

## Description

Miniaturised single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Available in versions for PCB or panel mounting, snap-in or threadneck, or as an integral type. Manual release facility optional for type 105.

Approved to CBE standard EN 60934 (IEC 60934). For higher current ratings see type 1140.

## Typical applications

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

## Ordering information

### Type No.

<b>104</b>	PCB mounting type (-PR), or integral type (-P30/P10)
<b>105</b>	snap-in panel mounting
<b>106</b>	threadneck panel mounting with hex and knurled nut*
<b>106-M2</b>	threadneck panel mounting 3/8-27UNS with collar, hex nut and knurled nut*

### Terminal design

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

### Shunt terminal (optional)

**A3** same as main terminals (up to  $I_N$  6 A/3 A max. load)

### Manual release facility (optional)

**H** only with type 105

### Auxiliary contacts (optional)

**Si51** type 104 only

### Current ratings

**0.05...10 A**

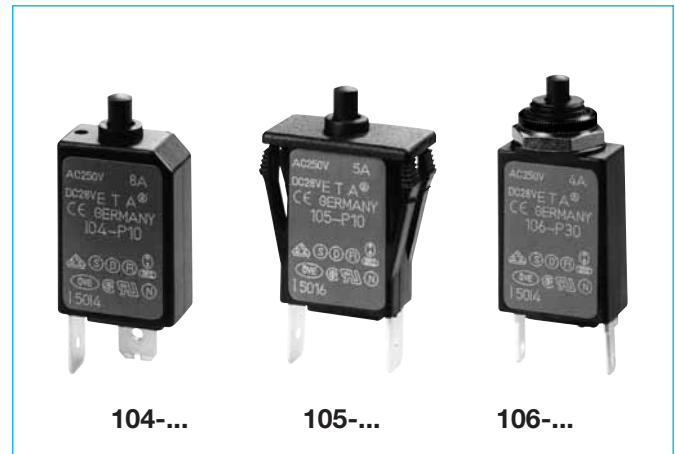
**106 - P30 - - - - - 5 A** = ordering example

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

\* mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

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



## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 48 V (UL: AC 250 V; DC 48 V)		
Current ratings	0.05...10 A		
Auxiliary circuit	0.5 A, AC 240 V, DC 28 V		
Typical life			
AC 240 V	0.05...8 A	2,000 operations at 1 x $I_N$ , inductive	
	0.05...5 A	3,000 operations at 2 x $I_N$ , inductive	
	6...8 A:	500 operations at 2 x $I_N$ , inductive	
DC 48 V	0.05...8 A	2,000 operations at 1 x $I_N$ , inductive	
	0.05...5 A	3,000 operations at 2 x $I_N$ , inductive	
	6...8 A:	500 operations at 2 x $I_N$ , inductive	
	10 A	200 operations at 1 x $I_N$ , inductive	
	10 A	50 operations at 2 x $I_N$ , inductive	
Ambient temperature	-20...+60 °C (-4...+140 °F) T 60		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	2
	2.5 kV	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A)	test voltage		
operating area	AC 3,000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity $I_{cn}$	0.05...8 A	6 x $I_N$ AC	
	> 8...10 A	5 x $I_N$ AC	
	0.05...10 A	6 x $I_N$ DC	
Interrupting capacity (UL 1077)	$I_N$	$U_N$	
	0.05...10 A	AC 250 V	2,000 A
	0.05...10 A	DC 48 V	200 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00		
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 10 g		

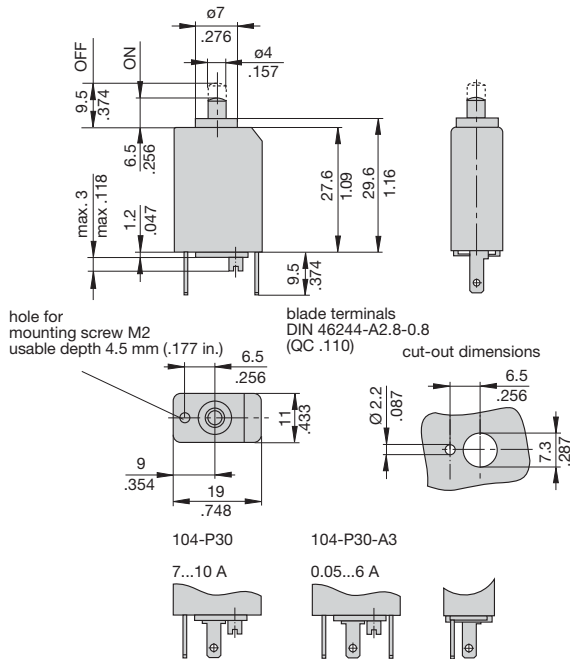
## Approvals

Authority	Voltage ratings	Current ratings
VDE, SEV,	AC 240 V	0.05...8 A
Kema (EN 60934)	DC 48 V	0.05...10 A
CSA, UL	AC 250 V; DC 48 V	0.05...10 A

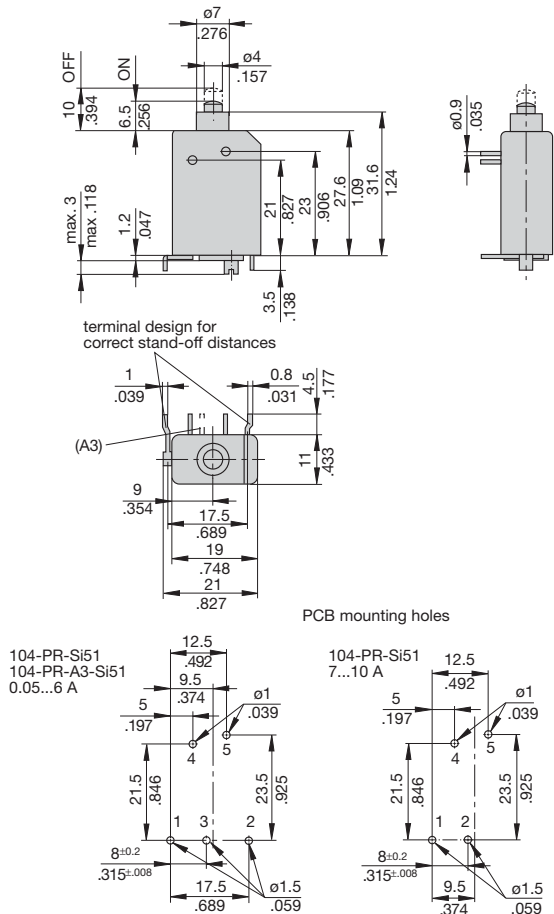
Circuit breakers with -Si51 not approved

## Dimensions

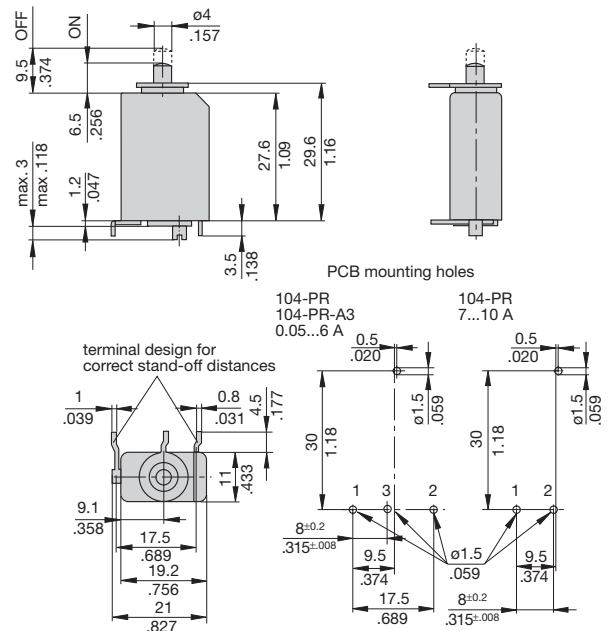
### 104-P30



### 104-PR-(A3)-Si51

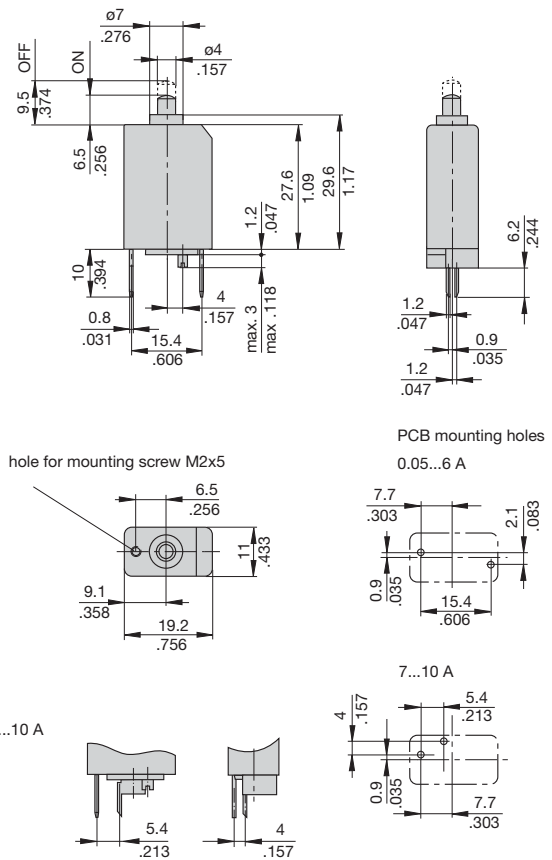


### 104-PR



### 104-PR3

0.05...6 A

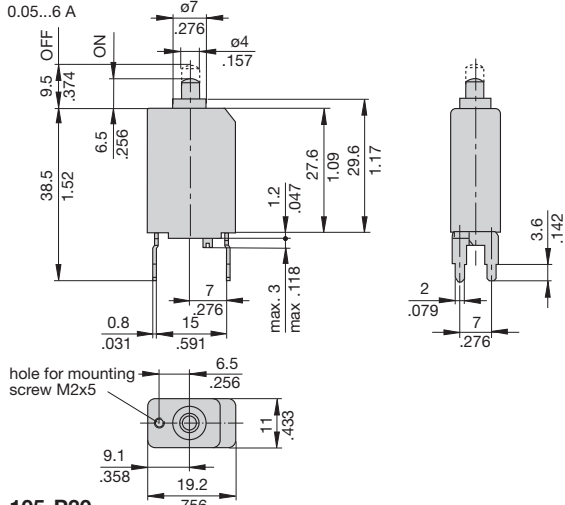


This is a metric design and millimeter dimensions take precedence ( $\frac{mm}{inch}$ )

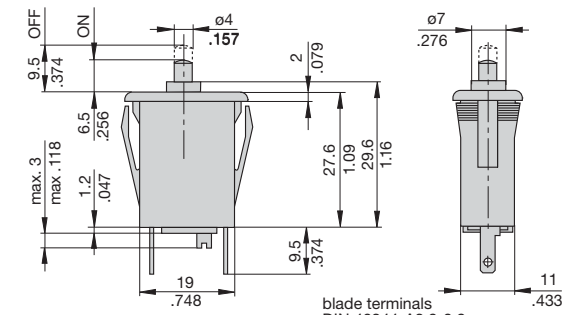
## Dimensions

### 104-PR2

0.05...6 A



### 105-P30



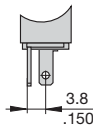
blade terminals  
DIN 46244-A2.8-0.8  
(QC .110)

panel cut-out  
a

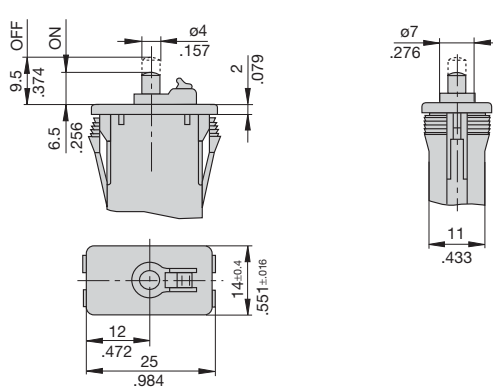
d		a		b
mm	inch	mm	inch	
0.8	.031	21.9	.862	11.3 <sup>+0.3</sup> .445 <sup>+0.12</sup>
1.0	.039	22	.866	
1.5	.059	22.1	.870	
2-3	.079-.118	22.2	.874	

105-P307...10 A

105-P30-A3  
0.05...6 A

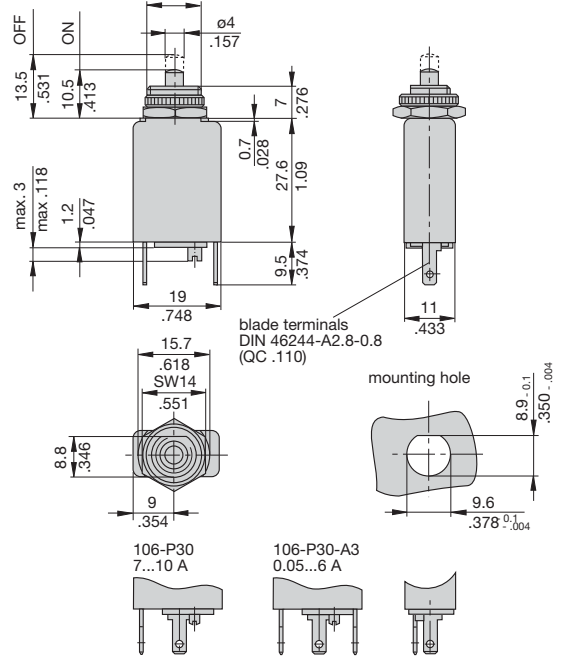


### 105-P..-H



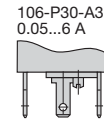
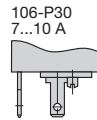
### 106-P30

3/8-27UNS-2A  
tightening torque max. 0.8 Nm



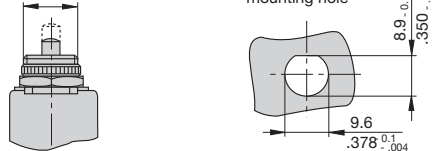
blade terminals  
DIN 46244-A2.8-0.8  
(QC .110)

mounting hole



### 106-M2

3/8-27UNS-2A  
tightening torque max. 0.8 Nm

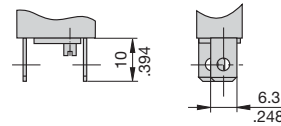


mounting hole

## Terminal design

### 104/105/106-P10

0.05...6 A



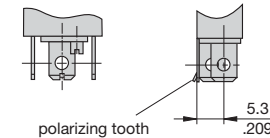
7...10 A



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

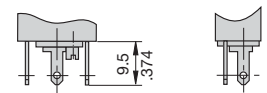
### 104/105/106-P10-A3

0.05...6 A



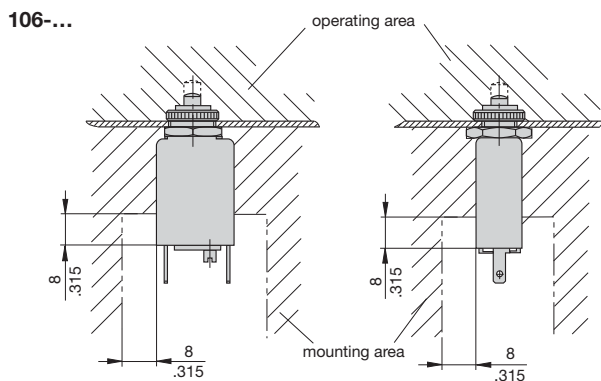
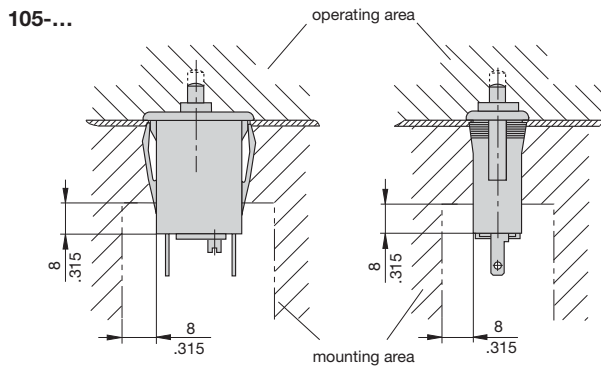
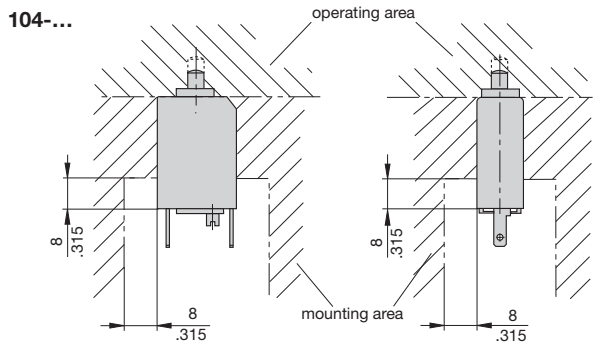
### 104/105/106-P30-A3

0.05...6 A

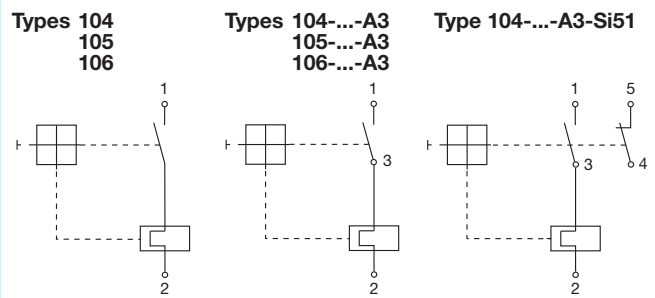


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

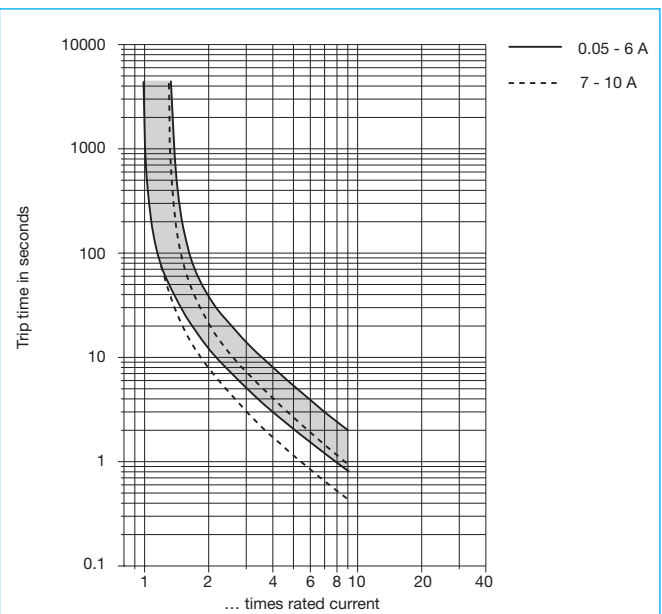
## Installation drawings



## Internal connection diagrams



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

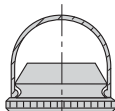


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

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

## Accessories

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



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

Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

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

## Ordering information

### Type No.

127

#### Mounting options

leave blank for integral/plug-in option

**F** for snap-in mounting

**T11** track mounting with captive stud terminals M4

**T12** track mounting with screw terminals M4

#### Terminal design (for use with and without flange -F)

**P10** blade terminals A6.3-0.8 (QC .250)

**K10** screw terminals M4x6

#### Manual release (optional)

**H** manual release facility

#### Special housing (optional)

**KF** for tropical and high humidity conditions (not for -T11 and -T12)

#### Current ratings

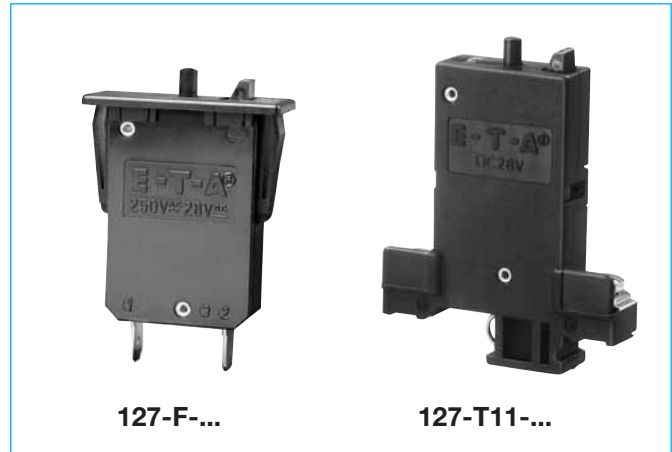
0.05...25 A

127 - F - P10 - H - ... - 10 A = ordering example

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	280	1.5	0.6
0.08	100	1.8	0.4
0.1	110	2	0.3
0.15	56	2.5	0.2
0.2	29	3	0.1
0.25	18	3.5	0.06
0.3	14	4	0.06
0.35	9.8	4.5	0.05
0.4	7	5	0.05
0.45	5.9	6	0.02
0.5	4.9	7	0.02
0.6	3.4	8	0.02
0.7	2.5	10	< 0.02
0.8	1.8	15	< 0.02
0.9	1.5	16	< 0.02
1	1.2	20	< 0.02
1.2	0.8	25	< 0.02



## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 250 V; DC 28 V (UL: AC 250 V; DC 50 V)	
Current ratings	0.05...25 A	
Typical life	0.05...16 A	5,000 operations at 2 x I <sub>N</sub> , inductive
	17...25 A	5,000 operations at 2 x I <sub>N</sub> , resistive
Ambient temperature	-20...+60 °C (-4...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree
	2.5 kV	2
	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A)	test voltage	operating area
	AC 3,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	type -F:	8 x I <sub>N</sub>
	0.05 ...2.5 A	20 x I <sub>N</sub>
	3...5 A	200 A
	6...12 A	400 A
	13...25 A	400 A
	type -T:	8 x I <sub>N</sub>
	0.05...2.5 A	20 x I <sub>N</sub>
	3...5 A	200 A
	6...25 A	400 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms), to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	127-F-...: approx. 24 g 127-T-...: approx. 35 g	

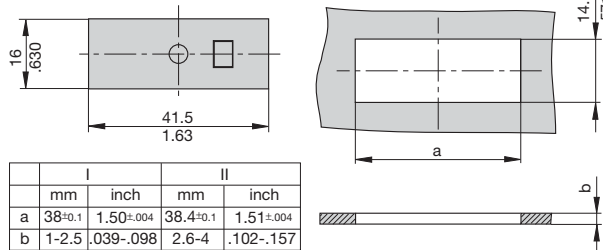
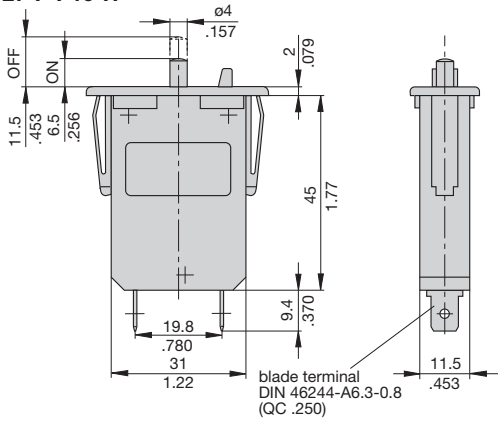
## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
CSA, UL	AC 250 V DC 50 V	0.1...20 A 0.1...25 A
CCC	AC 250 V	0.05...25 A

Type 127-T.- without approvals

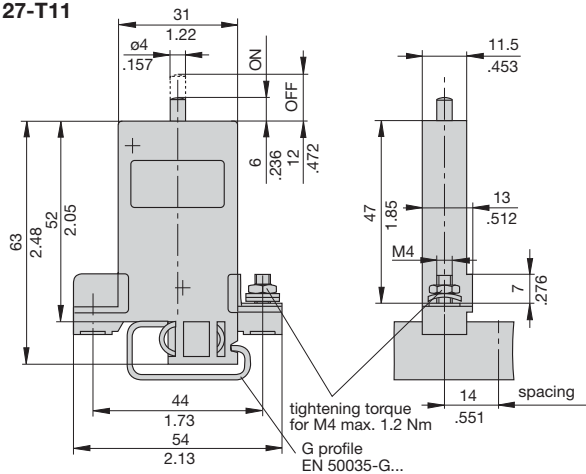
## Dimensions

### 127-F-P10-H

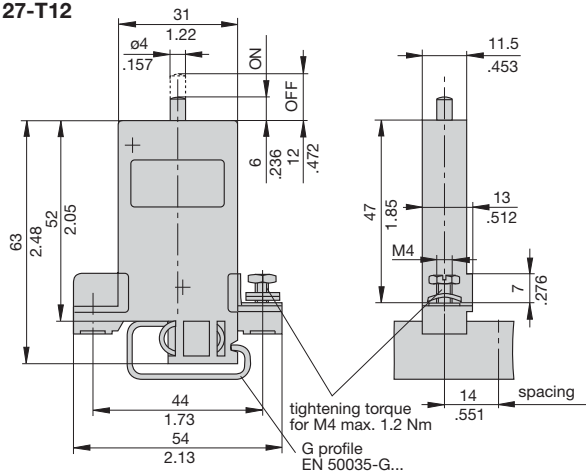


	mm	inch	mm	inch
a	38 <sup>+0.1</sup>	1.50 <sup>+0.004</sup>	38.4 <sup>+0.1</sup>	1.51 <sup>+0.004</sup>
b	1-2.5	.039-.098	2.6-4	.102-.157

### 127-T11

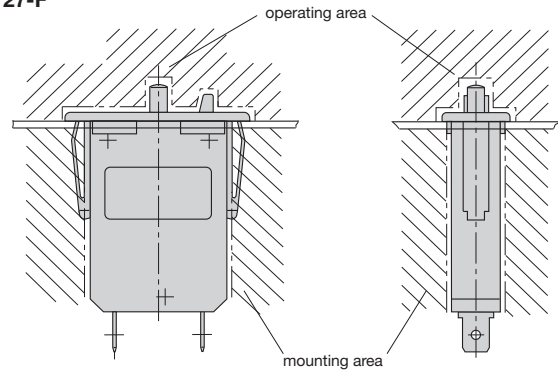


### 127-T12

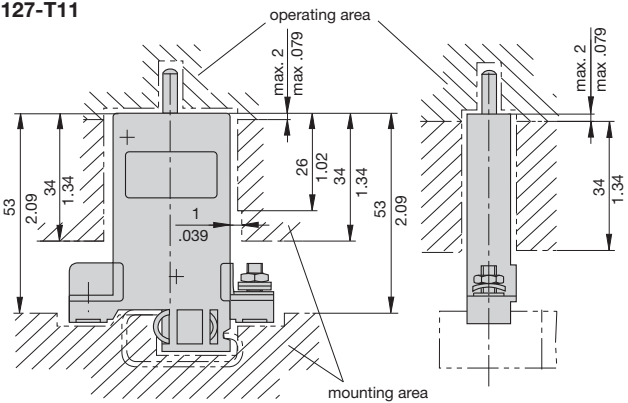


## Installation drawings

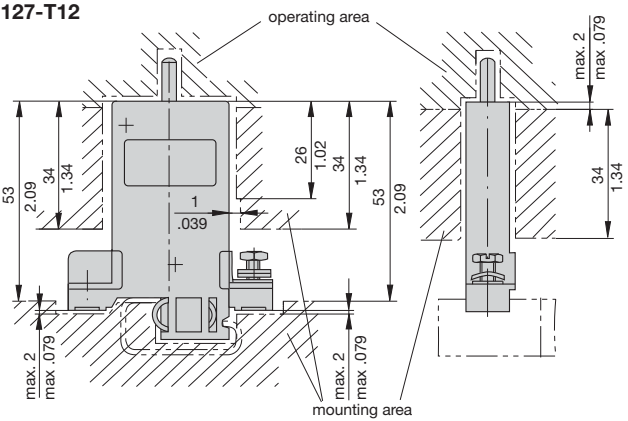
### 127-F



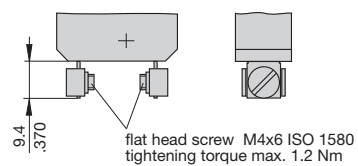
### 127-T11



### 127-T12

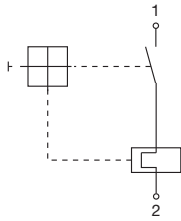


## Terminal design 127-F-K10

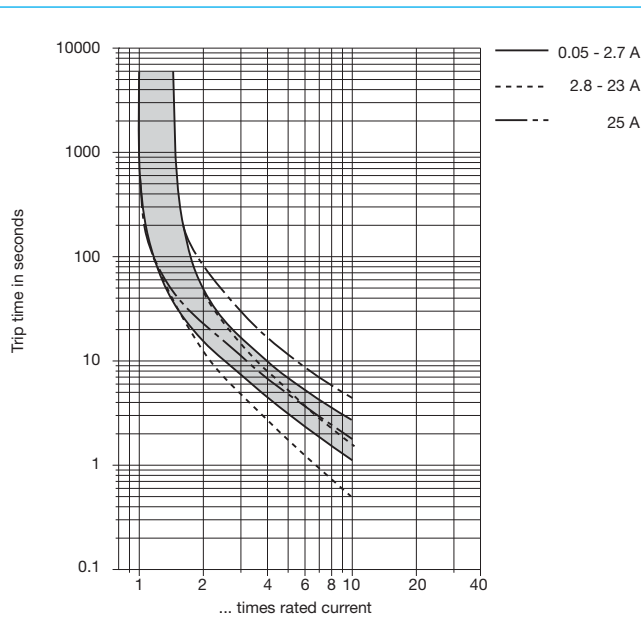


This is a metric design and millimeter dimensions take precedence (mm)  
inch

## Internal connection diagram



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



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

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

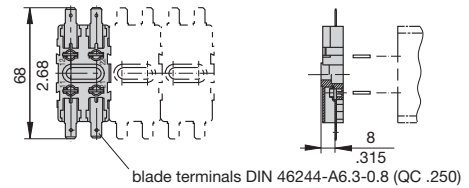
This is a metric design and millimeter dimensions take precedence  $\left(\frac{\text{mm}}{\text{inch}}\right)$

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.

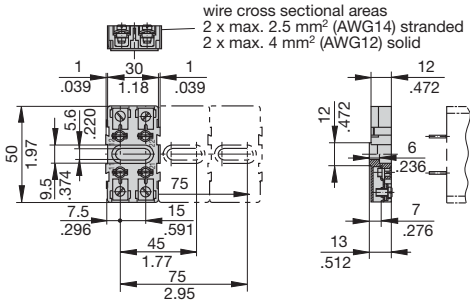
## Accessories

### Mounting sockets

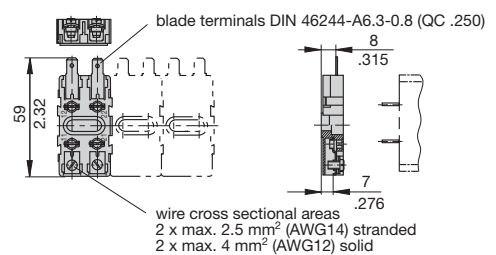
**10F-P10** (up to 16 A max. load)



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

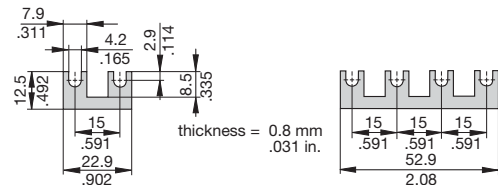


**10F-A10** (up to 16 A max. load)



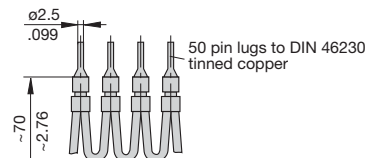
### Accessories for sockets (up to 20 A max. load)

2-way bus bar **Y 301 166 02** 4-way bus bar **Y 301 166 01**



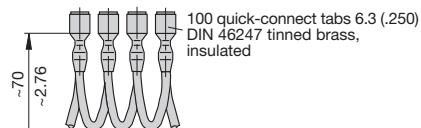
### Connector bus links -K10

**X 210 589 01/** 2.5 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)



### 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)



## Description

Single pole thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism and separate manual release (M-type TO CBE to EN 60934). Designed for bolt-on mounting with terminal block type 83-P10.

