

# TMCP

## Thermomagnetic circuit breaker for mounting in a base

### CLIPLINE

Data sheet  
100211\_en\_02

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## 1 Description

Single or multi-position thermomagnetic circuit breaker with lever actuation, base or front 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.

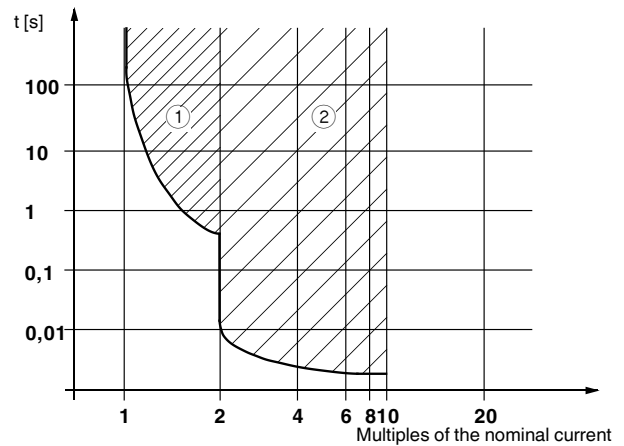


Figure 1 Ideal characteristic curve

- 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, plug-in, 1, 2, and 3-pos. | TMCP... (see order key) |           | 6         |

#### 2.1 Order key

| Type | Main current paths                                | Characteristic curves   | Auxiliary contact versions  | Nominal current |       |
|------|---|---|---|-----------------|-------|
| TMCP | 1 ≙ Single-pos.<br>2 ≙ Two-pos.<br>3 ≙ 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<br>(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>300</b> ≙ Single-pos.: 1 N/O contact and 1 N/C<br>contact per position | 0.2 A           | 2.5 A |
|      |   |   |   | 0.3 A           | 3 A   |
|      |   |   |   | 0.4 A           | 4 A   |
|      |   |   |   | 0.5 A           | 5 A   |
|      |   |   |   | 0.6 A           | 6 A   |
|      |   |   |   | 0.8 A           | 8 A   |
|      |   |   |   | 1 A             | 10 A  |
|      |   |   |   | 1.2 A           | 12 A  |
|      |   |   |   | 2 A             | 16 A  |

#### Ordering example

TMCP with 1-pos. main current path, one N/O contact and N/C contact, medium-blow characteristic curve, and a nominal current of 2 A: **TMCP 1 M1 300 2A**

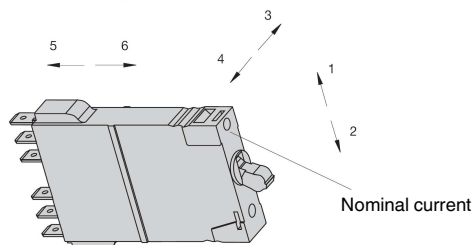
#### Accessories

| Description  | Type            | Order No.            | Pcs./Pkt. |
|--|-----------------|----------------------|-----------|
| <b>Modular base</b> , 2-pos., designed to accommodate two 1-pos. circuit breakers, width of 12.5 mm per position   | TMCP SOCKET M   | 0916589              | 10        |
| <b>Base termination elements</b> , can be plugged into both the left and right-hand side, contain the connections for the reset inputs/group query               | TMCP CONNECT LR | 0916592              | 3         |
| <b>Spring lock</b> , for mechanical locking if mounted overhead, 1-pos.  | SPRING-LOCK     | 0713009              | 10        |
| <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, 80-section, can be labeled with BLUEMARK and CMS-P1-PLOTTER, color: white | UC-TM 6         | 0818085              | 10        |
| <b>Plug-in bridge</b> , not insulated, 500 mm long, can be cut to length, for distribution of the supply potential in the base, $I_{max} = 50$ A                 | FBST 500 TMCP   | 0916615              | 20        |
| <b>Plug-in bridge</b> , 500 m long, can be cut to length, for potential distribution, $I_{max} = 32$ A, red  | FBST 500-PLC RD | 2966786              | 20        |
| <b>Plug-in bridge</b> , 500 m long, can be cut to length, for potential distribution, $I_{max} = 32$ A, blue   | FBST 500-PLC BU | 2966692              | 20        |
| <b>Signal bridge</b> , plug-in, for bridging group indication when there is a free slot on the TMCP SOCKET M base, $I_{max} = 1$ A                               | TMCP SB         | 0916602              | 6         |

