1            | 3g (57 Hz ... 500 Hz), $\pm 0.23$ mm (10 Hz ... 57 Hz)                              |
| Characteristic curve M1            | 53g (57 Hz ... 500 Hz), $\pm 0.38$ mm (10 Hz ... 57 Hz)                             |
|                                    | Test according to IEC 60068-2-6, Test Fc, 10 frequency cycles/axis                  |
| Shock resistance                   |   |
| Characteristic curve F1            | 25g (11 ms), shock direction 1, 2, 3, 4, 5; 10g (11 ms), shock direction 6          |
| Characteristic curve M1            | 25g (11 ms), shock direction 1, 2, 3, 4, 5; 20g (11 ms), shock direction 6          |
|                                    | Test according to IEC 60068-2-27, Test Ea   |
|                                    |  |
| Corrosion resistance               | 96 hours in 5% salt fog   |
|                                    | Test according to IEC 60068-2-11, Text Ka   |
| Humidity test                      | 240 hours in 95% relative humidity  |
|                                    | Test according to IEC 60068-2-78, Text Cab  |
| Weight                             | 60 g per position, approximately  |

**Technical data according to IEC/DIN VDE**

|  |                             |
|--|-----------------------------|
| Impulse voltage withstand level                                  | 4 kV                        |
| Pollution degree   | 3                           |
| Auxiliary contact: maximum load current                          | 1 A for 2.5 mm <sup>2</sup> |
| Maximum cross-section with insertion bridge (solid and stranded) | 1.5 mm <sup>2</sup>         |
| Surge voltage category   | III                         |
| Insulation material group  | I                           |

**Connection capacity**

|  | Main contact                                 | Auxiliary contact                            |
|--|--|--|
| Connection capacity                            |  |  |
| Solid  | 0.2 mm <sup>2</sup> ... 6 mm <sup>2</sup>    | 0.2 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>  |
| Stranded                                       | 0.2 mm <sup>2</sup> ... 4 mm <sup>2</sup>    | 0.2 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>  |
| Connection capacity (stranded with ferrule)    |  |  |
| Without plastic sleeve                         | 0.25 mm <sup>2</sup> ... 4 mm <sup>2</sup>   | 0.25 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> |
| With plastic sleeve                            | 0.25 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> | 0.25 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> |
| Two conductors with the same cross-section     |  |  |
| Solid and stranded                             | 0.2 mm <sup>2</sup> ... 1 mm <sup>2</sup>    | 0.2 mm <sup>2</sup> ... 0.75 mm <sup>2</sup> |
| Stranded with ferrule without plastic sleeve   | 0.2 mm <sup>2</sup> ... 1 mm <sup>2</sup>    | 0.2 mm <sup>2</sup> ... 0.5 mm <sup>2</sup>  |
| Stranded with TWIN ferrule with plastic sleeve | 0.5 mm <sup>2</sup> ... 2.5 mm <sup>2</sup>  | 0.5 mm <sup>2</sup> ... 0.75 mm <sup>2</sup> |

| Connection capacity (continued)          | Main contact      | Auxiliary contact |
|--|-------------------|-------------------|
| Stripping length                         | 12 mm             | 12 mm             |
| Internal cylindrical gauge (IEC 60947-1) | A 3               | A 1               |
| Screw thread                             | M3                | M3                |
| Tightening torque                        | 0.6 Nm ... 0.8 Nm | 0.6 Nm ... 0.8 Nm |

| General data                            |                   |
|---|-------------------|
| Width x length                          | 12.5 mm x 83.5 mm |
| Height                                  | 96 mm             |
| On NS 35/7.5... DIN rail                | 103.5 mm          |
| On NS 35/15... DIN rail                 | 100.5 mm          |
| On NS 32... DIN rail                    |                   |
| Insulation material                     | PA-F              |
| Inflammability class according to UL 94 | V0                |
| Degree of protection (IEC 60529)        |                   |
| Actuation area                          | IP30              |
| Connection area                         | IP20              |

| Approvals          |  |                       |
|--------------------|--|-----------------------|
| Test center        | Nominal voltage                                | Nominal current range |
| GL, VDE (EN 60934) | 3 433 V AC, 250 V AC, 65 V DC                  | 0.1 A ... 32 A        |
| UL, CSA            | 277 V AC, 277/480 V AC,<br>3 480 V AC, 65 V DC | 0.1 A ... 32 A        |