## Typical applications

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

## Ordering information

<b>Type No.</b>	
129	base mounting and connection
<b>Terminal design</b>	
L11	90 ° bent terminals
<b>Manual release</b>	
H	manual release facility
<b>Housing</b>	
KF	standard
<b>Current ratings</b>	
3...25 A	
129 - L11 - H - KF - 10 A = ordering example	

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
3	0.1	8	0.02
3.5	0.06	10	< 0.02
4	0.06	12	< 0.02
4.5	0.05	16	< 0.02
5	0.05	20	< 0.02
6	0.02	25	< 0.02
7	0.02		

## Approvals

Authority	Voltage rating	Current rating
CSA, UL	AC 250 V DC 50 V	3...20 A 3...25 A
BWB (VG 95345 part 9)	DC 28 V	6...25 A



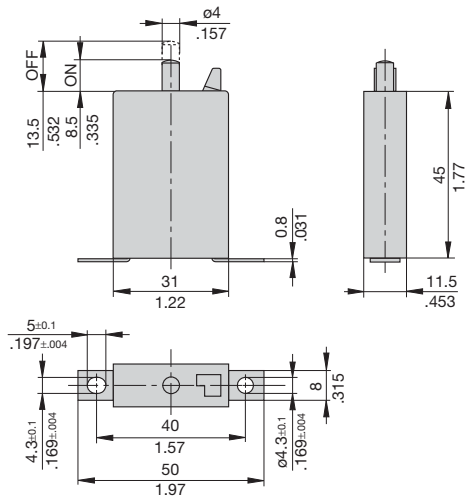
129-L11-H-KF

## Technical data

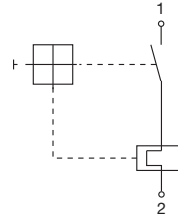
Voltage rating	DC 28 V (UL: AC 250 V; DC 50 V)	
Current ratings	3...25 A	
Typical life	5,000 operations at $2 \times I_N$	
Ambient temperature	-40...+75 °C (-40...167 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity $I_{cn}$	3...5 A $20 \times I_N$ 6...25 A 400 A	
Degree of protection (IEC 60529/DIN 40050)	operating area IP32 terminal area IP00	
Vibration	10 g (55-2,000 Hz) ± 0.76 mm (10-55 Hz) to VG 95210 part 28	
Shock	50 g (11 ms) to VG 95210 part 28	
Corrosion	96 hours at 5 % salt mist, to VG 95210 part 2	
Humidity	240 hours at 95 % RH to VG 95210 part 7	
Mass	approx. 25 g	



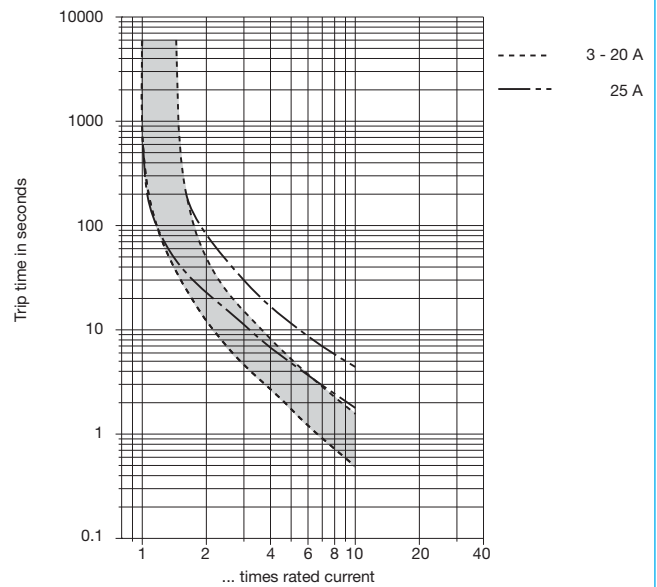
## Dimensions



## Internal connection diagram



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

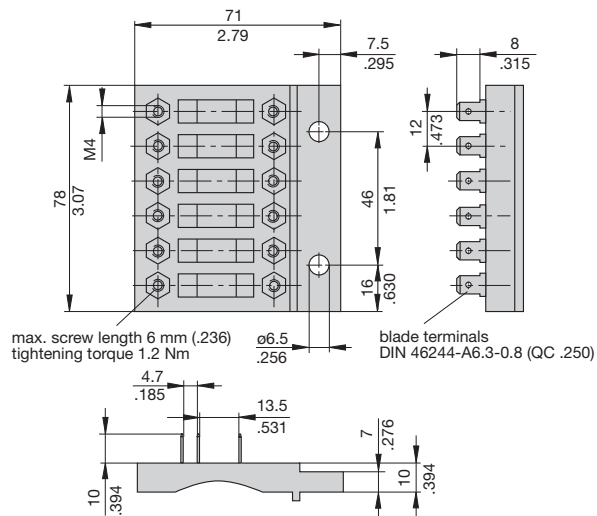


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temp. °F	-40	-4	+14	+32	+73.4	+104	+122	+140	+167
°C	-40	-20	-10	0	+23	+40	+50	+60	+75
Derating factor	0,60	0,76	0,84	0,92	1	1,08	1,16	1,24	1,35

## Accessories

### Mounting block 83-P10



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

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

## Description

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

## Typical applications

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

## Ordering information

### Type No.

**157** threadneck panel mounting\*  
**158** integral or plug-in mounting

### Terminal design

**P10** blade terminals A6.3-0.8 (QC .250)

**K10** screw terminals M4x6

### Special housing (optional)

**KF** for tropical and high humidity conditions

### Current ratings

0.05...25 A

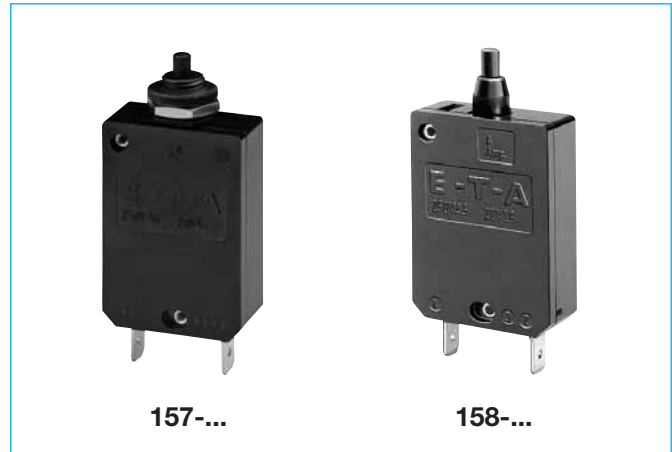
**157 - P10 - .. - 10 A** = ordering example

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

\*mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	280	3	0.1
0.08	100	3.5	0.06
0.1	110	4	0.06
0.2	29	4.5	0.05
0.3	14	5	0.05
0.4	7	6	0.02
0.5	4.9	7	0.02
0.6	3.4	8	0.02
0.7	2.5	10	< 0.02
0.8	1.8	12	< 0.02
1	1.2	13	< 0.02
1.2	0.8	15	< 0.02
1.5	0.6	16	< 0.02
1.8	0.2	20	< 0.02
2	0.3	22	< 0.02
2.5	0.2	25	< 0.02



## Technical data

For further details please see chapter: Technical Information

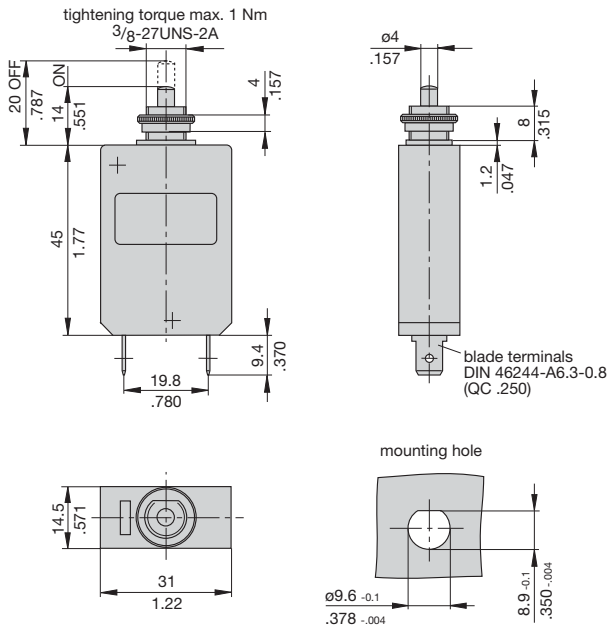
Voltage rating	AC 250 V; DC 28 V (UL: AC 250 V; DC 50 V)
Current ratings	0.05...25 A
Typical life	0.05...16 A 5,000 operations at 2 x I <sub>N</sub> , inductive 17...25 A 5,000 operations at 2 x I <sub>N</sub> , resistive
Ambient temperature	-20...+60 °C (-4...+140 °F)
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity I <sub>cn</sub>	0.05...2.5 A 8 x I <sub>N</sub> 3...5 A 20 x I <sub>N</sub> 6...12 A 200 A 13...25 A 400 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 24 g

## Approvals

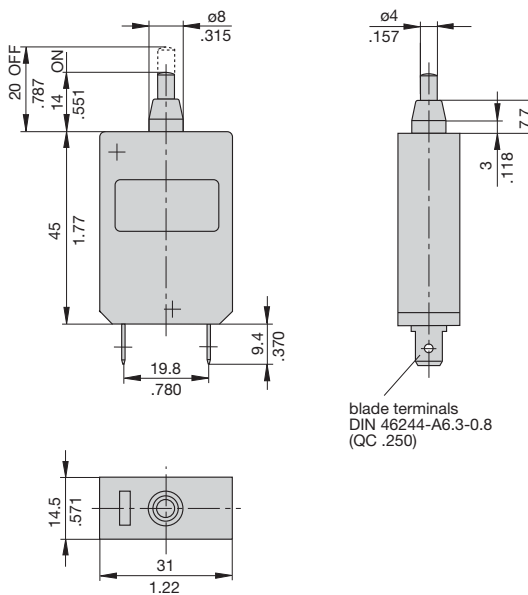
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
CSA, UL	AC 250 V	0.1...16 A
CCC	AC 250 V	0.05...25 A

## Dimensions

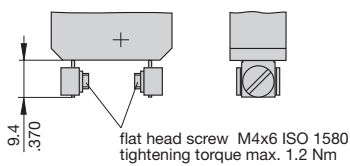
### 157-P10



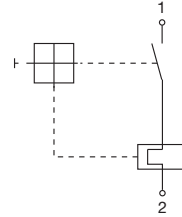
### 158-P10



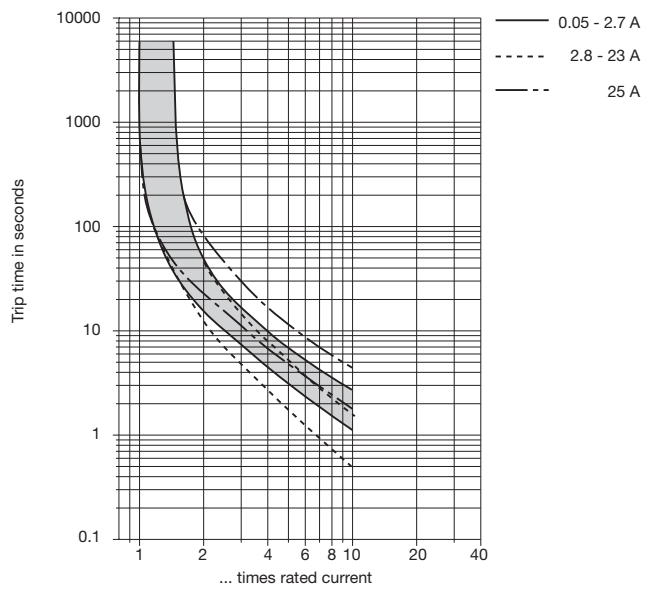
### 157/158-K10



## Internal connection diagram



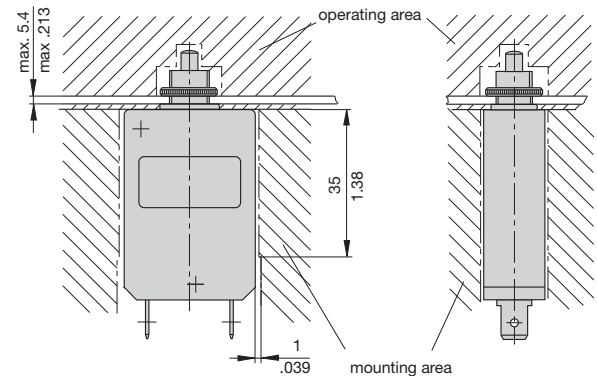
## Typical time/current characteristics at +23 °C/+73.4 °F



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

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

## Installation drawings

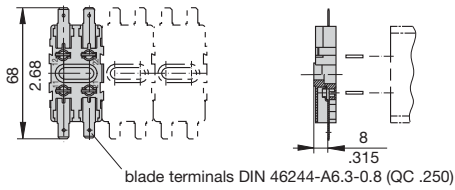


This is a metric design and millimeter dimensions take precedence (mm)  
inch

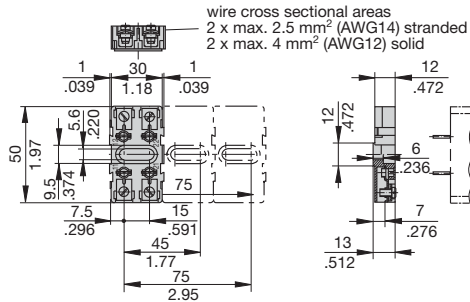
## Accessories

### Mounting sockets

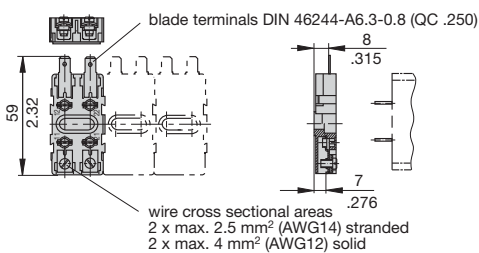
**10F-P10** (up to 16 A max. load)



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

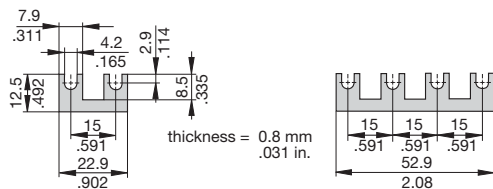


**10F-A10** (up to 16 A max. load)



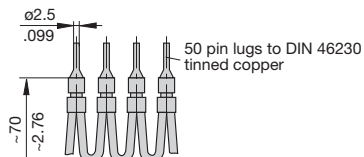
### Accessories for sockets (up to 20 A max. load)

2-way bus bar **Y 301 166 02**    4-way bus bar **Y 301 166 01**



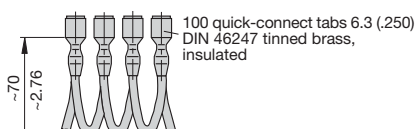
### Connector bus links -K10

**X 210 589 01/** 2.5 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)



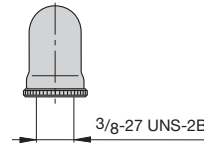
### Connector bus links -P10

**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)

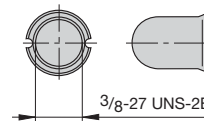


## Accessories for type 157-...

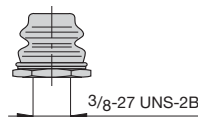
**Front panel water splash cover, transparent Y 300 538 01 and knurled nut Y 300 628 01 X 200 799 01 (bonded to nut) (IP64)**



**Front panel water splash cover, transparent with special knurled nut X 200 798 02 (bonded to nut) (IP64)**



**Splash cover (black) with hex nut X 210 739 01**



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

## Typical applications

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

## Ordering information

### Type No.

1110 snap in panel mounting

### Mounting

**F1** panel thickness 0.8...1.6 mm (.031 -.063 in)

**F2** panel thickness 1.8...3 mm (.071-.118 in)

### Number of poles

**1** 1-pole protected

### Actuator style

**2** black push button/white indicator ring, standard push-push function

**B** black push button/white indicator ring, standard push-to-reset function

Other indicator ring colours are available to special order

### Terminal design

**P1** blade terminals A6.3-0.8 (QC .250)

### Characteristic curve

**M1** medium delay

### Current ratings

**0.05...16A**

1110 - F1 1 2 - P1 M1 - 0.05 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	442	2	0.25
0.08	173	2.5	0.19
0.1	110	3	0.12
0.2	27.8	3.5	0.09
0.3	12.4	4	0.07
0.4	7.0	5	0.05
0.5	4.5	6	0.04
0.6	3.1	7	≤ 0.02
0.7	2.3	8	≤ 0.02
0.8	1.7	10	≤ 0.02
1	1.1	12	≤ 0.02
1.2	0.71	15	≤ 0.02
1.5	0.41	16	≤ 0.02
1.8	0.38		



1110-F1..

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 250 V; DC 28 V (UL: AC 250 V; DC 50 V)		
Current rating	0.05...16 A		
Typical life for S-type	AC + DC		
	0.05...10 A	10,000 operations at 1 x I <sub>N</sub> , inductive	
	12...16 A	6,000 operations at 1 x I <sub>N</sub> , inductive	
	for actuator style B:		
	0.05...10 A	200 operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+60 °C (-4...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	2.5 kV	pollution degree 2
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage	AC 3,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	AC 250 V:	0.05...16 A	8 x I <sub>N</sub>
	DC 28 V:	0.05...6 A	10 x I <sub>N</sub>
		7...10 A	200 A
		12...16 A	300 A
Interrupting capacity (UL 1077/EN60934 PC 1)	I <sub>N</sub>	U <sub>N</sub>	
	0.05...6 A	AC 250 V	1,000 A
	7...16 A	AC 125 V	1,000 A
	0.05...16 A	DC 50 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40		
	terminal area IP00		
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 12 g		

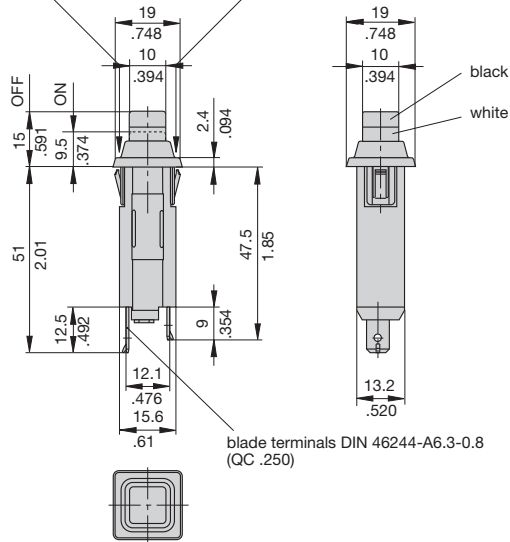
## Approvals

Authority	Voltage ratings	Current ratings
<b>for S-type:</b>		
UL	AC 250 V	0.05...6 A
	AC 125 V	7...16 A
	DC 50 V	0.05...16 A
CSA	AC 250 V; DC 50 V	0.05...16 A
VDE	AC 250 V; DC 28 V	0.05...10 A

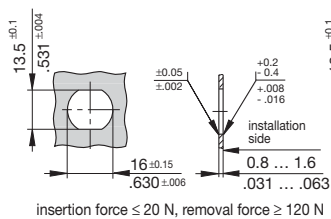
## Dimensions

### 1110-F1.. / -F2..

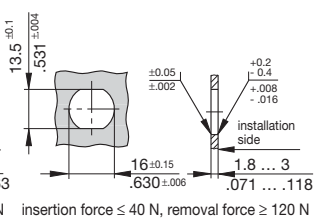
When installing the circuit breaker apply pressure on bezel only.



### Panel cut out 1110-F1..-PM1-...A



### 1110-F2..-PM1-...A

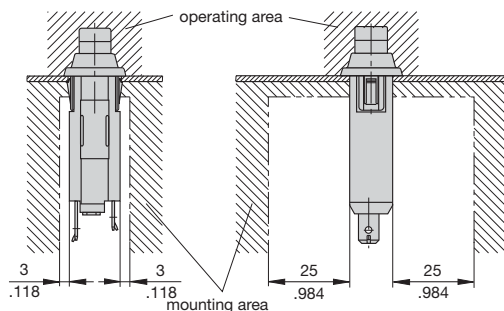


insertion force  $\leq 20$  N, removal force  $\geq 120$  N

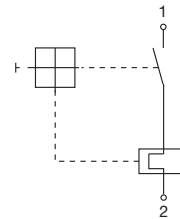
insertion force  $\leq 40$  N, removal force  $\geq 120$  N

## Installation drawing

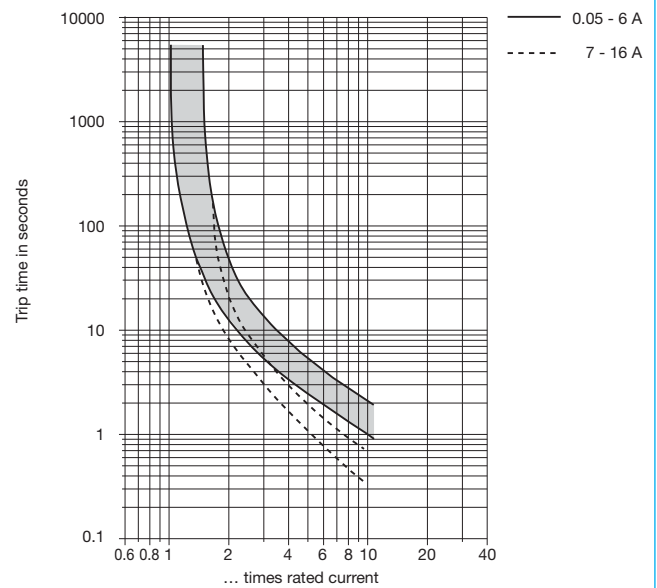
When installing the circuit breaker apply pressure on bezel only.



## Internal connection diagram



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



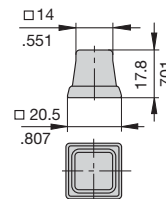
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

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

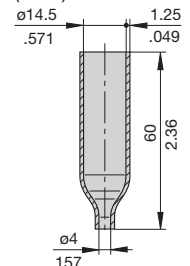
## Accessories - Water splash covers (transparent)

### Push button splash cover transparent Y 304 745 01 (IP64)

When using splash cover please note that the max. panel thickness is reduced by 0.5 mm/0.02 in.



### Terminal shroud Y 305 602 01 (IP64)



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

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

## Description

Double pole combined circuit breaker and ON/OFF switch with rocker actuation. Specially suited to single-phase applications. Snap-in front panel mounting. Thermal positively trip free mechanism ensures reliable overcurrent protection and safe physical isolation of the load circuit. Attractively styled, with rocker illumination optional. The status of the switching contacts is shown by the position of the rocker actuator. For high volume requirements customer-specific designs can be offered for the front bezel and the rocker. It meets the requirements of the CBE standard EN 60934 (IEC 60934): S type, TO. Meets the requirements regarding fire resistance of EN 60335-1 : 2007-02 Safety of household and similar electrical appliances.

Minimum ordering quantities apply!

## Typical applications

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

## Variants/Options

<b>Type No.</b>	1120 thermal circuit breaker
<b>Configuration</b>	F snap-in panel mounting
<b>Size of frame</b>	1 panel thickness 1 - 2.5 mm (without water splash protection) 2 panel thickness 1 - 2 mm (with water splash protection)
<b>Number of poles</b>	0 double pole without protection 5 double pole, one pole thermally protected
<b>Design</b>	0 standard 1 with water splash protection
<b>Terminal design</b>	P1 blade terminals 6.3x0.8 P2 blade terminals 6.3x0.8, 90° angled
<b>Characteristic curve</b>	Q0 without T1 thermal
<b>Actuator style</b>	U rocker (momentary switch) W rocker (latching switch)
<b>Actuator colour</b>	A black opaque B white opaque E blue opaque C red translucent D green translucent F blue translucent other colours upon request
<b>Actuator markings</b>	00 "I" and "O" moulded in
<b>Illumination</b>	0 without illumination B filament bulb
<b>Illumination voltage range</b>	0 without illumination 3 AC 90 V - 140 V 4 AC 185 V - 275 V DC illumination upon request
<b>Current ratings</b>	3...16 A
1120 - F 1 5 0 - P1 T1 - W B 00 00 - 10 A ordering example	



**1120-..**  
without water splash protection      with water splash protection

## Technical data

Voltage rating	AC 240 V; DC 32 V DC 50 V (only double pole)
Current ratings	3...16 A
Typical life	20,000 operations at I <sub>N</sub> , inductive
Ambient temperature	-20 °C...+60 °C
Insulation co-ordination (IEC 60664-1)	2,5 kV/2 reinforced insulation in operating area
Dielectric strength operating area terminal area pole/pole	test voltage AC 3,000 V test voltage AC 1,500 V test voltage AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Switching capacity I <sub>cn</sub>	AC 240 V: 200 A, 1 and 2 pole DC 50 V: 200 A, 2 pole DC 32 V: 200 A, 1 and 2 pole
Switching capacity (UL 1077)	AC 277 V: 3,500 A, 1 and 2 pole DC 50 V: 2,000 A, 2 pole DC 32 V: 2,000 A, 1 and 2 pole
Degree of protection (IEC 60529)	operating area IP40 with water splash protection IP66 terminal area IP00
Vibration	8 g (57-500 Hz), ± 0,61 mm (10-57 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	20 g (11 ms) test to IEC 60068-2-27, test Ea
Corrosion	48 hrs in 5% salt mist, test to IEC 60068-2-11, test Ka
Humidity	96 hrs in 95% RH, test to IEC 60068-2-3, test Cab
Mass	approx. 20 g

## Illumination voltage/power consumption

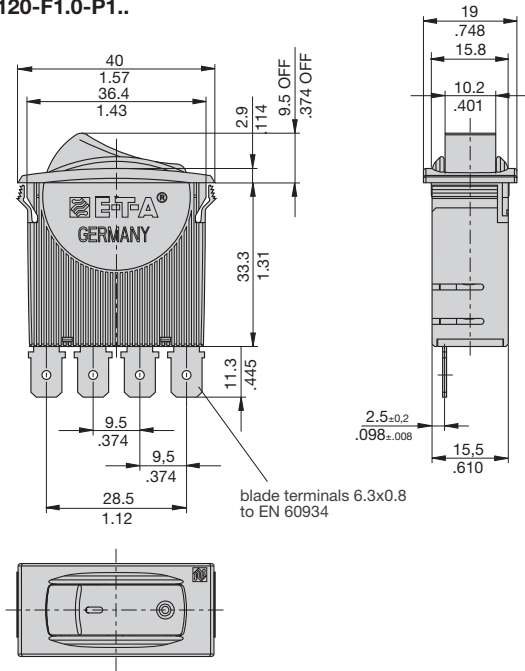
operating voltage	filament/neon
AC 115 V	< 1,5 mA
AC 230 V	< 1,5 mA

## Approvals

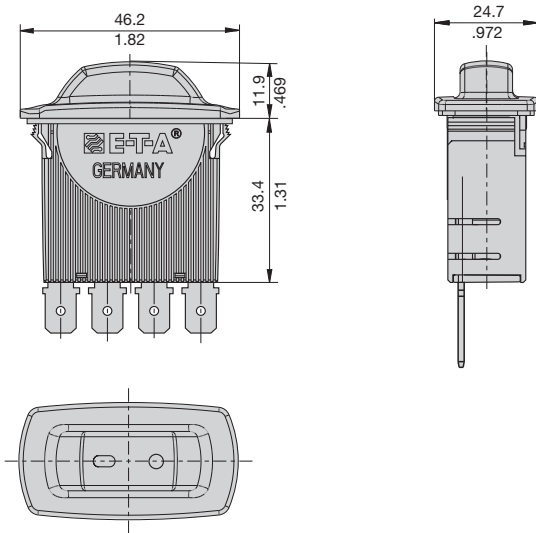
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V, DC 32 V DC 50 V	3...16 A 1 + 2 pole 3...16 A 2 pole
UL, CSA, CCC	AC 277 V, DC 32 V DC 50 V	3...16 A 1 + 2 pole 3...16 A 2 pole

## Dimensions single pole

1120-F1.0-P1..

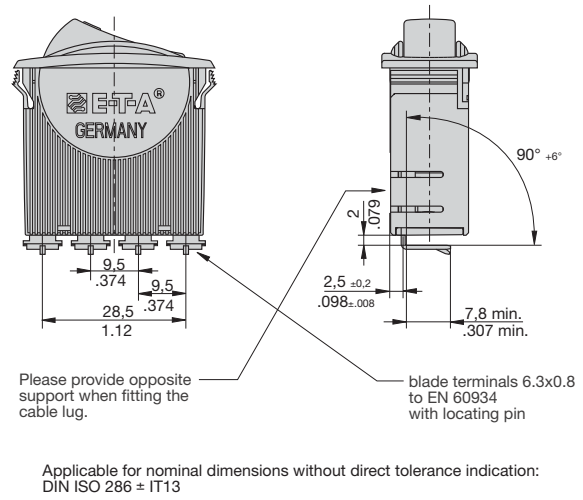


1120-F2.1-P1..