### 3 Technical data for TMCP

#### Technical data for TMCP...

|   |  |
|---|--|
| 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 x I <sub>N</sub> , 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                   | 1500 V AC test voltage   |
| Auxiliary circuit 11 - 12 to 23 - 24        | 1000 V AC test voltage   |
| Position to position                        | 1500 V AC test voltage   |
| Insulation resistance                       | > 100 MΩ (500 V DC)  |
| Switching capacity I <sub>cn</sub>          |  |
| TMCP...0,2 A ... TMCP...5 A                 | 400 A  |
| TMCP...6 A ... TMCP...16 A                  | 800 A  |
| Characteristic curve F1 and M1              | 2500 A (at 32 V DC)  |
| Switching capacity I <sub>N</sub> (UL 1077) | I <sub>N</sub> = 0.2 A ... 8 A   |
| 1 and 2-pos.                                | 250 V AC/1000 A  |
| 3-pos.                                      | 250 V AC/1000 A  |
| 1 and 2-pos.                                | 250 V DC/2000 A  |
| Switching capacity I <sub>N</sub> (UL 1077) | I <sub>N</sub> = 10 A ... 16 A   |
| 1 and 2-pos.                                | 250 V AC/2000 A  |
| 3-pos.                                      | 250 V AC/2000 A  |
| 1 and 2-pos.                                | 250 V DC/2000 A  |
| Vibration resistance                        |  |
| Characteristic curve F1                     | 3g (57 Hz ... 500 Hz), ±0.23 mm (10 Hz ... 57 Hz)                          |
| Characteristic curve M1                     | 53g (57 Hz ... 500 Hz), ±0.38 mm (10 Hz ... 57 Hz)                         |
|   | Test according to IEC 60068-2-6, Test Fc, 10 frequency cycles/axis         |
| Degree of protection (IEC 60529)            |  |
| Actuation area                              | IP30   |
| Connection area                             | IP20   |
| Vibration resistance                        |  |
| Characteristic curve F1                     | 3g (57 Hz ... 500 Hz), ±0.23 mm (10 Hz ... 57 Hz)                          |
| Characteristic curve M1                     | 53g (57 Hz ... 500 Hz), ±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                                  |



**Technical data for TMCP... (continued)**

|                      |   |
|----------------------|---|
| Corrosion resistance | 96 hours in 5% salt fog<br>Test according to IE 60068-2-11, Text Ka             |
| Humidity test        | 240 hours in 95% relative humidity<br>Test according to IE 60068-2-78, Text Cab |
| Weight               | 50 g per position, approximately  |

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

|                                 |        |
|---------------------------------|--------|
| Impulse voltage withstand level | 2.5 kV |
| Pollution degree                | 2      |

**Connection capacity**

|                      | Main contact   | Auxiliary contact   |
|----------------------|--|---|
| Nominal voltage      | 250 V AC (65 V DC)   | 240 V AC (65 V DC)<br>(Slip-on connection<br>6.3 mm x 0.8 mm) |
| Nominal current      | 0.2 A ... 16 A, see order key  | 1 A   |
| Maximum load current | Depends on the nominal current, with slip-on connection according to DIN 46244 | 1 A with slip-on connection according to DIN 46244            |

**General data**

|   |                 |
|---|-----------------|
| Width x length                          | 12.5 mm x 50 mm |
| Height                                  | 90 mm, maximum  |
| Insulation material                     | PA-F            |
| Inflammability class according to UL 94 | V0              |

**Approvals**

| Test center        | Nominal voltage                    | Nominal current range |
|--------------------|------------------------------------|-----------------------|
| GL, VDE (EN 60934) | 250 V AC, 65 V DC,<br>433 V AC     | 0.1 A ... 25 A        |
| UL, CSA            | 277 V AC, 65 V DC,<br>277/480 V AC | 0.1 A ... 25 A        |

