

## 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

| AC voltage      |                |                                       |                      |                                      |                      |
|-----------------|----------------|---------------------------------------|----------------------|--------------------------------------|----------------------|
| Number of poles | Voltage rating | Interrupting capacity $I_N$ 12...125A | Power factor         | Interrupting capacity $I_N$ 7 + 10 A | Power factor         |
| 1               | AC 240 V       | 5,000 A                               | $\cos\varphi = 0.7$  | 3,500 A                              | $\cos\varphi = 0.8$  |
| 2               | AC 240 V       | 8,000 A                               | $\cos\varphi = 0.7$  | 6,000 A                              | $\cos\varphi = 0.7$  |
| 3               | 3 AC 415 V     | 5,000 A                               | $\cos\varphi = 0.7$  | 3,000 A                              | $\cos\varphi = 0.85$ |
| 3               | 3 AC 500 V     | 4,000 A                               | $\cos\varphi = 0.8$  | 2,500 A                              | $\cos\varphi = 0.85$ |
| 3               | 3 AC 660 V     | 2,000 A                               | $\cos\varphi = 0.85$ | 2,000 A                              | $\cos\varphi = 0.85$ |

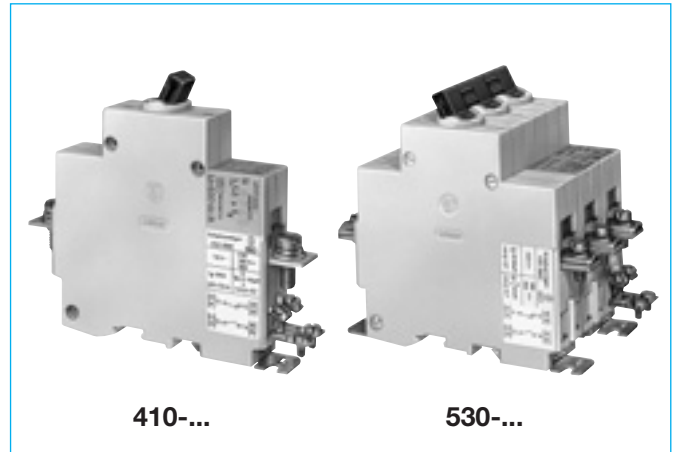
| DC voltage      |                |  |                |               |  |
|-----------------|----------------|--|----------------|---------------|--|
| Number of poles | Voltage rating | Interrupting capacity $I_N = 12...125$ A | $I_N = 7+10$ A | Time constant |  |
| 1               | DC 110 V       | 3,000 A                                  | 3,000 A        | L/R = 13 ms   |  |
| 1               | DC 110 V       | 5,000 A                                  | 3,500 A        | L/R = 5 ms    |  |
| 2               | DC 110 V       | 5,000 A                                  | 3,000 A        | L/R = 13 ms   |  |
| 2               | DC 110 V       | 10,000 A                                 | 6,000 A        | L/R ≈ 0 ms    |  |
| 2               | DC 220 V       | 2,000 A                                  | 2,000 A        | L/R = 13 ms   |  |
| 2               | DC 220 V       | 3,000 A                                  | 3,000 A        | L/R ≈ 0 ms    |  |

## Standard current ratings and typical internal resistance values

| Curves 01, 02, 04, 05: |                                  | Curves B3, C3:     |                                  |
|------------------------|----------------------------------|--------------------|----------------------------------|
| Current rating (A)     | Internal resistance (Ω) per pole | Current rating (A) | Internal resistance (Ω) per pole |
| 10                     | 0.033                            | 7                  | 0.033                            |
| 16                     | 0.015                            | 10                 | 0.015                            |
| 20                     | 0.010                            | 12                 | 0.015                            |
| 25                     | 0.0062                           | 16                 | 0.010                            |
| 32                     | 0.0039                           | 20                 | 0.0062                           |
| 40                     | 0.0031                           | 25                 | 0.0039                           |
| 50                     | 0.0022                           | 32                 | 0.0031                           |
| 63                     | ≤ 0.002                          | 40                 | 0.0022                           |
| 80                     | ≤ 0.002                          | 50                 | ≤ 0.002                          |
| 90                     | ≤ 0.002                          | 63                 | ≤ 0.002                          |
| 100                    | ≤ 0.002                          | 80                 | ≤ 0.002                          |
| 125                    | ≤ 0.002                          | 100                | ≤ 0.002                          |

## Approvals

| Authority            | Voltage ratings    | Current ratings      |
|----------------------|--------------------|----------------------|
| BV (except type 530) | AC 240 V; DC 110 V | 16...125 A           |
| 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; 3 AC 500 V; 3 AC 660 V (50/60 Hz); DC 110 V; DC 220 V series connection   |  |
| Current rating range                            | 10...125 A (EN 60947), curves 01/02/04/05<br>7...100 A (EN 60898), curves B3/C3/01  |  |
| Auxiliary circuit                               | 6 A, AC 240 V or DC 28 V<br>1 A, DC 110 V   |  |
| Typical life                                    | 10,000 operations at $1 \times I_N$<br>20,000 operations mechanical   |  |
| Ambient temperature                             | -20...+60 °C (-4...+140 °F)   |  |
| Insulation co-ordination (IEC 60664 and 60664A) | rated impulse withstand voltage<br>6 kV   | pollution degree<br>3                                |
| Dielectric strength (IEC 60664 and 60664A)      | test voltage<br>operating area<br>pole/pole<br>main circuit/aux.circuit<br>aux. circuit 11-12/13-14   | AC 3,300 V<br>AC 3,300 V<br>AC 2,200 V<br>AC 1,000 V |
| Insulation resistance                           | > 100 MΩ (DC 500 V)   |  |
| Degree of protection (IEC 60529/DIN 40050)      | operating area IP40<br>terminal area IP00   |  |
| Vibration                                       | curves 02/04/05/B3/C3:<br>4 g (60-500 Hz) ±0.30 mm (10-60 Hz)<br>curve 01:<br>3 g (60-500 Hz) ±0.23 mm (10-60 Hz)<br>to IEC 60068-2-6, test Fc<br>10 frequency cycles/axis                          |  |
| Shock   | curves 02/04/05/B3/C3:<br>50 g (11 ms) directions 1, 2, 3, 4, 5<br>30 g in direction 6<br>curve 01:<br>30 g (11 ms) in directions 1, 2, 3, 4, 5<br>20 g in direction 6<br>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 60068-2-3, test Ca  |  |
| Mass  | 410 (1-pole): approx. 290 g<br>520 (2-pole): approx. 580 g<br>530 (3-pole): approx. 870 g   |  |

## 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 I<sub>N</sub> AC (thyristor and rectifier protection)
- 02** 7-10 x I<sub>N</sub> AC (motor and generator protection to EN 60947)
- 04** 3.5-5 x I<sub>N</sub> AC (cable protection to EN 60947)
- 05** 4-6 x I<sub>N</sub> AC (generator protection to EN 60947)
- B3** 3-5 x I<sub>N</sub> AC (cable protection to EN 60898)
- C3** 5-10 x I<sub>N</sub> AC (cable protection to EN 60898)

### Auxiliary contacts optional (terminals M3.5)

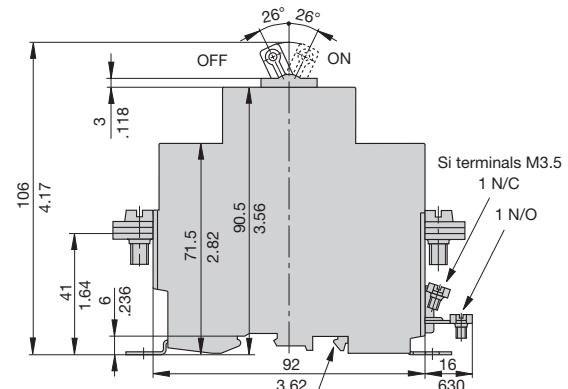
- Si** one each N/O and N/C contact
- Si1** one N/C (11,12)
- Si2** one N/O (13,14)
- 2Si** two each N/O and N/C (types 520/530)
- 3Si** three N/C, three N/O (type 530)

### Current ratings

7...125 A

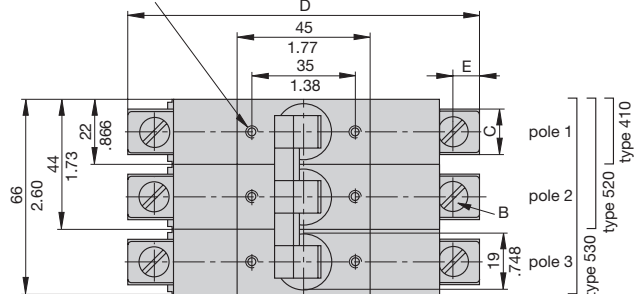
520 - K - 1 - 01 - ... - 10 A ordering example

## Dimensions

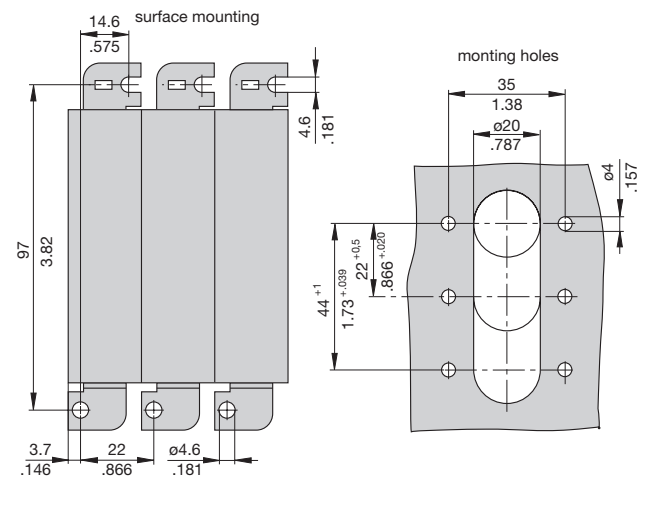


symmetrical rail DIN EN 50022-35x7.5  
G profile rail DIN EN 50035-G32 (not shown)

M3.5 - thread max. 9 mm (.354 in.) deep  
tightening torque max. 0.55 Nm



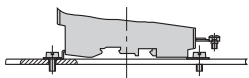
| Current rating | Dimensions mm/in. |              |             |           | Terminal                       | Cross section (see DIN 46288)                |  | Max. tightening torque |
|----------------|-------------------|--------------|-------------|-----------|--------------------------------|--|--|------------------------|
|                | B                 | C            | D           | E         |                                | with 1 or 2 equal conductors                 | with 2 different conductors  |                        |
| ≤ 32 A         | M5                | 13<br>.512   | 114<br>4.49 | 7<br>.276 | pressure plate B5<br>DIN 46288 | 2.5 mm <sup>2</sup> to<br>10 mm <sup>2</sup> | 2.5 mm <sup>2</sup> to<br>10 mm <sup>2</sup>   | 2.0 Nm                 |
| ≤ 63 A         | M6                | 15.4<br>.606 | 120<br>4.72 | 9<br>.354 | pressure plate B6<br>DIN 46288 | 4 mm <sup>2</sup> to<br>16 mm <sup>2</sup>   | 4 mm <sup>2</sup> and 6 mm <sup>2</sup><br>or<br>6 mm <sup>2</sup> to 16 mm <sup>2</sup> | 2.5 Nm                 |
| ≤ 125 A        | M6                | 15.4<br>.606 | 120<br>4.72 | 9<br>.354 | terminal screw                 |  |  | 2.5 Nm                 |



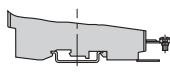
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Mounting methods

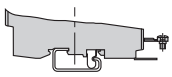
Surface mounting  
-1



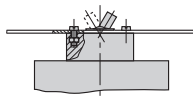
rail mounting  
(DIN EN 50 022-35x7,5)  
-2



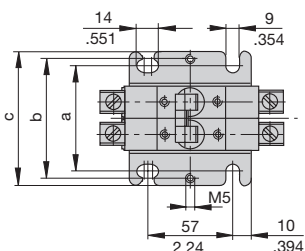
rail mounting on G profile  
(DIN EN 50 035-G32)  
-3



panel mounting  
-4



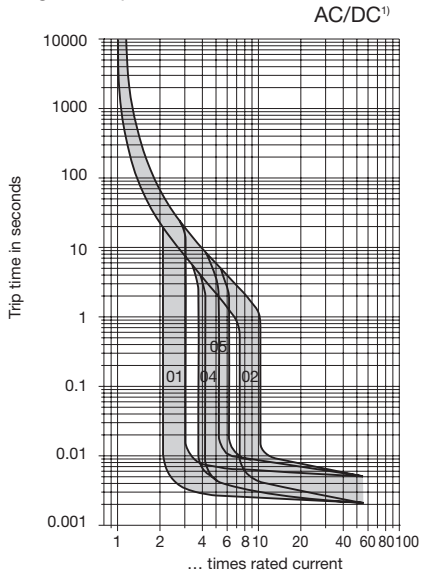
surface mounting  
with mounting brackets  
-5



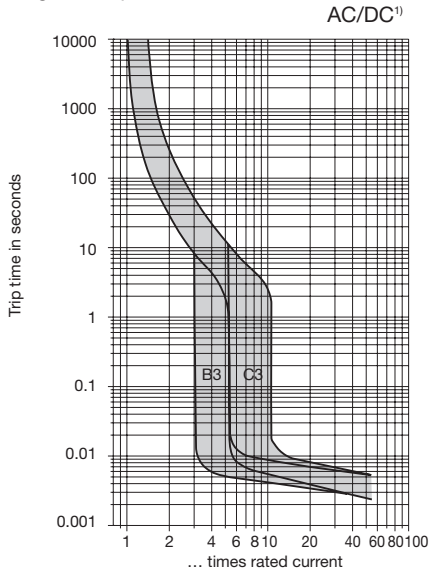
|          | a  |      | b     |      | c   |      |
|----------|----|------|-------|------|-----|------|
|          | mm | in.  | mm    | in.  | mm  | in.  |
| type 410 | 50 | 1.97 | 61.5  | 2.42 | 70  | 2.76 |
| type 520 | 72 | 2.84 | 83.5  | 3.29 | 92  | 3.62 |
| type 530 | 94 | 3.70 | 105.5 | 4.15 | 114 | 4.49 |

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

Magnetic trip curves 01,02,04,05



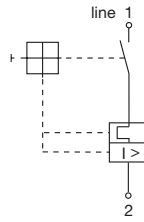
Magnetic trip curves B3,C3



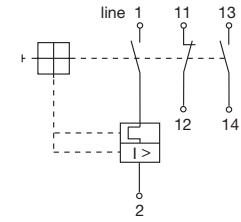
¹) Magnetic tripping currents are increased by 20% on DC supplies.