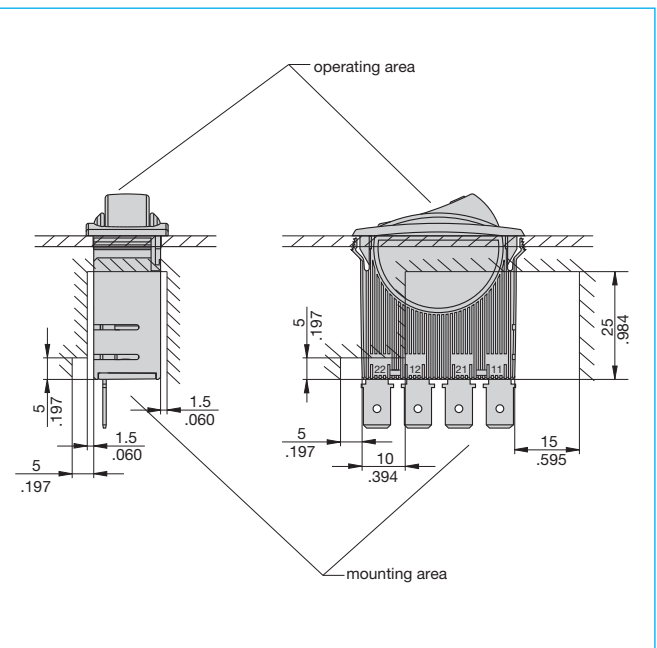


## Dimensions double pole

1120-F...-P2

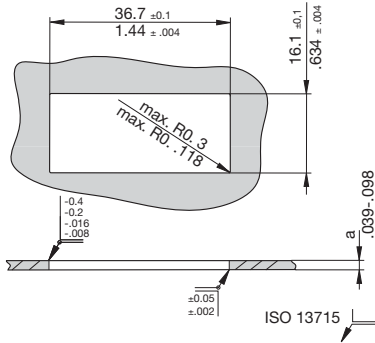


## Installation drawing





## Cut-out dimensions

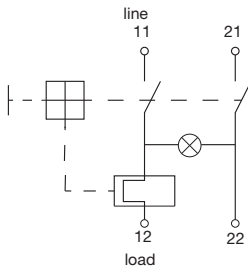


version	dimension "a"
1120-F1...-...	1 - 2.5 mm/ .039-.098
1120-F2...-...	1 - 2 mm/

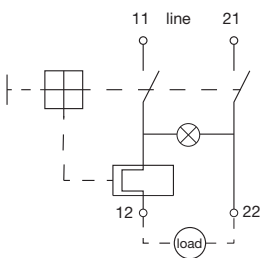
Applicable for nominal dimensions without direct tolerance indication:  
DIN ISO 286 ± IT13

## Internal connection diagrams

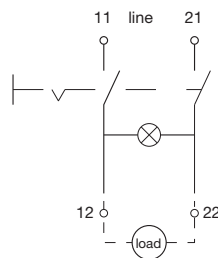
single pole connection  
AC 240 V, DC 32 V



AC 240 V, DC 50 V  
double pole  
one pole thermally protected

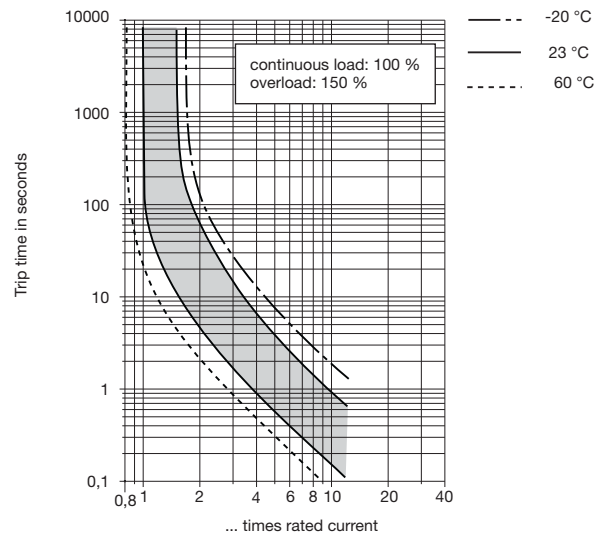


double pole  
without protection

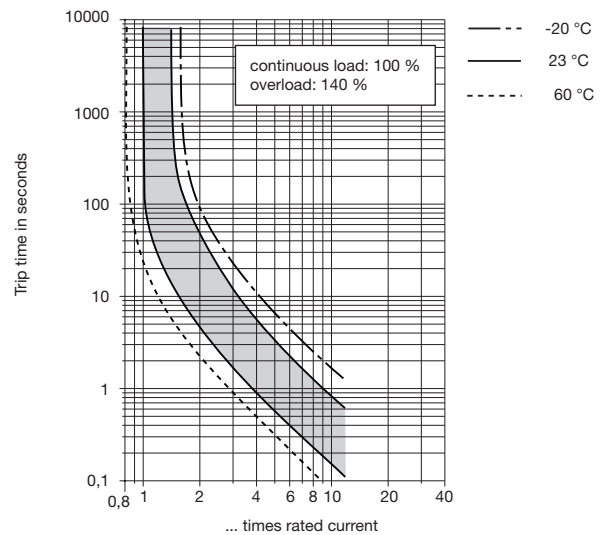


## T1 - thermal characteristic curve

3 ... 6 A



8 ... 16 A



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

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Derating factor	0,84	0,88	0,92	1	1,08	1,14	1,23

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

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

## Typical applications

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

## Ordering information

### Type No.

<b>1140</b>	single pole thermal circuit breaker
<b>Mounting</b>	
<b>E2</b>	integral mounting
<b>F1</b>	snap-in panel mounting
<b>G1</b>	threadneck panel mounting 3/8-27UNS with hex nut and knurled nut*
<b>G4</b>	threadneck panel mounting 3/8-27UNS with knurled nut*

### Number of poles

**1** 1-pole protected

### Actuator style

**1** black push button (standard)

### Terminal design

**P1** blade terminals A6.3-0.8 (QC .250)

### Characteristic curve

**M1** medium delay

### Current ratings

**3.5...16 A**

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

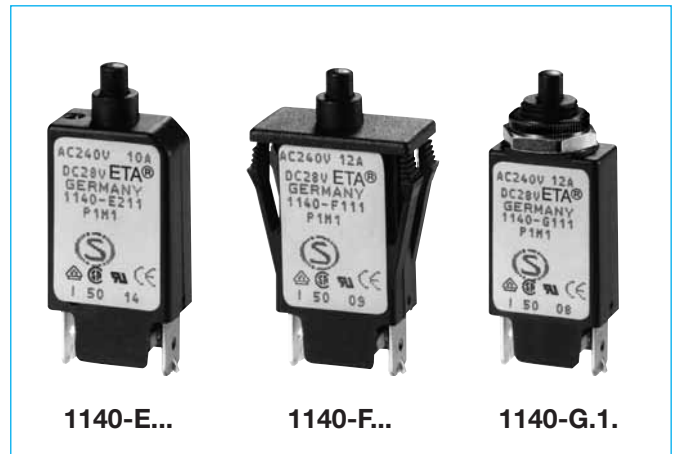
\*mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
3.5	0.06	10	< 0.02
4	0.04	12	< 0.02
5	0.03	13	< 0.02
6	0.02	15	< 0.02
7	< 0.02	16	< 0.02
8	< 0.02		

## Approvals

Authority	Voltage ratings	Current ratings
VDE	AC 240 V; DC 48 V	3.5...16 A
CSA, UL	AC 250 V; DC 50 V	3.5...16 A
Kema (EN 60934)	AC 240 V; DC 48 V	3.5...16 A



## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 48 V (UL: AC 250 V; DC 50 V)	
Current ratings	3.5...16 A	
Typical life	AC + DC 3.5...8 A 200 operations at 2 x I <sub>N</sub> , inductive 1,000 operations at 2 x I <sub>N</sub> , resistive 9...16 A 100 operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+60 °C (-4...+140 °F) T 60	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	3.5...8 A 10...16 A	8 x I <sub>N</sub> 120 A
Interrupting capacity (UL 10777)	I <sub>N</sub> 3.5...16 A 3.5...7A 8...16 A	U <sub>N</sub> DC 50 V AC 250 V AC 250 V 200 A 1,000 A 2,000 A
Degree of protection (IEC 60529/DIN 40 050)	operating area IP40 terminal area IP00	
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 10 g	

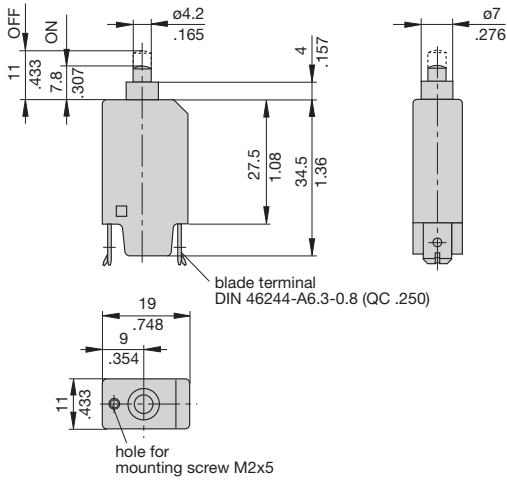
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.



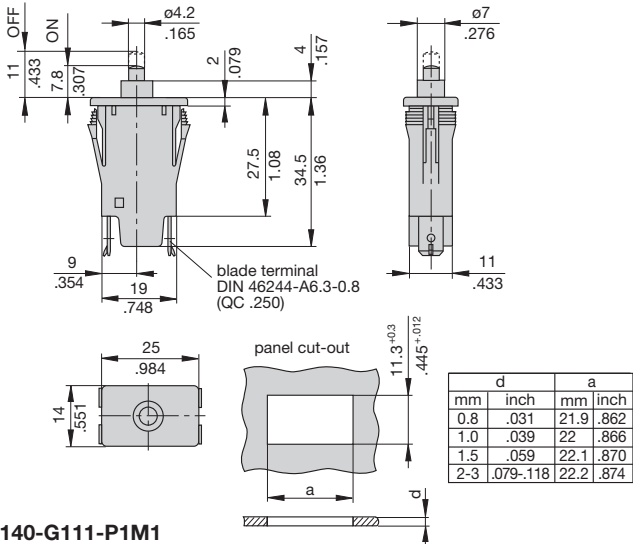
# Thermal Overcurrent Circuit Breaker 1140-...

## Dimensions

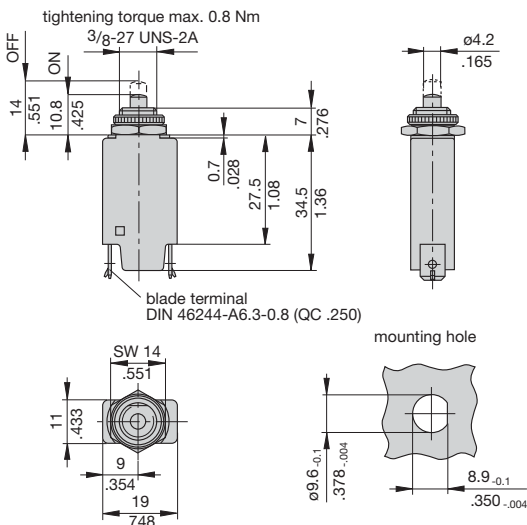
### 1140-E211-P1M1



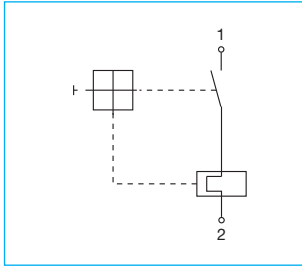
### 1140-F111-P1M1



### 1140-G111-P1M1

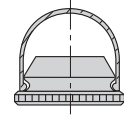


## Internal connection diagram

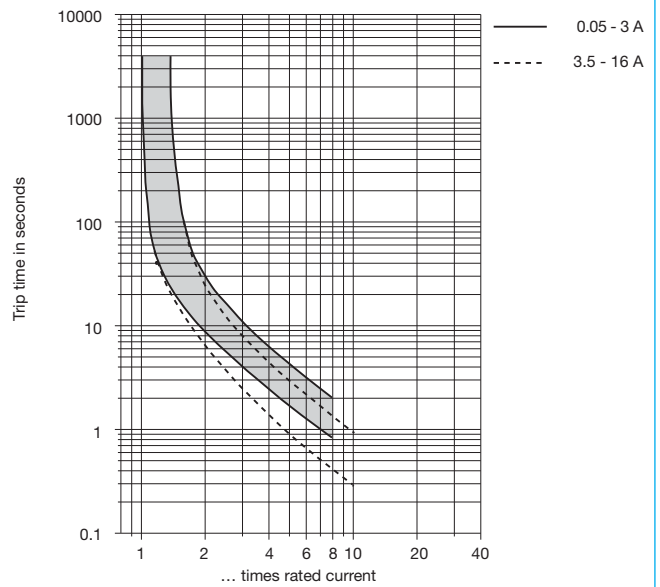


## Accessory

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



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

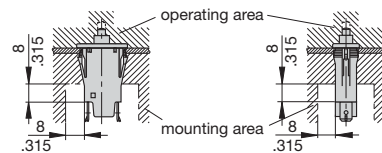


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

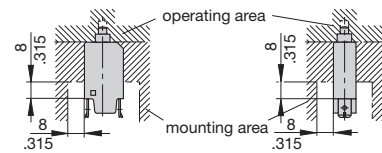
Ambient temperature °F	-4	+14	+32	+73.4	+104	+122	+140
°C	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.84	0.92	1	1.08	1.16	1.24

## Installation drawings

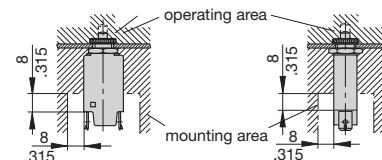
### 1140-F...



### 1140-E...



### 1140-G...



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

## Description

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

## Typical applications

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

## Ordering information

<b>Type No.</b>	
1140	double pole threadneck panel mounting
<b>Mounting</b>	
G1	threadneck panel mounting 3/8-27UNS, with hex nut and knurled nut*
G4	threadneck panel mounting 3/8-27UNS, with knurled nut*
<b>Number of poles</b>	
5	double pole, 1-pole protected
<b>Actuator style</b>	
1	black push button (standard)
<b>Terminal design</b>	
P7	blade terminals DIN 46244-C (QC 2x.110)
<b>Characteristic curve</b>	
M1	medium delay
<b>Current ratings</b>	
0.05...16 A	
1140 - G1 5 1 - P7 M1 - 16 A ordering example	

\*mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

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

## Approvals

Authority	Voltage ratings	Current ratings
VDE	AC 240 V; DC 48 V	0.05...16 A
CSA, UL	AC 250 V; DC 50 V	0.05...16 A
Kema (EN 60934)	AC 240 V; DC 48 V	0.05...16 A



1140-G.5

## Technical data

For further details please see chapter: Technical Information

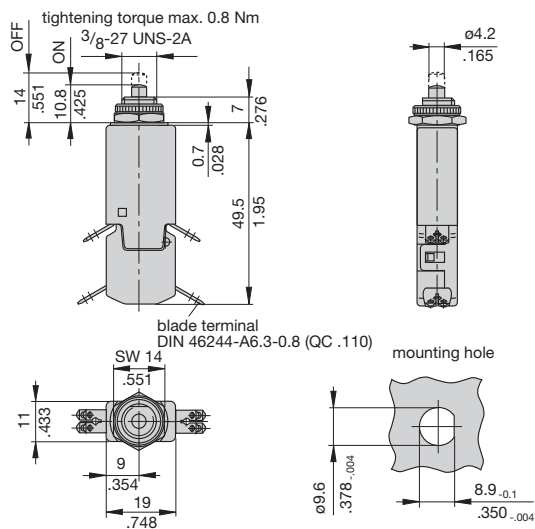
Voltage rating	AC 240 V; DC 48 V (UL: AC 250 V; DC 50 V)		
Current ratings	0.05...16 A		
Typical life	AC + DC		
	0.05...3 A	300 operations at 2 x I <sub>N</sub> , inductive 3,000 operations at 2 x I <sub>N</sub> , resistive	
	3.5...8 A	200 operations at 2 x I <sub>N</sub> , inductive 1,000 operations at 2 x I <sub>N</sub> , resistive	
	9...16 A	100 operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+60 °C (-4...+140 °F) T 60		
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV	pollution degree 2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area pole/pole	AC 3,000 V AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.05...3 A	6 x I <sub>N</sub>	
	3.5...8 A	8 x I <sub>N</sub>	
	10...16 A	120 A	
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.05...16 A	DC 50 V	200 A
	0.05...7 A	AC 250 V	1,000 A
	8...16 A	AC 250 V	2,000 A
Degree of protection (IEC 60529/DIN 40 050)	operating area IP40 terminal area IP00		
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 13 g		



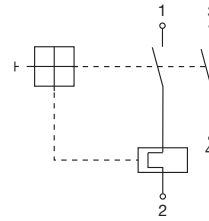
# Thermal Overcurrent Circuit Breaker 1140-... (2-pole)

## Dimensions

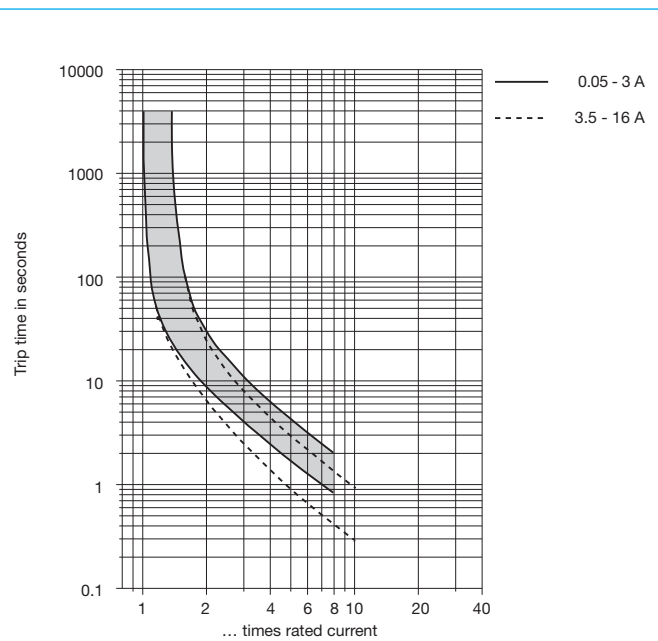
### 1140-G15...



## Internal connection diagram



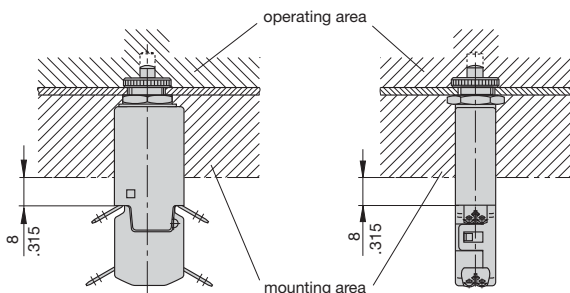
## Typical time/current characteristics at +23 °C/+73.4 °F



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

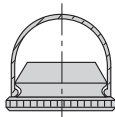
Ambient temperature °F	-4	+14	+32	+73.4	+104	+122	+140
°C	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.84	0.92	1	1.08	1.16	1.24

## Installation drawing



## Accessories

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



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

Thermal circuit breaker, with controlled self-resetting mechanism, specially suited to installation in inaccessible locations. Under overload conditions the circuit breaker contacts will open to protect the load circuit. A low current excitation circuit ensures that the contacts remain open thereby avoiding the hazards of automatic reset operation. The circuit breaker is reset by switching off the supply circuit for a short period. Class 2 device, contacts stay open until voltage is removed. Type II to SAE J 553.

## Typical applications

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

## Ordering information

<b>Type No.</b>	
<b>1160</b>	single pole plug-in type
<b>Design standard</b>	
<b>02</b>	standard version 12 V
<b>Current ratings</b>	
<b>12, 15, 20, 30 A</b>	
<b>1160 - 02 - 12A</b>	ordering example

## Standard current ratings and typical voltage drop values

Current rating (A)	Voltage drop (mV)
12	< 150
15	< 150
20	< 150
30	< 150



1160-...

## Technical data

Voltage rating	DC 12 V
Current ratings	12...30 A
Typical life	300 operations at $2 \times I_N$
Ambient temperature	-30...+60 °C (-22...+140 °F)
Holding current	< 0.6 A
Reset time at 23°C after 5 s of load with $U_N$	< 35 sec
Interrupting capacity (o-o-o)	200 A, L/R = 2.5 ms
Degree of protection (IEC 60529/DIN 40050)	housing area IP54 terminal area IP00
Vibration	5 g (57-500 Hz) $\pm$ 0.38 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 6 g



## Description

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

Type III to SAE J 553.

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

## Typical applications

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

## Ordering information

Type No.	
1170	plug-in
Design standard	
21	blade terminals for automotive fuse blocks (standard) with retaining clips
22	blade terminals for automotive fuse blocks, without retaining clips
Current ratings	
3...25 A	
1170 - 21 - 15 A ordering example	

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

Current rating (A)	Voltage drop (mV)	Actuator colour
3	< 300	violet (approximating RAL 4008)
4	< 300	pink (approximating RAL 3015)
5	< 300	orange-brown (approximating RAL 8023)
6	< 150	mossy-green (approximating RAL 6005)
7.5	< 150	hazel (approximating RAL 8011)
8	< 150	honey (approximating RAL 1005)
10	< 150	red (approximating RAL 3020)
15	< 150	blue (approximating RAL 5012)
20	< 150	yellow (approximating RAL 1018)
25	< 150	pearl (approximating RAL 1013)



1170-...

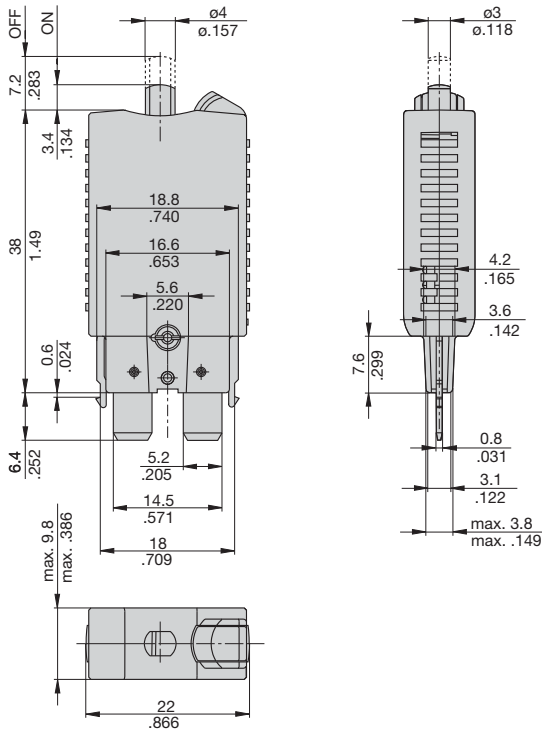
## Technical data

Voltage rating	DC 28 V
Current ratings	3...25 A (30 A upon request)
Typical life	at rated current: 3...25 A 6,000 operations at $I_N$ 3...20 A 3,000 operations at $2 \times I_N$ 25 A 1,000 operations at $2 \times I_N$
Ambient temperature	-40...+85 °C (-40...+185 °F)
Interrupting capacity $I_{cn}$	400 A
Ultimate short-circuit breaking capacity	≥ 1 break operation at 2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	50 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 13 g

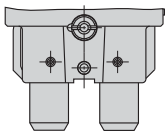


## Dimensions

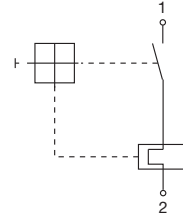
### 1170-21



### 1170-22

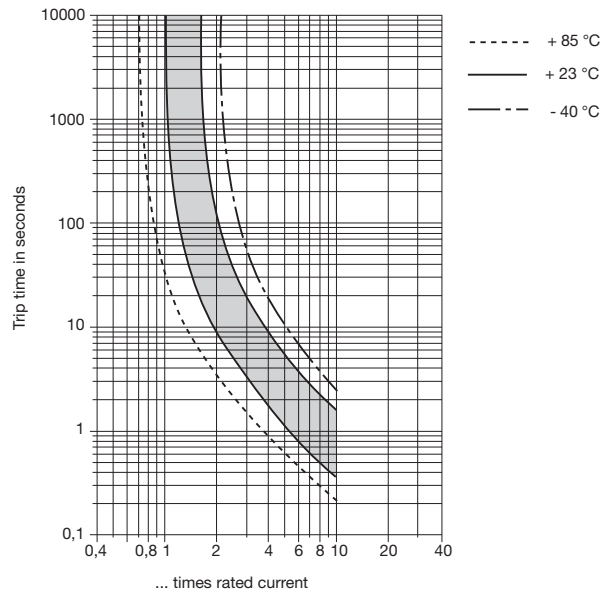


## Internal connection diagram



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

### 3 ... 25 A



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

Ambient temperature °F	-40	-22	-4	+14	+32	+50
Ambient temperature °C	-40	-30	-20	-10	0	+10
Derating factor	0,77	0,80	0,84	0,89	0,94	0,96
Ambient temperature °F	+73.4	+104	+122	+140	+158	+185
Ambient temperature °C	+23	+40	+50	+60	+70	+85
Derating factor	1	1,08	1,16	1,24	1,33	1,42

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



## Description

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

## Typical applications

Protection of loads in power distribution systems in control cabinets and process control.

## Ordering information

### Type No.

**1180** single pole thermal circuit breaker, plug-in mounting

### Versions

**01** with switching function, without label

**02** reset function only, without label

### Current rating range

**0.1...10 A**

**1180 - 01 - 1 A** ordering example

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.1	81	2	0.25
0.2	22	2.5	0.18
0.25	14	3	0.11
0.3	8.7	3.5	0.08
0.4	5.5	4	0.07
0.5	3.4	5	$\leq 0.05$
0.6	2.5	6	$\leq 0.05$
0.7	1.7	7	$\leq 0.05$
0.8	1.5	8	$\leq 0.05$
1	0.9	10	$\leq 0.05$
1.5	0.4		

## Approvals

Authority	Voltage rating	Current ratings
VDE	AC 250 V; DC 65 V	0.1...10 A
UL	AC 250 V; DC 72 V	0.1...10 A
CSA	AC 250 V; DC 72 V	0.1...10 A



**1180-...**

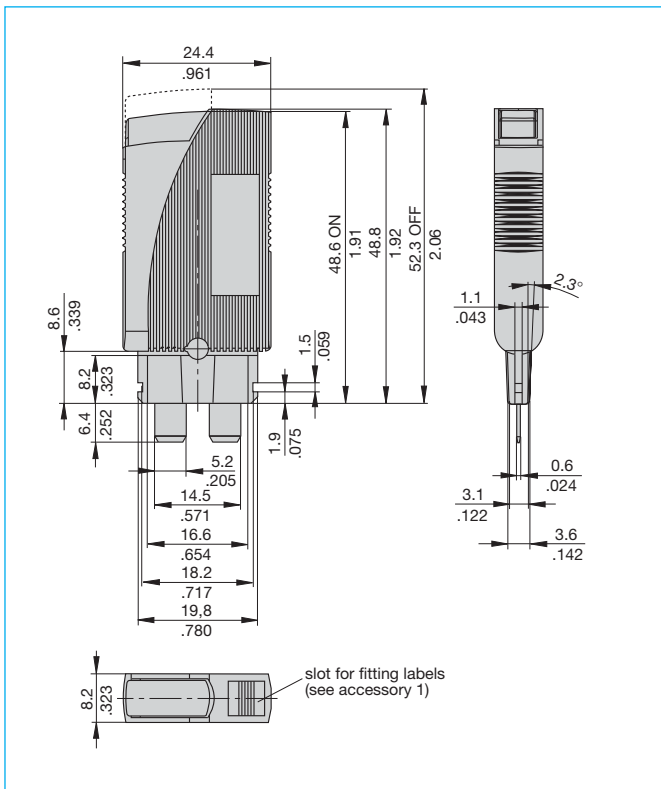
## Technical data

Voltage rating	AC 250 V; DC 65 V (UL, UL Canada: AC 250 V; DC 72 V)
Current ratings	0.1...10 A
Typical life	6,000 operations at $1 \times I_N$ (low-inductance) 3,000 operations at $1 \times I_N$ (inductive) 500 operations at $2 \times I_N$ (inductive)
Ambient temperature	-20...+60 °C (T 60) -4...+140 °F
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,000 V installation area AC 1,500 V
Insulation resistance	> 100 M $\Omega$ (DC 500 V)
Interrupting capacity $I_{cn}$	0.1...5 A $6 \times I_N$ 6...10 A $8 \times I_N$
Interrupting capacity (UL 1077)	AC 250 V: 2,000 A DC 65 V: 200 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration without terminal block	5 g (57-500 Hz) $\pm 0.38$ mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis and to EN 50155
Shock without terminal block	25 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 15 g

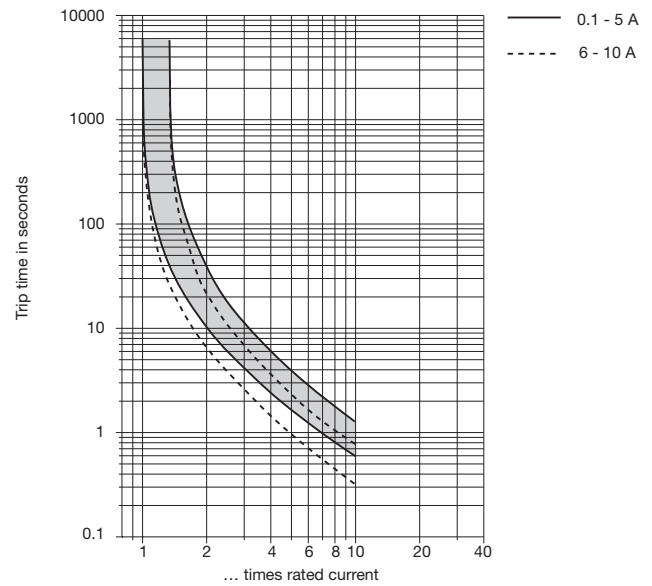


# Thermal Overcurrent Circuit Breaker 1180-...

## Dimensions



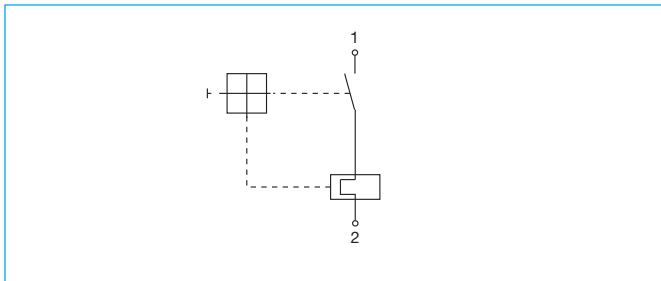
## Typical time/current characteristics at +23 °C/73.4 °F



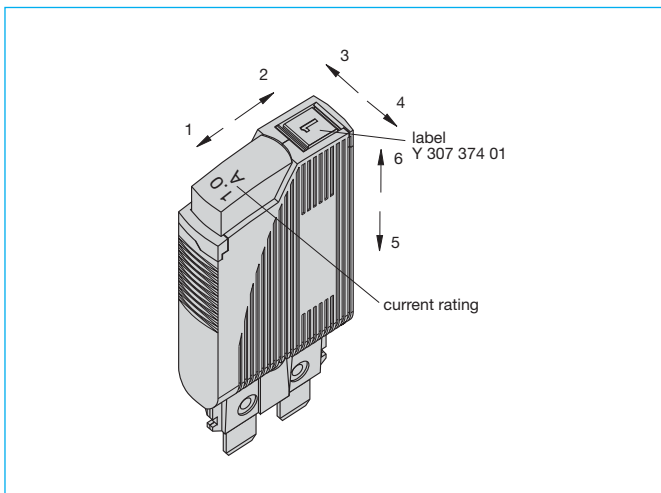
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

## Internal connection diagram



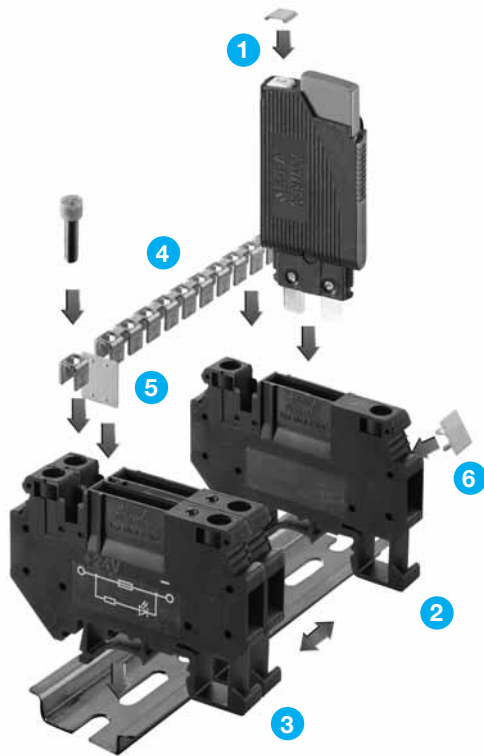
## Shock directions



**Note:** When several devices are mounted together, each device should only carry 80 % of its rating or it must be overrated accordingly.