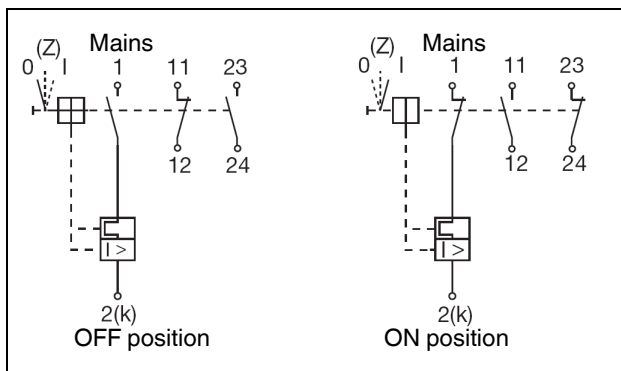


Figure 2 Circuit diagrams

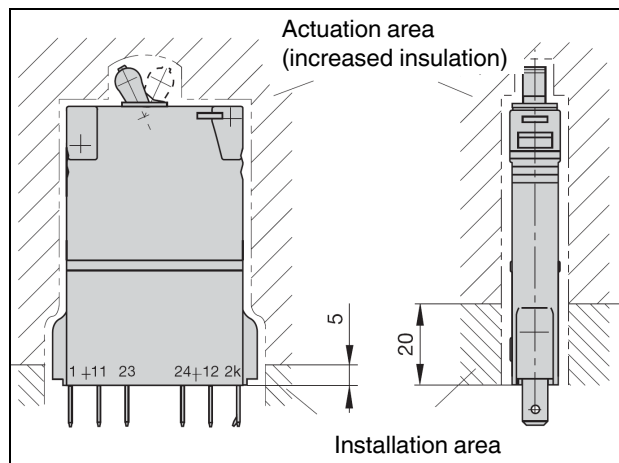


Figure 3 Installation diagram

## 4 Dimensions

### 4.1 TMCP with base and base termination element

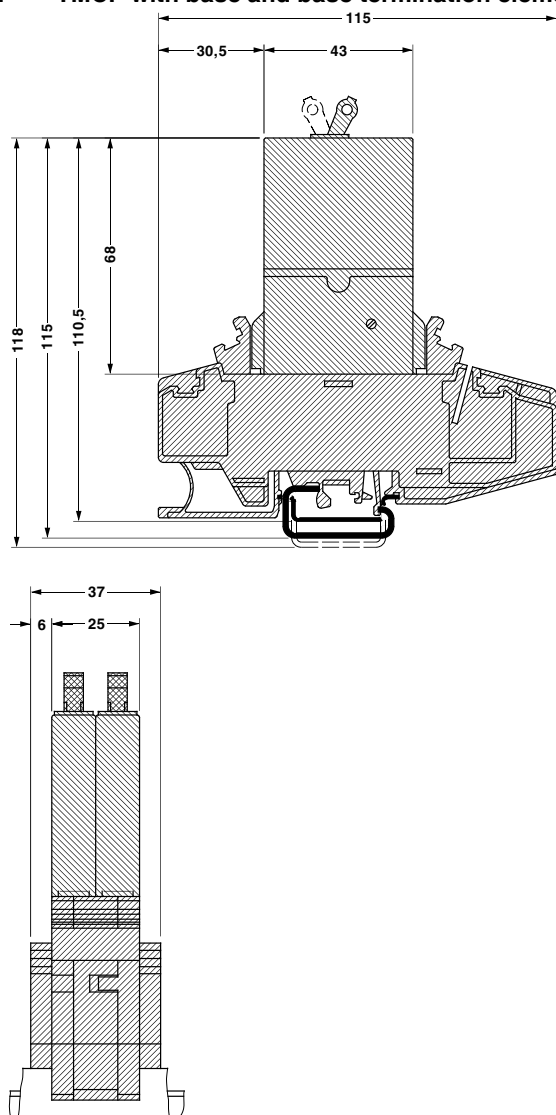


Figure 4 Dimensional drawing with base (dimensions in mm)