Figure 2 Circuit diagrams

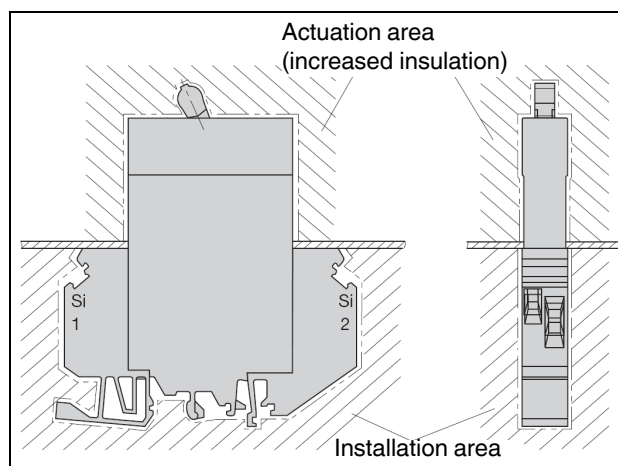


Figure 3 Installation diagram

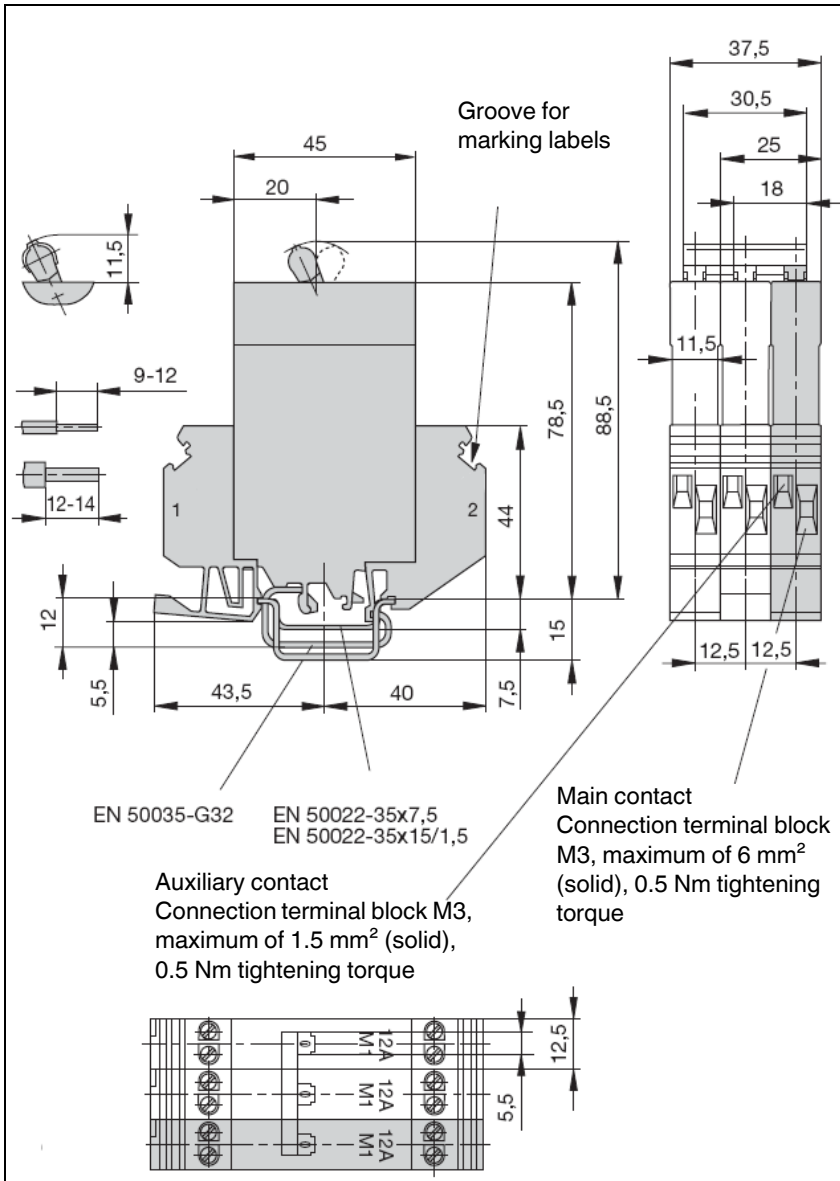


Figure 4 Dimensional drawing (dimensions in mm)

## 4 Backup fuse



**NOTE:** Use a backup fuse in combination with the circuit breaker if the maximum switching current can be exceeded in the event of an error.