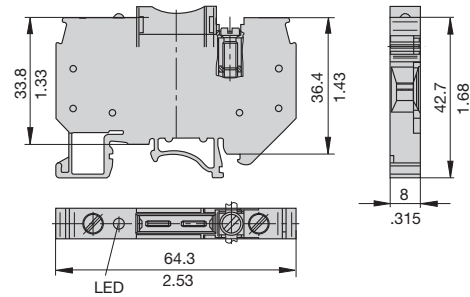
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories - Terminal block with screw terminals



- 1 Label** for circuit breaker 1180, surface for marking 4.5 x 5 mm (packaging quantity 120 pcs)  
**Y 307 374 01**
- 2 Terminal block** for DIN rail mounting, with screw terminals up to 6 mm<sup>2</sup> conductor, width 8.2 mm, dimensions 64 x 42.5 x 8.2 mm, headroom over the upper rail edge with circuit breaker fitted (OFF position) 84 mm.  
Approvals: UL 300 V / 30 A / AWG 26-8  
**X 222 233 01**
- 3 Terminal block** for DIN rail mounting see item 2, but with LED DC 24 V (lighted after tripping); current rating LED 2 mA  
**X 222 233 02**
- 4 Bus connection** for potential bridging of several terminal blocks see item 2 and 3 (10-pole, separable, mounting hardware included), max. current rating 34 A  
**X 222 232 01**
- 5 Insulation barriers** for insertion between two circuits (packaging quantity 10 pcs)  
**Y 307 373 01**
- 6 Label** for terminal block, see item 2 and 3, surface for marking 8 x 10 mm (packaging quantity 10 pcs)  
**Y 307 375 01**

### Dimensions X 222 233 02



### Vibration

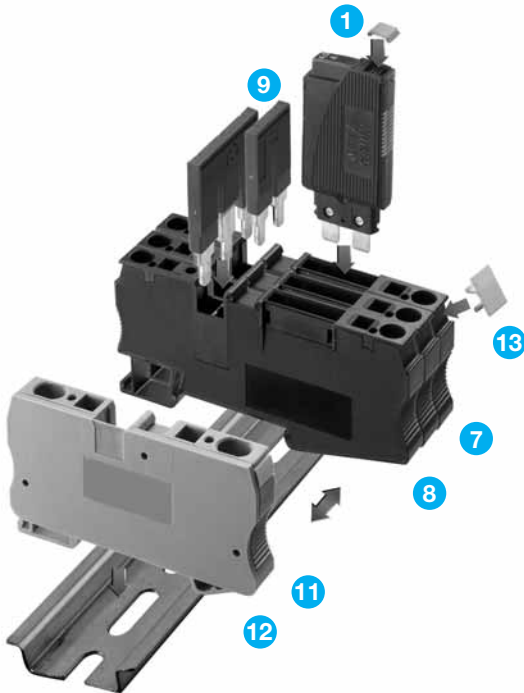
**with terminal block X 222 233 01 and X 222 233 02**  
5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis and EN 50155

### Shock

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

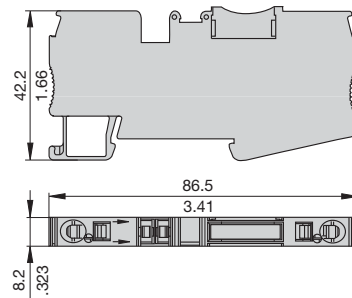
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories - Terminal block with spring-loaded terminals



- 1 Label** for circuit breaker 1180, surface for marking 4.5 x 5 mm (packaging quantity 120 pcs)  
**Y 307 374 01**
- 7 Terminal block** for DIN rail mounting, with spring-loaded terminals up to 4 mm<sup>2</sup> conductor, width 8.2 mm, dimensions 68.5 x 36.5 x 8.2 mm, headroom over the upper rail edge with circuit breaker fitted (OFF position) 82 mm. UL approval pending.  
**X 222 316 01**
- 8 Terminal block** for DIN rail mounting see item 7, but with LED DC 24 V (lighted after tripping); current rating LED 2 mA  
**X 222 315 02**
- 9 Jumper 2pole**, max. current rating 32 A for terminal blocks items 7 and 8 and feed supply terminal item 11.  
**X 222 318 01**
- 10 Jumper 3pole**, max. current rating 32 A for terminal blocks items 7 and 8 and feed supply terminal item 11.  
**X 222 318 02**
- 11 Feed supply terminal** with spring-loaded terminals up to 6 mm<sup>2</sup> conductor, width 8.2 mm, suitable for use with jumpers items 9 and 10 (power distribution).  
**X 222 317 01**
- 12 Cover** for feed supply terminal item 11 for closing the open side at the end of an assembly.  
**Y 307 507 01**
- 13 Label** for terminal block items 7 and 8, and feed supply terminal item 11, surface for marking 7.5 x 5 mm (packaging quantity 50 pcs)  
**Y 307 508 01**

### Dimensions X 222 316 01



### Vibration

#### with terminal blocks X 222 316 01 and X 222 315 02

vibration axis 3-4:  
3 g (57-500 Hz), ± 0.38 mm (10-57 Hz)  
other axes:  
5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)  
to IEC 60068-2-6, test Fc,  
10 frequency cycles/axis  
and EN 50155

### Shock

#### with terminal blocks X 222 316 01 and X 222 315 02

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

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

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

## Typical applications

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

## Ordering information

<b>Type No.</b>	1410 snap-in panel mounting type
<b>Mounting</b>	F snap-in panel mounting
<b>Size of frame</b>	1 to fit mounting cut-out 28 x 12.7 mm (1.1 x .5 in)
<b>Number of poles</b>	1 single pole, thermally protected
<b>Accessories</b>	0 without accessories
<b>Terminal design</b>	P1 blade terminals 2.8-0.8 (QC .110/2x.110) silver-plated
<b>Characteristic curve</b>	F1 fast acting
<b>Actuator style</b>	W rocker, rounded profile
<b>Actuator colour</b>	02 white opaque 14 red translucent 15 orange translucent 19 green translucent
<b>Actuator markings</b>	Q I and O
<b>Trip/ON illumination (optional)</b>	B illuminated when tripped E illuminated when ON
<b>Illumination voltage range (optional)</b>	2 20-28 V marked 24 V 35 mA 3 90-140 V marked 115 V < 1 mA 4 185-275 V marked 230 V < 1 mA
<b>Current ratings</b>	0.63...10 A
1410 - F 1 1 0 - P1 F1 - W 14 Q E 3 - 2 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

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.63	1.8	3.15	< 0.12
0.8	1.7	4	< 0.1
1	1.3	5	< 0.1
1.5	< 1	6.3	< 0.1
1.8	< 1	8	< 0.1
2	< 1	10	< 0.1
2.5	< 0.15		



1410-F1..

## Technical data

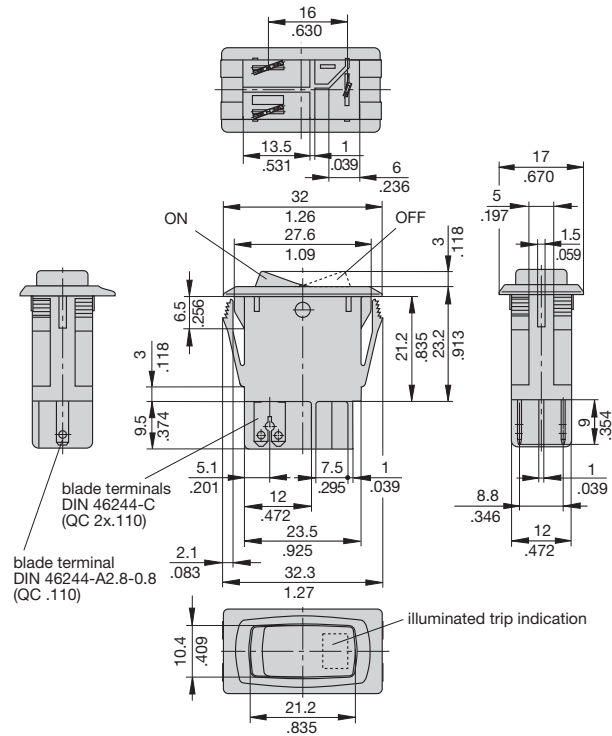
Voltage rating	AC 240 V; DC 28 V (DC 50 V upon request) (UL: AC 250 V; DC 48 )
Current rating range	0.63...10 A
Typical life	30,000 operations for $I_N \leq 6.3$ A AC/DC 10,000 operations for $I_N > 6.3$ A AC 3,000 operations for $I_N > 6.3$ A DC
protection circuit 1-2	300 break operations at $2 \times I_N$
Ambient temperature	-20...+70 °C (-4...+158 °F)
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity $I_{cn}$	0.63...2 A 12 x $I_N$ 2.5...8 A 8 x $I_N$ , AC max. 50 A 10 A 6 x $I_N$ 3.15...10 A 10 x $I_N$ , DC
Interrupting capacity (UL 1077)	0.63...10 A 2,000 A AC 250 V 0.63...8 A 200 A DC 50 V 0.63...5 A 200 A DC 60 V
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	20 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	96 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 9 g

## Approvals

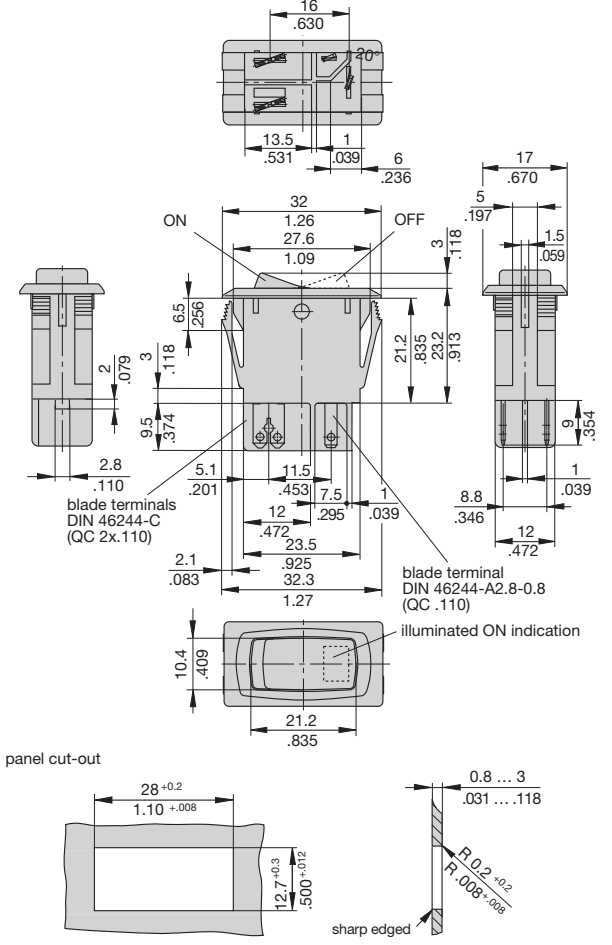
Authority	Voltage ratings	Current ratings
UL, CSA	AC 250 V DC 50 V	0.63...10 A 0.63...8 A
UL	DC 60 V	0.63...5 A

## Dimensions

1410-F...-...-...B.

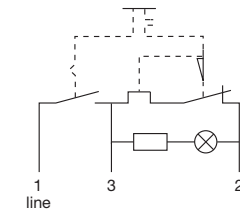


1410-F...-...-...E.



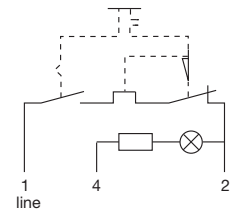
## Internal connection diagrams

1410-F...-...-...B.

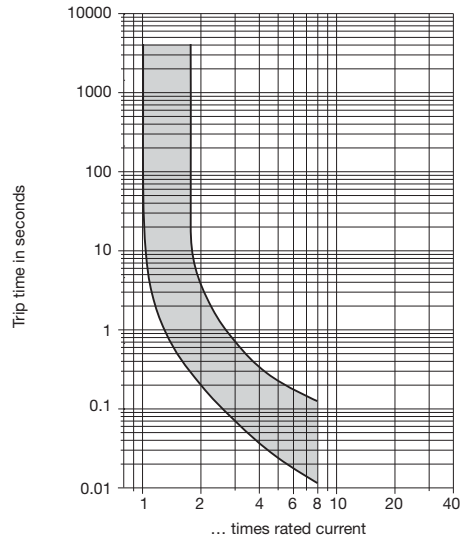


lamp current:  
24 V = 35 mA  
115 V < 1 mA  
230 V < 1 mA

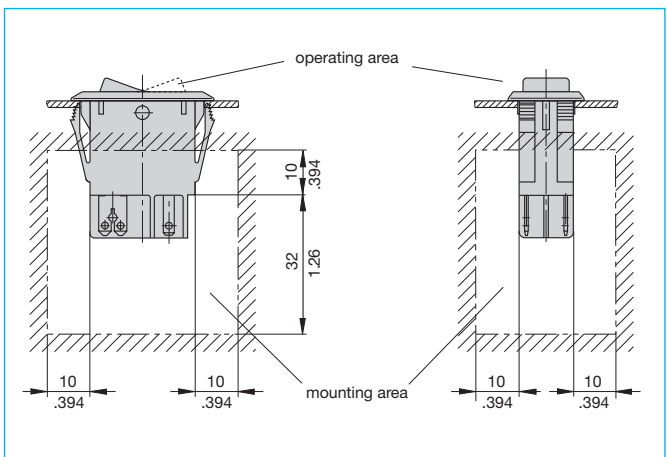
1410-F...-...-...E.



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



## Installation drawing



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

## Typical applications

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

## Ordering information

### Type No.

1410 single pole circuit breaker

### Configuration

**L** integral mounting or PCB mounting

### Mounting

**1** footprint 16.3x4.6

**4** footprint 17.5x4.6

### Number of poles

**1** 1-pole, thermally protected

### Hardware

**0** without

### Terminal design

**L1** solder pins 1.8x0.8 silver-plated (-L1 only)

**P3** blade terminals DIN 46244-A4.8-0.5 silver-plated (only -L4)

**P4** blade terminals DIN 46244-A4.8-0.8 silver-plated (only -L4)

### Characteristic curve

**F1** fast acting

### Actuator

**S** reset button (1410-L1)

**E** round reset slide (1410-L4)

### Actuator colour

**01** black (for -L1)

**03** white-yellow (for -L4)

**04** red (for -L4)

### Current ratings

**0.63...10 A**

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

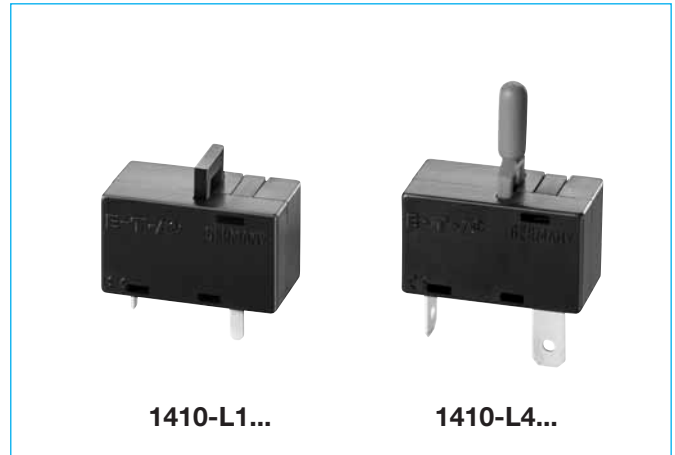
\*mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.63	1.8	3.15	< 0.12
0.8	1.7	4	< 0.1
1	1.3	5	< 0.1
1.5	< 1	6.3	< 0.1
1.8	< 1	8	< 0.1
2	< 1	10	< 0.1
2.5	< 0.15		

## Approvals

Authority	Voltage rating	Current ratings
VDE	AC 240 V	0.63...10 A
	DC 50 V	0.63...2 A
	DC 28 V	2.5...10 A
UL, CSA	AC 250 V; DC 50 V	0.63...10 A



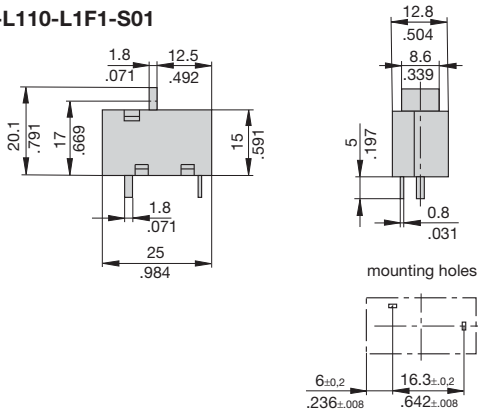
## Technical data

For further details please see chapter: Technical Information

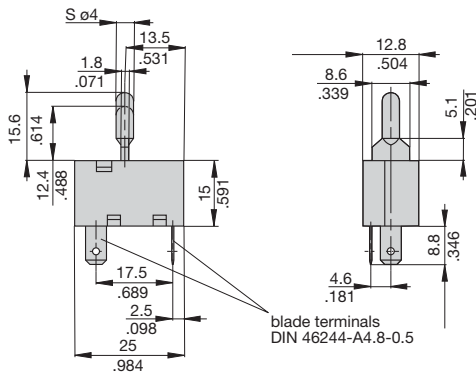
Voltage rating	AC 240 V; DC 28 V (UL: AC 250 V; DC 50 V)	
Current rating range 1-2	0.63...10 A	
Typical life	AC 240 V: 0.63...2.25 A 500 break operations at 2 x I <sub>N</sub> , inductive 2.5...10 A 500 break operations at 2 x I <sub>N</sub> , resistive DC 50 V: 0.63...2.25 A 500 break operations at 2 x I <sub>N</sub> , inductive DC 28 V: 2.5...10 A 500 break operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+70 °C (-4...+158 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub> (o-o-o)	0.63...2 A 12 x I <sub>N</sub> 2.5...8 A 8 x I <sub>N</sub> , AC max. 50 A 10 A 6 x I <sub>N</sub> , AC 3.15...10 A 10 x I <sub>N</sub> , DC	
Interrupting capacity (UL 1077)	0.63...10 A 2,000 A 0.63...10 A 200 A	AC 250 V DC 50 V
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	20 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	96 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 5 g	

## Dimensions

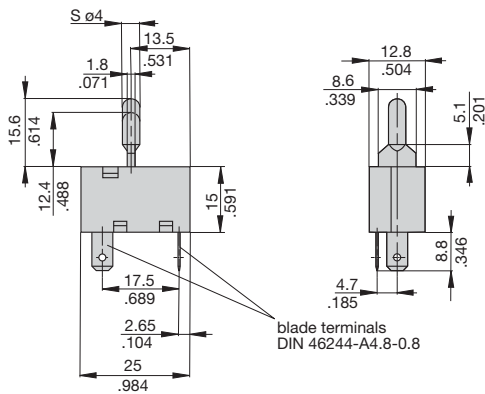
### 1410-L110-L1F1-S01



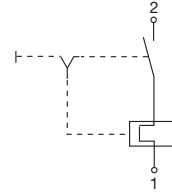
### 1410-L410-P3F1-E...



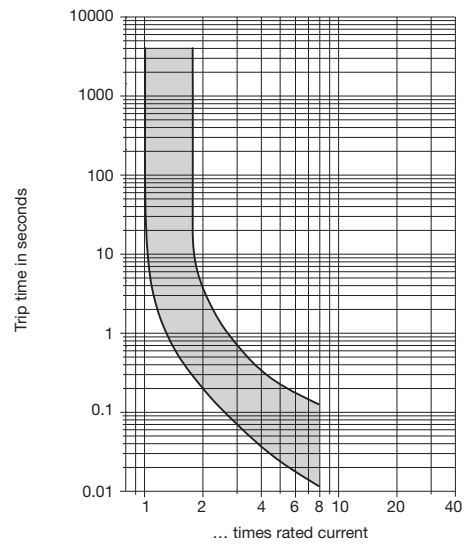
### 1410-L410-P4F1-E...



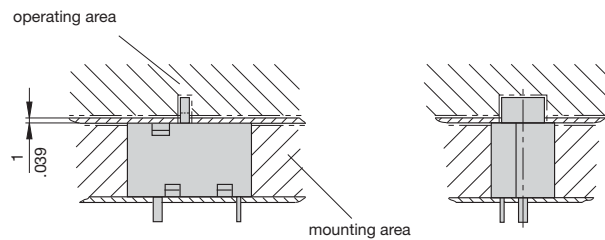
## Internal connection diagram



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



## Installation drawings



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

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

## Description

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

## Typical applications

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

## Ordering information

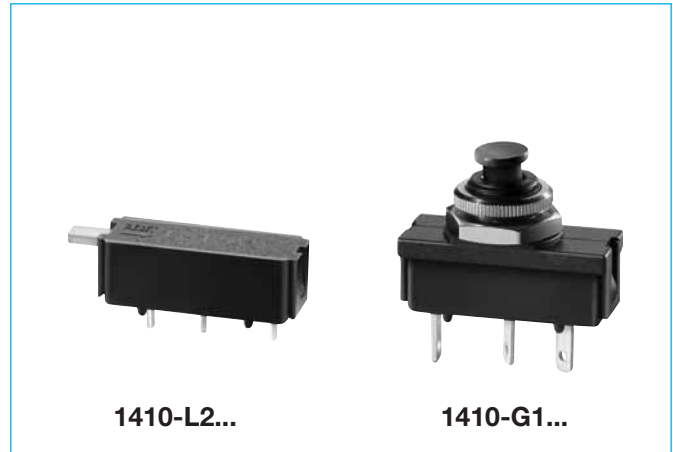
<b>Type No.</b>	1410	single pole circuit breaker
<b>Configuration</b>	<b>L</b>	PCB mounting or integral mounting
	<b>G</b>	threadneck panel mounting or PCB mounting
<b>Mounting</b>	<b>1</b>	threadneck 3/8-27UNS-2A (1410-G)
	<b>2</b>	PCB 10.15x7.62 (1410-L)
	<b>3</b>	PCB 10.15 without shunt terminal (1410-L)
<b>Number of poles</b>	<b>1</b>	1-pole, thermally protected
<b>Hardware</b>	<b>0</b>	without
	<b>1</b>	with hexnut and knurled nut (only 1410-G) > 5 pcs hexnut and knurled nut bulk shipped
	<b>2</b>	without hexnut and knurled nut and without shunt terminal (only 1410-G)
	<b>4</b>	with hexnut and knurled nut, without shunt terminal (only 1410-G)
	<b>8</b>	with actuator guard and marking CB.. (only 1410-G)
<b>Terminal design</b>	<b>L2</b>	solder pins 1x0.8 silver-plated
	<b>P2</b>	blade terminals DIN 46244-A2.8-0.8 silver-plated (only -G)
	<b>P3</b>	blade terminals DIN 46244-A4.8-0.5 silver-plated (only -G)
<b>Characteristic curve</b>	<b>F1</b>	fast acting
<b>Actuator</b>	<b>B</b>	flat reset-slide (only 1410-G)
	<b>S</b>	reset slide/button
<b>Actuator colour</b>	<b>01</b>	black (for -G1..)
	<b>02</b>	white (for -L2..)
	<b>04</b>	red (for 1410-G...-B)
<b>Current ratings</b>		0.63...10 A

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

\*mounting hardware bulk shipped

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.63	1.8	3.15	< 0.12
0.8	1.7	4	< 0.1
1	1.3	5	< 0.1
1.5	< 1	6.3	< 0.1
1.8	< 1	8	< 0.1
2	< 1	10	< 0.1
2.5	< 0.15		



## Technical data

For further details please see chapter: Technical Information

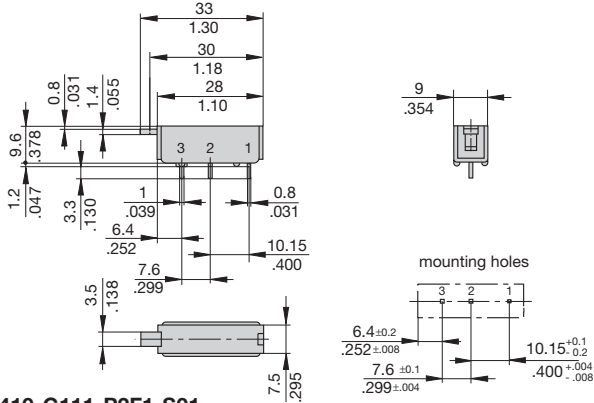
Voltage rating	AC 240 V; DC 28 V (UL: AC 250 V; DC 50 V)	
Current rating range 1-2	0.63...10 A	
Auxiliary circuit 1-3	0.2 x I <sub>N</sub> max. 1 A, AC 250 V	
Typical life	AC 240 V: 0.63...2.25 A 500 break operations at 2 x I <sub>N</sub> , inductive 2.5...10 A 500 break operations at 2 x I <sub>N</sub> , resistive DC 50 V: 0.63...2.25 A 500 break operations at 2 x I <sub>N</sub> , inductive DC 28 V: 2.5...10 A 500 break operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+70 °C (-4...+158 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area	AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub> (o-o-o)	0.63...2 A 2.5...8 A 10 A 3.15...10 A	12 x I <sub>N</sub> 8 x I <sub>N</sub> , AC max. 50 A 6 x I <sub>N</sub> , AC 10 x I <sub>N</sub> , DC
Interrupting capacity (UL 1077)	0.63...10 A 0.63...10 A	2,000 A AC 250 V 200 A DC 50 V
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	20 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	96 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 5 g	

## Approvals

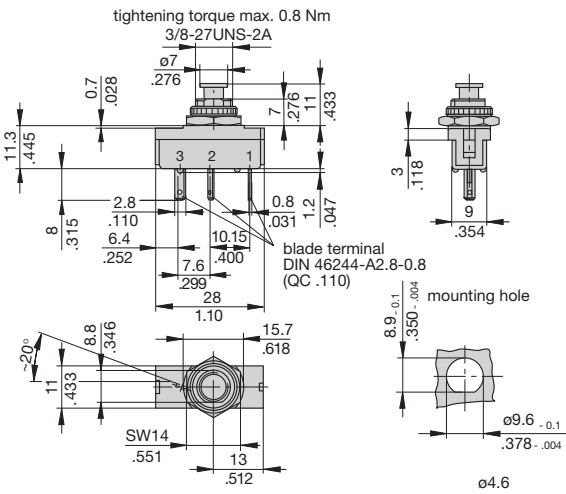
Authority	Voltage rating	Current ratings
VDE	AC 240 V	0.63...10 A
	DC 50 V	0.63...2 A
	DC 28 V	2.5...10 A
UL, CSA	AC 250 V; DC 50 V	0.63...10 A

## Dimensions

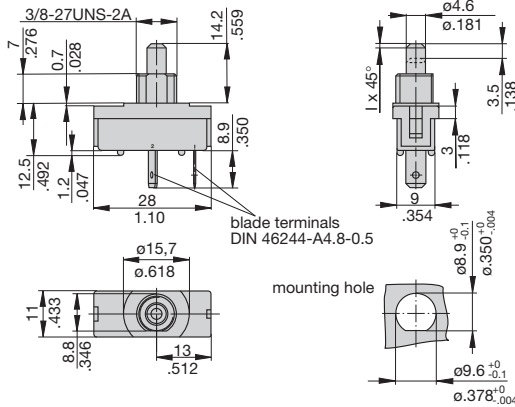
### 1410-L210-L2F1-S02



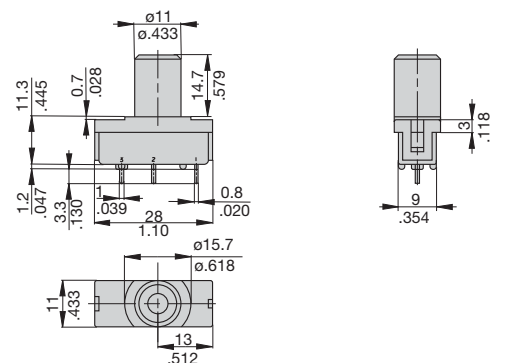
### 1410-G111-P2F1-S01



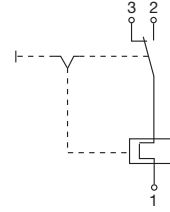
### 1410-G114-P3F1-B04-...



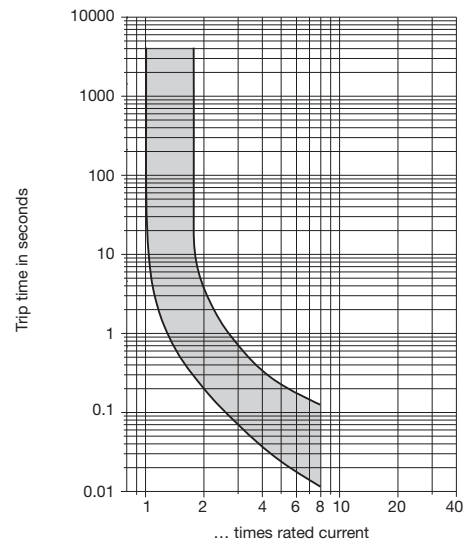
### 1410-G118-L2F1-B04-...



## Internal connection diagram



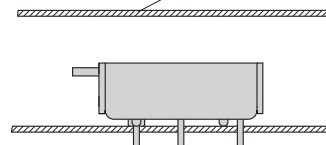
## Typical time/current characteristics at +23 °C/+73.4 °F



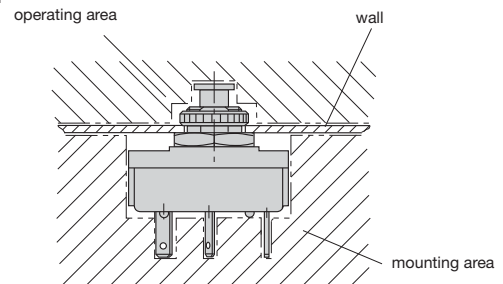
## Installation drawings

### 1410-L2..

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



### 1410-G...



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

Inch

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

## Description

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

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

## Typical applications

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

## Ordering information

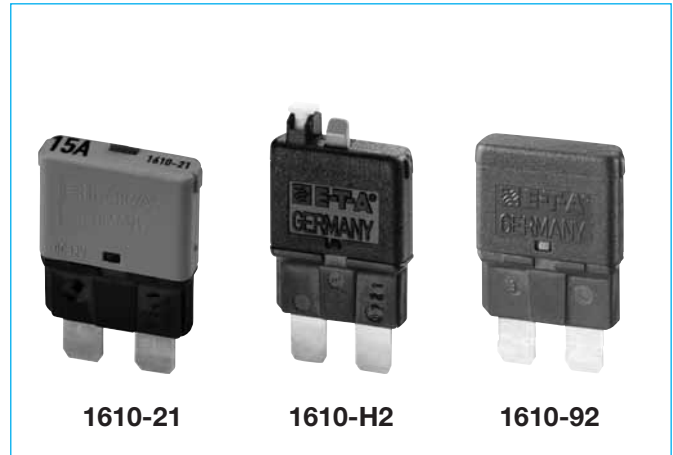
Type No.							
1610	single pole automotive circuit breaker						
<b>Voltage rating</b>							
21	DC 28 V						
H2	DC 28 V, with manual release facility (type III to SAE J 553)						
92	DC 12 V, autoreset (type I to SAE J 553)						
<b>Current ratings</b>							
5	6	8	10	15	20	25	30 A
1610 - 21 - 8 A		ordering example					

## Current ratings, typical voltage drop values and colour coding

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

## Homologations

Homologation	
UL 1500	Ignition Protected



## Technical data

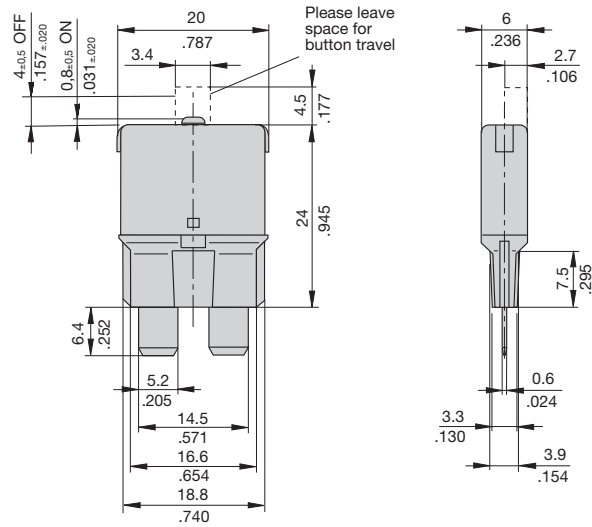
Voltage rating	1610-92: DC 12 V 1610-21/1610-H2: DC 32 V
Current ratings	5...30 A
Service short-circuit breaking capacity	300 operations at ≤ 50 A
Reset period for 1610-92 (at 23 °C)	≤ 15 s
Ambient temperature	-40...+85 °C (-40...+185 °F)
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 (-21/-H2) operating area IP54 (-92) terminal area IP00
Ultimate short-circuit breaking capacity	≥ 3 break operations at 150 A, or ≥ 1 break operation at 2,000 A
Vibration (with mounting socket 12)	10 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock (with mounting socket 12)	50 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Mass	approx. 5 g

### N.B.

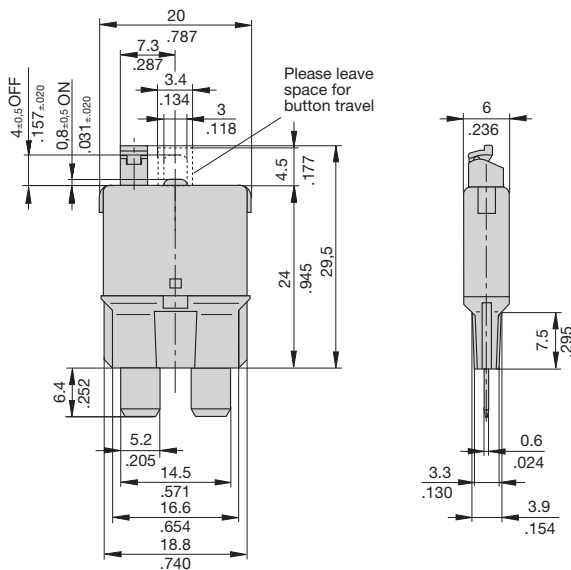
It is good practice to switch off the vehicle's ignition system before re-setting the circuit breaker. Free travel of the actuator must be ensured.