### 4.2 Dimensional drawing for TMCP... circuit breakers

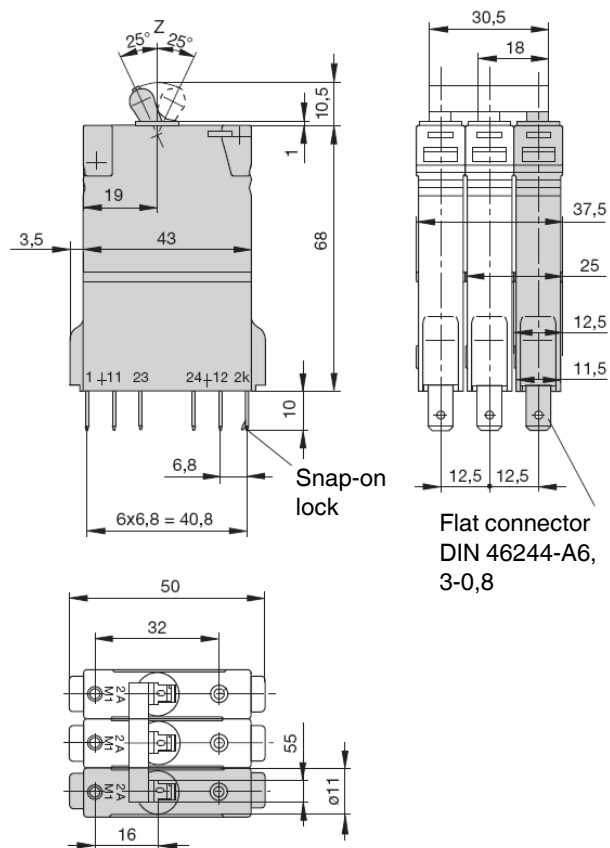


Figure 5 Dimensional drawing (dimensions in mm)

### 4.3 Drilling diagram for front plate mounting

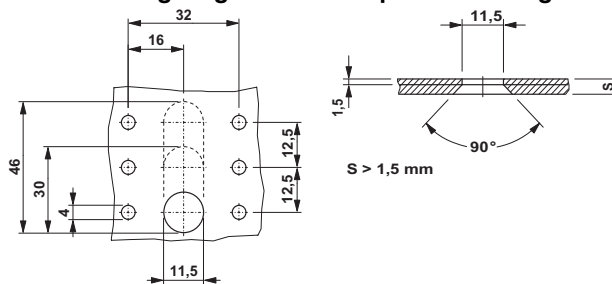


Figure 6 Dimensions (in mm) for 1, 2, and 3-pos. circuit breakers

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

## 6 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.

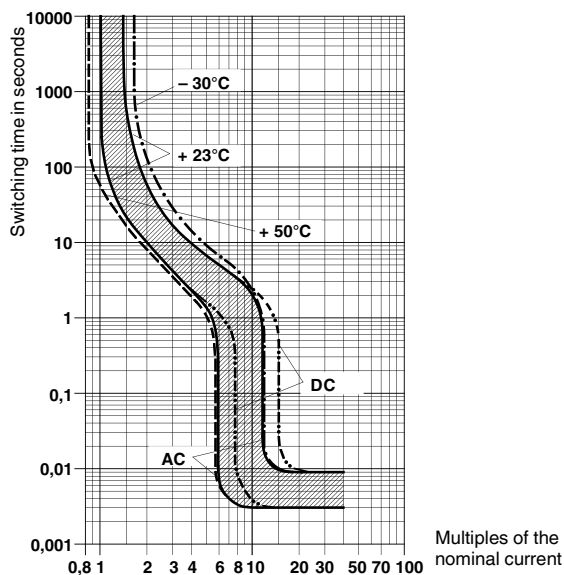


**NOTE:** When mounting several circuit breakers in rows, observe the mutual warming effect. When the circuit breakers are loaded simultaneously, a mutual warming effect occurs, which has the same effect as an increase in ambient temperature.

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.

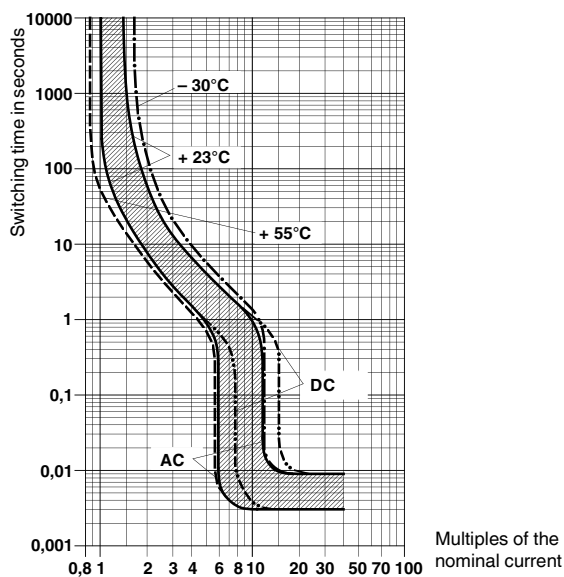
**6.1 Medium-blow (M1): Nominal value 0.2 A ... 6 A**