## Internal connection diagrams

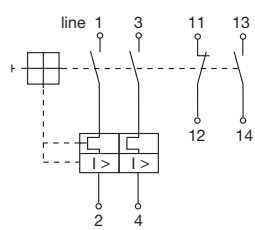
Type 410-K



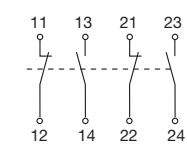
Type 410-K-Si



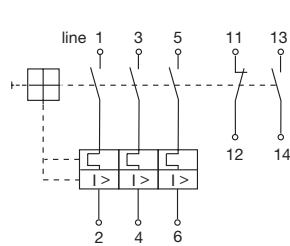
Type 520-K-Si



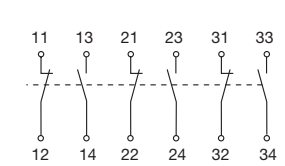
Type 520-K-2Si



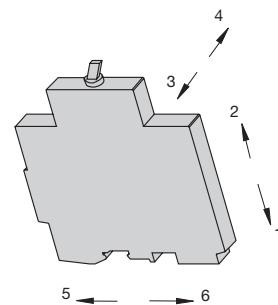
Type 530-K-Si



Type 530-K-3Si

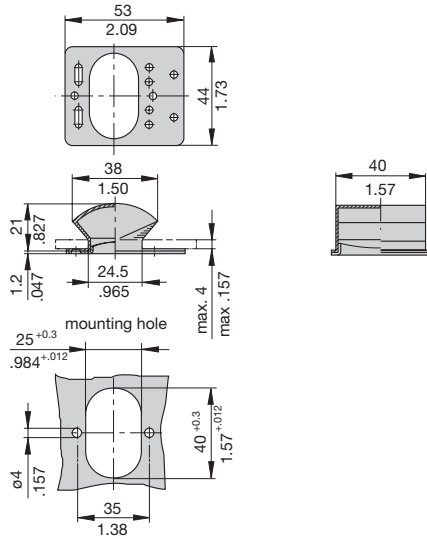


## Shock directions

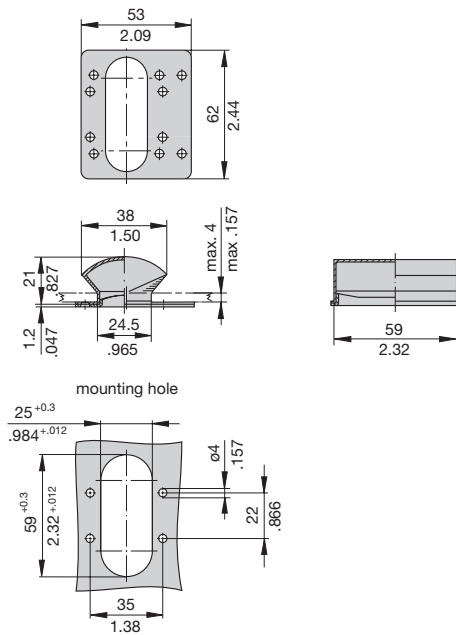


## Accessories

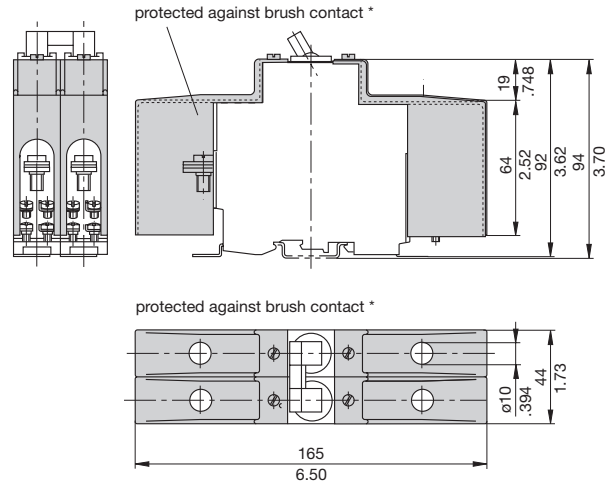
**Splash cover (transparent),  
with fixing plate and screws (IP54)  
for type 410  
X 211 118 01**



**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 ( $\frac{\text{mm}}{\text{inch}}$ )

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.

## 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

|   |   |
|---|---|
| <b>Type No.</b>                         |   |
| 412                                     | threadneck panel mounting                             |
| <b>Terminal design</b>                  |   |
| K14                                     | screw terminals M4 (to aircraft specs.)               |
| K54                                     | screw terminals M4 sealed housing (to vehicle specs.) |
| <b>Version</b>                          |   |
| FN2                                     | vehicle application, nickel-plated                    |
| LN2                                     | aircraft application, black finish                    |
| N2                                      | general application, nickel-plated                    |
| <b>Current ratings</b>                  |   |
| 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

| Current rating (A) | Voltage drop (mV) |       | Current rating (A) | Voltage drop (mV) |       |
|--------------------|-------------------|-------|--------------------|-------------------|-------|
|                    | -LN/N             | -FN   |                    | -LN/N             | -FN   |
| 6                  | -                 | ≤ 300 | 15                 | ≤ 200             | ≤ 200 |
| 7.5                | ≤ 300             | ≤ 250 | 20                 | ≤ 200             | ≤ 200 |
| 8                  | ≤ 250             | ≤ 200 | 25                 | ≤ 200             | ≤ 200 |
| 10                 | ≤ 200             | ≤ 200 | 30                 | ≤ 200             | -     |
| 12                 | ≤ 200             | ≤ 200 | 35                 | ≤ 200             | -     |
| 13                 | ≤ 200             | ≤ 200 |                    |                   |       |

## Approvals

| Test authority | Voltage ratings | Current ratings |
|----------------|-----------------|-----------------|
| UL             | DC 28 V         | 0.1...35 A      |



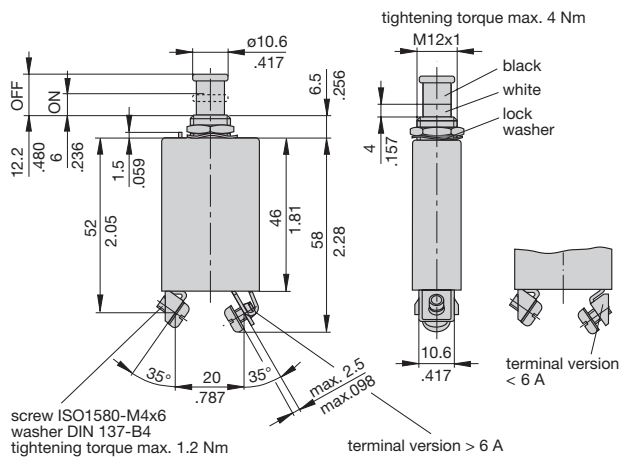
412-...

## Technical data

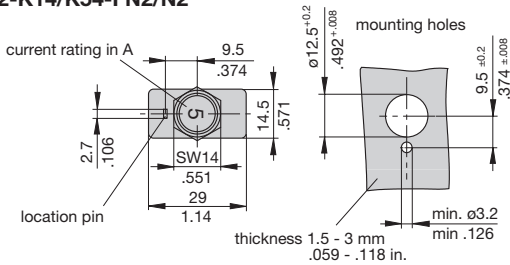
|   |  |
|---|--|
| Voltage rating                                  | DC 28 V<br>AC 115 V (400 Hz) upon request  |
| Current rating range                            | 6...25 A (-FN2)<br>7.5...35 A (-LN2/-N2),<br>lower current ratings to special order                              |
| Typical life                                    | 4,000 operations at 2 x I <sub>N</sub>   |
| Ambient temperature                             | -55...+75 °C (-67...+167 °F)   |
| Insulation co-ordination (IEC 60664 and 60664A) | rated impulse withstand voltage 1.5 kV<br>pollution degree 3   |
| Dielectric strength (IEC 60664 and 60664A)      | test voltage AC 1,500 V<br>operating area  |
| Insulation resistance                           | > 100 MΩ (DC 500 V)  |
| Interrupting capacity I <sub>cn</sub>           | 6,000 A  |
| Interrupting capacity (UL 1077)                 | 6,000 A  |
| Degree of protection (IEC 60529/DIN 40050)      | operating area IP40<br>terminal area IP00  |
| Vibration                                       | 10 g (56-500 Hz) ±0.76 mm (10-55 Hz) to VG 95210, sheet 19/<br>MIL-STD-202, meth. 204/<br>IEC 60068-2-6, test Fc |
| Shock   | 25 g (11 ms) to VG 95210, sheet 28/<br>MIL-STD-202, meth. 213/<br>IEC 60068-2-27, test Ea                        |
| Corrosion                                       | 96 hours at 5 % salt mist, to VG 95210, sheet 2/<br>MIL-STD-202, meth. 101/<br>IEC 60068-2-11, test Ka           |
| Humidity  | 240 hours at 95 % RH to VG 95210, sheet 7/<br>MIL-STD-202, meth. 106/<br>IEC 60068-2-3, test Ca                  |
| Mass  | approx. 40 g   |

## Dimensions

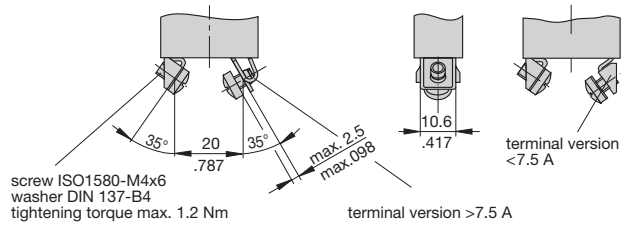
### 412-K54-FN2/N2



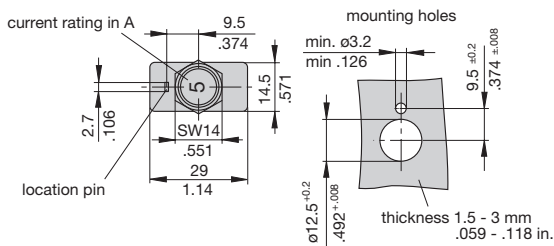
### 412-K14/K54-FN2/N2



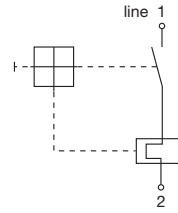
### 412-K14-LN2



### 412-K14/K54-LN2

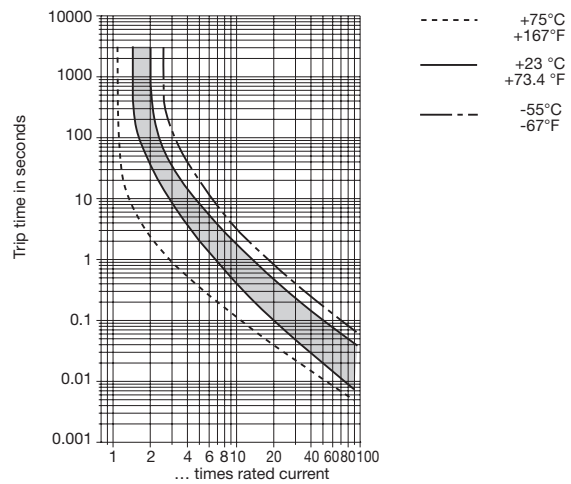


## Internal connection diagram

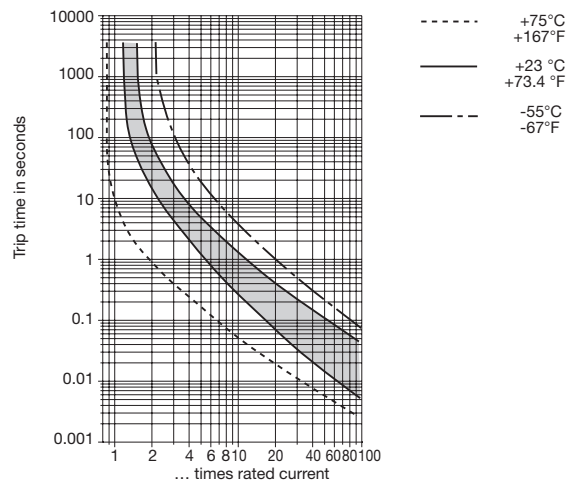


## Typical time/current characteristics

### 412-...-FN2 6...25 A

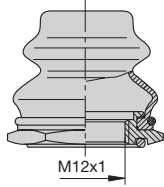


### 412-..LN2/-N2 7.5...35 A

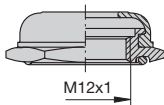


## Accessories (approved to VG 95345, part 23)

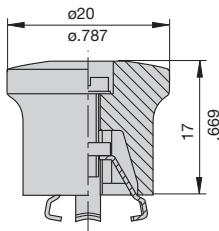
**Splash cover /hex nut assembly with O ring (IP66)**  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**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



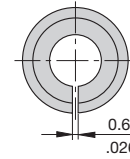
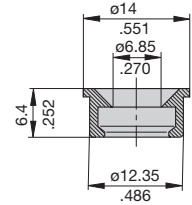
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

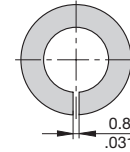
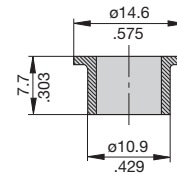
**Identification collar** to be snapped on the push button

**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



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## Ordering information

|  |   |
|--|---|
| <b>Type No.</b>                                |   |
| <b>413</b>                                     | threadneck panel mounting                         |
| <b>Terminal design</b>                         |   |
| <b>K14</b>                                     | screw terminals M6 (to aircraft specs.)           |
| <b>K34</b>                                     | reinforced screw terminals M6 (to vehicle specs.) |
| <b>K54</b>                                     | as K34, but housing sealed                        |
| <b>Version</b>                                 |   |
| <b>FN2</b>                                     | vehicle application, nickel-plated                |
| <b>LN2</b>                                     | aircraft application, black finish                |
| <b>N2</b>                                      | general application, nickel-plated                |
| <b>Current ratings</b>                         |   |
|  | 30...55 A (-FN2)                                  |
|  | 30...90 A (-LN2/N2)                               |
| <b>413 - K14 - LN2 - 40 A</b> ordering example |   |

## Standard current ratings and typical voltage drop values

| Current rating (A) | Voltage drop (mV) |       | Current rating (A) | Voltage drop (mV) |       |
|--------------------|-------------------|-------|--------------------|-------------------|-------|
|                    | -LN/N             | -FN   |                    | -LN/N             | -FN   |
| 30                 | ≤ 250             | ≤ 250 | 55                 | -                 | ≤ 200 |
| 35                 | ≤ 250             | ≤ 250 | 60                 | ≤ 200             | -     |
| 40                 | ≤ 200             | ≤ 200 | 70                 | ≤ 200             | -     |
| 45                 | ≤ 200             | ≤ 200 | 80                 | ≤ 200             | -     |
| 50                 | ≤ 200             | ≤ 200 | 90                 | ≤ 200             | -     |

## Approvals

| Test authority | Voltage ratings | Current ratings |
|----------------|-----------------|-----------------|
| UL             | DC 28 V         | 30...80 A       |
| QPL Sweden     | DC 28 V         | 30...50 A       |
| BV             | DC 28 V         | 30...70 A       |



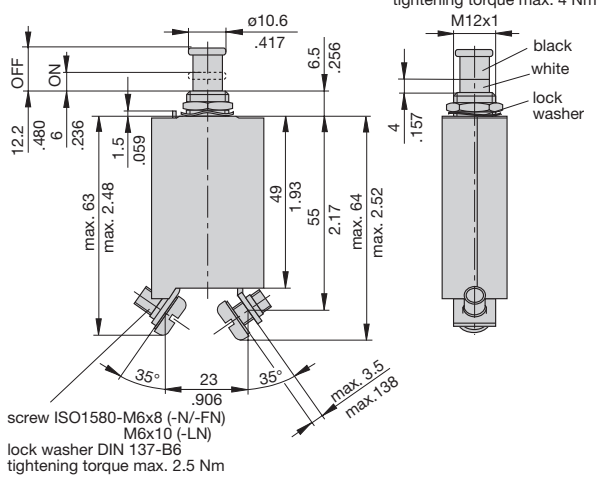
413-...