## Dimensions

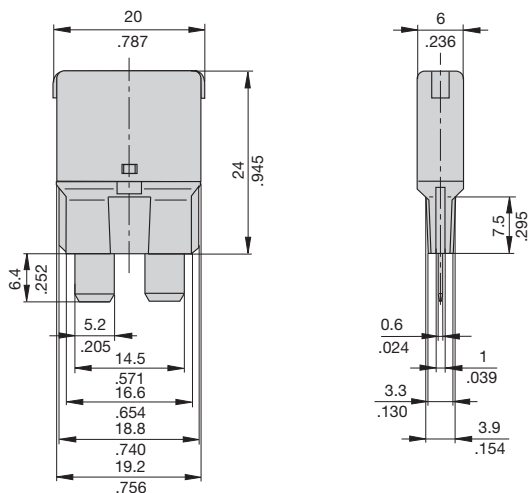
### 1610-21



### 1610-H2

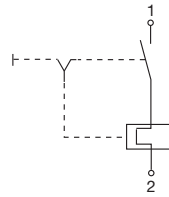


### 1610-92

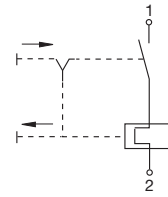


## Internal connection diagrams

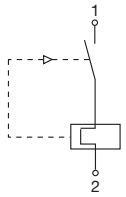
### 1610-21



### 1610-H2

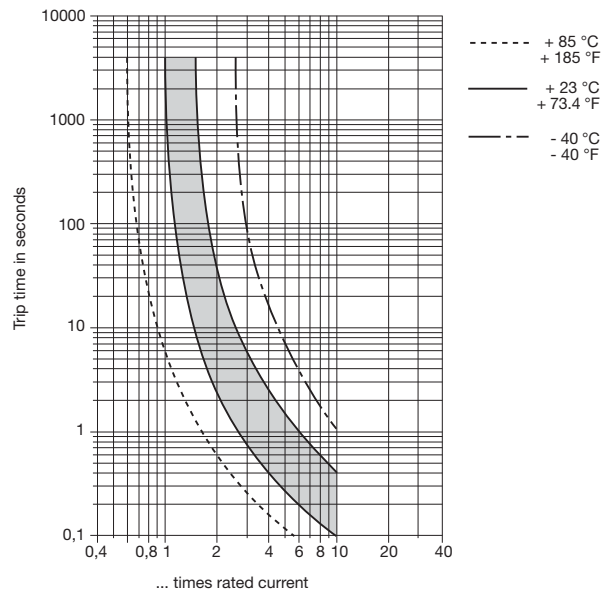


### 1610-92



## Typical time/current characteristic curve

### 5 ... 30 A



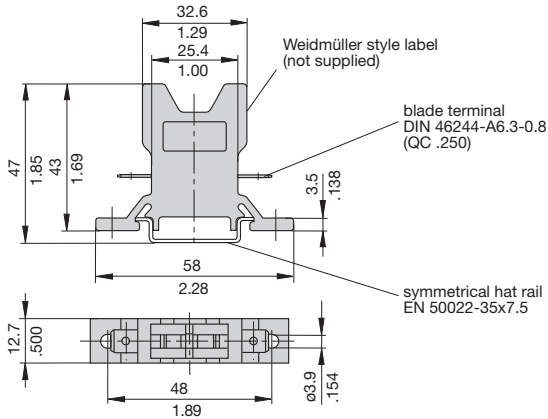
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature	°F	-40	-22	-4	+14	+32	+50
	°C	-40	-30	-20	-10	0	10
Derating factor		0,73	0,78	0,82	0,86	0,91	0,95
Ambient temperature	°F	+73.4	+104	+122	+140	+158	+185
	°C	23	40	50	60	70	85
Derating factor		1	1,09	1,16	1,25	1,33	1,43

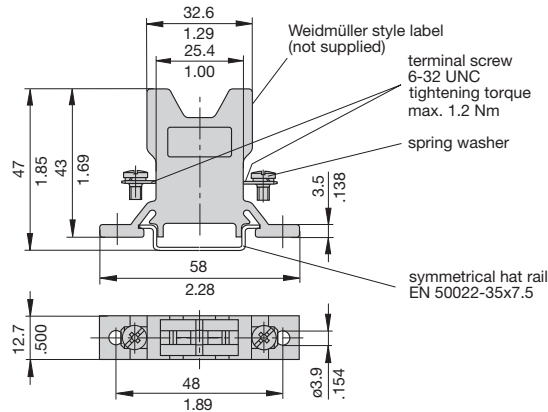
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories

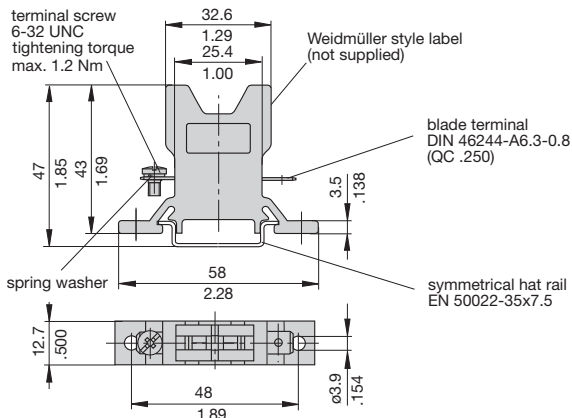
### Socket 12-P10



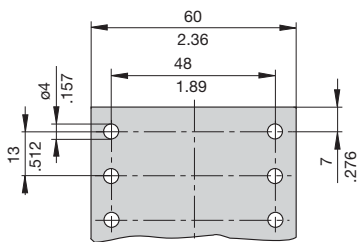
### Socket 12-J20



### Socket 12-A10



### Dimensions for surface mounting



### Other sockets available to special order

Labels: Weidmüller, D-33102 Paderborn

## Ordering information Mounting socket 12

### Type No.

12	Mounting socket
<b>Terminal design</b>	
P10	blade terminals A 6.3-0.8 (QC .250)
J20	screw terminals 6-32 UNC
A10	1 blade terminal A6.3-0.8 (QC .250) / 1 screw terminal 6-32 UNC

### Version

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

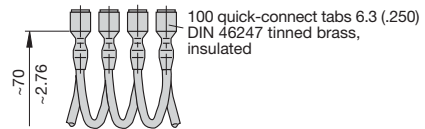
12 - P10 - 20 ordering example

Labels: Weidmüller, D-33102 Paderborn

## Accessories for mounting socket 12

### Connector bus links -P10

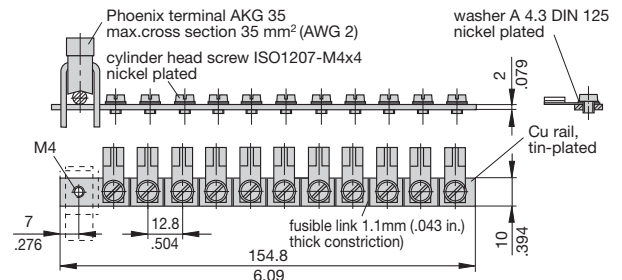
- X 210 588 01/ 1.5 mm<sup>2</sup> (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm<sup>2</sup> (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm<sup>2</sup> (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm<sup>2</sup> (AWG 14), blue (up to 20 A max. load)



### Bus bar (supplied as a complete package)

(up to 100 A max. load)

- X 211 157 01 with terminal
- X 211 157 02 without terminal



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

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

Very cost effective design to meet international requirements. No exposed metal parts which are, or could become, current-carrying except for terminals. R-type TO CBE to EN 60934.

- Manual reset, cycling trip free mechanism
- Extremely small and lightweight
- UL, CSA, VDE and EN 60934 (IEC 60934) approved

## Typical applications

Battery chargers, consumer products, power supplies, motors.

## Ordering information

### Type No.

**1658** single pole thermal circuit breaker

#### Threadneck design

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

#### Hardware

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

#### Terminals

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

#### Current ratings

**5...30 A**

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

\* Screws and lock washers bulk shipped

## Standard current ratings and typical voltage drop values

Current rating (A)	Voltage drop (mV)	Current rating (A)	Voltage drop (mV)
5	≤ 150	12	≤ 140
6	≤ 150	15	≤ 240
7	≤ 150	16	≤ 240
8	≤ 150	20	≤ 240
9	≤ 150	25	≤ 240
10	≤ 140	30	≤ 240

## Approvals

Authority	Voltage rating	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V	5...25 A
UL	AC 240 V	5...16 A 1658-G../F..
	AC 120 V	18...30 A 1658-G../F..
	AC 120 V	5...30 A 1658-A...
	DC 32 V	5...30 A 1658-G../F..
	DC 28 V	5...30 A 1658-A..



1658-...

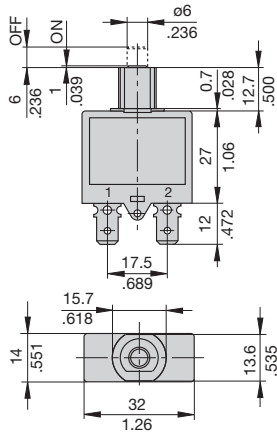
## Technical data

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

Voltage rating	AC 240 V; DC 28 V		
Current ratings	5...30 A		
Typical life	AC + DC	5...16 A	1,000 operations at 2 x I <sub>N</sub> , inductive
		17...25 A	1,000 operations at 2 x I <sub>N</sub> , resistive
Ambient temperature	-20...+60 °C (-4...+140 °F), ≤ 7 A max. +40 °C (+104 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	2.5 kV	pollution degree 2
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage	AC 3,000 V	
	> 100 MΩ (DC 500 V)		
Insulating capacity I <sub>cn</sub>	5...7 A	180 A	
	8...30 A	200 A	
Interrupting capacity (UL 1077/EN 60934 PC1)	I <sub>N</sub>	U <sub>N</sub>	
	5...16 A	AC 240 V	2,000 A
	18...30 A	AC 120 V	2,000 A
	5...30 A	DC 32 V	2,500 A
	5...30 A	DC 28 V	2,000 A (1658-A..)
Degree of protection (IEC 60529/DIN 40050)	operating area IP40		
	terminal area IP00		
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 16 g		



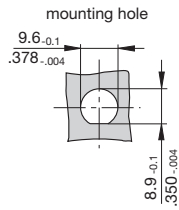
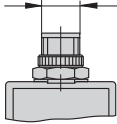
## Dimensions



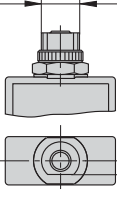
**A00**



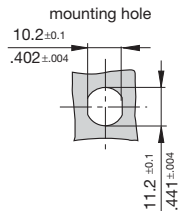
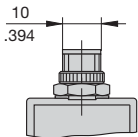
**A21** tightening torque max. 0.8 Nm  
3/8-27UNS-2A



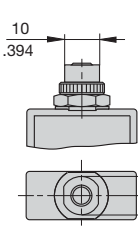
**G21** tightening torque max. 0.8 Nm  
3/8-27UNS-2A



**A41**

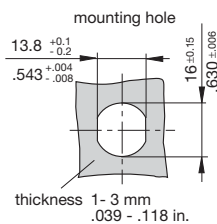
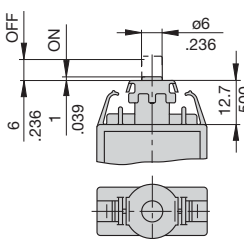


**G41**



7/16-28UNS-2A  
double "D"  
tightening torque max. 0.8 Nm

**F01**

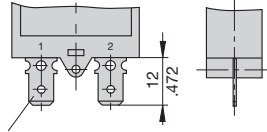


Caution:  
Please keep a tight grip on the unit  
while removing the female connectors.

See ordering information for mounting hardware.

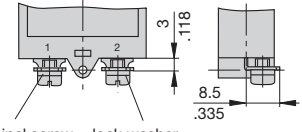
## Terminal design

**P10**



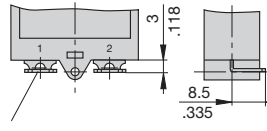
blade terminals DIN 46244-A6.3-0.8  
(QC .250)

**S83**



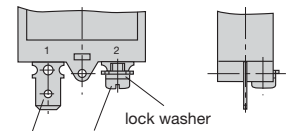
terminal screw lock washer  
6-32 UNC

**P13**



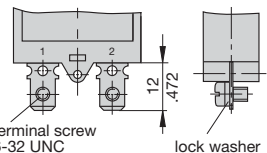
blade terminals DIN 46244-A6.3-0.8 (QC .250)  
angled 90°

**P10-S83**



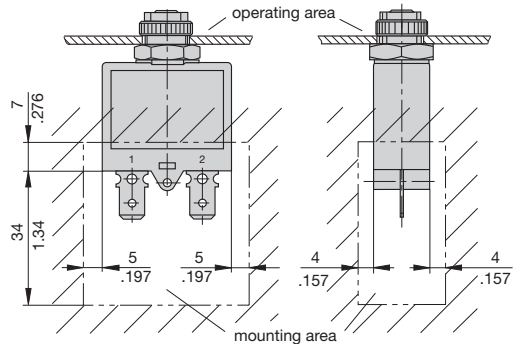
terminal screw lock washer  
6-32 UNC

**S80**



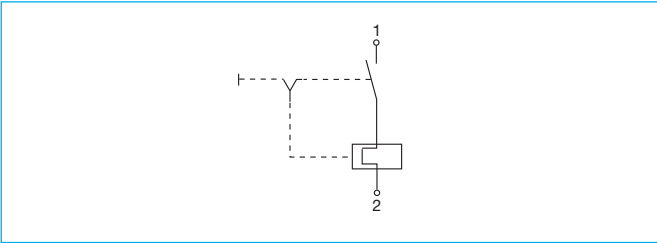
blade terminals  
DIN 46244-A6.3-0.8 (QC .250)

## Installation drawing

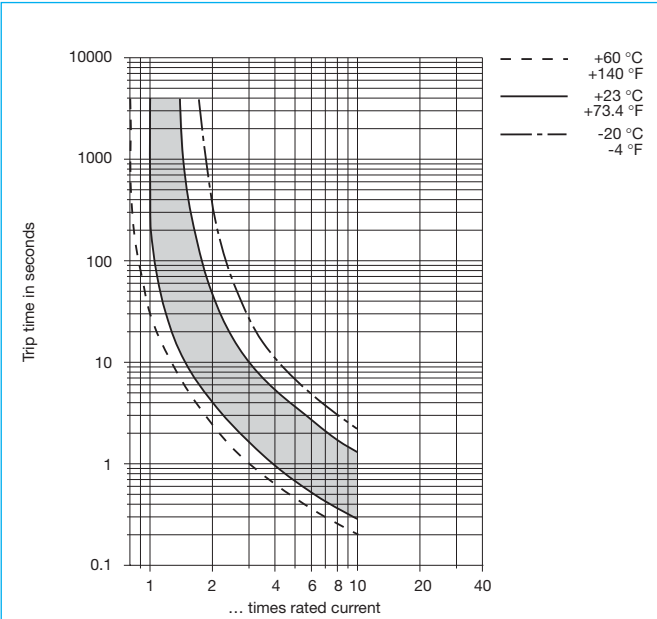


This is a metric design and millimeter dimensions take precedence (mm)  
inch

## Internal connection diagram



## Typical time/current characteristics

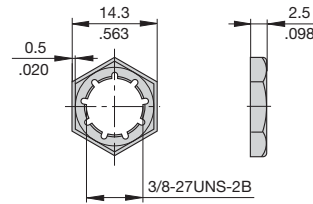


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

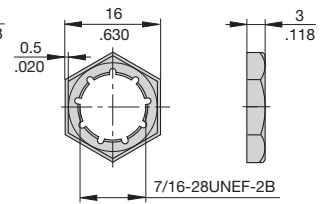
Ambient temperature °F	-4	+14	+32	+73.4	+104	+122	+140
°C	-20	-10	0	+23	+40	+50	+60
Derating factor $I_N > 7A$	0.83	0.85	0.9	1	1.1	1.18	1.25
Derating factor $I_N \leq 7A$	0.74	0.76	0.82	1	1.23	-	-

## Accessories

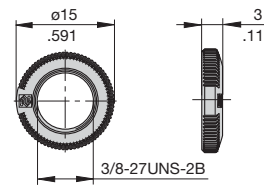
**Mounting nut 3/8", 27-thread**  
Y306 671 01



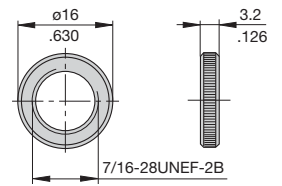
**Mounting nut 7/16", 28-thread**  
Y303 200 01



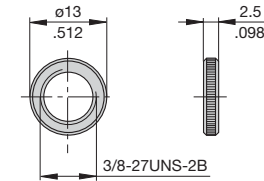
**Knurled nut 3/8", 27-thread plastic (standard)**  
Y307 117 02



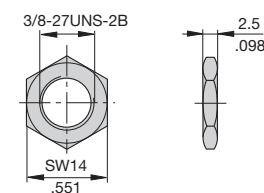
**Knurled nut 7/16", 28-thread nickel-plated brass**  
Y302 294 03



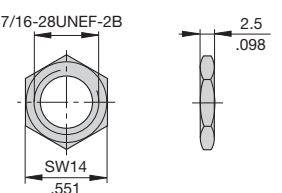
**Knurled nut 3/8", 27-thread nickel-plated brass**  
Y300 190 03



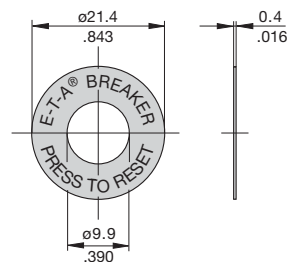
**Hex nut 3/8", 27-thread nickel-plated brass**  
Y300 192 01



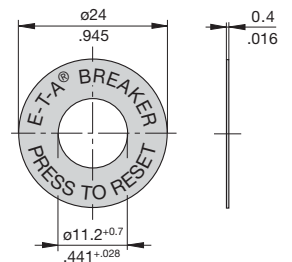
**Hex nut 7/16", 28-thread nickel-plated brass**  
Y302 295 01



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



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

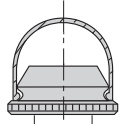


This is a metric design and millimeter dimensions take precedence (mm/inch)

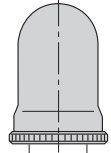
## Accessories

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

long  
X200 799 01



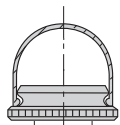
3/8-27 UNS-2B



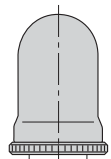
3/8-27 UNS-2B

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

long  
X222 119 02



7/16-28 UNS-2B



7/16-28 UNS-2B

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

## Description

An extremely versatile range of rocker switch/thermal circuit breakers (S-type TO CBE to EN 60934 with trip free mechanism) offering the choice of single pole, double pole with single pole protection, and double pole with protection on both poles. Designed for snap-in panel mounting with versions available for three different panel cut-out sizes. Illumination is optional and there is a range of colours and markings for the rocker. Under overload conditions the rocker returns to the OFF position. 6-way frame for 3120-F5 available upon request.

Any one of the following additional function modules can be supplied factory fitted to the rear of the switch/circuit breaker.

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

Approved to CBE standard EN 60934 (IEC 60934).

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

## Typical applications

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

## Standard current ratings and typical internal resistance values

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

## Illumination voltage/power consumption

operating voltage	power consumption		
	Y + R	G	T
6 V	2 mA	3.6 mA	4.9 mA
12 V	2 mA	3.5 mA	4.9 mA
24 V	2 mA	3.5 mA	4.9 mA
48 V	2 mA	3.5 mA	4.9 mA
115 V	0,9 mA	2.8 mA	2.2 mA
230 V	0,9 mA	2.8 mA	2.2 mA

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V DC 50 V DC 50 V	0.1...20 A 0.1...20 A 2-pole 0.1...10 A 1-pole
UL, CSA	AC 250 V; DC 50 V	0.1...20 A
CCC	AC 250 V; DC 50 V	0.1...20 A



3120-F...

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 50 V (AC 415 V to special order) (UL: AC 250 V; DC 50 V)		
Current ratings	0.1...20 A (up to 30 A to special order, single pole only)		
Typical life		<b>1-pole</b>	
AC 240 V:	0.1...20 A	30,000 operations at $1 \times I_N$ , inductive	
DC 50 V:	0.1...4 A	30,000 operations at $1 \times I_N$ , inductive	
	4.5...16 A	30,000 operations at $1 \times I_N$ , resistive	
DC 28 V:	4.5...20 A	30,000 operations at $1 \times I_N$ , inductive	
		<b>2-pole</b>	
AC 415 V:	0.1...16 A	10,000 operations at $1 \times I_N$ , inductive	
AC 240 V:	0.1...16 A	50,000 operations at $1 \times I_N$ , inductive	
	17...20 A	30,000 operations at $1 \times I_N$ , inductive	
DC 50 V:	0.1...16 A	50,000 operations at $1 \times I_N$ , inductive	
	17...20 A	10,000 operations at $1 \times I_N$ , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
operating area	AC 3,000 V		
between poles (2-pole)	AC 1,500 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity $I_{cn}$	0.1...2 A	$10 \times I_N$	
	2.5...20 A	250 A 2-pole, or 150 A 1-pole	
Interrupting capacity (UL 1077)	$I_N$	$U_N$	2-pole
	0.1...2 A	AC 250 V	200 A
	2.5...3 A	AC 250 V	1,000 A
	3.5...8 A	AC 250 V	2,000 A
	9...16 A	AC 250 V	3,500 A
	18...20 A	AC 250 V	5,000 A
	0.1...20 A	DC 50 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 (IP54 with water splash protection) terminal area IP00		
Vibration	8 g (57-500 Hz), ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 33 g (double pole) approx. 27 g (single pole)		

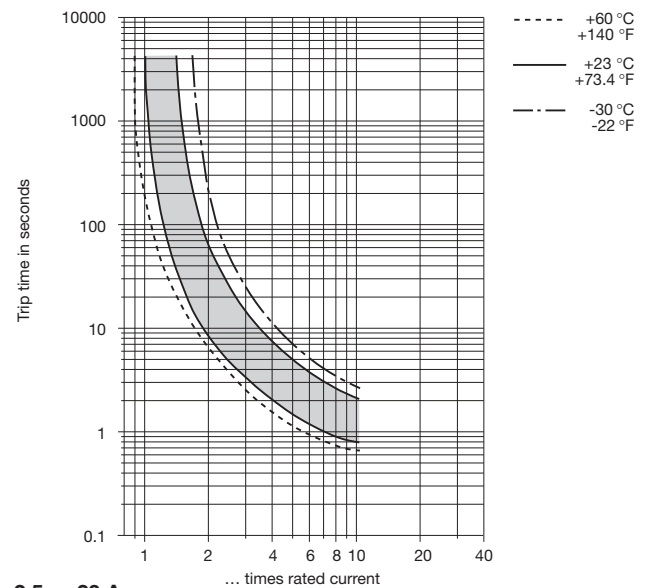
## Ordering information

<b>Type No.</b>																																																			
3120	rocker switch/circuit breaker																																																		
<b>Mounting</b>																																																			
<b>F</b> snap in frame																																																			
<b>Size of frame</b> <span style="float:right"><b>panel thickness</b></span>																																																			
3	to fit mounting cut-out 50.5 x 21.5 mm 1-6.35 mm (.039-.250 in)																																																		
5	to fit mounting cut-out 44.5 x 22 mm 1-4 mm (.039-.157 in)																																																		
6	to fit mounting cut-out 45 x 33.7 mm 1.2-2.4 mm (.047-.094 in)																																																		
<b>Number of poles</b>																																																			
0	2-pole, unprotected, switch only																																																		
1	1-pole, thermally protected																																																		
2	2-pole, thermally protected																																																		
5	2-pole, thermally protected on one pole only (terminals 11,12k,12i)																																																		
6	1-pole, unprotected, switch only																																																		
<b>Mounting frame design</b>																																																			
1	collar height 1 mm																																																		
3	collar height 9 mm																																																		
4	collar height 2 mm with water splash protection (IP54), not with -F6...																																																		
<b>U</b> with water splash protection and actuator guard																																																			
<b>Terminal configuration</b>																																																			
<b>P7</b>	blade terminals 2x2.8x0.8 mm (QC 2x.110) (terminals 12(k), 22(k), 11, 21), not for under voltage module, not for switch																																																		
<b>H7</b>	12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws, not for switch																																																		
<b>N7</b>	as P7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110) not for under voltage module																																																		
<b>G7</b>	as H7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110)																																																		
<b>Characteristic curve</b>																																																			
<b>T1</b>	thermal, 1.01-1.4 x I <sub>N</sub>																																																		
<b>Q1</b>	switch only																																																		
<b>Actuator style</b>																																																			
<b>W</b>	rocker																																																		
<b>U</b> momentary switch																																																			
<b>Switch colour designation</b>																																																			
opaque	translucent (for illuminated versions)																																																		
<b>01</b> black	<b>12</b> white																																																		
<b>02</b> white	<b>14</b> red																																																		
<b>04</b> red	<b>15</b> orange																																																		
	<b>16</b> sky blue																																																		
	<b>19</b> green																																																		
<b>Rocker markings</b>																																																			
A	<table border="1" style="margin-left: 20px;"> <tr><td>0</td><td>AUS</td><td>OFF</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td>I</td><td>EIN</td><td>ON</td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td>0</td><td>AUS</td><td>OFF</td><td></td><td></td><td></td><td></td></tr> <tr><td>I</td><td>EIN</td><td>ON</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td><td>X</td><td></td><td></td><td></td></tr> </table>	0	AUS	OFF											I	EIN	ON								0	AUS	OFF					I	EIN	ON								A	B	C	D	E	F	X			
0		AUS	OFF																																																
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X = without marking																																																			
<b>Rocker illumination (optional)</b>																																																			
<b>G</b>	green LED																																																		
<b>Y</b>	yellow LED																																																		
<b>R</b>	red LED																																																		
<b>T</b>	blue LED																																																		
<b>Illumination voltage range</b>																																																			
<b>0</b>	0 - 4 V AC/DC																																																		
<b>1</b>	10 - 14 V AC/DC																																																		
<b>2</b>	20 - 28 V AC/DC																																																		
<b>3</b>	90 - 140 V AC																																																		
<b>4</b>	185 - 275 V AC																																																		
<b>5</b>	42 - 54 V AC/DC																																																		
<b>Current ratings</b>																																																			
<b>0.1...20 A</b>																																																			
3120 - F 3 2 1 - N7 T1 - W 14 A R 4 - 10 A ordering example																																																			
3120 - F . 0 . . - N7 Q1 - W .. . . . - 20 A (switch only)																																																			

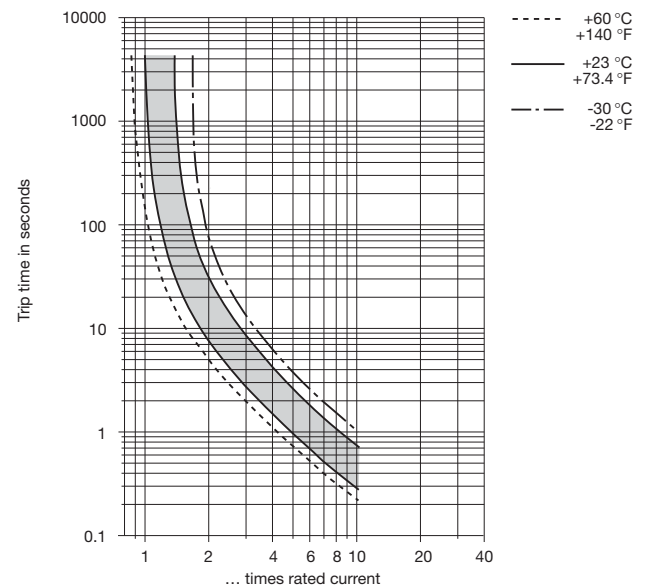
## Typical time/current characteristics

single or double pole load

0.1 ... 2 A



2.5 ... 20 A



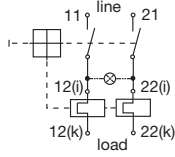
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

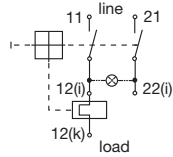
**N.B.**  
Switch only versions must be specified with -N7 or -G7 terminals.  
Terminals 12(k) and 22(k) are not fitted.

## Internal connection diagrams

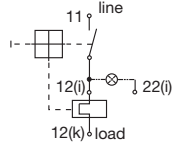
**2-pole, thermally protected on both poles**



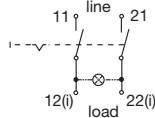
**2-pole, thermally protected on one pole only**



**1-pole, thermally protected**

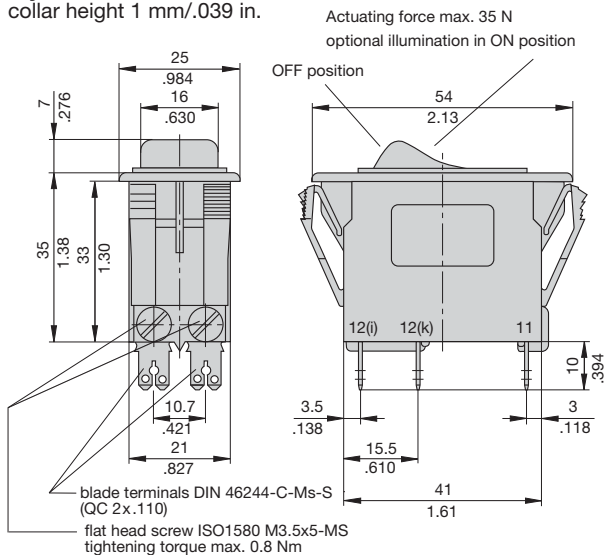


**2-pole, unprotected**

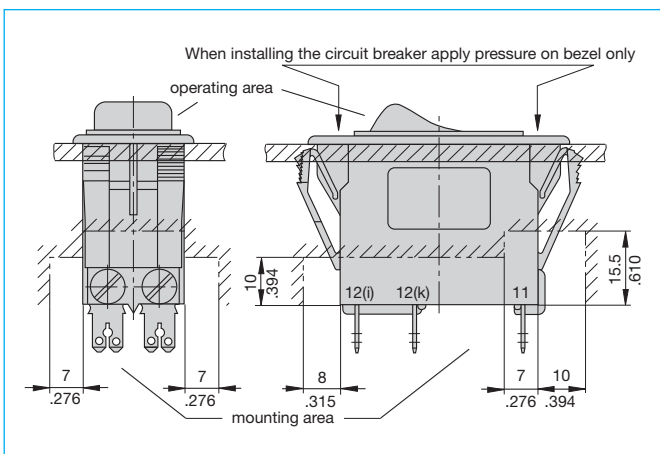


## Dimensions

**Style F3.1**  
collar height 1 mm/.039 in.



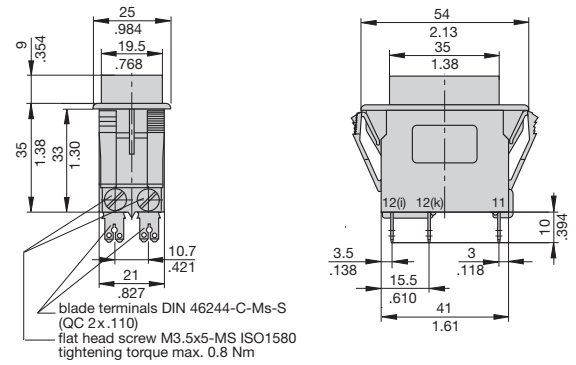
## Installation drawing



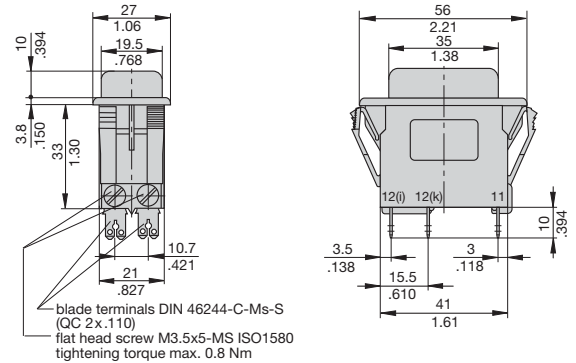
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Mounting style variants

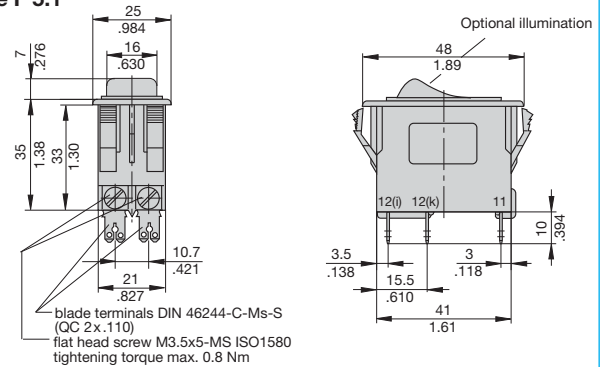
**Style F 3.3** collar height 9 mm (.354 in.)