The table lists the maximum switching current, the relevant internal resistance, and the resulting backup fuse.

| Nominal current | NH backup fuse | Internal resistance   |                            | Switching capacity according to EN 60934 |
|-----------------|----------------|-----------------------|----------------------------|--|
|                 |                | F1 (fast-blow) for DC | M1 (medium-blow) for DC/AC |  |
| 0.2 A           | Any            | 39.3 Ω                | 26.1 Ω                     | 400 A                                    |
| 0.3 A           | Any            | 17.5 Ω                | 11.6 Ω                     | 400 A                                    |
| 0.4 A           | Any            | 9.2 Ω                 | 6.6 Ω                      | 400 A                                    |
| 0.5 A           | Any            | 6.8 Ω                 | 4.1 Ω                      | 400 A                                    |
| 0.6 A           | Any            | 4.2 Ω                 | 3 Ω                        | 400 A                                    |
| 0.8 A           | Any            | 2.8 Ω                 | 1.65 Ω                     | 400 A                                    |
| 1 A             | Any            | 1.6 Ω                 | 1.10 Ω                     | 400 A                                    |
| 1.5 A           | 25 A           | 0.78 Ω                | 0.47 Ω                     | 400 A                                    |
| 2 A             | 25 A           | 0.42 Ω                | 0.28 Ω                     | 400 A                                    |
| 2.5 A           | 25 A           | 0.26 Ω                | 0.183 Ω                    | 400 A                                    |
| 3 A             | 25 A           | 0.18 Ω                | 0.124 Ω                    | 400 A                                    |
| 4 A             | 25 A           | 0.12 Ω                | 0.077 Ω                    | 400 A                                    |
| 5 A             | 25 A           | 0.092 Ω               | 0.063 Ω                    | 400 A                                    |
| 6 A             | 50 A           | 0.054 Ω               | 0.045 Ω                    | 800 A                                    |
| 8 A             | 50 A           | 0.025 Ω               | ≤ 0.02 Ω                   | 800 A                                    |
| 10 A            | 50 A           | 0.022 Ω               | ≤ 0.02 Ω                   | 800 A                                    |
| 12 A            | 50 A           | ≤ 0.02 Ω              | ≤ 0.02 Ω                   | 800 A                                    |
| 16 A            | 50 A           | ≤ 0.02 Ω              | ≤ 0.02 Ω                   | 800 A                                    |

## 5 Trigger characteristics

The thermomagnetic circuit breaker is available in 18 nominal current levels and in single and multi-pos. versions.

The version with the "medium-blow (M1)" trigger characteristic is suitable for AC and DC applications. The "fast-blow (F1)" characteristic version is suitable for DC applications.

The characteristic curves (see page 7) depend on the ambient temperatures. To avoid early or late disconnection, the circuit breaker nominal current must be multiplied by a factor.

| Ambient temperature | Multiplication factor |
|---------------------|-----------------------|
| -30°C               | 0.76                  |
| -20°C               | 0.79                  |
| -10°C               | 0.83                  |
| 0°C                 | 0.88                  |
| 10°C                | 0.93                  |
| 20°C                | 1                     |
| 30°C                | 1.04                  |
| 40°C                | 1.11                  |
| 50°C                | 1.19                  |
| 60°C                | 1.29                  |

The characteristic curves (see page 7) are also valid for multi-position devices if all positions have an equal load. For multi-position devices and only 1-pos. overload, the thermal tripping limit changes for characteristic curves F1 and M1 to a maximum of  $1.7 \times I_N$ .

For DC, the magnetic operate values of the curves are around factor 1.3 higher.

Tripping is supported even with high-energy current peaks < 0.003 s.



**NOTE:** When mounting several circuit breakers in rows, observe the mutual warming effect. When the circuit breakers are loaded simultaneously, a mutual warming effect occurs, which has the same effect as an increase in ambient temperature.

In this case, the nominal current can only be led to 80%. Alternatively, the load current can be increased by a multiplication factor and the circuit breaker dimensioned accordingly.

**5.1 Medium-blow (M1): Nominal value 0.2 A ... 6 A**

- Lower tripping limit:  $1.05 \times I_N$
- Upper tripping limit:  $1.4 \times I_N$



- Lower tripping limit:  $1.05 \times I_N$



**5.2 Medium-blow (M1): Nominal value 8 A ... 16 A**

- Lower tripping limit:  $1.05 \times I_N$
- Upper tripping limit:  $1.4 \times I_N$



**5.3 Fast-blow (F1): Nominal value 0.2 A ... 16 A**



Only for DC applications.

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