## Technical data

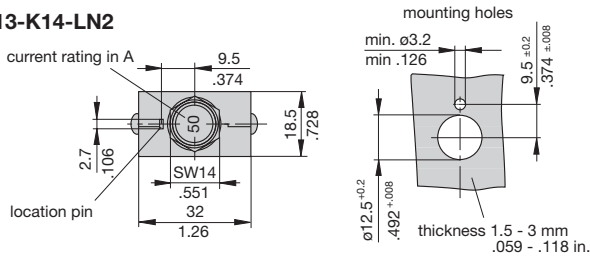
|   |   |                       |
|---|---|-----------------------|
| Voltage rating  | DC 28 V<br>AC 115 V (400 Hz) upon request   |                       |
| Current rating range                                      | 30...55 A (-FN2)<br>30...90 A (-LN2/-N2),   |                       |
| Typical life  | 2,000 operations at 1 x I <sub>N</sub>  |                       |
| Ambient temperature                                       | -55...+75 °C (-67...+167 °F)  |                       |
| Insulation co-ordination (IEC 60664 and 60664A)           | rated impulse withstand voltage<br>1.5 kV   | pollution degree<br>3 |
| Dielectric strength (IEC 60664 and 60664A) operating area | test voltage<br>AC 1,500 V  |                       |
| Insulation resistance                                     | > 100 MΩ (DC 500 V)   |                       |
| Interrupting capacity I <sub>cn</sub>                     | 6,000 A   |                       |
| Interrupting capacity (UL 1077)                           | 6,000 A   |                       |
| Degree of protection (IEC 60529/DIN 40050)                | operating area IP40<br>terminal area IP00   |                       |
| Vibration   | 10 g (56-500 Hz) ±0.76 mm (10-55 Hz)<br>to VG 95210, sheet 19/<br>MIL-STD-202, meth. 204/<br>IEC 60068-2-6, test Fc |                       |
| Shock   | 50 g (11 ms)<br>to VG 95210, sheet 28/<br>MIL-STD-202, meth. 213/<br>IEC 60068-2-27, test Ea                        |                       |
| Corrosion   | 96 hours at 5 % salt mist,<br>to VG 95210, sheet 2/<br>MIL-STD-202, meth. 101/<br>IEC 60068-2-11, test Ka           |                       |
| Humidity  | 240 hours at 95 % RH<br>to VG 95210, sheet 7/<br>MIL-STD-202, meth. 106/<br>IEC 60068-2-3, test Ca                  |                       |
| Mass  | approx. 65 g  |                       |

## Dimensions

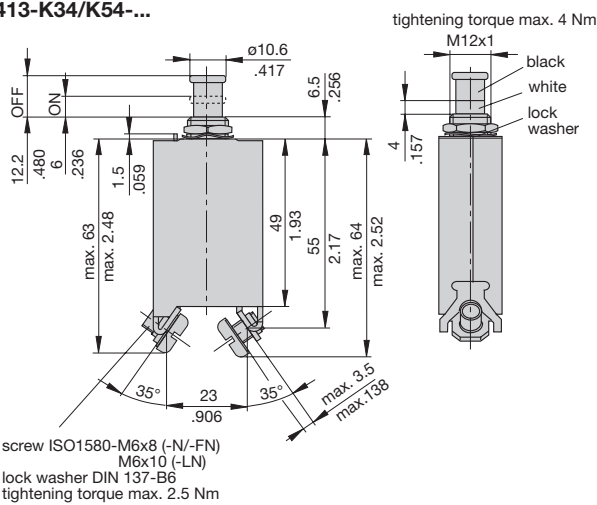
### 413-K14-...



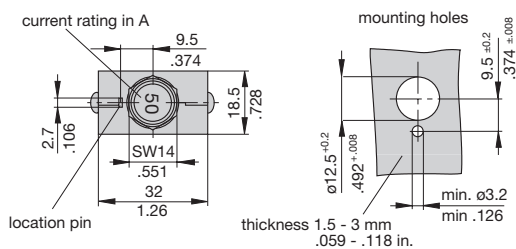
### 413-K14-LN2



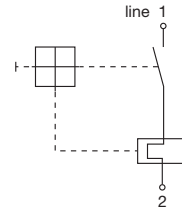
### 413-K34/K54-...



### 413-K34/K54-FN2/-N2

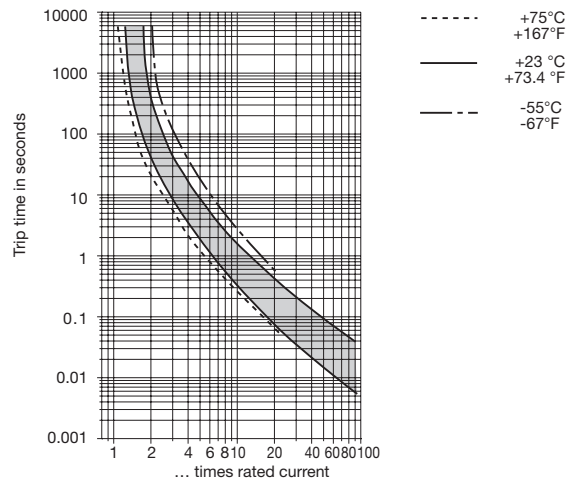


## Internal connection diagram

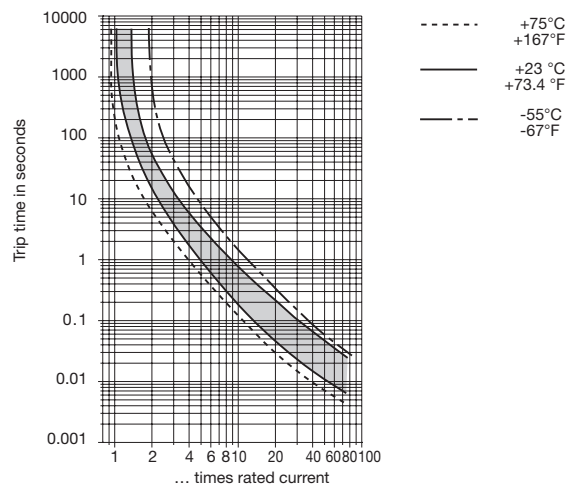


## Typical time/current characteristics

### 413-...-FN2 30...55 A



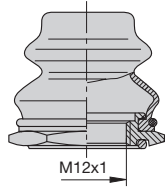
### 413-...-LN2/-N2 30...90 A



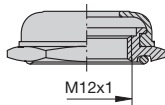
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories (approved to VG 95345, part 23)

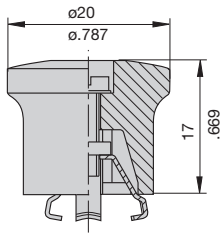
**Splash cover /hex nut assembly with O ring (IP66)**  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**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



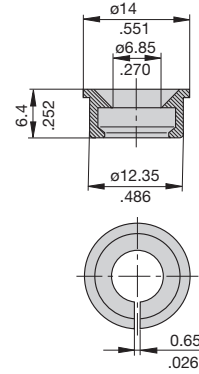
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

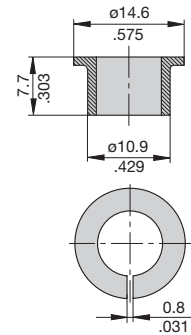
**Identification collar to be snapped on the push button**

**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 ( $\frac{\text{mm}}{\text{inch}}$ )

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.

## Description

Single pole high performance version of type 3200 (section 2) thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and additional manual release (M-type TM CBE to EN 60934). Designed for plug-in mounting with E-T-A sockets 10R or 16. Available with optional silver plated terminal pins for use in corrosive environments. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Extra low voltage systems, control equipment.

## Ordering information

| Type No.        |                  |
|-----------------|------------------|
| 428             | plug-in          |
| Current ratings |                  |
| 0.05...25 A     |                  |
| 428 - 10 A      | ordering example |

## Standard current ratings and typical internal resistance values

| Current rating (A) | Internal resistance (Ω) | Current rating (A) | Internal resistance (Ω) |
|--------------------|-------------------------|--------------------|-------------------------|
| 0.05               | 534                     | 4                  | 0.1407                  |
| 0.1                | 149                     | 5                  | 0.1068                  |
| 0.2                | 56                      | 6                  | 0.0627                  |
| 0.3                | 24.2                    | 7                  | 0.0491                  |
| 0.4                | 13.65                   | 8                  | ≤ 0.02                  |
| 0.5                | 8.08                    | 10                 | ≤ 0.02                  |
| 0.6                | 5.25                    | 12                 | ≤ 0.02                  |
| 0.8                | 3.55                    | 14                 | ≤ 0.02                  |
| 1                  | 2.02                    | 15                 | ≤ 0.02                  |
| 1.5                | 0.904                   | 16                 | ≤ 0.02                  |
| 2                  | 0.514                   | 18                 | ≤ 0.02                  |
| 2.5                | 0.36                    | 20                 | ≤ 0.02                  |
| 3                  | 0.23                    | 25                 | ≤ 0.02                  |

## Approvals

| Authority      | Voltage ratings   | Current ratings |
|----------------|-------------------|-----------------|
| VDE (EN 60934) | AC 240 V; DC 28 V | 0.05...25 A     |



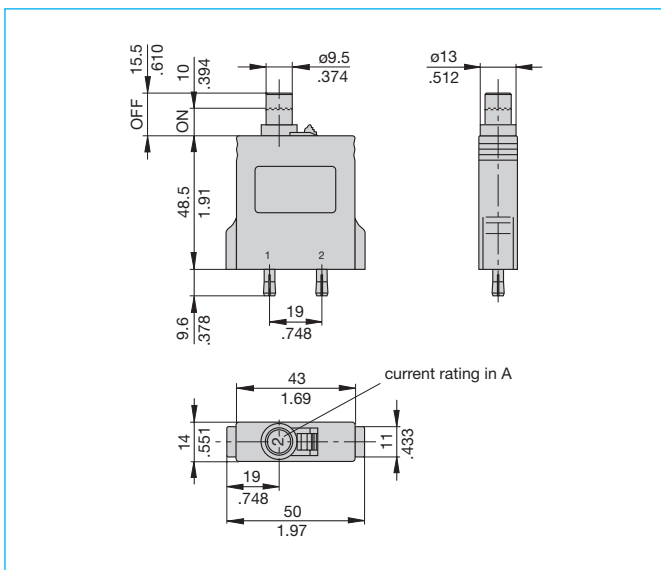
428-...

## Technical data

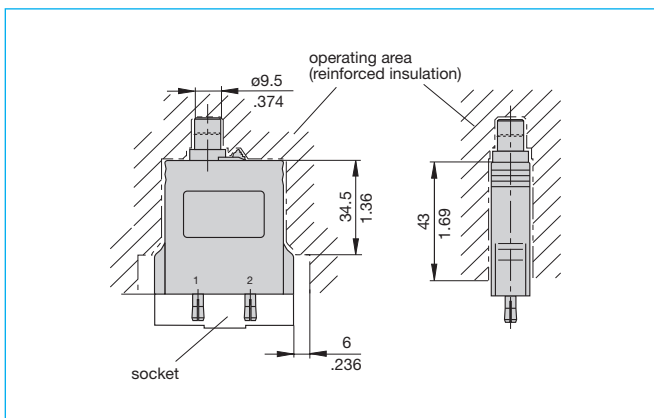
For further details please see chapter: **Technical Information**

|   |  |  |
|---|--|--|
| Voltage rating  | AC 250 V (50/60 Hz); DC 28 V   |  |
| Current rating range                                      | 0.05...25 A  |  |
| Typical life  | 2,000 operations at 1 x I <sub>N</sub> , inductive<br>4,000 operations at 1 x I <sub>N</sub> , resistive             |  |
| Ambient temperature                                       | -30...+60 °C (-22...+140 °F)   |  |
| Insulation co-ordination (IEC 60664 and 60664A)           | rated impulse withstand voltage<br>2.5 kV  | pollution degree<br>2<br>reinforced insulation in operating area |
| Dielectric strength (IEC 60664 and 60664A) operating area | test voltage<br>AC 3,000 V   |  |
| Insulation resistance                                     | > 100 MΩ (DC 500 V)  |  |
| Interrupting capacity I <sub>cn</sub>                     | 0.05...5 A    400 A<br>5.5...7.5 A    750 A<br>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<br>terminal area IP00  |  |
| Vibration   | 5 g (57-500 Hz) ±0.38 mm (10-57 Hz)<br>to IEC 60068-2-6, test Fc<br>10 frequency cycles/axis                         |  |
| Shock   | 25 g (11 ms)<br>to IEC 60068-2-27, test Ea   |  |
| Corrosion   | 96 hours at 5 % salt mist<br>to IEC 60068-2-11, test Ka  |  |
| Humidity  | 240 hours at 95 % RH<br>to IEC 60068-2-3, test Ca  |  |
| Mass  | approx. 50 g   |  |

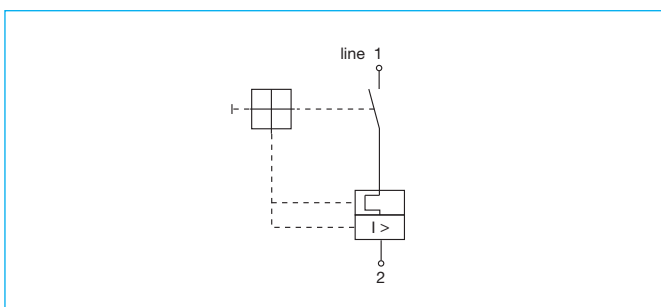
## Dimensions



## Installation drawing



## Internal connection diagram

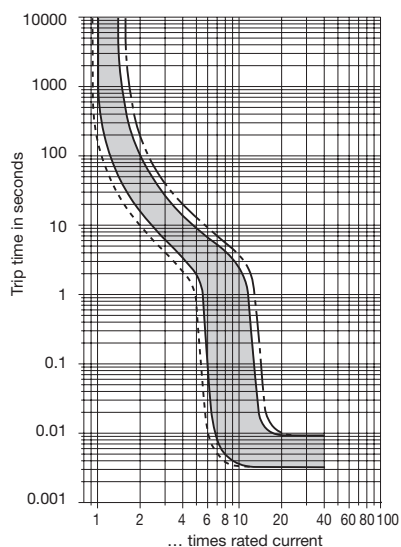


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics

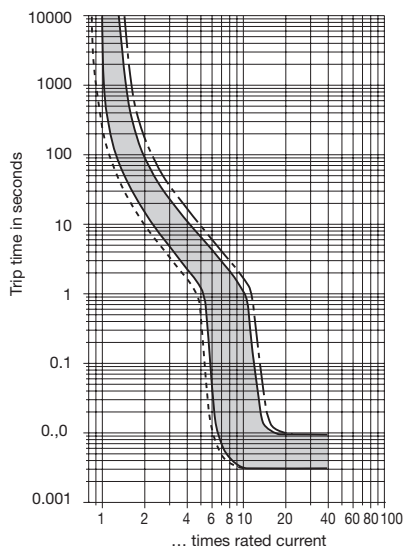
0.05 ... 7 A

AC/DC <sup>1)</sup>



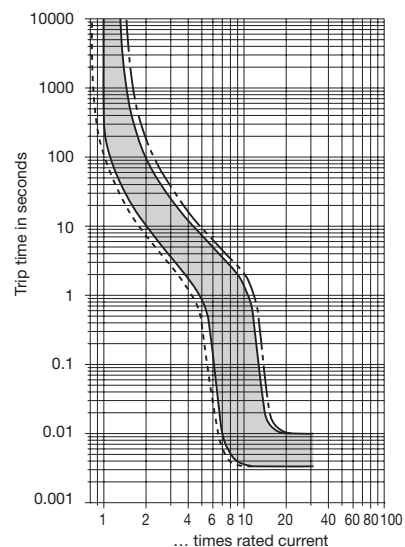
8 ... 16 A

AC/DC <sup>1)</sup>



18 ... 25 A (for  $I_N \geq 20$  A 50% ON duty/30 minutes)

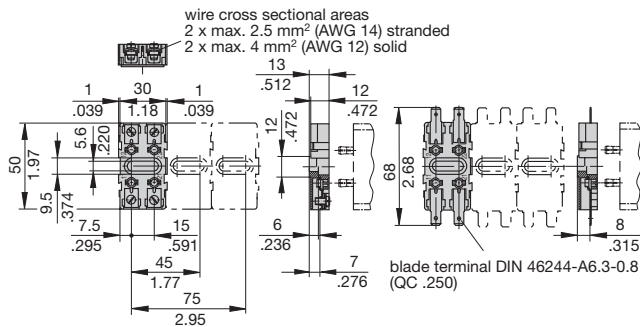
AC/DC <sup>1)</sup>



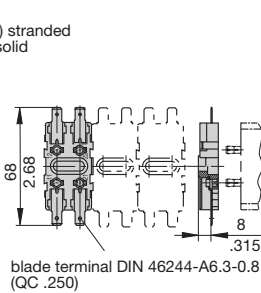
<sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.