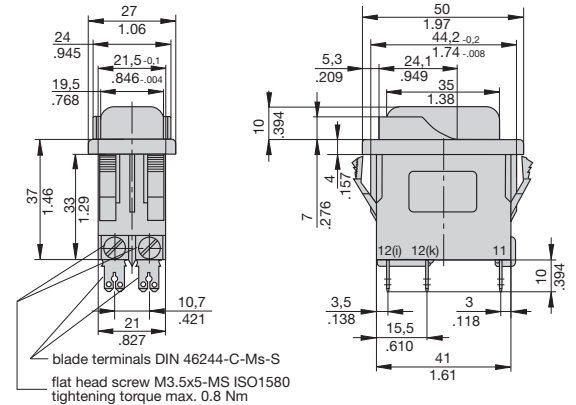
**Style F 3.4**  
collar height 2 mm (.079 in.), with water splash protection



**Style F 5.1**



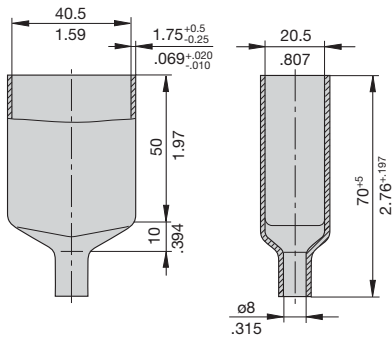
**Style F 5.U**  
with water splash protection (IP54) and actuator guard



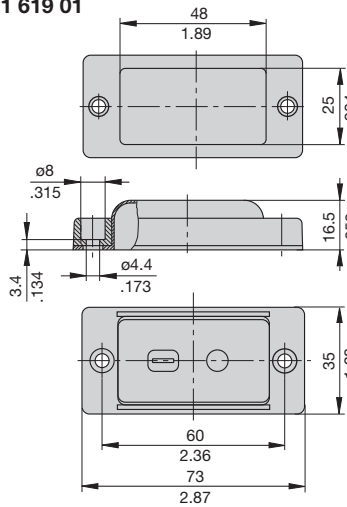
Dimension diagram for style F6 is available on request.

## Accessories

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

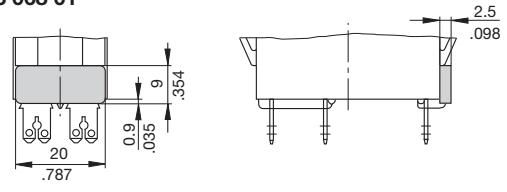


### Water splash cover, transparent (IP66) for style -F5.. X 221 619 01

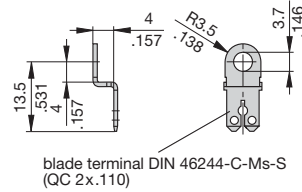


### 6-way frame for 3120-F5... upon request

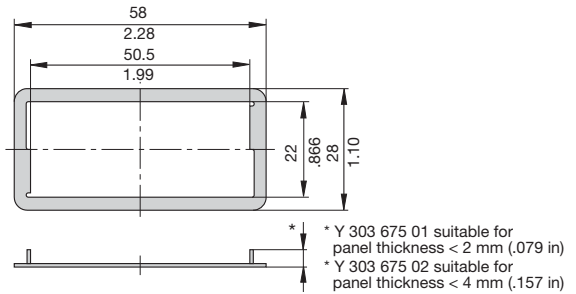
### Insulated cover Y 303 068 01



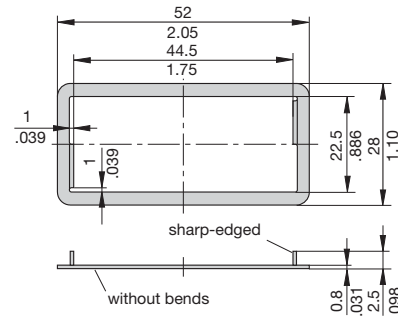
### Terminal adapter Y 303 862 01



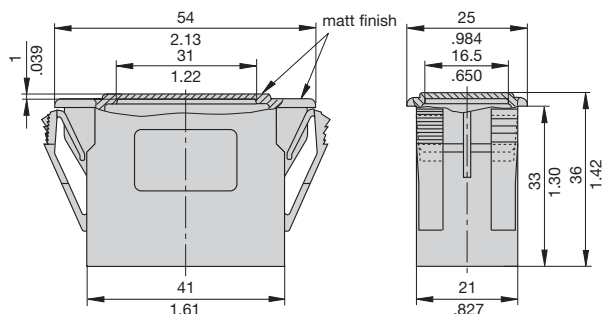
### Spacer for 3120-F3... Y 303 675 01/02



### Spacer for 3120-F5... Y 303 676 01

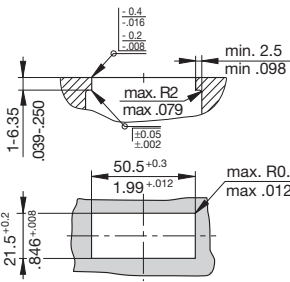


### Blanking piece in -F3 frame Y 303 885 31

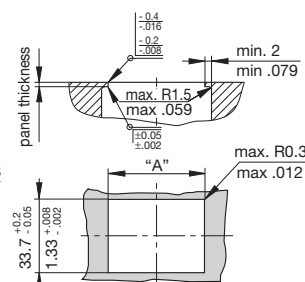


## Cut-out dimensions

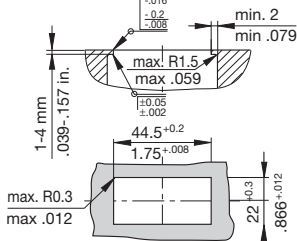
### Cut-out for mounting style -F3 with rocker and push button



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



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



panel thickness	mm	1.2 <sup>+0.4</sup>	1.6 <sup>+0.8</sup>	2.4 <sup>+1</sup>
	inch	.047 <sup>±0.016</sup>	.063 <sup>±0.031</sup>	.094 <sup>±0.039</sup>
dimension	mm	45 <sup>+0.2/-0.05</sup>	45 <sup>+1.1/-0.05</sup>	45 <sup>+2.2/-0.05</sup>
"A"	inch	1.77 <sup>+0.008/-0.002</sup>	1.77 <sup>+0.043/-0.002</sup>	1.77 <sup>+0.087/-0.002</sup>

Edges of working parts: ISO 13715

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

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

## Description

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

Any one of the following additional function modules can be supplied factory fitted to the rear of the switch/circuit breaker.

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

Approved to CBE standard EN 60934 (IEC 60934).

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

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

## Typical applications

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

## Standard current ratings and typical internal resistance values

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

## Illumination voltage/power consumption

operating voltage	power consumption LED
6 V	4.9 mA
12 V	4.9 mA
24 V	4.9 mA
48 V	4.9 mA
115 V	2.2 mA
230 V	2.2 mA

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V DC 50 V DC 50 V	0.1...20 A 0.1...20 A 2-pole 0.1...10 A 1-pole
UL, CSA	AC 250 V; DC 50 V	0.1...20 A
CCC	AC 250 V; DC 50 V	0.1...20 A



3120-F7..

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 50 V (AC 415 V to special order) (UL: AC 250 V; DC 50 V)		
Current ratings	0.1...20 A (up to 30 A to special order, single pole only)		
Typical life	<b>1-pole</b> AC 240 V: 0.1...20 A 30,000 operations at 1 x I <sub>N</sub> , inductive DC 50 V: 0.1...4 A 30,000 operations at 1 x I <sub>N</sub> , inductive 4.5...16 A 30,000 operations at 1 x I <sub>N</sub> , resistive DC 28 V: 4.5...20 A 30,000 operations at 1 x I <sub>N</sub> , inductive <b>2-pole</b> AC 415 V: 0.1...16 A 10,000 operations at 1 x I <sub>N</sub> , inductive AC 240 V: 0.1...16 A 50,000 operations at 1 x I <sub>N</sub> , inductive 17...20 A 30,000 operations at 1 x I <sub>N</sub> , inductive DC 50 V: 0.1...16 A 50,000 operations at 1 x I <sub>N</sub> , inductive 17...20 A 10,000 operations at 1 x I <sub>N</sub> , inductive		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area between poles (2-pole)	AC 3,000 V AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.1...2 A 10 x I <sub>N</sub> 2.5...20 A 250 A 2-pole, or 150 A 1-pole		
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	2-pole
	0.1...2 A	AC 250 V	200 A
	2.5...3 A	AC 250 V	1,000 A
	3.5...8 A	AC 250 V	2,000 A
	9...6 A	AC 250 V	3,500 A
	18...20 A	AC 250 V	5,000 A
	0.1...20 A	DC 50 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 (IP54 with water splash protection) terminal area IP00		
Vibration	8 g (57-500 Hz), ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 33 g (double pole) approx. 27 g (single pole)		



## Ordering information

<b>Type No.</b>	
3120	rocker switch/circuit breaker
<b>Mounting</b>	
<b>F</b> snap in frame	
<b>Size of frame</b> <span style="float:right">panel thickness</span>	
7	to fit mounting cut-out 44.5x22 mm (1.75x.866 in) 1-4 mm (.039-.157 in)
<b>Number of poles</b>	
0	2-pole, unprotected, switch only
1	1-pole, thermally protected
2	2-pole, thermally protected
5	2-pole, thermally protected on one pole only (terminals 11,12k,12l)
6	1-pole, unprotected, switch only
<b>Mounting frame design</b>	
<b>N</b>	grey frame
<b>P</b>	snap-on actuator guard grey
<b>Q</b>	snap-on water splash cover grey
<b>R</b>	black frame
<b>S</b>	snap-on actuator guard black
<b>T</b>	snap-on water splash cover black
<b>Terminal configuration</b>	
<b>P7</b>	blade terminals 2x2.8x0.8 mm (QC 2x.110) (terminals 12(k), 22(k), 11, 21), not for under voltage module, not for switch
<b>H7</b>	12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws, not for switch
<b>N7</b>	as P7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110) not for under voltage module
<b>G7</b>	as H7, but including shunt terminals 12(i) and 22(i) as blade terminals 2x2.8x0.8 mm (QC 2x.110)
<b>Characteristic curve</b>	
<b>T1</b>	thermal, $1.01-1.4 \times I_N$
<b>Q1</b>	switch only
<b>Actuator style</b>	
<b>A</b>	rocker
<b>Switch colour designation</b>	
opaque                      translucent	
<b>20</b>	blue <b>30</b> blue
<b>26</b>	sky blue <b>36</b> sky blue
<b>Rocker markings</b>	
<b>Q</b>	"I" and "0" moulded in
<b>Push button illumination (optional)</b>	
<b>T</b>	blue LED
<b>Illumination voltage range (optional)</b>	
<b>0</b>	4 - 7 V
<b>1</b>	10 - 14 V
<b>2</b>	20 - 28 V
<b>3</b>	90 - 140 V
<b>4</b>	185 - 275 V
<b>5</b>	42 - 54 V AC/DC
<b>Current ratings</b>	
<b>0.1...20 A</b>	
3120 - F 7 2 N - N7 T1 - A 30 Q T 4 - 10 A ordering example	
3120 - F . 0 N - N7 Q1 - A 30 Q T 4 - 20 A (switch only)	

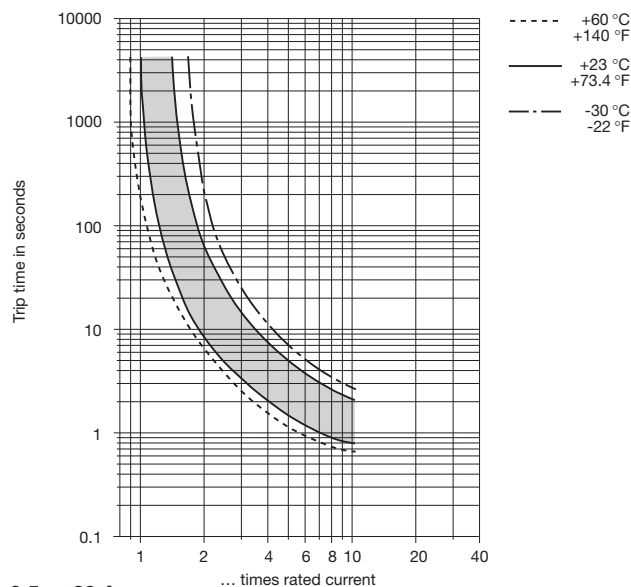
### N.B.

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

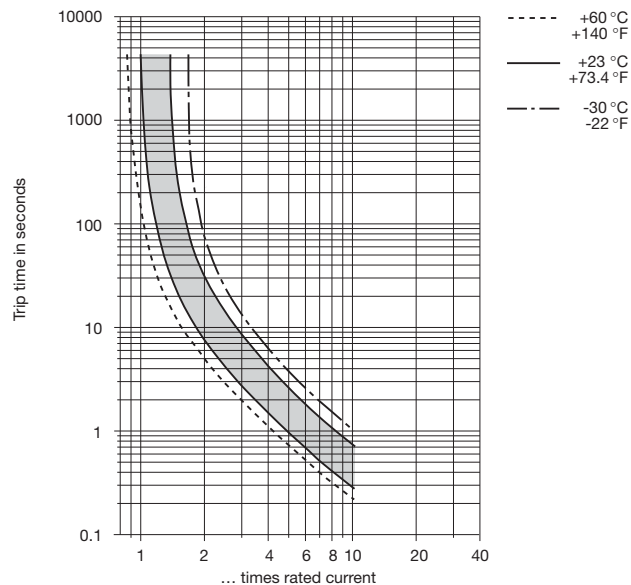
## Typical time/current characteristics

single or double pole load

### 0.1 ... 2 A



### 2.5 ... 20 A

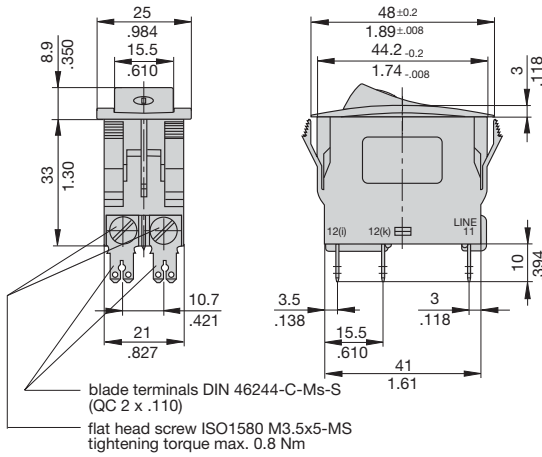


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

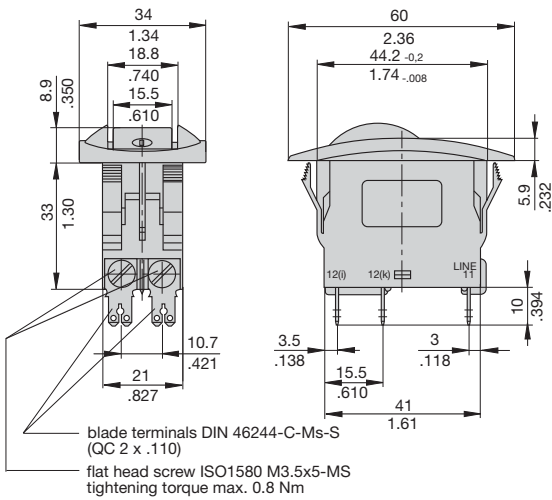
Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

## Dimensions

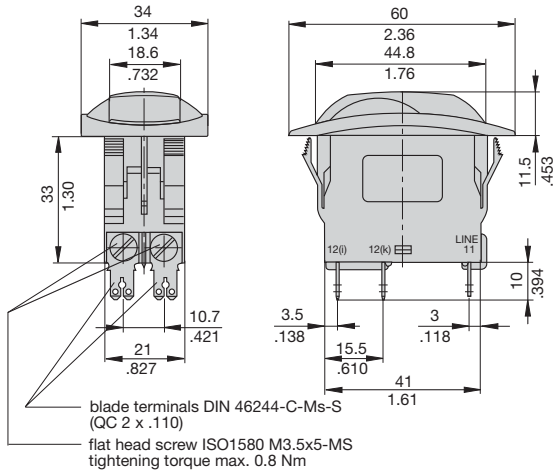
### Style -F7.N and F7.R



### Style -F7.P and F7.S

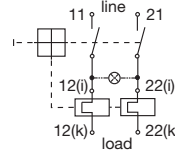


### Style -F7.Q and F7.T

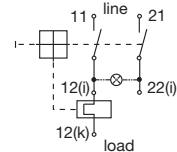


## Internal connection diagrams

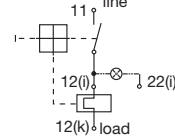
### 2-pole, thermally protected on both poles



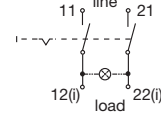
### 2-pole, thermally protected on one pole only



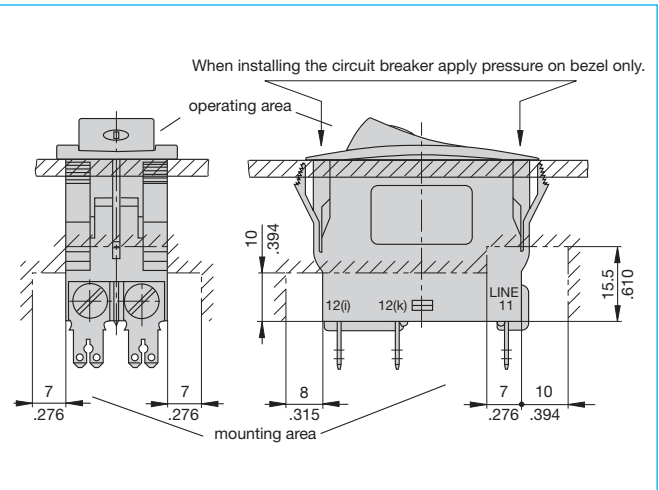
### 1-pole, thermally protected



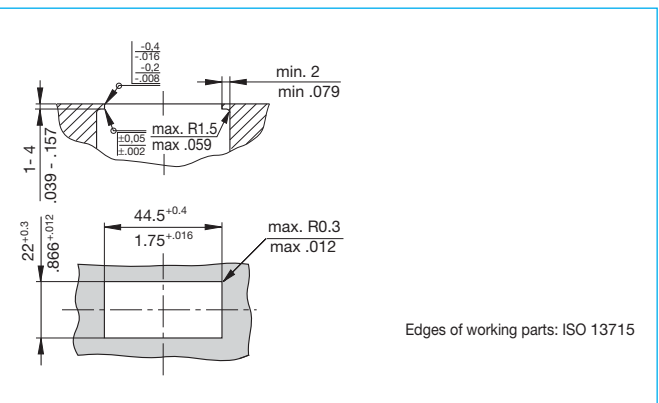
### 2-pole, unprotected



## Installation drawing



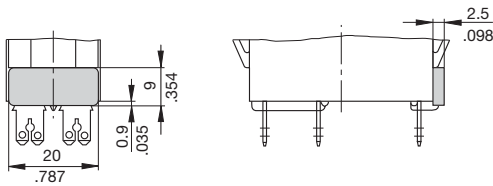
## Panel cut-out



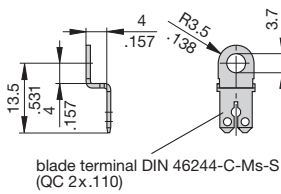
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories

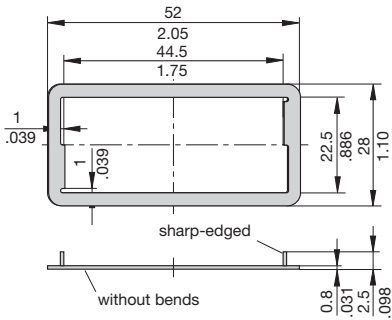
### Insulated cover Y 303 068 01



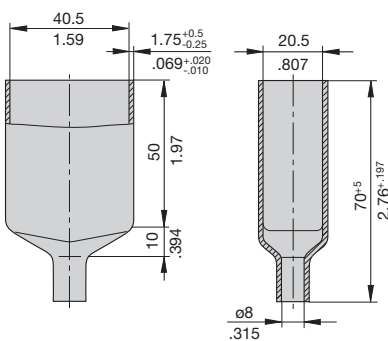
### Terminal adapter Y 303 862 01



### Spacer Y 303 676 01



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

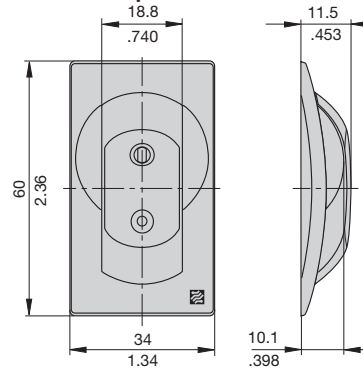


### Translucent water splash cover (IP54)

#### X 222 143 01

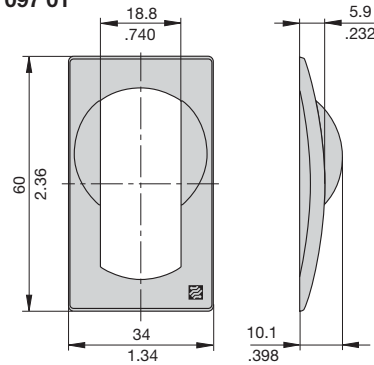
#### Consisting of

- Y 307 097 01 snap-on frame with actuator guard
- Y 307 096 01 soft plastic cover



### Snap-on frame with actuator guard (can be snapped on as switch-on protection or switch-off protection)

#### Y 307 097 01



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

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

Switch/thermal trip free circuit breaker (S-type TO CBE to EN 60934) with standard isolator style two button operation. Single button press-to-reset version also available. Both types can be supplied in single pole configuration only, in double pole with single pole protection, and in double pole with protection on both poles. Designed for snap-in panel mounting. There is a choice of push button colour combinations and illumination is optional.

Any one of the following additional function modules can be supplied factory fitted to the rear of the switch/circuit breaker:

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

Approved to CBE standard EN 60934 (IEC 60934).

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

## Typical applications

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

## Standard current ratings and typical internal resistance values

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

## Illumination voltage/power consumption

operating voltage	power consumption	
	Y + R	G
6 V	2 mA	3.6 mA
12 V	2 mA	3.5 mA
24 V	2 mA	3.5 mA
48 V	2 mA	3.5 mA
115 V	0.9 mA	2.8 mA
230 V	0.9 mA	2.8 mA

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V DC 50 V DC 50 V	0.1...20 A 0.1...20 A 2-pole 0.1...10 A 1-pole
UL, CSA	AC 250 V; DC 50 V	0.1...20 A
CCC	AC 250 V; DC 50 V	0.1...20 A



3120-F...

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 50 V (AC 415 V to special order) (UL: AC 250 V; DC 50 V)		
Current ratings	0.1...20 A (up to 30 A to special order, single pole only)		
Typical life		<b>1-pole</b>	
AC 240 V:	0.1...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V:	0.1...4 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
	4.5...16 A	30,000 operations at 1 x I <sub>N</sub> , resistive	
DC 28 V:	4.5...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
		<b>2-pole</b>	
AC 415 V:	0.1...16 A	10,000 operations at 1 x I <sub>N</sub> , inductive	
AC 240 V:	0.1...16 A	50,000 operations at 1 x I <sub>N</sub> , inductive	
	17...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V:	0.1...16 A	50,000 operations at 1 x I <sub>N</sub> , inductive	
	17...20 A	10,000 operations at 1 x I <sub>N</sub> , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area	AC 3,000 V	
	between poles (2-pole)	AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.1...2 A	10 x I <sub>N</sub>	
	2.5...20 A	250 A 2-pole, or 150 A 1-pole	
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	2-pole
	0.1...2 A	AC 250 V	200 A
	2.5...3 A	AC 250 V	1,000 A
	3.5...8 A	AC 250 V	2,000 A
	9...16 A	AC 250 V	3,500 A
	18...20 A	AC 250 V	5,000 A
	0.1...20 A	DC 50 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00		
Vibration	8 g (57-500 Hz), ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 33 g (double pole) approx. 27 g (single pole)		

## Ordering information

### Type No.

3120 push button switch/circuit breaker

### Mounting

F snap in frame

### Size of frame

2 flange mounting, special frame for fitting splash cover

3 to fit mounting cut-out 50.5 x 21.5 mm (1.99 x 8.47 in)  
panel thickness 1 - 6.35 mm (.039 - .250 in)

### Number of poles

0 2-pole, unprotected, switch only

1 1-pole, thermally protected

2 2-pole, thermally protected

5 2-pole, thermally protected on one pole only (terminals 11,12k,12i)

6 1-pole, unprotected, switch only

### Mounting frame design

F with 2 push buttons

G with 1 push button (switch-on only)

### Terminal configuration

P7 blade terminals 2x2.8x0.8 mm (QC 2x.110)  
(terminals 12(k), 22(k), 11, 21), not for under voltage module, not for switch

H7 12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110)  
11, 21: terminal screws, not for switch

N7 as P7, but including shunt terminals 12(i) and 22(i)  
as blade terminals 2x2.8x0.8 mm (QC 2x.110)  
not for under voltage module

G7 as H7, but including shunt terminals 12(i) and 22(i)  
as blade terminals 2x2.8x0.8 mm (QC 2x.110)

### Characteristic curve

T1 thermal, 1.01-1.4 I<sub>N</sub>

Q1 switch only, only for N7 or G7 terminals

### Switch style/colour

D 1 push button (re-set only)

Z 1 push button (momentary switch)

01X black

04X red

12X white translucent

19X green translucent

S 2 push buttons on/off

GRX green translucent/red

WRX white translucent/red

WBX white translucent/black

### Push button illumination (optional)

G green LED, AC/DC

Y yellow LED, AC/DC

R red LED, AC/DC

### Illumination voltage range (optional)

0 0 - 4 V AC/DC

1 10 - 14 V AC/DC

2 20 - 28 V AC/DC

3 90 - 140 V AC

4 185 - 275 V AC

5 42 - 54 V AC/DC

### Current ratings

0.1...20 A

3120 - F 3 2 F - N7 T1 - S GRX G 4 - 10 A ordering example

3120 - F 3 0 F - N7 Q1 - S ... . . - 20 A switch only

### N.B.

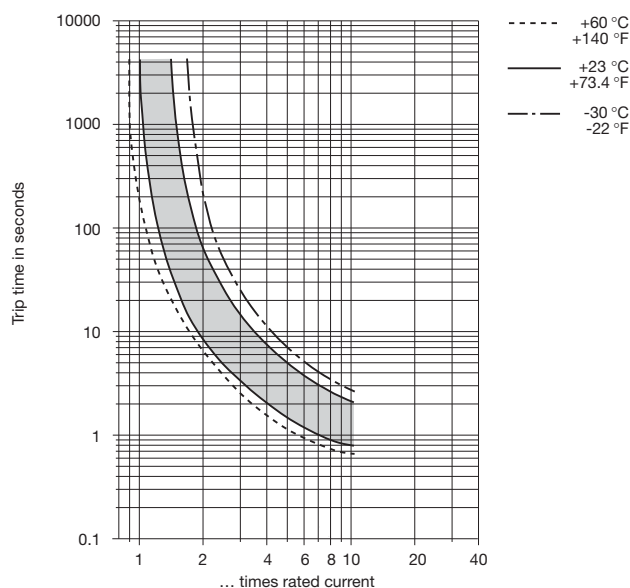
Switch only versions must be specified with -N7 or -G7 terminals.

Terminals 12(k) and 22 (k) are not fitted.

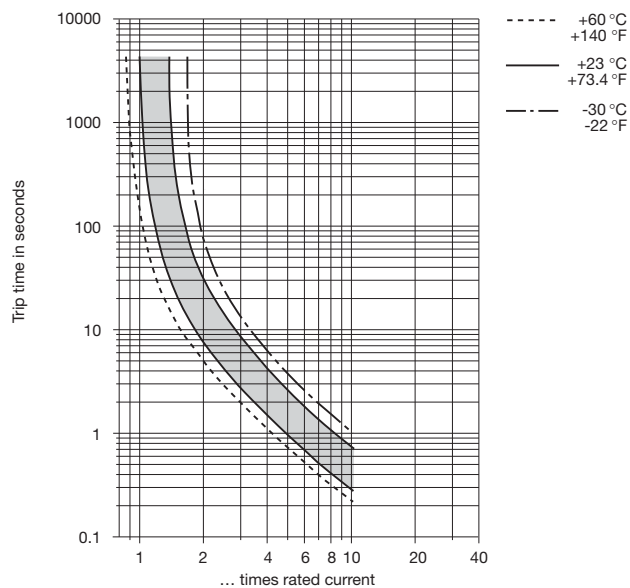
## Typical time/current characteristics

single or double pole load

### 0.1 ... 2 A



### 2.5 ... 20 A

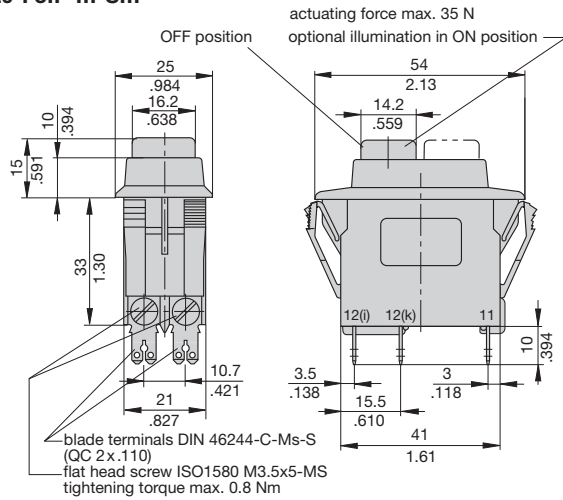


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

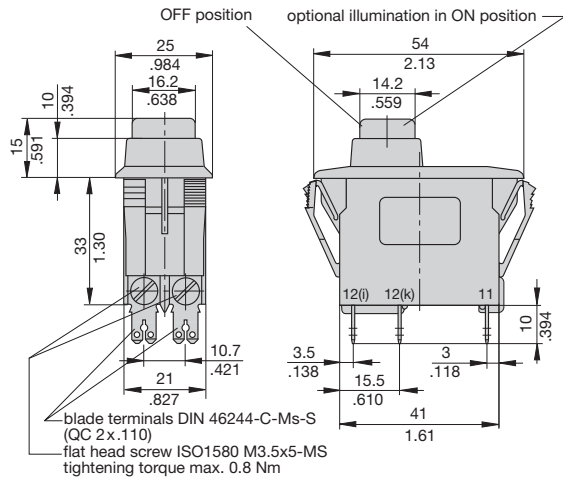
Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

## Dimensions

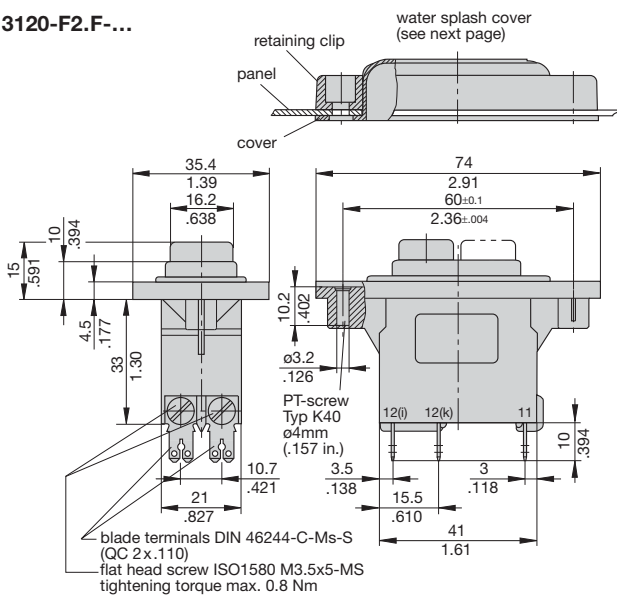
### 3120-F3.F-...-S...