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



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

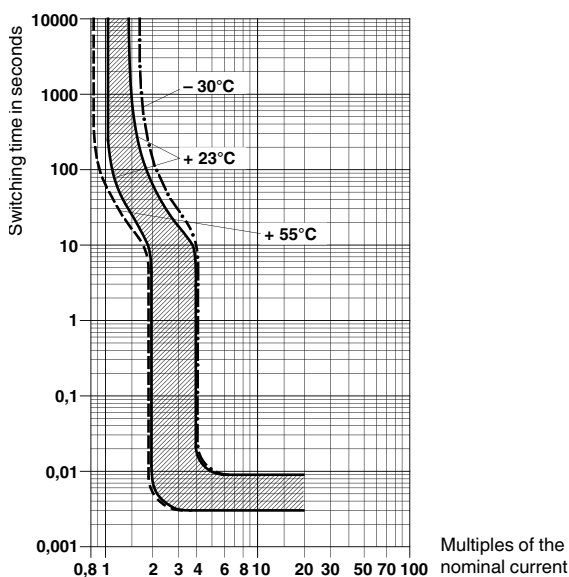
- Lower tripping limit:  $1.05 \times I_N$
- Upper tripping limit:  $1.4 \times I_N$



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

**Only for DC applications.**

- Lower tripping limit:  $1.05 \times I_N$



## 7 Mounting on a modular base

The TMCP SOCKET M base is snapped onto a DIN rail and can accommodate two TMCP... devices.

The two-channel bases are modular, which means that larger distribution systems can be created. A TMCP CONNECT LR base termination element is inserted at both the start and end of the system.

The base module has an integrated bridge shaft on the power input side. A plug-in bridge system, which can be cut to any length, can thus be used to create a current distribution with up to 40 positions. The maximum supply current depends on the type of supply and the bridge used.

Signal contacts, N/C contacts, and N/O contacts are already integrated in the circuit breakers.

All electrical connections are established using spring-cage terminal blocks.

Individual indication can be established via connection 11 on the TMCP CONNECT LR base termination elements and connection 12 on the base module.

Group indication is fully wired internally. The supply at connection 13 and the signal tap at connection 14 support the quick creation of a signal loop via all circuit breakers.



**NOTE:** If a slot is free on a base, the TMCP-SB signal bridge must be used here to feed through the signal.

The internal wiring is illustrated in the circuit diagram.

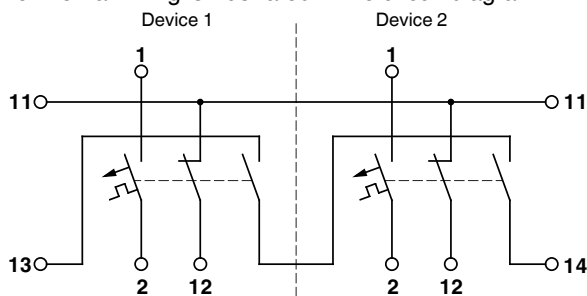


Illustration and definitions when switched off and with zero current.

### 7.1 Technical data

#### Connections

Spring-cage terminal blocks for solid wires and stranded cables with and without ferrules.

Use the specified screwdriver size (SD) to release the spring cage.

| Connection                     | Spring-cage terminal blocks for              | Stripping length | Screwdriver size (SD) |
|--------------------------------|--|------------------|-----------------------|
| Input (1)                      | 1.5 mm <sup>2</sup> ... 10 mm <sup>2</sup>   | 15 mm            | SD 2 (0.8 x 4.0 mm)   |
| Output (2)                     | 0.25 mm <sup>2</sup> ... 4 mm <sup>2</sup>   | 12 mm            | SD 1 (0.6 x 3.5 mm)   |
| Auxiliary contacts (11, 13/14) | 0.25 mm <sup>2</sup> ... 2.5 mm <sup>2</sup> | 10 mm            | SD 1 (0.6 x 3.5 mm)   |
| Single output (12)             | 0.25 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> | 10 mm            | SD 0 (0.4 x 2.5 mm)   |

#### TMCP SOCKET M - Base

##### Technical data

Test contact for testing group indication on a cable interrupt  $\phi = 2 \text{ mm}$

Nominal voltage (without circuit breaker) 433 V AC (65 V DC)

Nominal current (without circuit breaker)

|   |                   |
|---|-------------------|
| Input (1)                                     | 50 A              |
| Output (2)                                    | 25 A <sup>1</sup> |
| Supply (11)                                   | 10 A              |
| Single output (12), group indication (13, 14) | 1 A               |

Internal resistance (without circuit breaker)

|                                |  |
|--------------------------------|--|
| Input/output (1, 2)            | $\leq 5 \text{ m}\Omega$                     |
| Indication, parallel (11 - 12) | $\leq 9 \text{ m}\Omega/\text{per position}$ |
| serial (13 - 14)               | $\leq 8 \text{ m}\Omega/\text{per position}$ |