## Accessories

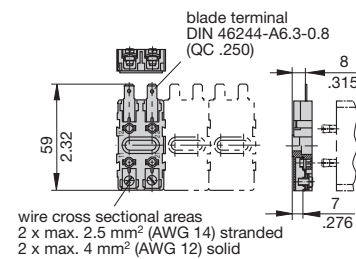
### Sockets 10R-K10 (continuous load up to 20 A)



### 10R-P10 (continuous load up to 16 A)

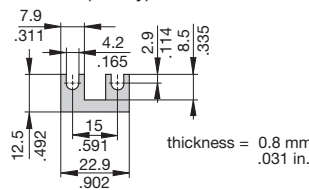


### 10R-A10 (continuous load up to 16 A)

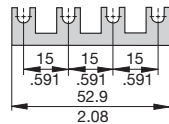


### Bus bars for sockets 10.-...: (continuous load up to 20 A)

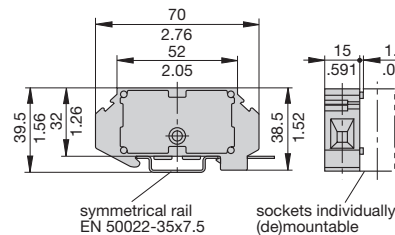
#### Y 301 166 02 (2-way)



#### Y 301 166 01 (4-way)

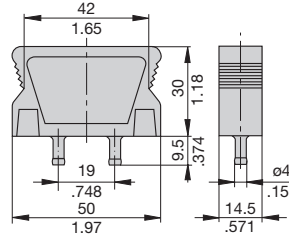


### Socket 16 (continuous load up to 16 A)

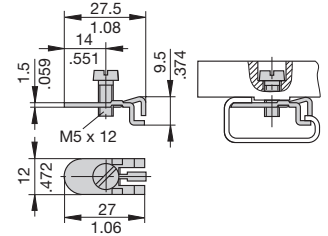


**Adapter  
X 200 409 01**  
for EN rail 50035-G32  
(specified as a separate  
item)  
for socket 16  
available on request

### Blanking plug Y 301 477 01 for sockets 10R-P10/K10/A10

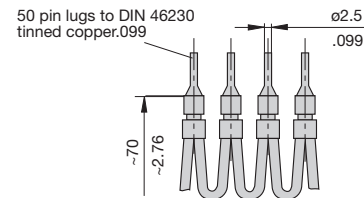


### Terminal for mounting rack X 200 800 01 for socket 10R, 10F on EN rail 50 035-G32



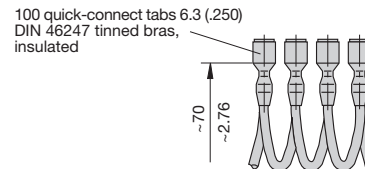
### Connector bus links -K10

X 210 589 01/ 2.5 mm<sup>2</sup> (AWG 14), black (up to 20 A max. load)  
X 210 589 02/ 1.5 mm<sup>2</sup> (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 mm<sup>2</sup> (AWG 16), brown (up to 13 A max. load)  
X 210 588 02/ 2.5 mm<sup>2</sup> (AWG 14), black (up to 20 A max. load)  
X 210 588 03/ 2.5 mm<sup>2</sup> (AWG 14), red (up to 20 A max. load)  
X 210 588 04/ 2.5 mm<sup>2</sup> (AWG 14), blue (up to 20 A max. load)



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

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.

## 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 60934). 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

|  |  |
|--|--|
| <b>Type No.</b>                                    |  |
| 437  | single pole, toggle actuator (2-pole upon request)   |
| <b>Enclosure design (optional)</b>                 |  |
| 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  |
| <b>Terminal design</b>                             |  |
| 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   |
| <b>Mounting</b>                                    |  |
| 1  | lugs   |
| 2  | compulsory and only for C3 housing   |
| 5  | brackets   |
| <b>Characteristic curve</b>                        |  |
| 06   | fast trip  |
| 07   | delayed trip   |
| <b>Auxiliary contacts (blade terminals 6.3x08)</b> |  |
| Si   | one each N/O and N/C   |
| Si01   | one N/C (11/12), two N/O (13/14 + 23/24)   |
| Si2  | one N/O (13/14)  |
| 2Si2   | two N/O  |
| <b>Remote trip (optional)</b>                      |  |
| 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 |
| <b>Coil voltage</b>                                |  |
| 12   | DC 12 V  |
| 24   | DC 24 V  |
| (higher voltage ratings upon request)              |  |
| <b>Current ratings</b>                             |  |
| 40...240 A   |  |
| <b>Voltage ratings</b>                             |  |
| (blank) ≤ DC 110 V                                 |  |
| B > DC 110 V                                       |  |

437 - ... - K60 - 5 - 06 - 2Si2 - FA 24 - 50A - ... 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

| Current rating (A) | Internal resistance (Ω) | Current rating (A) | Internal resistance (Ω) |
|--------------------|-------------------------|--------------------|-------------------------|
| 40                 | < 0.003                 | 120                | ≤ 0.002                 |
| 50                 | < 0.002                 | 160                | ≤ 0.001                 |
| 63                 | ≤ 0.002                 | 200                | ≤ 0.001                 |
| 80                 | ≤ 0.002                 | 240                | ≤ 0.001                 |
| 100                | ≤ 0.002                 |                    |                         |



437-...

## Technical data

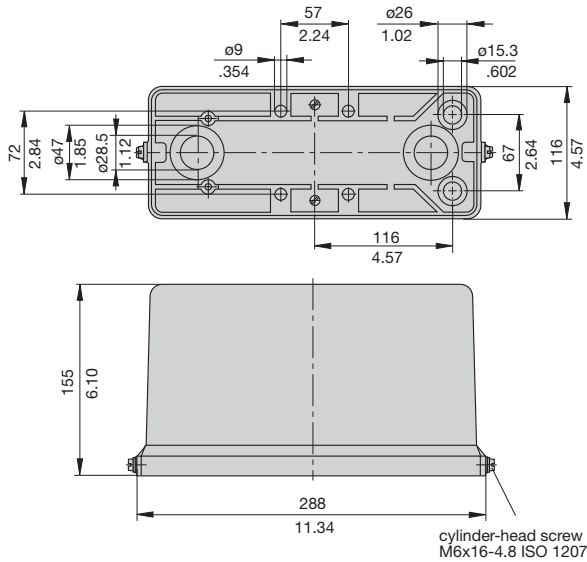
|  |   |  |
|--|---|--|
| Voltage rating                                     | DC 144 V (higher voltage ratings upon request)  |  |
| Current rating range                               | 40...240 A (higher current ratings upon request)  |  |
| Auxiliary contact rating                           | 6 A max. at DC 28 V<br>0.2 A at DC 180 V  |  |
| <b>Electrical remote disconnection (-FA)</b>       |   |  |
| operating voltage                                  | DC 12 V or DC 24 V  |  |
| operating current                                  | approx. 18 A or 12 A  |  |
| max. pulse time                                    | 10 ms < t <sub>ON</sub> < 20 ms / t <sub>OFF</sub> > 10 s   |  |
| switching time                                     | < 20 ms   |  |
| <b>Electrical remote re-connection (-FC)</b>       |   |  |
| operating voltage                                  | DC 12 V or DC 24 V  |  |
| operating current                                  | approx. 30 A or 15 A  |  |
| max. pulse time                                    | 0.1 s < t <sub>ON</sub> < 1.2 s / t <sub>OFF</sub> > 60 s   |  |
| switching time                                     | < 100 ms  |  |
| Typical life                                       | 3,000 operations at 240 A, DC 180 V<br>10,000 operations at 240 A, DC 28 V<br>20,000 operations mechanical  |  |
| Ambient temperature                                | -40...+60 °C (-40...+140 °F)  |  |
| Insulation co-ordination (IEC 60664 and 60664 A)   | rated impulse withstand voltage<br>6 kV   | pollution degree<br>3  |
| <b>Dielectric strength (IEC 60664 and 60664 A)</b> |   |  |
| operating area                                     | test voltage<br>AC 3,300 V  |  |
| main to aux. circuit                               | AC 2,200 V  |  |
| aux. circuits 11-12 to 13-14                       | AC 1,000 V  |  |
| Insulation resistance                              | > 100 MΩ (DC 500 V)   |  |
| Interrupting capacity I <sub>cn</sub>              | 2,000 A at DC 180 V; L/R = 0 ms<br>10,000 A at DC 28 V; L/R = 0 ms<br>7,500 A at DC 28 V; L/R = 13 ms   |  |
| Degree of protection (IEC 60529/DIN 40050)         | operating area IP40,<br>terminal area IP00<br>with enclosure B IP54<br>with enclosure C IP65  |  |
| Vibration  | curve 06:   | 3 g (60-500 Hz), ±0.23 mm (10-60 Hz)   |
|  | curve 07:   | 4 g (60-500 Hz), ±0.30 mm (10-60 Hz)<br>to IEC 60068-2-6, test Fc,<br>10 frequency cycles/axis |
| Shock  | curve 06:   | 20 g (11 ms), to IEC 60068-2-27, test Ea   |
|  | curve 07:   | 25 g (11 ms), to IEC 60068-2-27, test Ea   |
| Corrosion  | 48 hours at 5 % salt mist,<br>to IEC 60068-2-11, test Ka  |  |
| Humidity   | 240 hours at 95 % RH,<br>to IEC 60068-2-3, test Ca  |  |
| Mass   | approx. 900 g base unit<br>+ approx. 400 g remote disconnection<br>+ approx. 100 g remote re-connection<br>+ approx. 750 g B housing<br>+ approx. 1,000 g C housing |  |

## Approvals

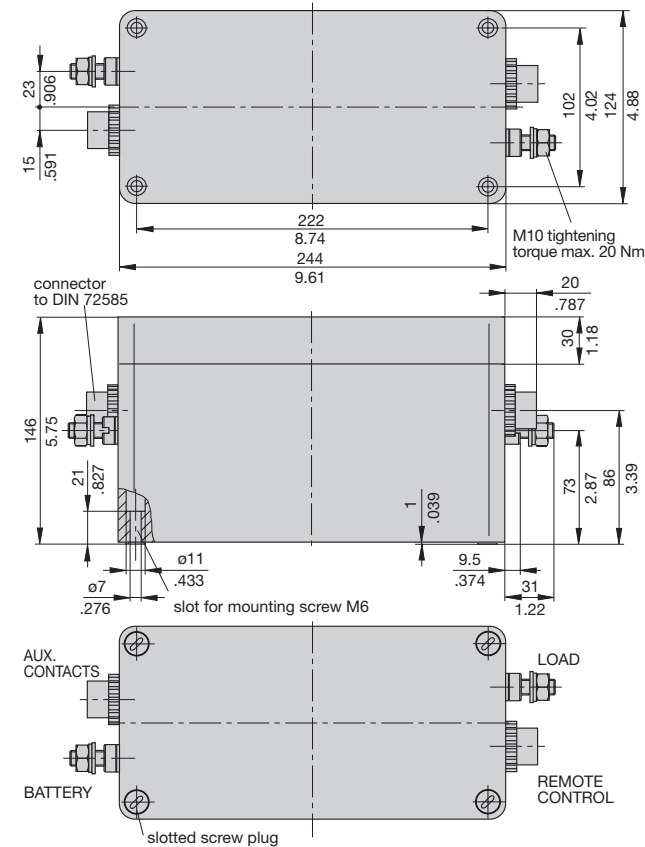
| Authority | Voltage ratings | Current ratings |
|-----------|-----------------|-----------------|
| BV        | DC 180 V        | 40...240 A      |

## Dimensions

### Moulded enclosure IP54 -B3

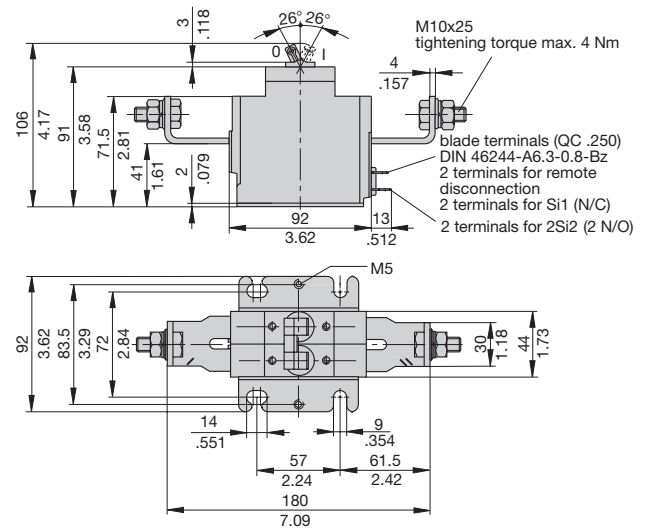


### Moulded enclosure IP65 -C3

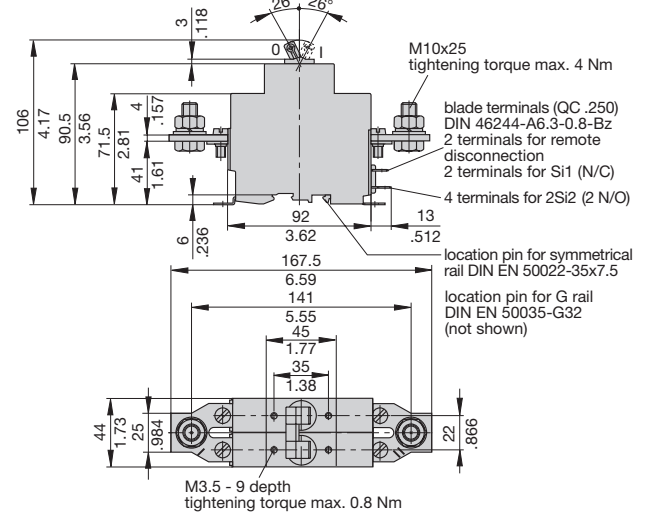


## Dimensions

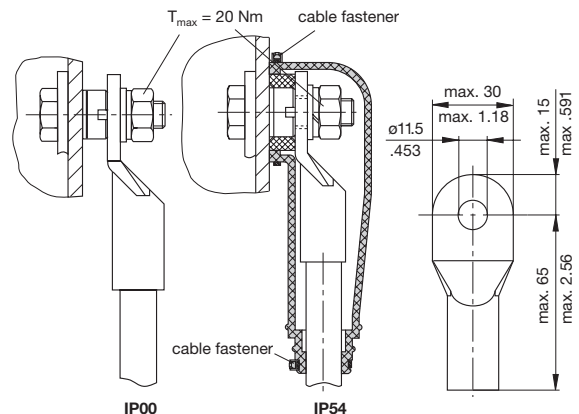
### 437-K12-5-Si-...-FA



### 437-K60-1-...-FA



## Terminals with housing C3



Rubber caps and cable fasteners are supplied with the product.