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

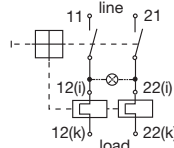


### 3120-F2.F-...

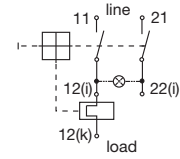


## Internal connection diagrams

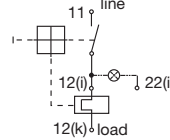
### 2-pole, thermally protected on both poles



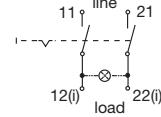
### 2-pole, thermally protected on one pole only



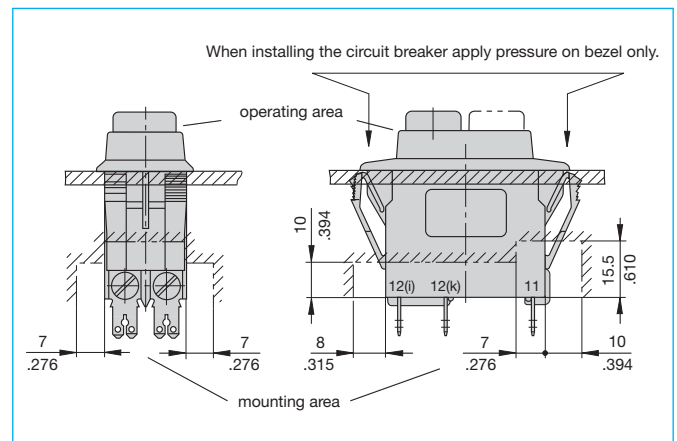
### 1-pole, thermally protected



### 2-pole, unprotected

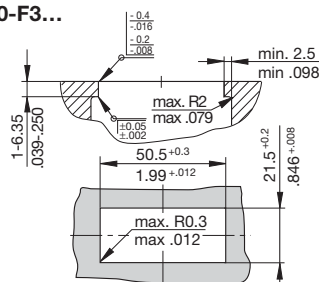


## Installation drawing

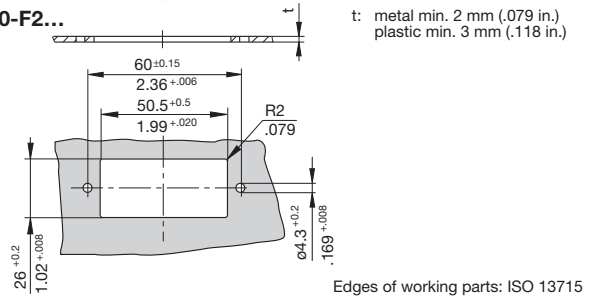


## Panel cut-out

### 3120-F3...



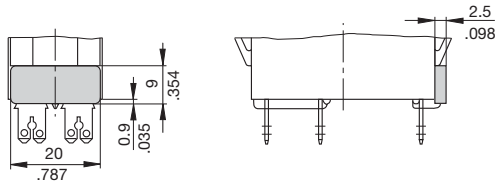
### 3120-F2...



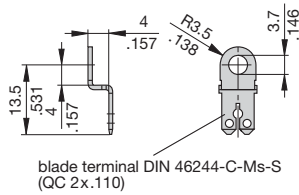
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Accessories

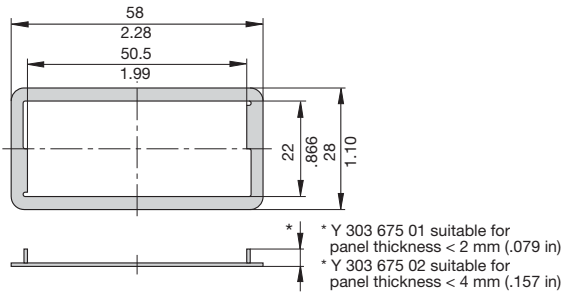
### Insulated cover Y 303 068 01



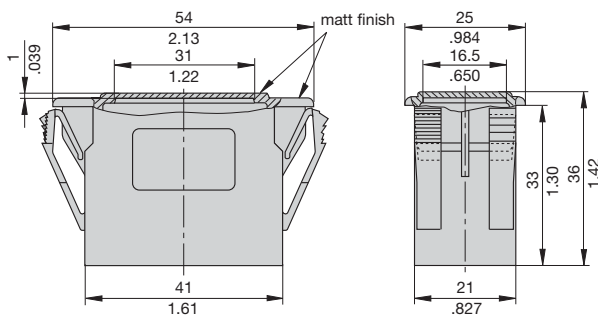
### Terminal adapter Y 303 862 01



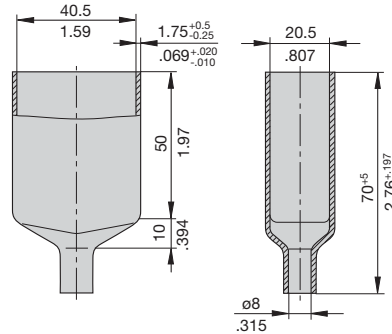
### Spacer for 3120-F3... Y 303 675 01/02



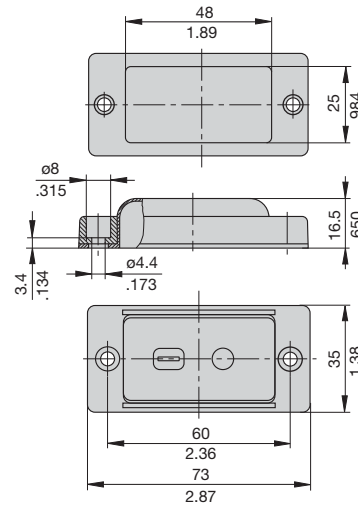
### Blanking piece in -F3 frame Y 303 885 31



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



### Water splash cover, transparent (IP66) for style 3120-F2.F-... X 221 619 01 consisting of - retaining clip Y 306 551 01 - cover Y 306 001 01



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

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

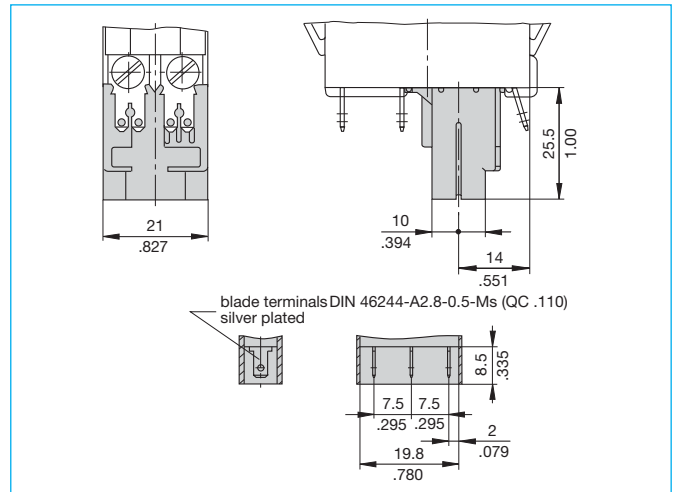
## Typical applications

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

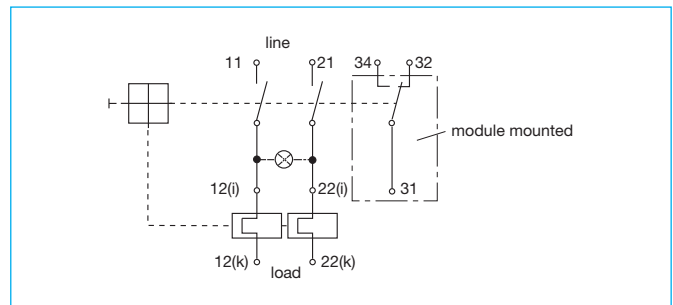
## Ordering information

<b>Type No.</b>																									
<b>X3120</b>	Module for type 3120 and type 3140																								
<b>Function</b>																									
<b>S</b>	auxiliary contact module																								
<b>Contact configuration</b>																									
<b>0</b>	change-over contact																								
<b>Terminal design</b>																									
<b>1</b>	blade terminals 2.8 x 0.5 (QC .110), silver plated																								
<b>Contact rating</b>																									
	<table border="1"> <thead> <tr> <th colspan="2">AC</th> <th colspan="2">DC (not approved)</th> </tr> <tr> <th>Voltage rating</th> <th>Current rating</th> <th>Voltage rating</th> <th>Current rating</th> </tr> </thead> <tbody> <tr> <td rowspan="4"><b>A</b> 10 V-250 V</td> <td rowspan="4">0.1...4 A</td> <td>12 V</td> <td>0.1...4 A</td> </tr> <tr> <td>24 V</td> <td>0.1...4 A</td> </tr> <tr> <td>60 V</td> <td>0.1...1 A</td> </tr> <tr> <td>110 V</td> <td>0.1...0.5 A</td> </tr> <tr> <td rowspan="2"><b>B</b> 5 V-250 V</td> <td rowspan="2">0.05...1 A</td> <td>220 V</td> <td>0.1...0.25 A</td> </tr> <tr> <td>5 V-250 V</td> <td>0.05...1 A</td> </tr> </tbody> </table>	AC		DC (not approved)		Voltage rating	Current rating	Voltage rating	Current rating	<b>A</b> 10 V-250 V	0.1...4 A	12 V	0.1...4 A	24 V	0.1...4 A	60 V	0.1...1 A	110 V	0.1...0.5 A	<b>B</b> 5 V-250 V	0.05...1 A	220 V	0.1...0.25 A	5 V-250 V	0.05...1 A
AC		DC (not approved)																							
Voltage rating	Current rating	Voltage rating	Current rating																						
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		110 V	0.1...0.5 A																						
<b>B</b> 5 V-250 V	0.05...1 A	220 V	0.1...0.25 A																						
		5 V-250 V	0.05...1 A																						
<b>Supply condition</b>																									
<b>M</b>	module mounted to circuit breaker 3120-...																								
<b>X3120 - S 0 1 A M</b>	ordering example																								

## Dimensions



## Internal connection diagram



## Approvals (complete circuit breaker/module assembly)

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

## Technical data

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

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

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

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

## Typical applications

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

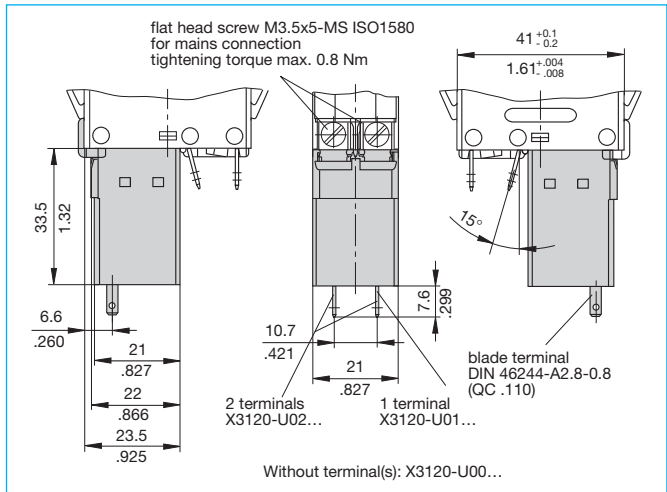
## Ordering information

Type No.	
<b>X3120</b>	Module for type 3120
<b>Function</b>	
<b>U</b>	undervoltage release module
<b>Terminal design</b>	
<b>00</b>	standard (without separate connections)
<b>01</b>	1 blade terminal 2.8x0.8 (QC .110)
<b>02</b>	2 blade terminals 2.8x0.8 (QC .110)
<b>Voltage ratings</b>	
<b>00</b>	AC 230/240 V 50/60 Hz
<b>01</b>	AC 120 V 50/60 Hz
<b>02</b>	AC 100 V 50/60 Hz
<b>03</b>	DC 24 V
<b>Assembly status</b>	
<b>M</b>	module mounted to the circuit breaker 3120
<b>X3120 - U 00 00 M</b>	ordering example

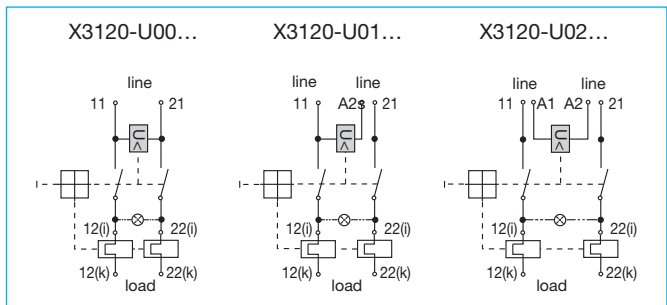
## Approvals (complete circuit breaker/module assembly)

Authority	Voltage ratings
VDE (EN 60934)	AC 100...240 V; DC 24 V
UL, CSA	AC 100...240 V; DC 24 V

## Dimensions



## Internal connection diagrams



## Technical data

Voltage ratings	AC 100; 120 V; 230/240 V 50/60 Hz DC 24 V
Voltage tolerance	+10%/-15%
Current consumption	approx. 2.5 mA
Typical life	20,000 operations
Release values	$0.2 \times U_N < U < 0.7 \times U_N$ (at a rated voltage of AC 100 V the device may release at 70 V and must release at 20 V)
Release delay	$t < 20$ ms
Latch-in values	$\geq 85 \% U_N$
Ambient temperature	-30...+60 °C (-22...+140 °F)
Vibration	8 g (57-500 Hz) $\pm$ 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95% RH to IEC 60068-2-78, test Cab
Mass	approx. 53 g (complete assembly)

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

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

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

## Typical applications

Electrical monitoring of safety systems, remote trip.

## Ordering information

<b>Type No.</b>	
<b>X3120</b>	Module for type 3120
<b>Function</b>	
<b>M</b>	magnetic relay trip module
<b>Style</b>	
<b>2</b>	magnetic remote trip coil
<b>Terminal design</b>	
<b>P7</b>	blade terminals 2x2.8x0.8 (QC 2x.110) tin plated
<b>Supply condition</b>	
<b>M</b>	module mounted to the circuit breaker
<b>Voltage ratings</b>	
AC 12, 24, 48, 60, 120, 220, 230, 240 V	
DC 12, 24 V	
<b>X3120 - M 2 P7 M - 12 V</b> ordering example	

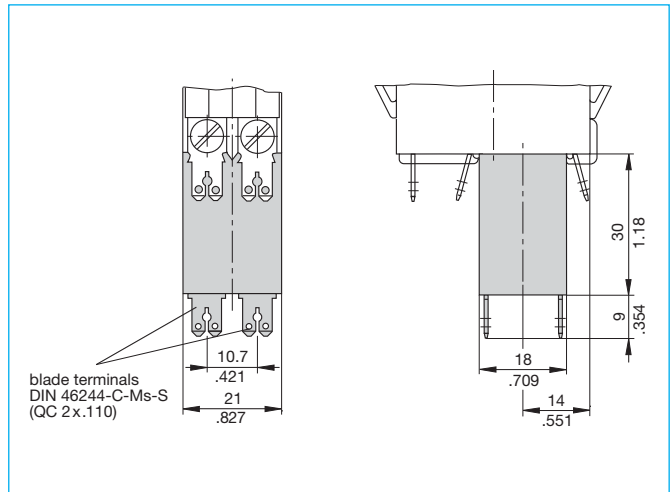
## Standard voltage ratings and typical internal resistance values

Voltage rating (V)	Internal resistance per pole ( $\Omega$ )	Voltage rating (V)	Internal resistance per pole ( $\Omega$ )
12 V AC/DC	0.78	120 V AC	71.0
24 V AC/DC	3.3	220 V AC	312
48 V AC	11.9	230 V AC	312
60 V AC	18.5	240 V AC	312

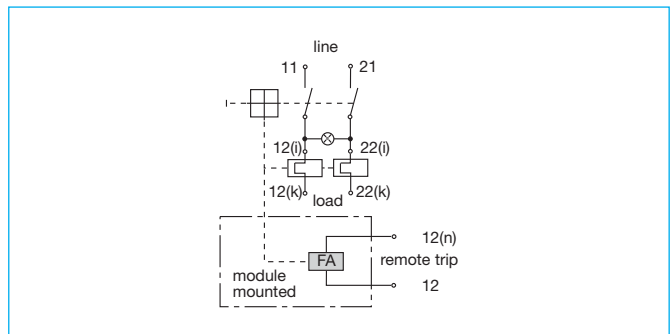
## Approvals (complete circuit breaker/module assembly)

Authority	Voltage ratings
VDE (EN 60934)	AC 12...240 V; DC 12...24 V
UL, CSA	AC 12...240 V; DC 12...24 V

## Dimensions



## Internal connection diagram



## Technical data

Voltage ratings	AC 12...240 V; DC 12...24 V
Power consumption	approx. 200 W
Pulse operation	20 ms < t <sub>ON</sub> < 100 ms / t <sub>OFF</sub> > 10 sec
Release delay	t < 20 ms
Typical life	50,000 operations at U <sub>N</sub>
Ambient temperature	-30...+60 °C (-22...+140 °F)
Dielectric strength (IEC 60664 and 60664A)	test voltage between main circuit and trip coil circuit AC 3,000 V
Insulation resistance	> 100 M $\Omega$ (DC 500 V)
Vibration	8 g (57-500 Hz) $\pm$ 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 53 g (complete assembly)

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

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

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

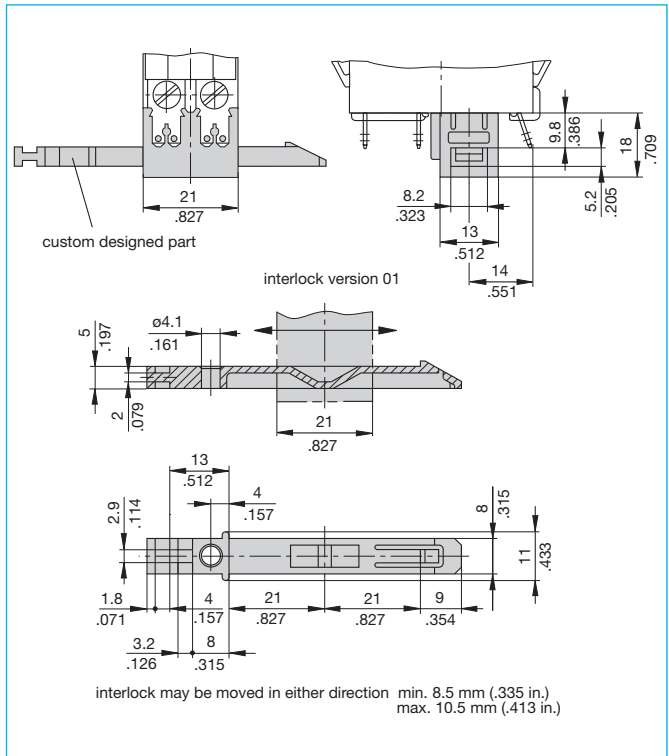
## Typical applications

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

## Ordering information

<b>Type No.</b>	
<b>X3120</b>	Module for type 3120-F
<b>Function</b>	
<b>V</b>	mechanical slide interlock module
<b>Module operation</b>	
<b>1</b>	3120 can only be switched on without the interlock fitted
<b>Interlock design</b>	
<b>00</b>	without interlock
<b>01</b>	interlock version 01 (see dimension diagram)
<b>Delivery condition of interlock</b>	
<b>L</b>	interlock supplied separately with the module
<b>M</b>	module factory-fitted with the interlock in its centre position
<b>O</b>	module supplied without interlock
<b>Operating direction of interlock</b>	
<b>0</b>	without interlock, or interlock supplied separately
<b>1</b>	interlock operated from the side near terminals 11, 12k, 12i of the 3120-...
<b>2</b>	interlock operated from the side near terminals 21, 22k, 22i of the 3120-...
<b>Assembly status</b>	
<b>L</b>	module supplied separately
<b>M</b>	module mounted to the circuit breaker
<b>X3120 - V 1 00 0 0 M</b>	ordering example

## Dimensions



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

## Typical applications

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance per pole ( $\Omega$ )	Current rating (A)	Internal resistance per pole ( $\Omega$ )
0.1	94	4	0.0435
0.2	24	5	0.0325
0.3	12	6	0.0215
0.4	5.30	7	0.0165
0.5	4.20	8	0.0165
0.8	1.50	10	< 0.02
1	0.9	12	< 0.02
1.2	0.80	14	< 0.02
1.5	0.45	15	< 0.02
2	0.27	16	< 0.02
2.5	0.0785	18	< 0.02
3	0.0595	20	< 0.02
3.5	0.0565		

## Illumination voltage/power consumption

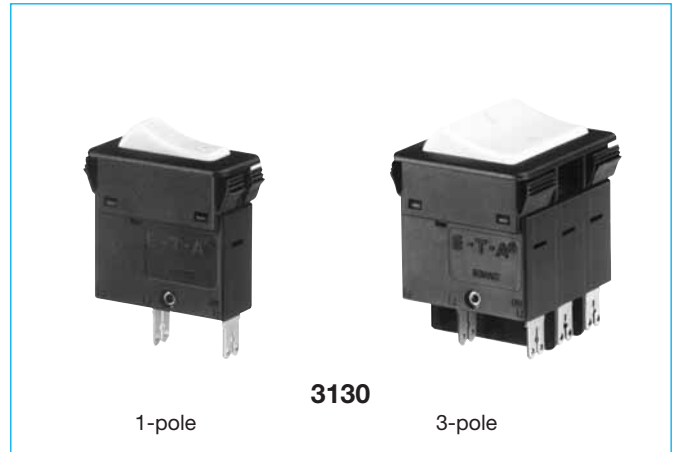
operating voltage	power consumption	
	filament/neon (B)	LED (G, R, Y)
6 V	60 mA	9 mA
12 V	20 mA	9 mA
24 V	20 mA	9 mA
48 V	20 mA	1.5 mA
115 V	< 1.5 mA	< 1 mA*
230 V	< 1.5 mA	< 1 mA*
415 V	< 1 mA	not available

\* single pole version only

## Approvals

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

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

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; 3 AC 415 V; DC 50 V (UL: AC 250 V; 3 AC 250 V; DC 50 V)		
Current ratings	0.1...20 A 1-pole 0.1...16 A 2- and 3-pole		
Typical life	<b>1-pole</b>		
	AC 240 V: 0.1...20 A	30,000 operations at $1 \times I_N$ , inductive	
DC 50 V:	0.1...4 A	30,000 operations at $1 \times I_N$ , inductive	
	4.5...16 A	30,000 operations at $1 \times I_N$ , resistive	
DC 28 V:	4.5...20 A	30,000 operations at $1 \times I_N$ , inductive	
		<b>2-pole</b>	
AC 240 V:	0.1...16 A	50,000 operations at $1 \times I_N$ , inductive	
	DC 50 V: 0.1...16 A	50,000 operations at $1 \times I_N$ , inductive	
3 AC 415 V:	<b>3-pole</b>		
	0.1...16 A	30,000 operations at $1 \times I_N$ , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area	AC 3,000 V	
	current path/current path	AC 1,500 V	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)		
Interrupting capacity $I_{cn}$	0.1...2 A	10 x $I_N$	
	2.5...20 A	150 A	1-pole
	2.5...16 A	250 A	2-pole
	2.5...12 A	150 A	3-pole
	14 + 16 A	130 A	3-pole
Interrupting capacity (UL 1077)	$I_N$	0.1...12 A	14...16 A
	1- + 2-pole	AC 250V/3500A	AC 250V/3500A
	3-pole	3AC 250V/5000A	
	1- + 2-pole	DC 50V/2000A	DC 50V/2000A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40		
	terminal area IP00		
Vibration	5 g (57-500 Hz) $\pm$ 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	1-pole: 25 g (11 ms) 2 + 3-pole: 20 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 45 g (three pole)		
	approx. 31 g (double pole)		
	approx. 17 g (single pole)		

## Ordering information - 1-pole

Type No.	3130	rocker switch/circuit breaker
Mounting	F	snap in frame
Frame	1	standard
	3	special single pole version
Number of poles	1	single pole, thermally protected
A		1-pole, unprotected**
Frame mounting	0	panel thickness 1-2.5 mm (.039-.099 in) (only 3130-F1...)
	1	panel thickness 1.5-3.2 mm (.059-.126 in)(only 3130-F3.1...)
Terminal design	P7	blade terminals DIN 46244-C-Ms-S (QC 2x.110)
	H7	for terminals 1.1, 2.1 3.1 terminal screws M 3.5 for terminals 1.2, 2.2, 3.1 blade terminals (QC 2x.110)
	N7	blade terminals (QC 2x.110), with shunt terminal
Characteristic curve	T1	thermal, 1.05-1.4 I <sub>N</sub>
	Q1	switch, only with terminal design -N7
Switch style	W	rocker
	U	momentary switch function
Switch colour designation		opaque      translucent
	01	black      12 white
	02	white      14 red
	04	red      19 green
	09	green      29 black, rocker with green dot
Rocker markings	A	dot (ON position, only with switch colour designation 29)
	Q	"I" and "O" moulded in
Rocker illumination (optional)		
	12 Q Y	white rocker, yellow LED, AC/DC
	14 Q R	red rocker, red LED, AC/DC
	19 Q Y	green rocker, yellow LED, AC/DC
	29 A G	black rocker with dot, green LED
Illumination voltage range* (optional)		
	1	4 - 7 V (G,R,Y)
	2	10 - 14 V (G,R,Y)
	3	20 - 28 V (G,R,Y)
	4	42 - 54 V (R,Y)
	6	90 - 140 V (R,Y)
	7	185 - 275 V (R,Y)
	X	LED, DC 8 - 10 mA ***
Current ratings		0.1...20 A

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

\* N/A for non-illuminated version

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

\*\*\* without series resistor and diode, to be selected by customer.

Recommendation:

4-7 V Rv 0.43 kΩ

10-14 V Rv 1.1 kΩ

20-28 V RV 2.7 kΩ

diode 1N4007

## Ordering information - multipole

Type No.	3130	rocker switch/circuit breaker multipole
Mounting	F	snap in frame
Frame	1	standard
Number of poles	2	2-pole, thermally protected
	3	3-pole, thermally protected
	5	2-pole, thermally protected on one pole only
	6	3-pole, thermally protected on two poles only
	B	2-pole, unprotected**
	C	3-pole, unprotected**
Frame mounting	0	panel thickness 1-2.5 mm (.039-.099 in) (only 3130-F1...)
Terminal design	P7	blade terminals DIN 46244-C-Ms-S (QC 2x.110)
	H7	for terminals 1.1, 2.1 3.1 terminal screws M 3.5; for terminals 1.2, 2.2, 3.1 blade terminals (QC 2x.110)
	N7	blade terminals DIN 46244-C-Ms-S (QC 2x.110), with shunt terminal
Characteristic curve	T1	thermal, 1.05-1.4 I <sub>N</sub>
	Q1	switch, only with terminal design -N7
Switch style	W	rocker
	U	momentary switch function
Switch colour designation		opaque      translucent
	01	black      12 white
	02	white      14 red
	04	red      19 green
	09	green
Rocker markings	Q	"I" and "O" moulded in
Rocker illumination (optional)		
	B	filament (≤ AC/DC 48 V), neon (≥ AC 115 V)
	G	green LED, DC
	R	red LED, DC
	Y	yellow LED, DC
Illumination voltage range* (optional)		
	1	4 - 7 V (B,G,R,Y)
	2	10 - 14 V (B,G,R,Y)
	3	20 - 28 V (B,G,R,Y)
	4	42 - 54 V (B,R,Y)
	6	90 - 140 V (B)
	7	185 - 275 V (B)
	8	320 - 450 V (B)
Current ratings		0.1...16 A

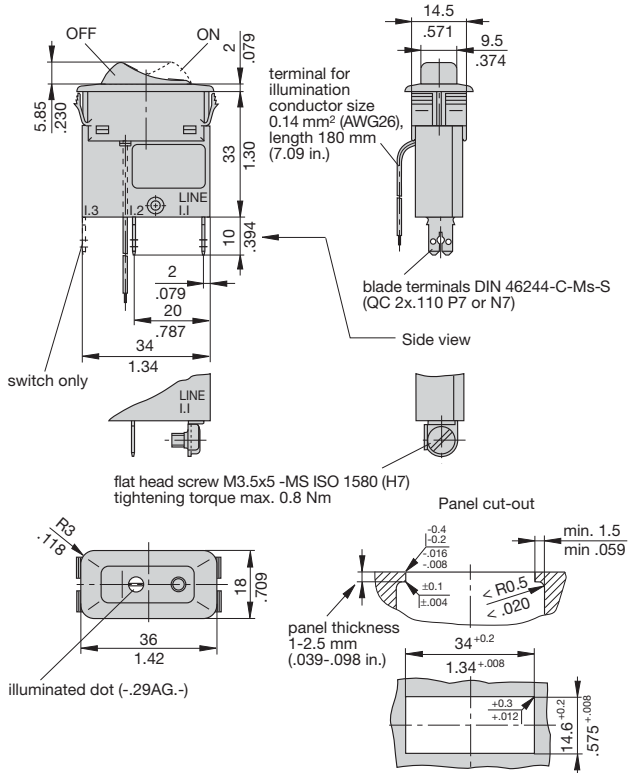
3130 - F 1 3 0 - P7 T1 - W 12 Q B 7 - 5 A ordering example

\* N/A for non-illuminated version

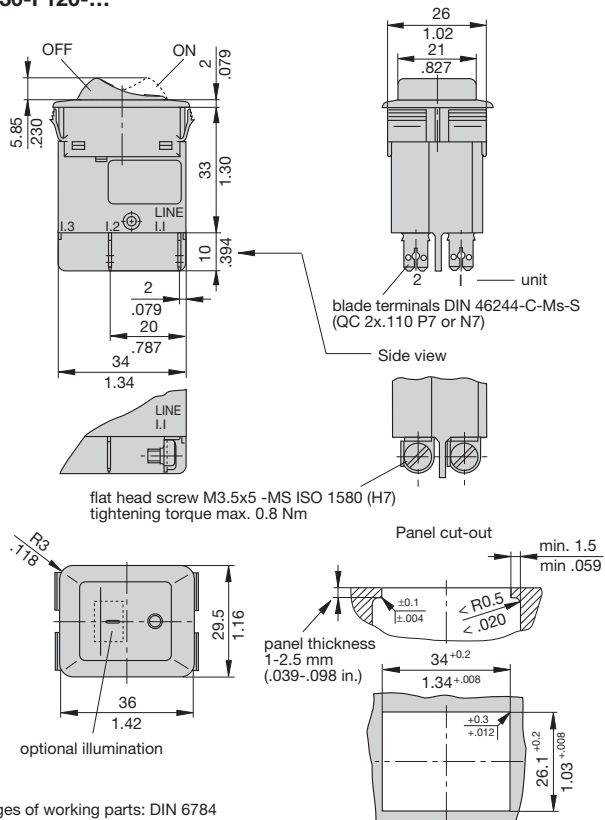
\*\* unprotected poles have to ordered with terminal design N7

## Dimensions

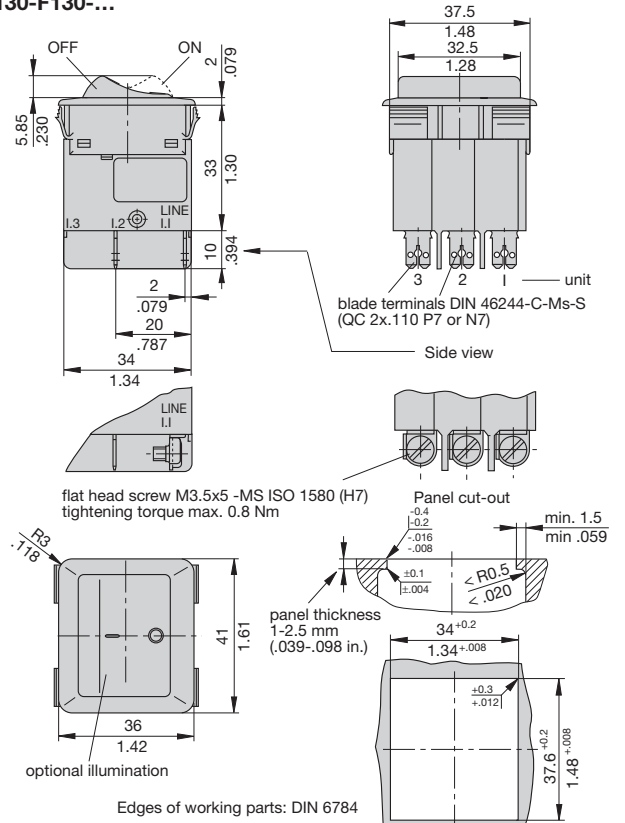
### 3130-F110-...



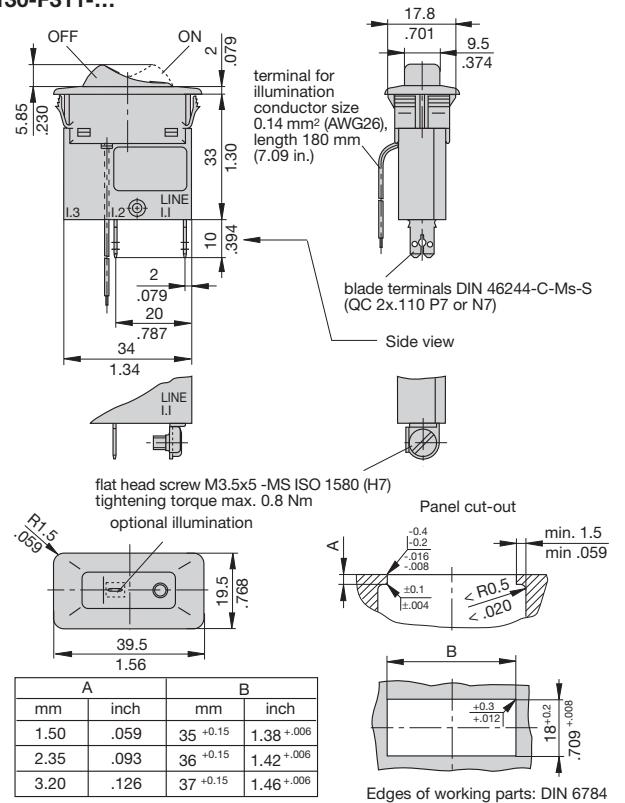
### 3130-F120-...