Supply rail for current distribution, plug-in bridge

FBST 500-PLC...  $I_{\text{max}} = 32 \text{ A}$   
 FBST 500-TMCP<sup>2</sup>  $I_{\text{max}} = 50 \text{ A}$

##### Dielectric strength

|  |        |
|--|--------|
| Between main circuits (without plug-in bridge) | 1500 V |
| Main circuit to signal circuit                 | 1500 V |
| Signal circuit to signal circuit               | 1500 V |

##### Weight

|                            |                     |
|----------------------------|---------------------|
| Central part               | 85 g, approximately |
| Connection elements (pair) | 30 g, approximately |

<sup>1</sup> When several circuit breakers are mounted in rows, the entire nominal current cannot be led due to the mutual thermal effect.  
 When  $I_N \leq 16 \text{ A}$ , the maximum load is 80%.  
 When  $I_N > 16 \text{ A}$ , the maximum load is 65%.

<sup>2</sup> Uninsulated power rail  $I_{\text{max}} = 50 \text{ A}$  (the uninsulated power rail is inserted fully and is therefore safe to touch)



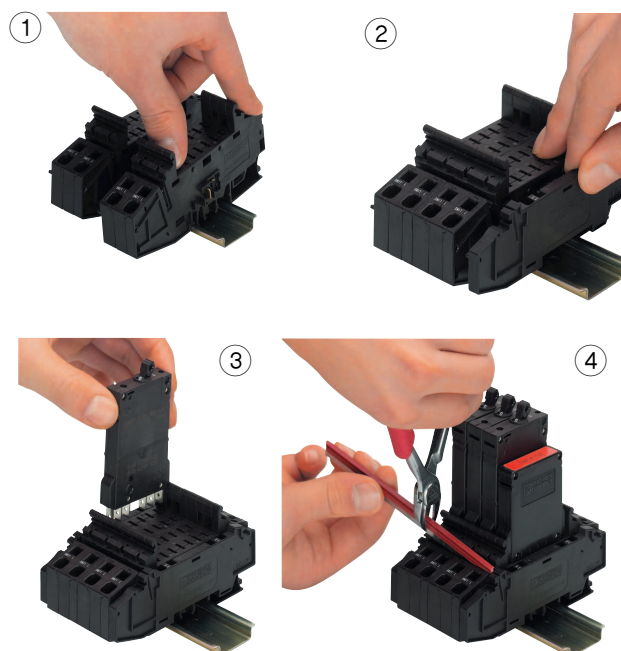
**TMCP CONNECT LR - Base termination element**

| Connection capacity  | Supply<br>Auxiliary contact<br>11 | Group output<br>Auxiliary contacts<br>13/14 |
|----------------------|-----------------------------------|---|
| Nominal voltage      | 250 V AC (65 V DC)                | 250 V AC (65 V DC)                          |
| Nominal current      | 10 A                              | 1 A   |
| Maximum load current | 10 A for 2.5 mm <sup>2</sup>      | 1 A for 2.5 mm <sup>2</sup>                 |

**General data**

|   |                |                         |
|---|----------------|-------------------------|
| TMCP CONNECT LR                         | Width x length | 25 mm (2-pos.) x 115 mm |
| TMCP SOCKET M                           | Width x length | 6 mm x 115 mm           |
| Height on NS 35/7.5... DIN rail         |                | 110.5 mm                |
| Height on NS 35/15... DIN rail          |                | 118 mm                  |
| Insulation material                     |                | PA-F                    |
| Inflammability class according to UL 94 |                | V0                      |
| Impulse voltage withstand level         |                | 2.5 kV                  |
| Pollution degree                        |                | 2                       |

**7.2 Mounting**



To assemble, proceed as follows:

- Snap the TMCP SOCKET M base onto a DIN rail according to EN 60751 ①. Individual bases can be mounted side by side to create any number of positions.
- Push bases together.
- Snap on TMCP CONNECT LR base termination elements to the left and right-hand side ②. The termination elements contain the contacts for group indication and the supply for individual indication.
- Insert TMCP ③.



**WARNING:** Always fill empty slots with the TMCP SB signal bridge.

- If a slot on the base is empty, the TMCP SB signal bridge is used. It bridges the group signal and replaces the circuit breaker. The bridging option in the base enables supply potential distribution over a maximum of 40 positions.
- Cut FBST 500... plug-in bridge to length as required and insert in bases ④.
- Insert the connecting cables in the spring-cage terminal blocks.
- If mounted overhead, secure the TMCP and base using the SPRING-LOCK clamp.



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