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



## 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

| Type No.  | Description   |
|---|---|
| 446   | single pole base mounting, fast characteristic curve  |
| 447   | single pole base mounting, medium delay characteristic curve  |
| 449   | single pole base mounting, delayed characteristic curve   |
| <b>Terminal design, mounting</b>                    |   |
| K   | screw terminals M12, insertion nuts M8  |
| S   | screw terminals M12, insertion nuts 5/16-18   |
| <b>Manual release</b>                               |   |
| H   | standard  |
| <b>Version</b>                                      |   |
| N   | general application (type 446 only)   |
| FN  | general application (types 447 and 449 only)  |
| <b>Auxiliary contacts (optional)</b>                |   |
| Si  | 2 electrically separate auxiliary contacts with screw terminals M3.5 and blade terminals DIN 46244-C-MS-S |
| <b>Remote trip (optional for types 447 and 449)</b> |   |
| FA12  | DC 12 V coil voltage  |
| FA24  | DC 24 V coil voltage  |
| <b>Current ratings</b>                              |   |
| 30...400 A  | type 446  |
| 100...400 A   | type 447  |
| 125...500 A   | type 449  |

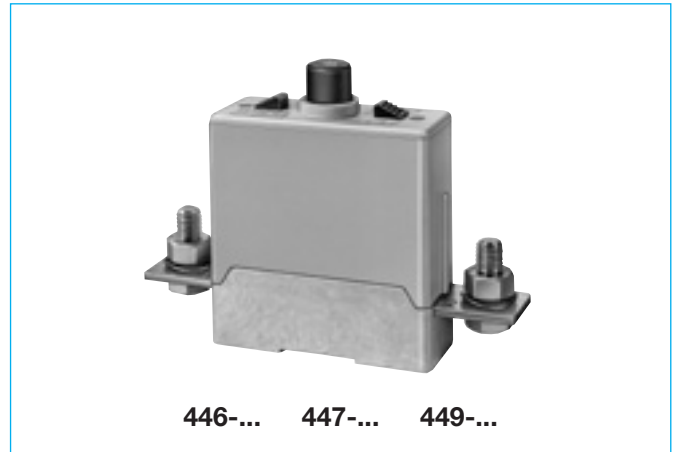
447 - K - H - FN - ... - ... - 400 A ordering example

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

| Type     | Current rating (A) | Internal resistance (Ω) | Current rating (A) | Internal resistance (Ω) |         |         |
|----------|--------------------|-------------------------|--------------------|-------------------------|---------|---------|
| Type 446 | 30                 | 0.006                   | Type 447           | 100                     | < 0.002 |         |
|          | 40                 | 0.0048                  |                    | 125                     | < 0.001 |         |
|          | 50                 | 0.0038                  |                    | 160                     | < 0.001 |         |
|          | 60                 | 0.0028                  |                    | 225                     | < 0.001 |         |
|          | 70                 | 0.0025                  |                    | 300                     | < 0.001 |         |
|          | 80                 | 0.0023                  |                    | 400                     | < 0.001 |         |
|          | 90                 | 0.0019                  |                    | 400                     | < 0.001 |         |
|          | 100                | 0.0016                  |                    | Type 449                | 125     | < 0.001 |
|          | 125                | < 0.001                 |                    |                         | 160     | < 0.001 |
|          | 150                | < 0.001                 |                    |                         | 225     | < 0.001 |
| 170      | < 0.001            | 315                     | < 0.001            |                         |         |         |
|          | 200                | < 0.001                 |                    | 350                     | < 0.001 |         |
|          | 225                | < 0.001                 |                    | 400                     | < 0.001 |         |
|          | 250                | < 0.001                 |                    | 500                     | < 0.001 |         |
|          | 300                | < 0.001                 |                    | 500                     | < 0.001 |         |
|          | 350                | < 0.001                 |                    | only with 50 % ON duty  |         |         |
|          | 400                | < 0.001                 |                    |                         |         |         |
|          | 400                | < 0.00                  |                    |                         |         |         |
|          | 400                | < 0.00                  |                    |                         |         |         |

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.



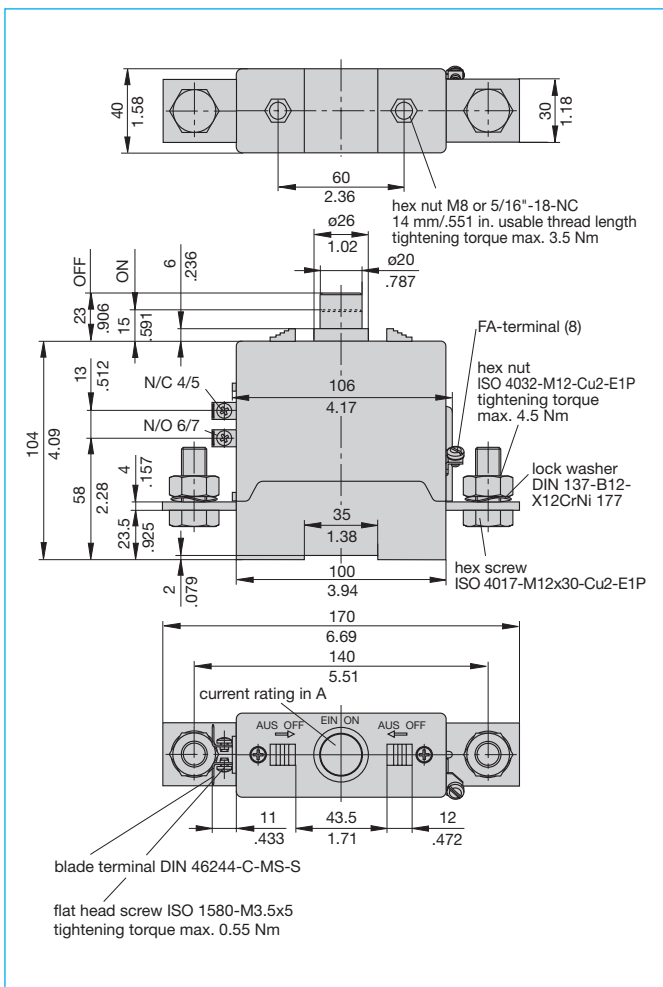
## Technical data

|   |   |
|---|---|
| Voltage rating                                  | DC 28 V   |
| Current rating range                            | type 446: 30...400 A<br>type 447: 100...400 A<br>type 449: 125...500 A  |
| Auxiliary circuit                               | 10 A  |
| Electrical remote disconnection (-FA)           | operating voltage DC 12 V or DC 24 V<br>operating current approx. 18 A or 12 A<br>max. pulse time 10 ms < t <sub>ON</sub> < 20 ms / t <sub>OFF</sub> > 10 s<br>switching time < 20 ms |
| Typical life                                    | 1,000 operations at I <sub>N</sub><br>2,000 operations mechanical   |
| Ambient temperature                             | -55...+75 °C (-67...+167 °F)  |
| Insulation co-ordination (IEC 60664 and 60664A) | rated impulse withstand voltage 1.5 kV<br>pollution degree 3  |
| Dielectric strength (IEC 60664 and 60664A)      | test voltage operating area AC 1,000 V<br>main circuit to auxiliary contacts AC 1,000 V   |
| Insulation resistance                           | >100 MΩ (DC 500 V)  |
| Interrupting capacity I <sub>cn</sub>           | 10,000 A  |
| Degree of protection (IEC 60529/DIN 40050)      | operating area IP40<br>terminal area IP00   |
| Vibration                                       | without auxiliary contacts: 10 g (56-500 Hz) ±0.76 mm (10-55 Hz)<br>with auxiliary contacts: 4 g (56-500 Hz) ±0.30 mm (10-56 Hz)<br>to VG 95210, sheet 19/IEC 60068-2-6, test Fc      |
| Shock   | without auxiliary contacts: 50 g (11 ms)<br>with auxiliary contacts: 20 g (11 ms)<br>to VG 95210, sheet 28/IEC 60068-2-27, test Ea  |
| Corrosion                                       | 96 hours at 5 % salt mist<br>to VG 95210, sheet 2/IEC 60068-2-11, test Ka   |
| Humidity  | 240 hours at 95 % RH<br>to VG 95210, sheet 7/IEC 60068-2-3, test C  |
| Mass  | approx. 850 g   |

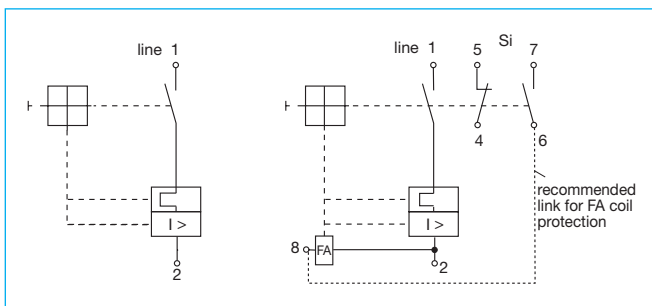
## Approvals

| Authority    | Voltage ratings   | Current ratings |
|--------------|-------------------|-----------------|
| Type 446: UL | DC 28 V           | 30...400 A      |
| Type 447: UL | DC 28 V           | 100...400 A     |
|              | QPL Sweden        | DC 28 V         |
| Type 449: UL | DC 28 V           | 125...350 A     |
|              | VG 95345, part 15 | DC 28 V         |
|              |                   | 125...500 A     |

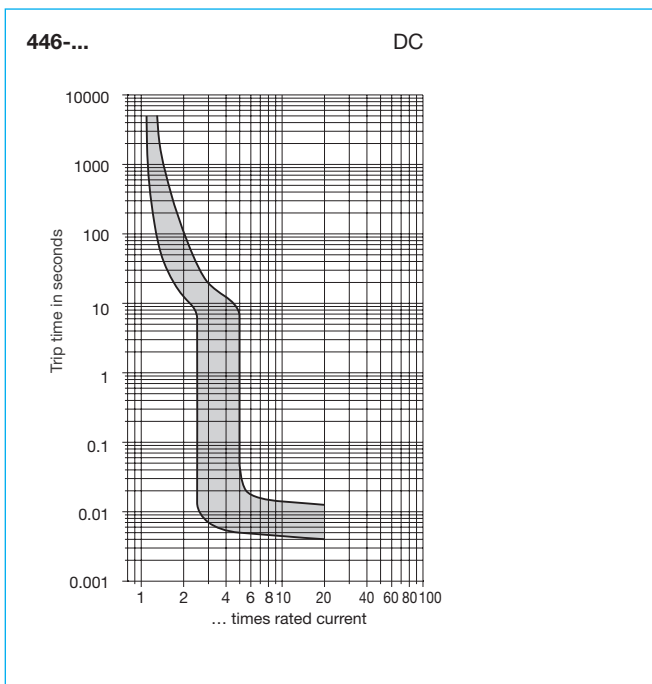
## Dimensions



## Internal connection diagrams

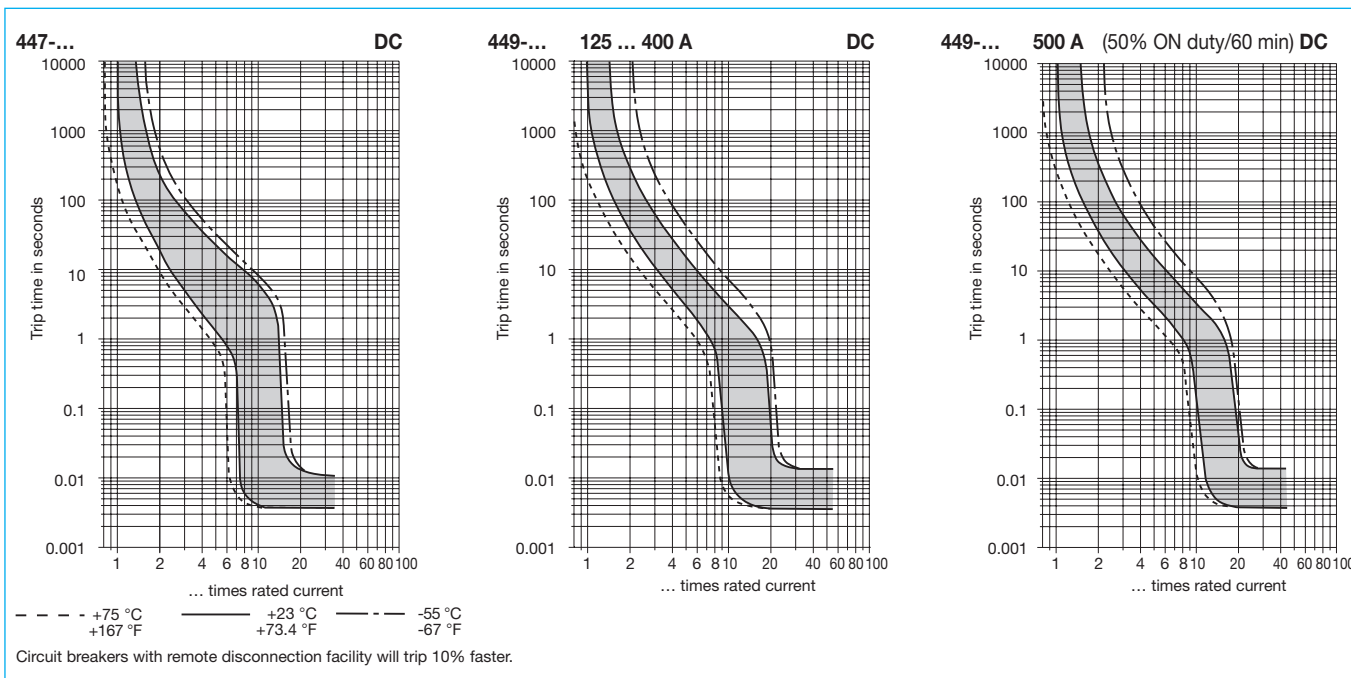


## Typical time/current characteristics at +23°C/+73.4°F



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

## Typical time/current characteristics



## 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

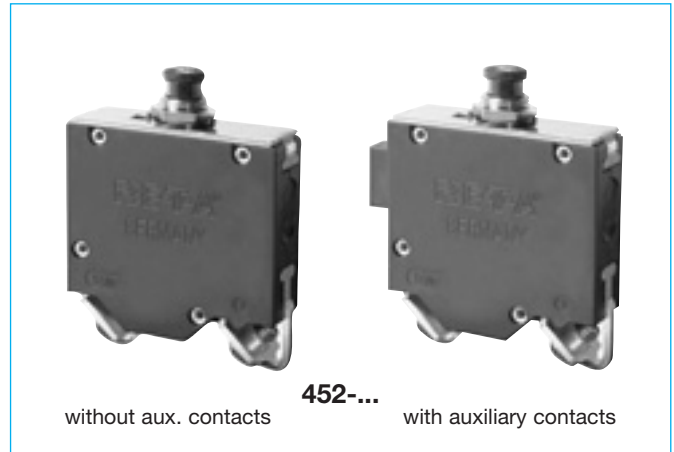
|                             |   |
|-----------------------------|---|
| <b>Type No.</b>             |   |
| 452                         | standard delay curve  |
| 452-2                       | fast trip curve   |
| <b>Terminal design</b>      |   |
| K14                         | screw terminals M6  |
| K34                         | screw terminals M6, reinforced                              |
| <b>Version</b>              |   |
| FN2                         | vehicle application   |
| LN2                         | aircraft/general application                                |
| <b>Auxiliary contacts</b>   |   |
| (blank)                     | without auxiliary contacts                                  |
| S1                          | with auxiliary contact<br>(connector EN 3155-016M2018 (NC)) |
| S5                          | as S1, but with polarized auxiliary contact (NC)            |
| <b>Current ratings</b>      |   |
| 50...100 A                  |   |
| 452 - K14 - LN2 - S1 - 80 A | ordering example  |

## Standard current ratings and typical volt drop values

| Current rating (A) | Volt drop (mV) | Current rating (A) | Volt drop (mV) |
|--------------------|----------------|--------------------|----------------|
| 50                 | 80             | 80                 | 65             |
| 60                 | 75             | 90                 | 60             |
| 70                 | 70             | 100                | 60             |
| 75                 | 65             |                    |                |

## Approvals (without auxiliary contacts)

| Authority         | Voltage ratings | Current ratings         |
|-------------------|-----------------|-------------------------|
| VG 95345, part 17 | DC 28 V         | 60...100 A              |
| QPL, Canada       | DC 28 V         | 60...100 A              |
| QPL, Sweden       | DC 28 V         | 60...100 A (452-K34-FN) |
| BV                | DC 28 V         | 50...100 A              |
| UL                | DC 28 V         | 50...100 A              |

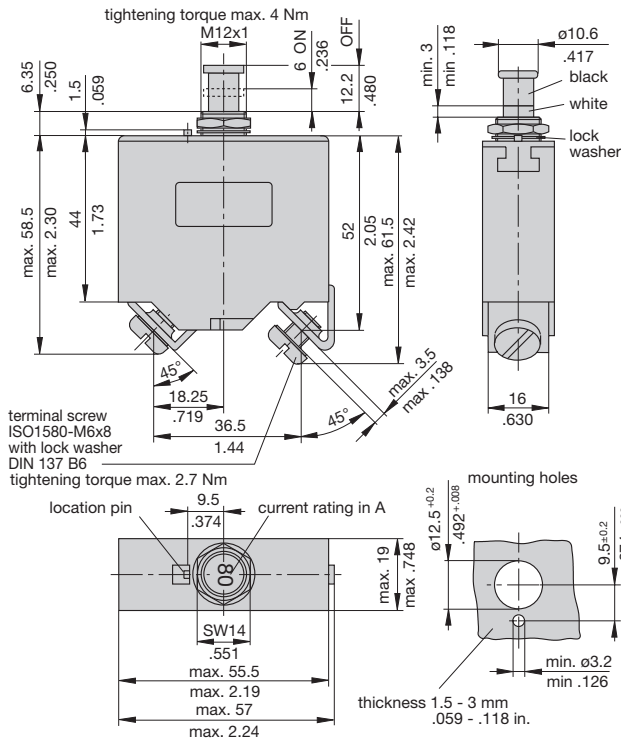


## Technical data

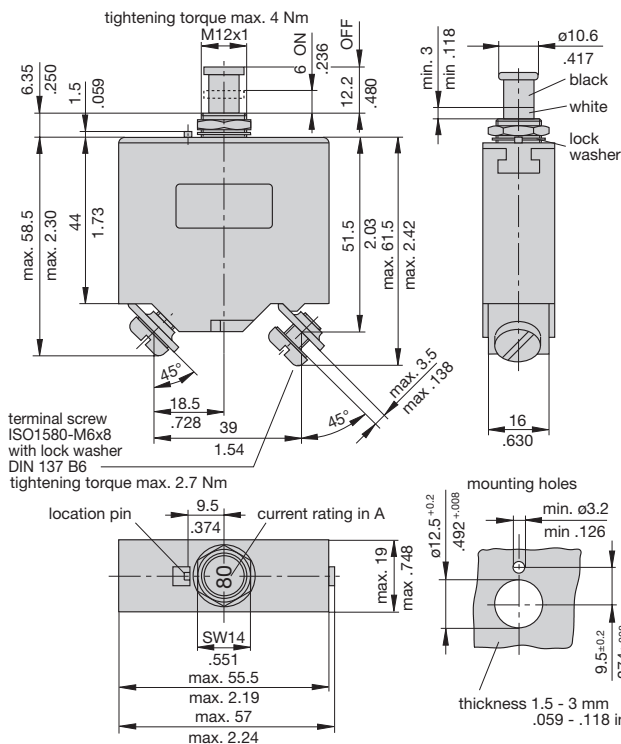
|   |   |                       |
|---|---|-----------------------|
| Voltage rating  | DC 28 V   |                       |
| Current rating range                                      | 50...100 A  |                       |
| Auxiliary circuit   | 0.5 A, DC 28 V  |                       |
| Typical life  | 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<br>1.5 kV   | pollution degree<br>3 |
| Dielectric strength (IEC 60664 and 60664A) operating area | test voltage<br>AC 1,500 V  |                       |
| Insulation resistance                                     | > 100 MΩ (DC 500 V)   |                       |
| Interrupting capacity $I_{cn}$                            | 6,000 A   |                       |
| Degree of protection (IEC 60529/DIN 40050)                | operating area IP40<br>terminal area IP00   |                       |
| Vibration   | 10 g (55-2000 Hz) ±0.76 mm (10-55 Hz)<br>to VG 95210, sheet 19/<br>IEC 60068-2-6, test Fc |                       |
| Shock   | 50 g (11 ms)<br>to VG 95210, sheet 28/<br>IEC 60068-2-27, test Ea                         |                       |
| Corrosion   | 96 hours at 5 % salt mist<br>to VG 95210, sheet 2/<br>IEC 60068-2-11, test Ka             |                       |
| Humidity  | 240 hours at 95 % RH<br>to VG 95210, sheet 7/<br>IEC 60068-2-3, test C                    |                       |
| Explosion   | to VG 95210, sheet 10/<br>MIL-STD-202, meth. 109  |                       |
| Mass  | approx. 122 g without auxiliary contact<br>approx. 126 g with auxiliary contact           |                       |

## Dimensions 452-K...-...

### 452-K34-FN2 (VG 95335 T17)

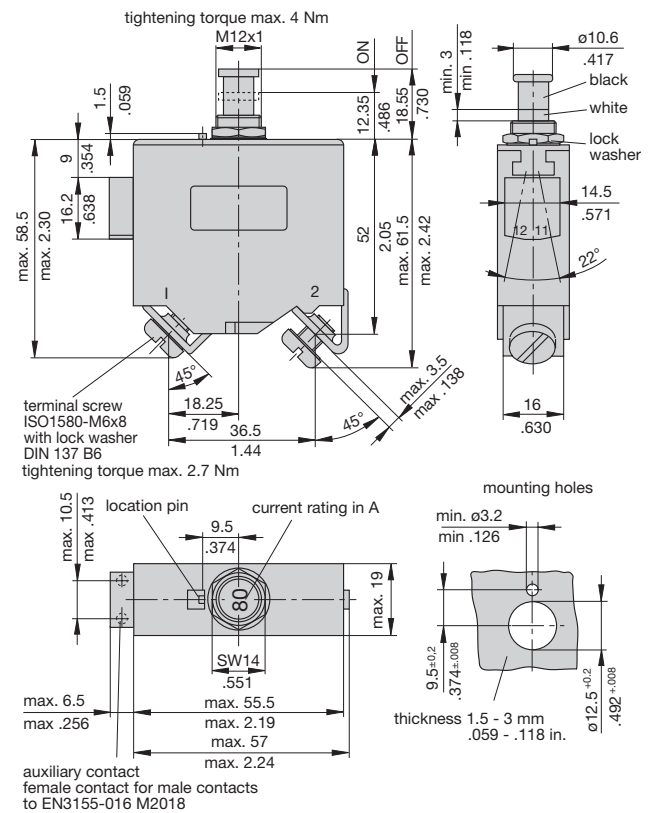


### 452-K14-LN2 (VG 95335 T17)

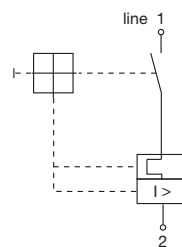


## Dimensions 452-K...-S.

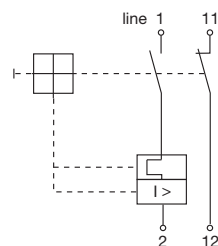
### 452-K34-LN2-S1 (VG 95345 T17) 452-K34-LN2-S5



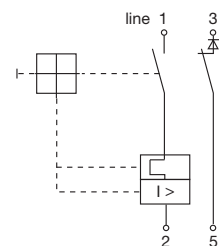
## Internal connection diagram



with auxiliary contact -S1



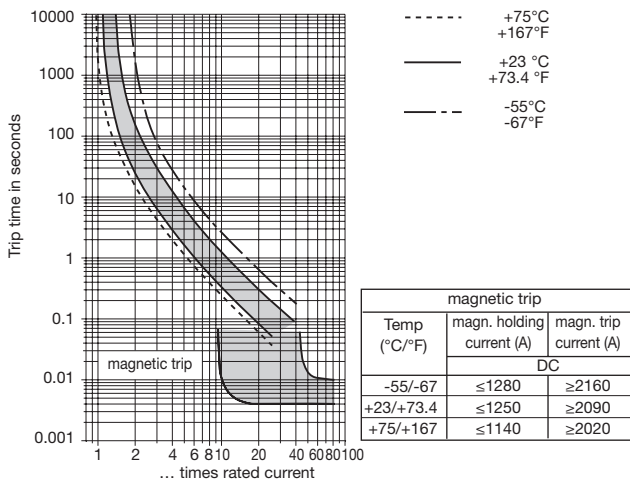
with polarized auxiliary contact -S5



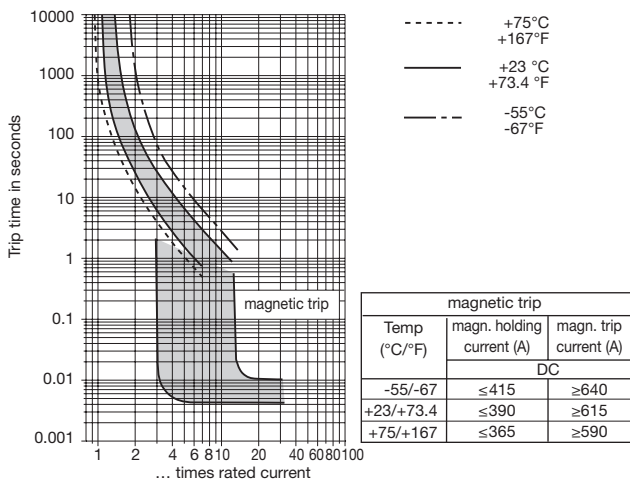
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Typical time/current characteristics

452-... (standard delay)



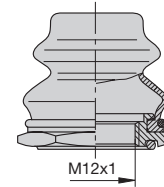
452-2-... (fast trip)



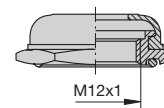
Characteristic curves for AC to special order.

## Accessories (approved to VG 95345, part 23)

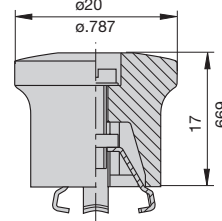
**Splash cover/hex nut assembly with O ring (IP66)**  
**X 200 801 08** nickel plated nut, transparent cover  
**X 200 801 03** matt black finish nut, black cover



**Splash cover/hex nut assembly with O ring (IP54)**  
**X 200 802 01** nickel plated nut  
**X 200 802 02** matt black finish nut



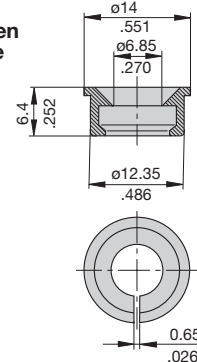
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

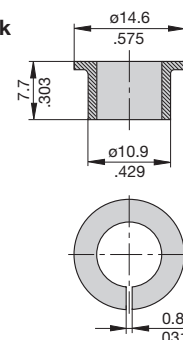
**Identification collar to be snapped on the push button**

**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 ( $\frac{\text{mm}}{\text{inch}}$ )

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.

## Description

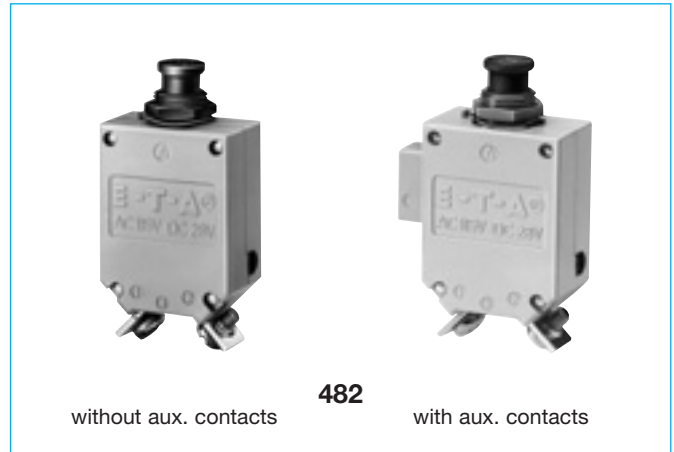
Single pole compact high performance thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted in tracked vehicle and 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

|   |                |   |
|---|----------------|---|
| <b>Type No.</b>   | 482            | single pole thermal circuit breaker   |
| <b>Mounting</b>   | <b>G</b>       | threadneck panel mounting   |
| <b>Threadneck design</b>  | <b>1</b>       | M 12x1 nickel plated  |
|   | <b>2</b>       | M 12x1 black  |
|   | <b>3</b>       | 15/32-UN-2A black   |
|   | <b>6</b>       | M12x1x8 black, without locating pin, push button marking as with 482-G2..   |
|   | <b>7</b>       | M12x1x6,4 black, without locating pin, push button marking as with 482-G1.. |
| <b>Hardware - washer for threadneck</b>                         | <b>0</b>       | without hardware  |
|   | <b>1</b>       | corrugated washer 12/15, fitted   |
|   | <b>2</b>       | serrated lock washer 12/15, fitted (MS 35333-136)                           |
|   | <b>3</b>       | serrated lock washer 12/15, bulk shipped (MS 35333-136)                     |
| <b>Hardware - hex nut for threadneck</b>                        | <b>0</b>       | without hardware  |
|   | <b>1</b>       | hex nut M12x1 nickel plated   |
|   | <b>2</b>       | hex nut M12x1 black   |
|   | <b>3</b>       | hex nut 15/32-UN-2B black, fitted   |
|   | <b>4</b>       | hex nut 15/32-UN-2B black, bulk shipped                                     |
| <b>Terminal design (main terminals)</b>                         | <b>K1</b>      | screw terminals with metric thread M4                                       |
|   | <b>J1</b>      | screw terminals with inch thread 8-32-UNC-2B                                |
|   | <b>R1</b>      | round connector ø6  |
| <b>Characteristic curve</b>                                     | <b>M1</b>      | thermal 1.15-1.4 I <sub>N</sub>   |
| <b>Terminal screws</b>  | <b>A</b>       | flat head screw M4x6, ISO 1580, fitted                                      |
|   | <b>B</b>       | Phillips screw 8-32UNC-2Ax6 (MS 51957-41), fitted                           |
|   | <b>F</b>       | Phillips screw M4x6 (ISO 7045), bulk shipped                                |
|   | <b>H</b>       | socket head cap screw M4x6 (DIN 7984), fitted                               |
|   | <b>K</b>       | hex screw 8-32UNC-3Ax7.6 fitted   |
| <b>Terminal washers</b>   | <b>0</b>       | without lock washer   |
|   | <b>1</b>       | lock washer DIN 137-B4, fitted  |
|   | <b>2</b>       | lock washer 4.3, fitted, MS 35336-37  |
|   | <b>3</b>       | lock washer 4.3, bulk shipped (MS 35 338-137)                               |
|   | <b>5</b>       | lock washer 4.3/9, fitted   |
|   | <b>6</b>       | lock washer DIN 137-B4, bulk shipped  |
| <b>Auxiliary contact</b>  | <b>S0</b>      | without auxiliary contacts  |
|   | <b>S1</b>      | with auxiliary contact (NC)   |
|   | <b>S5</b>      | with polarized aux. contact (NC)  |
| <b>Barrier</b>  | <b>(blank)</b> | without barrier   |
|   | <b>T</b>       | with barrier, 31 mm wide  |
| <b>Current ratings</b>  |                | <b>0.1...50 A</b>   |
| <b>482 - G 1 1 1 - K1 M1 - A 1 S1 . - 10 A</b> ordering example |                |   |



without aux. contacts

**482**

with aux. contacts

## Technical data

|  |   |  |
|--|---|--|
| <b>Voltage rating</b>                                  | AC 115 V (400 Hz); DC 28 V<br>AC 230 (50/60 Hz) to special order                      |  |
| <b>Current rating range</b>                            | 0.1...50 A  |  |
| <b>Auxiliary circuit</b>                               | 0.5 A, DC 28 V  |  |
| <b>Typical life</b>                                    | 10,000 operations mechanical<br>5,000 operations at I <sub>N</sub>                    |  |
| <b>Ambient temperature</b>                             | -55...+75 °C (-67...+167 °F)  |  |
| <b>Insulation co-ordination (IEC 60664 and 60664A)</b> | rated impulse withstand voltage<br>1.5 kV   | pollution degree<br>3  |
| <b>Dielectric strength (IEC 60664 and 60664A)</b>      | test voltage<br>operating area<br>main to aux. circuit                                | AC 1,500 V<br>AC 1,500 V   |
| <b>Insulation resistance</b>                           | > 100 MΩ (DC 500 V)   |  |
| <b>Interrupting capacity I<sub>cn</sub></b>            | 0.1...2.5 A<br>3...3.5 A<br>4...7 A<br>7.5...50 A<br>35...50 A                        | 15 x I <sub>N</sub><br>250 A DC / 150 A AC<br>500 A<br>6,000 A DC / 1,000 A AC<br>with auxiliary contact:<br>3,000 A DC / 1,000 A AC |
| <b>Interrupting capacity (UL 1077)</b>                 | I <sub>N</sub><br>0.1...50 A  | U <sub>N</sub><br>DC 72 V 5000 A   |
| <b>Degree of protection (IEC 60529/DIN 40050)</b>      | operating area IP40<br>terminal area IP00   |  |
| <b>Vibration</b>                                       | 10 g (55-2000 Hz) ±0.76 mm (10-55 Hz)<br>to VG 95210, sheet 19/IEC 60068-2-6, test Fc |  |
| <b>Shock</b>   | 50 g (11 ms)<br>to VG 95210, sheet 28/IEC 60068-2-27, test Ea                         |  |
| <b>Corrosion</b>                                       | 48 hours at 5 % salt mist<br>to VG 95210, sheet 2/IEC 60068-2-11, test Ka             |  |
| <b>Humidity</b>  | 240 hours at 95 % RH<br>to VG 95210, sheet 7/IEC 60068-2-3, test C                    |  |
| <b>Explosion</b>                                       | to VG 95210, sheet 10/MIL-STD-202, meth. 109  |  |
| <b>Mass</b>  | approx. 43 g without auxiliary contact<br>approx. 46 g with auxiliary contact         |  |

## Approvals

| Authority    | Voltage ratings | Current ratings |
|--------------|-----------------|-----------------|
| VG 95345 T21 | DC 28 V         | 0.1...50 A      |
| QPL, Canada  | DC 28 V         | 0.5...35 A      |
| UL           | DC 72 V         | 0.1...50 A      |

Previous ordering codes:

482-N-MS = 482-G111-K1M1-A1S0-...A

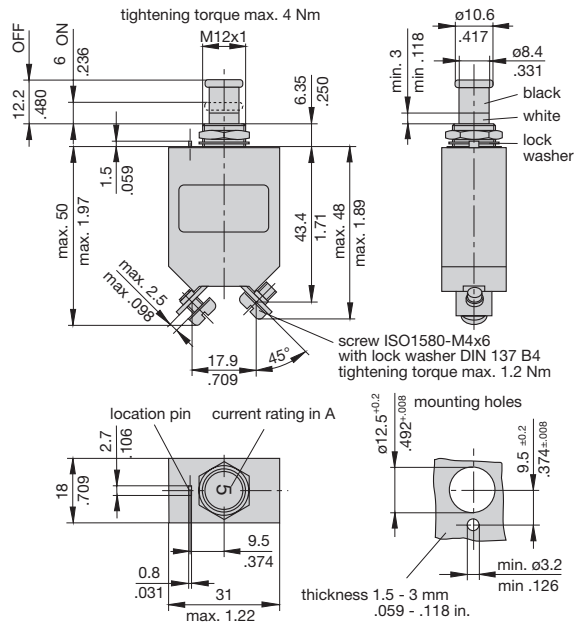
482-MS = 482-G212-K1M1-A1S0-...A

## Standard current ratings and typical volt drop values

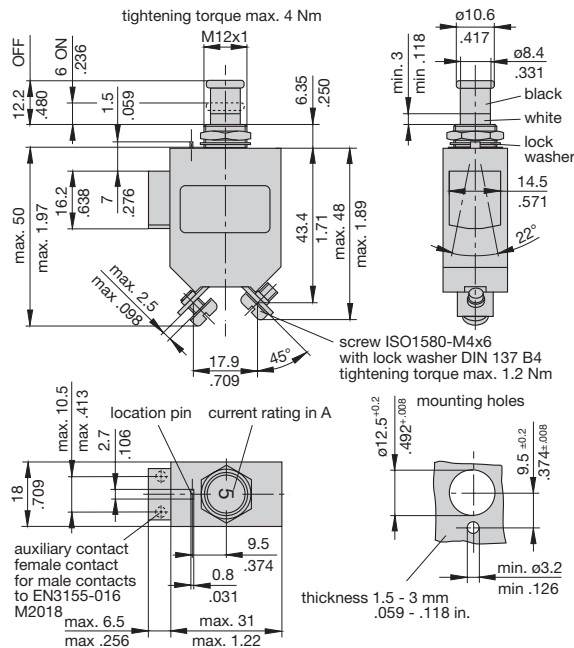
| Current rating (A) | Volt drop (mV) | Current rating (A) | Volt drop (mV) |
|--------------------|----------------|--------------------|----------------|
| 0.1                | 16 000         | 5                  | 350            |
| 0.2                | 8 000          | 7.5                | 230            |
| 0.5                | 3 000          | 10                 | < 200          |
| 0.8                | 2 000          | 15                 | < 200          |
| 1                  | 1 500          | 20                 | < 200          |
| 1.2                | 1 200          | 25                 | < 200          |
| 1.5                | 1 000          | 30                 | < 200          |
| 1.8                | 850            | 35                 | < 200          |
| 2                  | 800            | 40                 | < 200          |
| 2.5                | 700            | 45                 | < 200          |
| 3                  | 600            | 50                 | < 200          |
| 4                  | 430            |                    |                |

## Dimensions 482-G1...

### 482-G111-K1M1-A1S0 (VG 95345 T21)

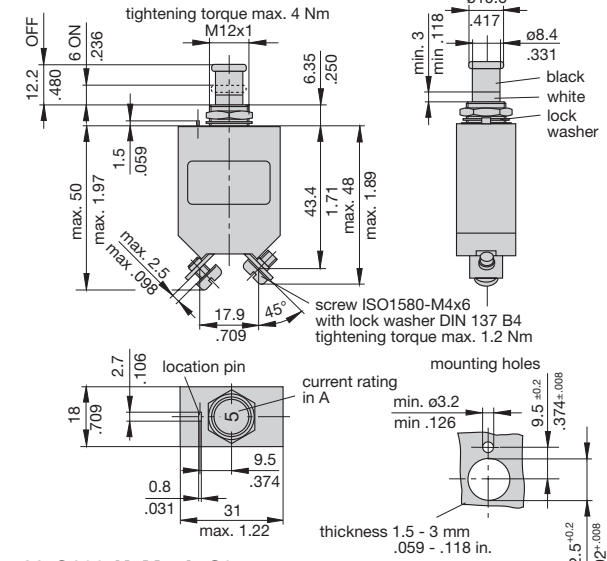


### 482-G111-K1M1-A1S1 (VG 95345 T21) 482-G111-K1M1-A1S5

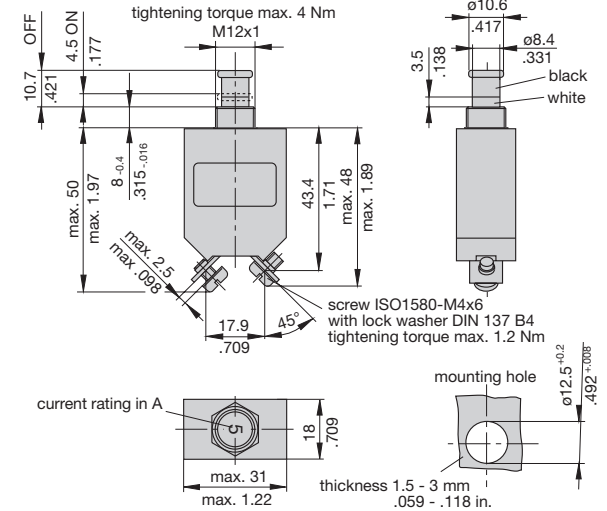


## Dimensions 482-G2../-G6../-G7...

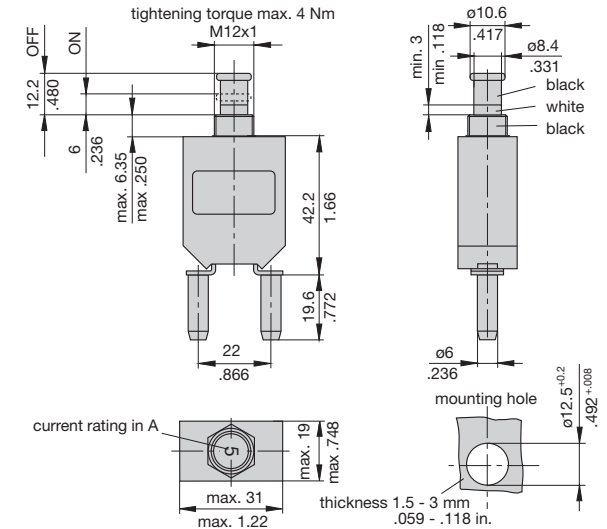
### 482-G212-K1M1-A1S0 (VG 95345 T21)



### 482-G600-K1M1-A1S0



### 482-G700-R1M1-Z0S0

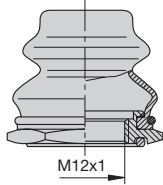


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

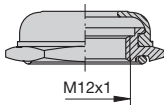


## Accessories (approved to VG 95345, part 23)

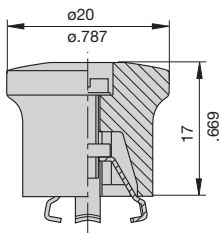
**Splash cover /hex nut assembly with O ring (IP66)**  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**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



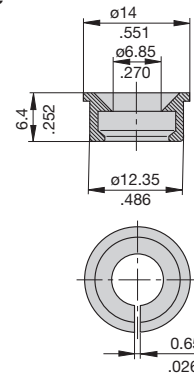
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

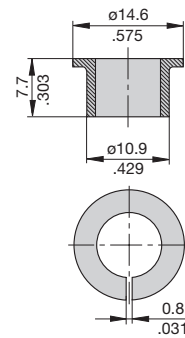
**Identification collar** to be snapped on the push button

**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 ( $\frac{\text{mm}}{\text{inch}}$ )

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.

## 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.

## Standard current ratings and typical volt drop values

| Current rating (A) | Volt drop (mV) | Current rating (A) | Volt drop (mV) |
|--------------------|----------------|--------------------|----------------|
| 1                  | 750            | 10                 | 190            |
| 2                  | 520            | 15                 | 190            |
| 2.5                | 400            | 20                 | 200            |
| 3                  | 360            | 25                 | 170            |
| 4                  | 350            | 30                 | 160            |
| 5                  | 260            | 35                 | 150            |
| 7.5                | 230            |                    |                |

## Approvals

| Authority          | Voltage ratings | Current ratings |
|--------------------|-----------------|-----------------|
| LN 29886           |                 |                 |
| VG 95345 T06       |                 |                 |
| MS 3320, MS 3320 V |                 |                 |
| QPL                |                 |                 |
| UL                 | DC 75 V         | 1...35 A        |



## Technical data

|  |   |                          |
|--|---|--------------------------|
| Voltage rating                                     | AC 115 V (400 Hz); DC 28 V<br>(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<br>10,000 operations at $I_N$ ( $\leq 25$ A)<br>5,000 operations at $I_N$ (30 + 35 A)                                       |                          |
| Ambient temperature                                | -55...+125 °C (-67...+257 °F)   |                          |
| Insulation co-ordination<br>(IEC 60664 and 60664A) | rated impulse<br>withstand voltage<br>1.5 kV  | pollution<br>degree<br>3 |
| Dielectric strength<br>(IEC 60664 and 60664A)      | test voltage<br>operating area<br>main to aux. circuit  | AC 1,500 V<br>AC 1,500 V |
| Insulation resistance                              | > 100 M $\Omega$ (DC 500 V)   |                          |
| Interrupting capacity $I_{cn}$                     | AC 115 V (400 Hz):<br>$\leq 4$ A      1,000 A<br>5 A          2,000 A<br>7.5...35 A    2,500 A<br>DC 28 V:<br>1...25 A      6,000 A<br>30 + 35 A    4,000 A |                          |
| Degree of protection<br>(IEC 60529/DIN 40050)      | operating area IP40<br>terminal area IP00   |                          |
| Vibration<br>(sinusoidal)                          | 15 g (70-2000 Hz) $\pm 0.76$ mm (5-70 Hz)<br>to VG 95210, sheet 19/<br>IEC 60068-2-6, test Fc/ISO 7137  |                          |
| Vibration (random)                                 | 16.4 g rms, 0.2 g <sup>2</sup> /Hz $\pm 1.5$ dB<br>to VG 95210, sheet 29/ISO 7137   |                          |
| Acceleration                                       | 17 g, to ISO 2669   |                          |
| Shock  | 75 g (11 ms) to VG 95210, sheet 28/<br>IEC 60068-2-27, test Ea/ISO 7137   |                          |
| Corrosion  | 96 hours at 5 % salt mist, severity A<br>48 hours at 20 % salt mist, severity B<br>to VG 95210, sheet 2/<br>IEC 60068-2-11, test Ka/ISO 7137                |                          |
| Humidity   | 240 hours at 95 % RH,<br>to VG 95210, sheet 7/<br>IEC 60068-2-3, test C/ISO 7137  |                          |
| Explosion  | to VG 95210, sheet 10/<br>MIL-STD-202, meth. 109  |                          |
| Altitude   | $\leq 25,000$ m above sea level   |                          |
| Mass   | max. 29 g with auxiliary contact<br>max. 25 g without auxiliary contact   |                          |

**Weight reduction through aluminium threadneck: approx. 3 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.

## Ordering information

### Type No.

483 single pole, with temperature compensation

### Mounting

**G** threadneck panel mounting, standard

**L** threadneck panel mounting, extended push button

**V** threadneck panel mounting, high vibration performance

### Threadneck design

**1** M12x1x6.4x8.8 dia. with mounting plate (aux. contact version)

**2** 15/32-32UNx6.4x7.8 dia. (without aux. contact)

**3** MJ12x6.4x8.8 dia. (without aux. contact)

**4** M12x1x6.4x8.8 dia. (without aux. contact)

**5** 7/16-32UNx6.4x7.8 dia. (without aux. contact)

**6** M12x1x9.4x8.8 dia. (without aux. contact)

**7** 7/16-32 UNx6.4x7.8 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 15/32-32UN (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<sub>N</sub>

### Terminal screws

**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

**S0** without auxiliary contact

**S1** with auxiliary contact (N/C) connector to EN3155-016M2018, size 20

**S5** 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**

483 - G 4 1 1 - K 1 M1 - A 1 S0 Z . - 5 A ordering example

## Ordering information for approved devices

### 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 7/16-32UNx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320.

### 483-V533-J1M1-B2S0ZN (MS 3320-V)

Threadneck size 7/16-32UNx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-V.

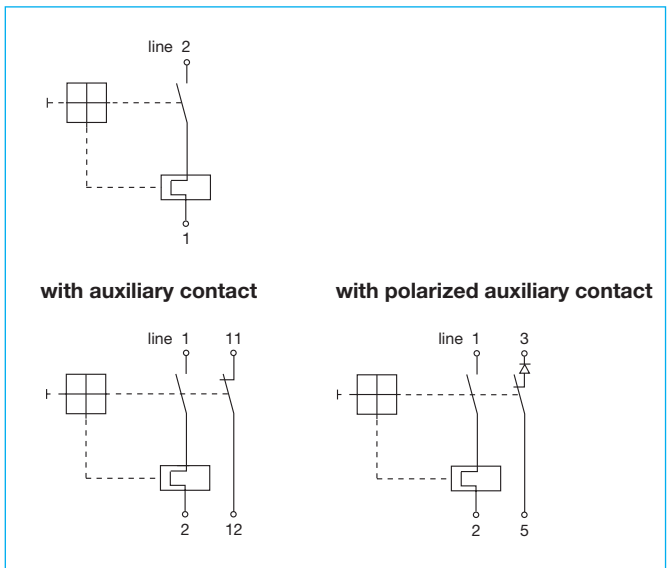
### 483-G533-J3M1-C4S0Z

Threadneck size 7/16-32UNx6.4 and terminal design -J25 (inch thread 6-32), listed by the German Materialamt der Bundeswehr to VG 95345, part 6.

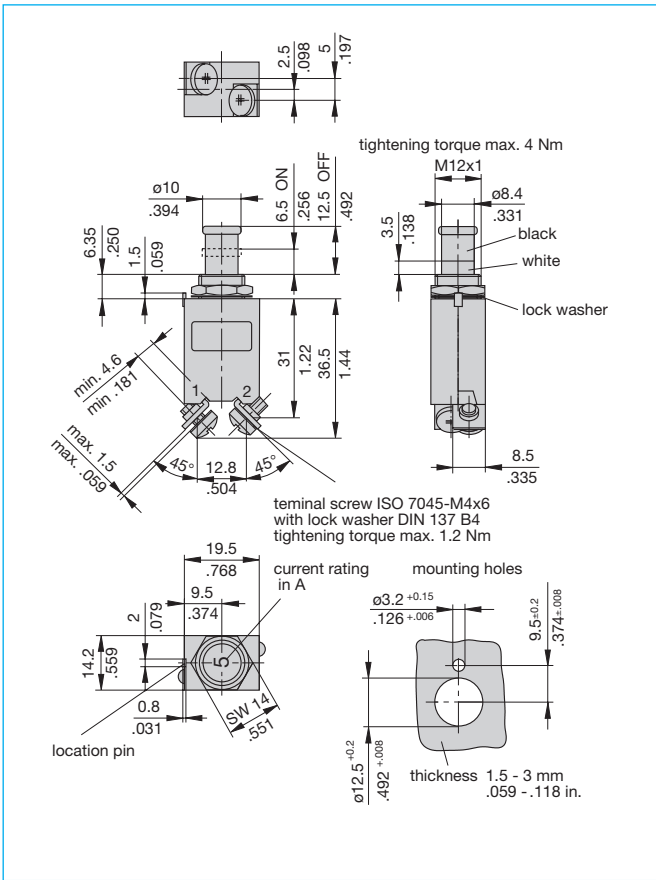
### 483-G814-K1M1-A1S1ZN

Aluminium threadneck M12x1x6.4x8.8 dia.

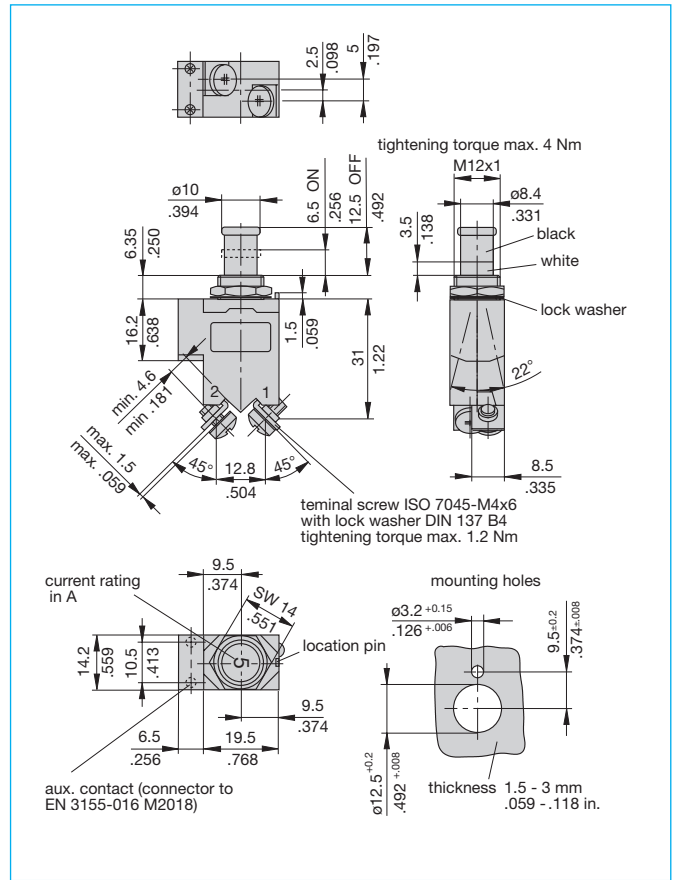
## Internal connection diagrams



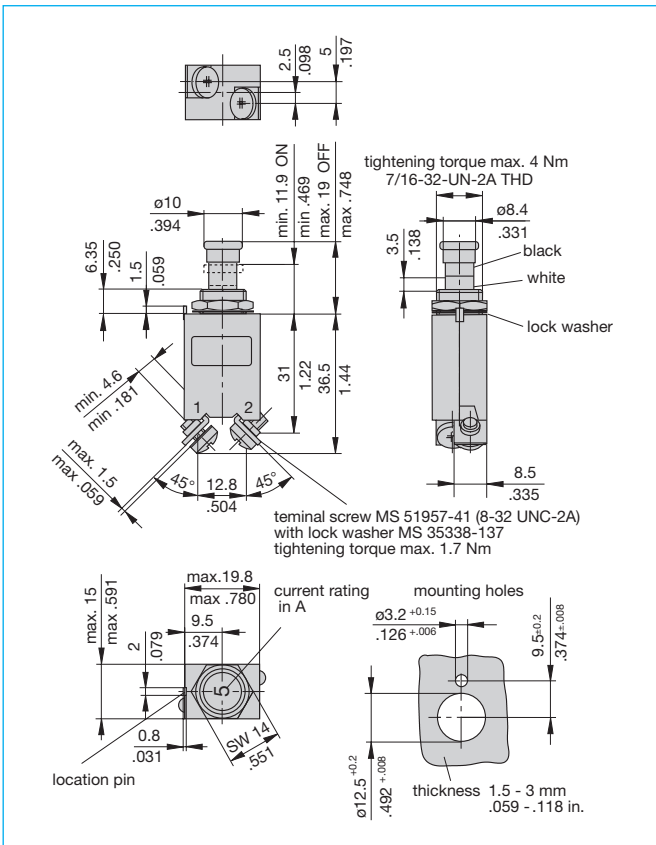
**Dimensions 483-G411-K1M1-A1S0ZN (VG 95345 T06)**



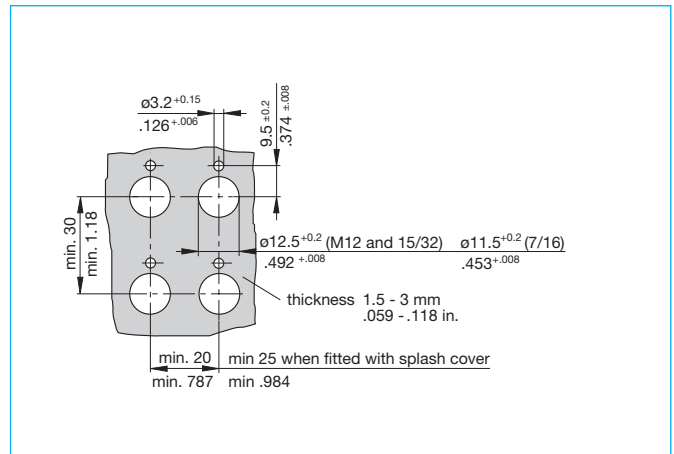
**Dimensions 483-G111-K1M1-A1S1ZN (VG 95345 T06)**



**Dimensions 483-G533-J1M1-B2S0ZN (MS 3320)**



**Mounting**



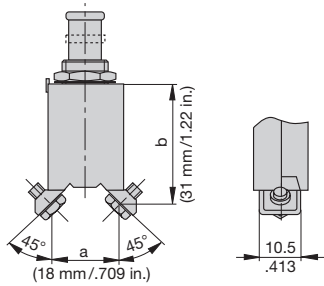
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Other main terminal and threadneck designs

### Terminal design -J2

Terminal distances to:

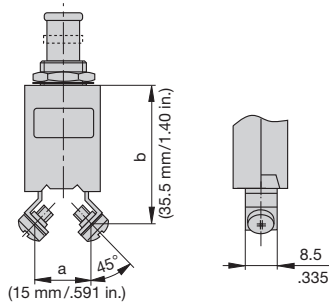
- MS 14 105 (a, b)
- MS 14 153 (a, b)
- MS 22 073 (a)
- MS 22 074 (a)
- MS 25 244 (a)
- MS 25 373 (a, b)



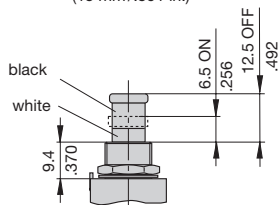
### Terminal design -J3

Terminal distances to:

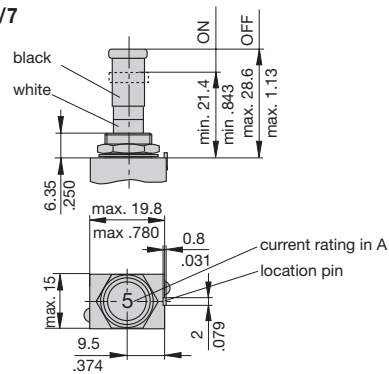
- MS 26 574 (a, b)



### Mounting -G6



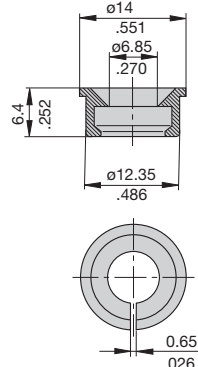
### Mounting -L2/5/7



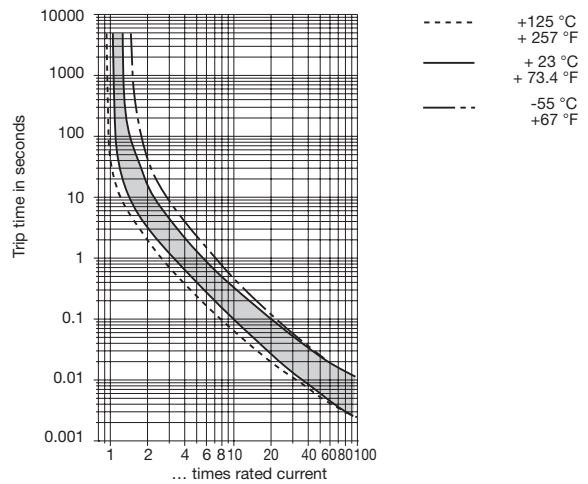
## Accessories

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



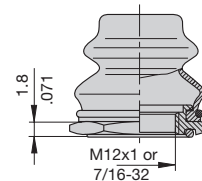
## Typical time/current characteristics



## Accessories

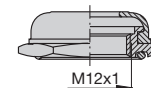
Splash cover/hex nut assembly with O ring (IP66)  
(approved to VG 95345, T23)

- 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



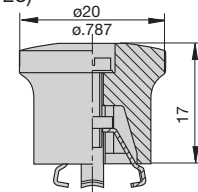
Splash cover/hex nut assembly with O ring (IP54)  
(approved to VG 95345, T23)

- X 200 802 01 nickel plated nut
- X 200 802 02 matt black finish nut



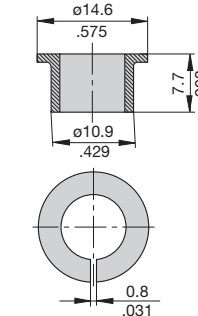
Actuator extension (black) to be fitted on the push button  
(approved to VG 95345, T23)

- X 200 803 01



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