### 3130-F130-...

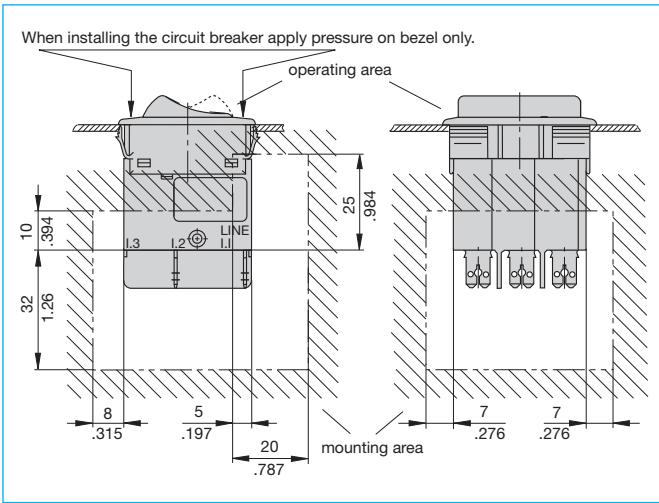


### 3130-F311-...



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

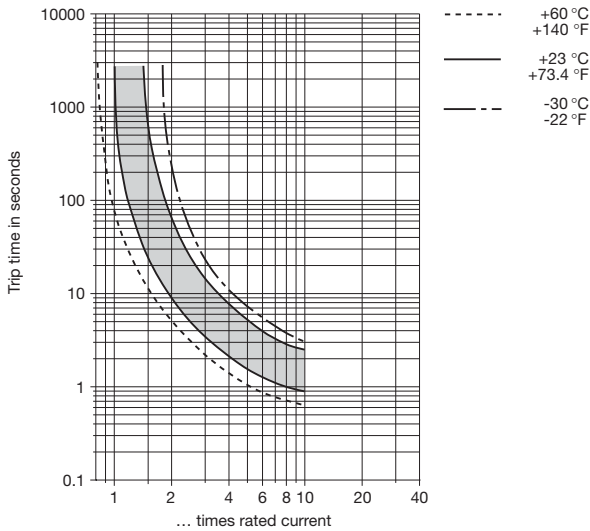
### Installation drawing 3130-F1...



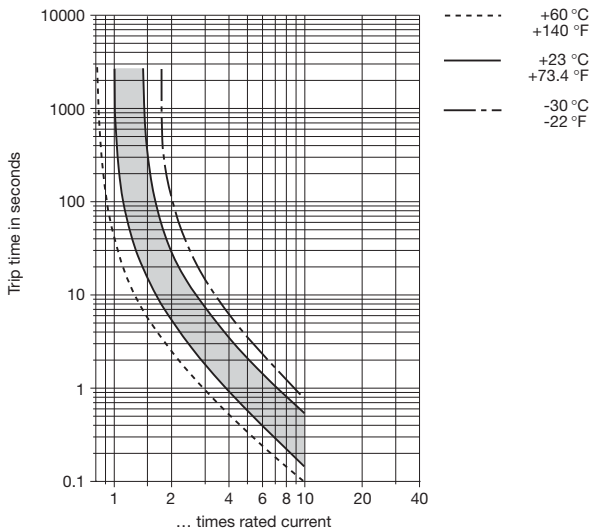
### Typical time/current characteristics

Multipole types: all poles symmetrically loaded.  
With single pole overload, thermal tripping will be at approx.  $1.54 \times I_N$  with 2-pole devices and at approx.  $1.68 \times I_N$  with 3-pole devices.

#### 0.1 ... 2 A

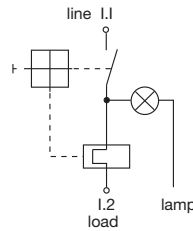


#### 2.5 ... 20 A 1-pole 2.5 ... 16 A 2- and 3-pole

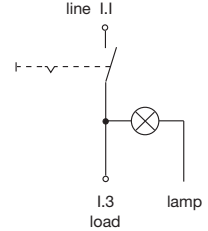


### Internal connection diagrams

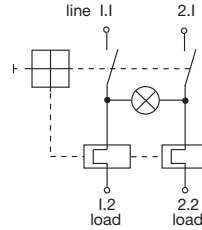
#### 1-pole



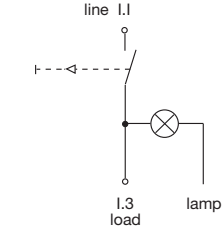
#### 1-pole switch



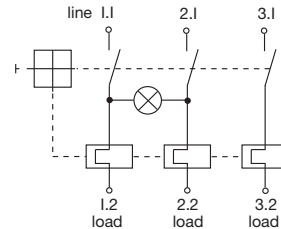
#### 2-pole



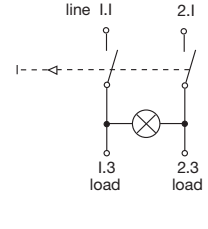
#### 1-pole momentary switch



#### 3-pole

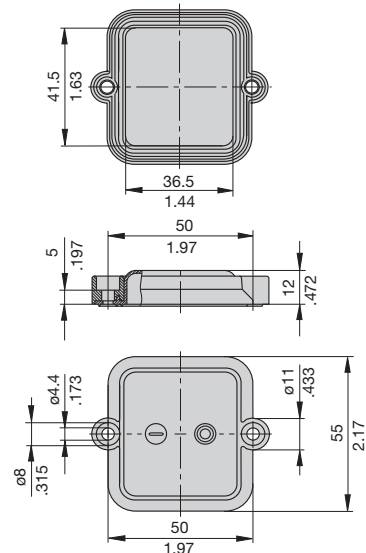


#### 2-pole momentary switch



### Accessories 3130-F130-...

**Splash cover, transparent, for 3-pole version**  
**X 221 258 01** (IP54), comprising bezel Y 306 109 01 and transparent cover Y 306 108 01



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

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

## Description

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

## Typical applications

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance per pole ( $\Omega$ )	Current rating (A)	Internal resistance per pole ( $\Omega$ )
0.1	94	4	0.0435
0.2	24	5	0.0325
0.3	12	6	0.0215
0.4	5.30	7	0.0165
0.5	4.20	8	0.0165
0.8	1.50	10	< 0.02
1	0.9	12	< 0.02
1.2	0.80	14	< 0.02
1.5	0.45	15	< 0.02
2	0.27	16	< 0.02
2.5	0.0785	18	< 0.02
3	0.0595	20	< 0.02
3.5	0.0565		

## Illumination voltage/power consumption

operating voltage	power consumption	
	filament/neon (B)	LED (G, R, Y)
6 V	60 mA	9 mA
12 V	20 mA	9 mA
24 V	20 mA	9 mA
48 V	20 mA	1.5 mA
115 V	< 1.5 mA	< 1 mA
230 V	< 1.5 mA	< 1 mA

## Approvals

Authority	Voltage rating	Current rating
VDE (EN 60934)	AC 240/415 V	0.1...20 A
	DC 50 V	0.1...8 A
	DC 28 V	0.1...20 A
UL, CSA	AC 250 V, DC 50 V	0.1...16 A



**3130**  
water splash protected (IP 66)

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V; DC 50 V (UL: AC 250 V; DC 50 V)	
Current ratings	0.1...20 A	
Typical life	AC 240 V: 0.1...20 A 30,000 operations at $1 \times I_N$ , inductive DC 50 V: 0.1...4 A 30,000 operations at $1 \times I_N$ , inductive 4.5...16 A 30,000 operations at $1 \times I_N$ , resistive DC 28 V: 4.5...20 A 30,000 operations at $1 \times I_N$ , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area current path/current path	AC 3,000 V AC 1,500 V
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity $I_{cn}$	0.1...2 A 2.5...20 A	10 $\times I_N$ 150 A
Interrupting capacity (UL 1077)	0.1...12 A AC 250 V/3,500 A DC 50 V/2,000 A	14...16 A AC 250 V/3,500 A DC 50 V/2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP66 terminal area IP00	
Vibration	5 g (57-500 Hz) $\pm$ 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab	
Mass	approx. 17 g	



## Ordering information - IP66

<b>Type No.</b>	
3130	rocker switch/circuit breaker
<b>Mounting</b>	
F	snap in frame
<b>Frame</b>	
2	splash water protected
<b>Number of poles</b>	
1	single pole, thermally protected
A	1-pole, unprotected **
<b>Frame mounting</b>	
2	panel thickness 2-3.5 mm
<b>Terminal design</b>	
P7	blade terminals DIN 46244-C-Ms-S (QC 2x.110)
H7	for terminals 1.1 terminal screws M 3.5 for terminals 1.2 2 x .110 blade terminals
N7	blade terminals DIN 46244-C-Ms-S (QC 2x.110), with shunt terminal or for switch only
<b>Characteristic curve</b>	
T1	thermal, 1.05-1.4 I <sub>N</sub>
Q1	switch, only with terminal design -N7
<b>Switch style</b>	
S 00	without actuator rocker X 222 420 .. must be ordered separately. Available symbols see following pages.
S	rocker
P	momentary switch
<b>Switch colour designation (not S00)</b>	
opaque	translucent
01 black	12 white
02 white	14 red
04 red	19 green
09 green	
<b>Switch markings</b>	
0	without actuator
Q	"I" and "O" moulded in
<b>Switch illumination</b>	
12 Q Y	white rocker, yellow LED, AC/DC
14 Q R	red rocker, red LED, AC/DC
19 Q Y	green rocker, yellow LED, AC/DC
S 00 0 Y	without rocker, LED yellow, AC/DC
<b>Illumination voltage range*</b>	
1	4 - 7 V (R,Y)
2	10 - 14 V (R,Y)
3	20 - 28 V (R,Y)
4	42 - 54 V (R,Y)
6	90 - 140 V (R,Y)
7	185 - 275 V (R,Y)
X	LED, DC 8-10 mA ***
<b>Current ratings</b>	
0.1...20 A	
3130 F 2 1 2 - P7 T1 - S 12 Q Y 7 - 5 A ordering example	

\* N/A for non-illuminated version

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

\*\*\* without series resistor and diode, to be selected by customer.

Recommendation:

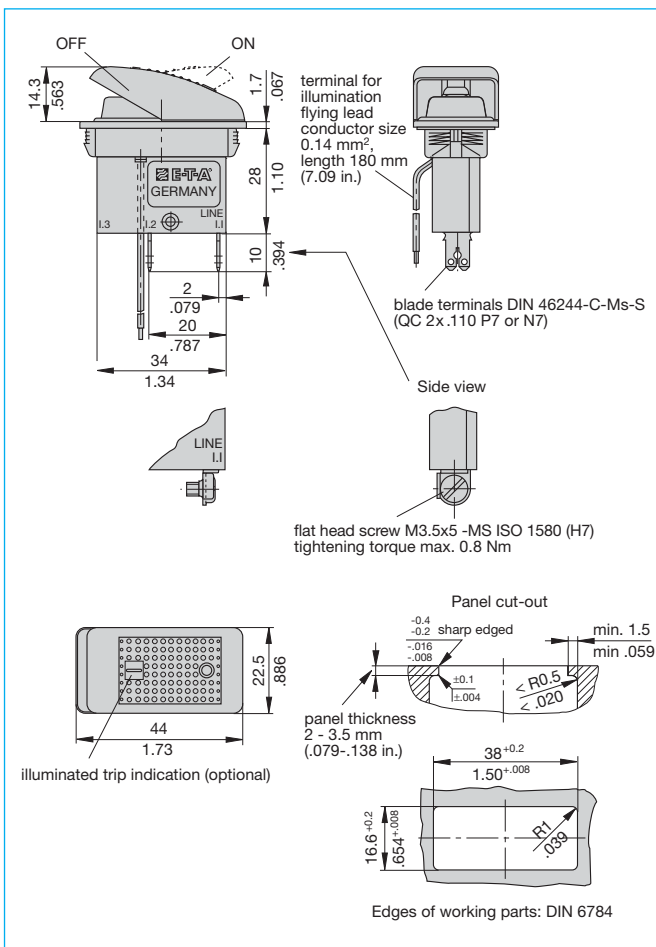
4-7 V Rv 0,43 kΩ

10-14 V Rv 1,1 kΩ

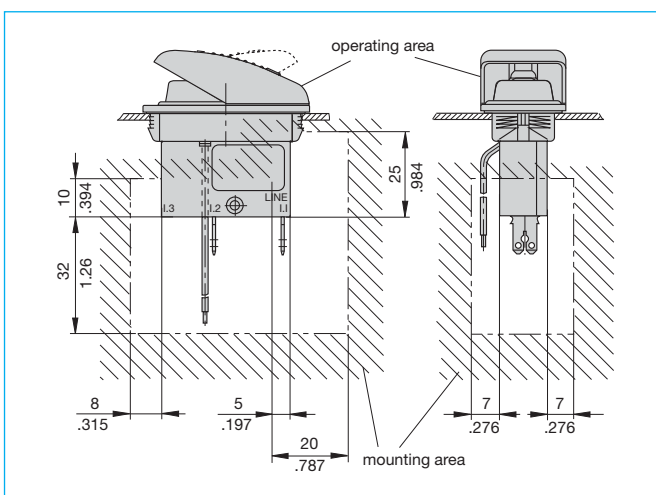
20-28 V RV 2,7 kΩ

diode 1N4007

## Dimensions 3130-F212-...



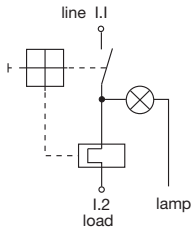
## Installation drawing 3130-F212-...



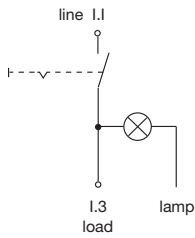
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Internal connection diagrams

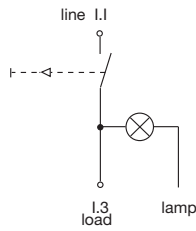
### 1-pole



### 1-pole switch

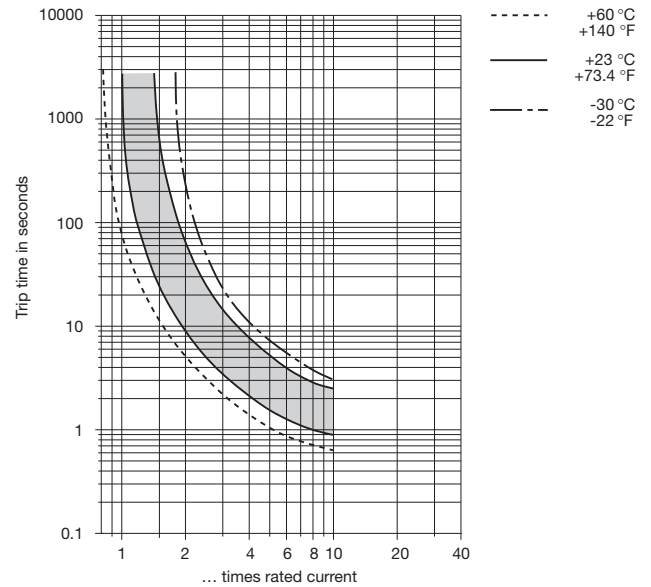


### 1-pole momentary switch

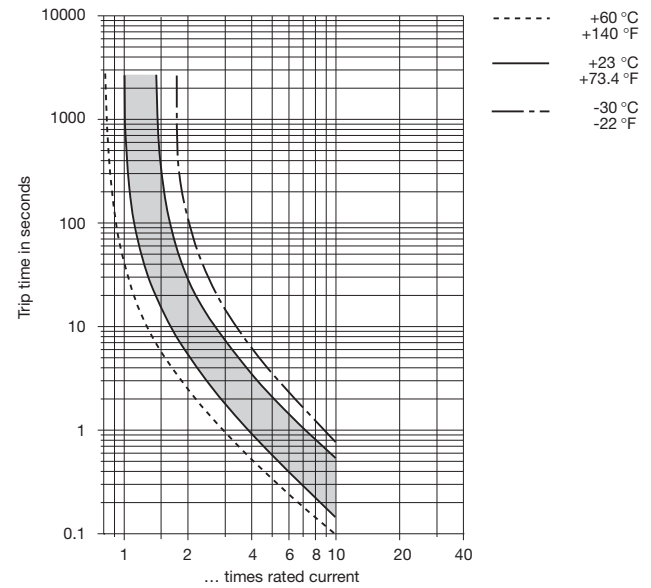


## Typical time/current characteristics

### 0.1 ... 2 A



### 2.5 ... 20 A



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

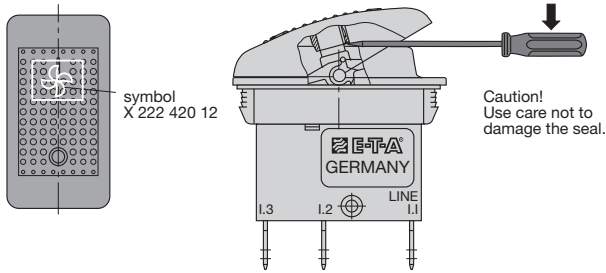
Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

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

## Accessories

### Rocker X 222 420 ..

### How to exchange rockers



### Symbols/legends available

Interior light		X 222 420 01
Anchor light		X 222 420 02
Cockpit light		X 222 420 03
Navigation light		X 222 420 04
VHF radio		X 222 420 05
Refrigerator		X 222 420 06
Anchor		X 222 420 07
Windshield wiper		X 222 420 08
Bilge pump		X 222 420 09
Potable water		X 222 420 10
Horn		X 222 420 11
Ventilation fan		X 222 420 12
Panel light		X 222 420 13

### Symbols/legends available

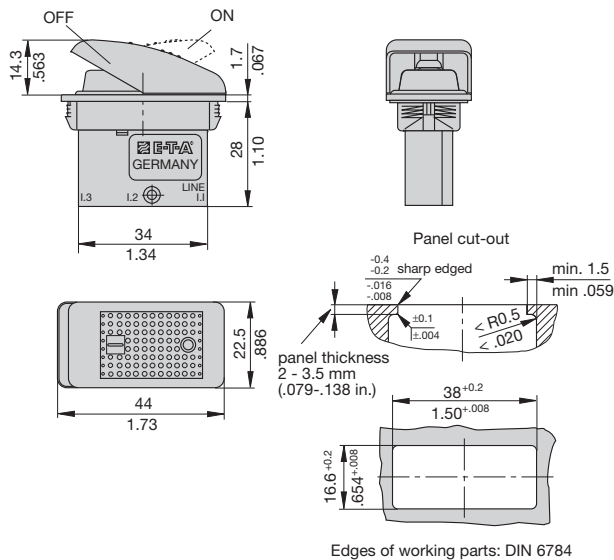
Navigation instruments		X 222 420 14
Music		X 222 420 15
Heating		X 222 420 16
Shower pump		X 222 420 17
		X 222 420 18
Icebox		X 222 420 19
Water for windshield wiper		X 222 420 20
Weigh anchor		X 222 420 21
Drop anchor		X 222 420 22
Search light		X 222 420 23
Autopilot		X 222 420 24
Trim flaps		X 222 420 25
Mast lift		X 222 420 26
Navigation lights (sailing ship)		X 222 420 27
Cockpit light (sailing ship)		X 222 420 28
Deck light (sailing ship)		X 222 420 29
Anchor light (sailing ship)		X 222 420 30

Further symbols upon request.

### S00 switch style:

white translucent rocker coated with black lacquer with laser marked symbols that appear in white translucent.

### Blanking piece (black) 3130-387012



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

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

## Description

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

## Typical applications

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

## Current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.1	94	4	0.0435
0.2	24	5	0.0325
0.3	12	6	0.0215
0.4	5.30	7	0.0165
0.5	4.20	8	0.0165
0.8	1.50	10	< 0.02
1	0.9	12	< 0.02
1.2	0.80	14	< 0.02
1.5	0.45	15	< 0.02
2	0.27	16	< 0.02
2.5	0.0785	18	< 0.02
3	0.0595	20	< 0.02
3.5	0.0565		

## Illumination voltage / power consumption

Operating voltage	Power consumption (LED)	
	Y = yellow	T = blue
12 V	10 mA	10 mA
24 V	10 mA	10 mA
115 V	< 1 mA	-
230 V	< 1 mA	-

## Approvals

Authority	Voltage rating	Current rating
UL 1500	Ignition Protected	
UL 1077	AC 250 V; DC 32 V	0.1...20 A
VDE (EN 60934)	AC 240 V; DC 32 V	0.05...20 A



**3131**  
Circuit breaker

## Technical data

For further details please see chapter: Technical Information	
Voltage rating	AC 240 V; DC 28 V
Current rating range	0.1...20 A
Typical life	0.1...20 A 30,000 operations at $1 \times I_N$ , inductive
Ambient temperature	-20...+60 °C (-4...+140 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 re-inforced insulation in the operating area
Dielectric strength	operating area test voltage AC 3,000 V current path/current path test voltage AC 1,500 V
Insulation resistance	> 100 M $\Omega$ (DC 500 V)
Interrupting capacity $I_{cn}$	0.1...2 A 10 $\times I_N$ 2.5...20 A 150 A
Interrupting capacity (UL 1077)	0.1...16 A: AC 240 V 3,000 A DC 32 V 2,500 A
Protection class (IEC 60529)	operating area IP66 terminal area IP00
Vibration	5 g (57-500 Hz) $\pm$ 0.38 mm (10-57 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms), test to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, test to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, test to IEC 60068-2-78, test Cab
Mass	approx. 30 g

## Ordering Information

### Type number

3131 single pole thermal circuit breaker or switch

### Function

A circuit breaker single pole, latching switch

C circuit breaker single pole, momentary switch

### Mounting

F flange mounting

### Accessories

1 with sealing IP66

### Terminal design

H terminal 1: screws M3.5x5 ISO 1580 (DIN 85)  
terminal 2: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 EN 60934 connectors

N terminals 1,2 and 4: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 EN 60934 connectors

P terminals 1 and 2: blade terminal for 1x6.3x0.8 mm or 2x2.8x0.8 EN 60934 connectors

### Characteristic curve

T thermal 1.0 – 1.4 times rated current

Q switch only

### Actuator style

0 without actuator

rocker X3131-W... must be ordered separately

### Actuator colour

0 without actuator

### Rocker legends

00 without

### Rocker marking

0 without

### Orientation

0 without

### Illumination

0 without

1 illuminated when in position 1 (ON)

3 as 1, with dimmed illumination of window 1

### Type of illumination

0 without illumination

T blue LED

Y yellow LED

### Illumination voltage range

0 without illumination

2 10 - 14 V DC

3 20 - 32 V DC

6 90 - 140 V AC

7 185 - 275 V AC

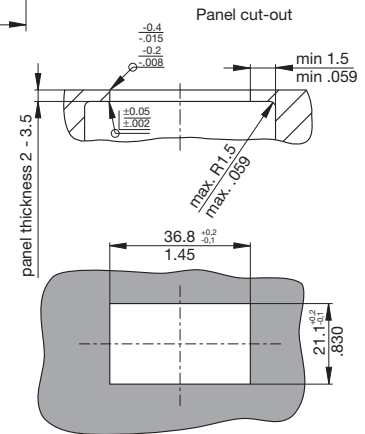
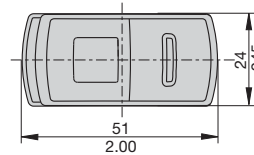
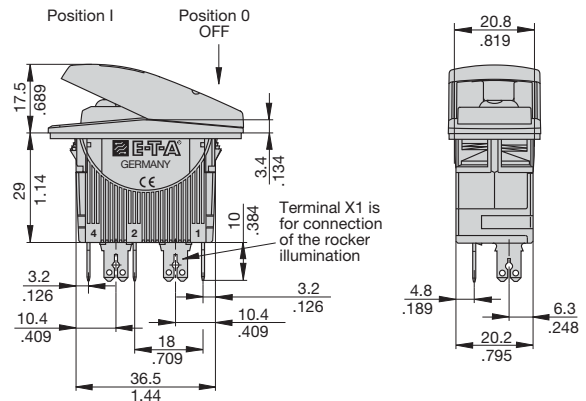
### Current ratings

0.1...20 A

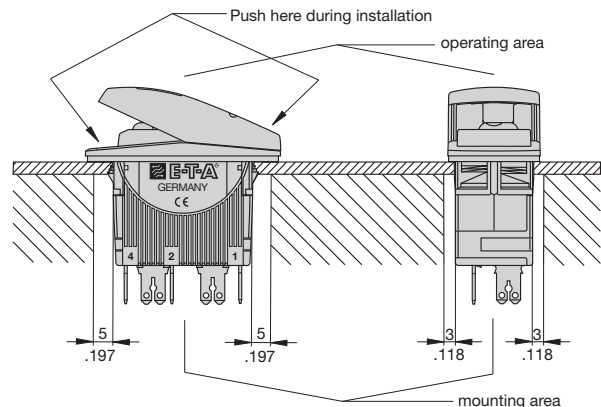
3131 - A F 1 P T - 0 0 00 0 0 - 1 Y 3 - 10A ordering example

3131 - . . . N Q - 0 0 00 0 0 - . . . - 20A switch

## Dimensions



## Installation drawing

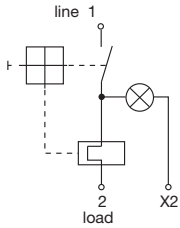


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

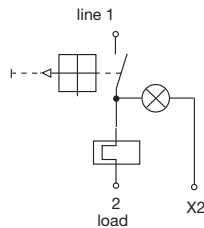
## Internal connection diagrams

### circuit breaker

#### 1-pole switch

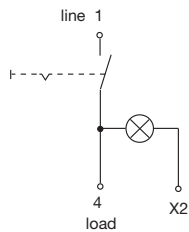


#### 1-pole momentary switch

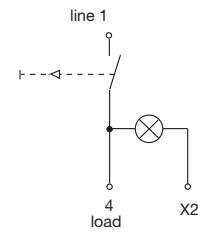


### switch

#### 1-pole switch

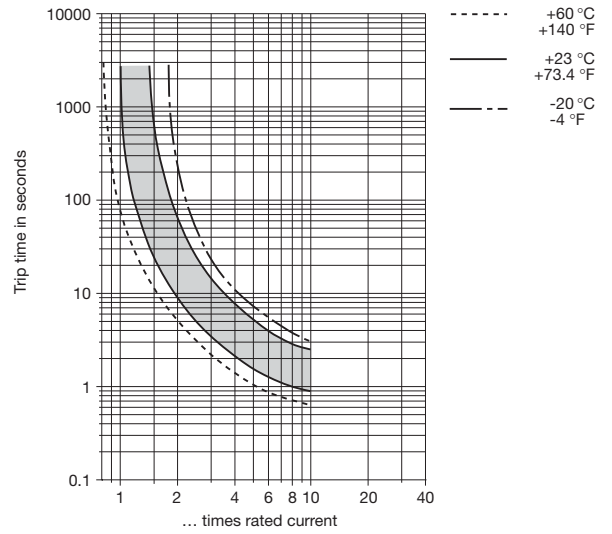


#### 1-pole momentary switch

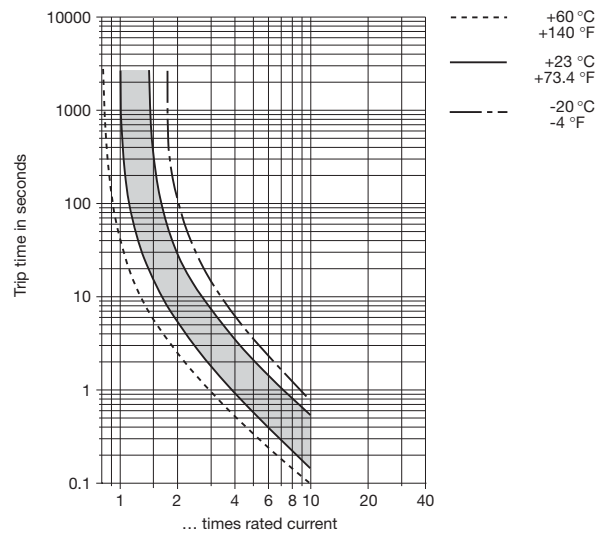


## Typical time/current characteristics

### 0.1 ... 2 A



### 2.5 ... 20 A



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

Ambient temperature °F	-4	+14	+32	+73.4	+104	+122	+140
°C	-20	-10	0	+23	+40	+50	+60
Derating factor	0.84	0.88	0.92	1	1.08	1.14	1.23

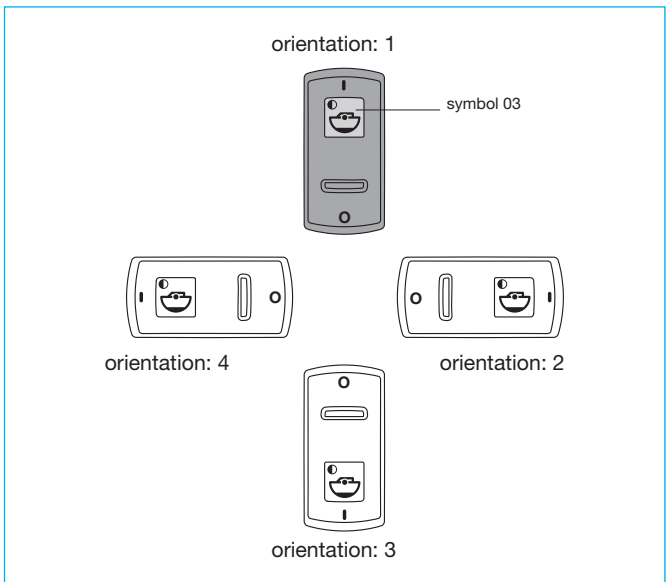
## List of available legends

1

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

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

**Further symbols upon request**



## Ordering Information X3131-...

<b>Type number</b>	X3131	module for type 3131
<b>Actuator style</b>	W	rocker soft-touch, two illumination windows
<b>Actuator colour</b>	A	blue / white translucent
	B	black / white translucent
	C	skyblue / white translucent
<b>Rocker legends</b>	00	without
	...	see separate survey of legends
<b>Rocker marking</b>	0	without
	A	I and 0
<b>Orientation</b>	0	without orientation
	1	orientation 1 (standard)
	2	orientation 2
	3	orientation 3
	4	orientation 4

**X3131 - W A 01 0 1** ordering example

## Description

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

## Typical applications

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

## Ordering Information

### Type number

3131 Single pole switch (3 positions)

### Function

- B** 3-position switch single pole, switching function
- D** 3-position switch single pole, momentary switch function
- E** latching switch under window 1, momentary switch under window 2
- F** momentary switch under window 1, latching switch under window 2

### Mounting

- F** flange mounting

### Accessories

- 1** with sealing IP66

### Terminal design

- N** blade terminals 2x2.8x0.8 EN 60934

### Characteristic curve

- Q** switch only,

### Actuator style

- 0** without actuator
- rocker X3131-W... must be ordered separately

### Actuator colour

- 0** without actuator

### Rocker legends

- 00** without

### Rocker marking

- 0** without

### Orientation

- 0** without

### Illumination

- 0** without
- 2** two LEDs, full illumination in position 1 and 2, dimmed illumination in position 0

### Type of illumination

- 0** without illumination
- T** blue LED
- Y** yellow LED

### Illumination voltage range

- 0** without illumination
- 2** 10 - 14 V DC
- 3** 20 - 32 V DC

### Current ratings

- 20 A**

3131 - B F 1 N Q - 0 0 00 0 0 - 2 Y 3 - 20A ordering example

## Illumination voltage / power consumption

Operating voltage	Power consumption
	LED
12 V	10 mA
24 V	10 mA



**3131**  
Three-position switch

## Technical data

For further details please see chapter: Technical Information

Voltage rating	DC 32 V
Current rating	20 A
Typical life	30,000 operations at 1 x I <sub>N</sub> , inductive
Ambient temperature	-20...+60 °C (-4...+140 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 re-inforced insulation in the operating area
Dielectric strength	operating area test voltage AC 3,000 V current path/current path test voltage AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Protection class (IEC 60529)	operating area IP66 terminal area IP00
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms), test to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, test to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, test to IEC 60068-2-78, test Cab
Mass	approx. 30 g

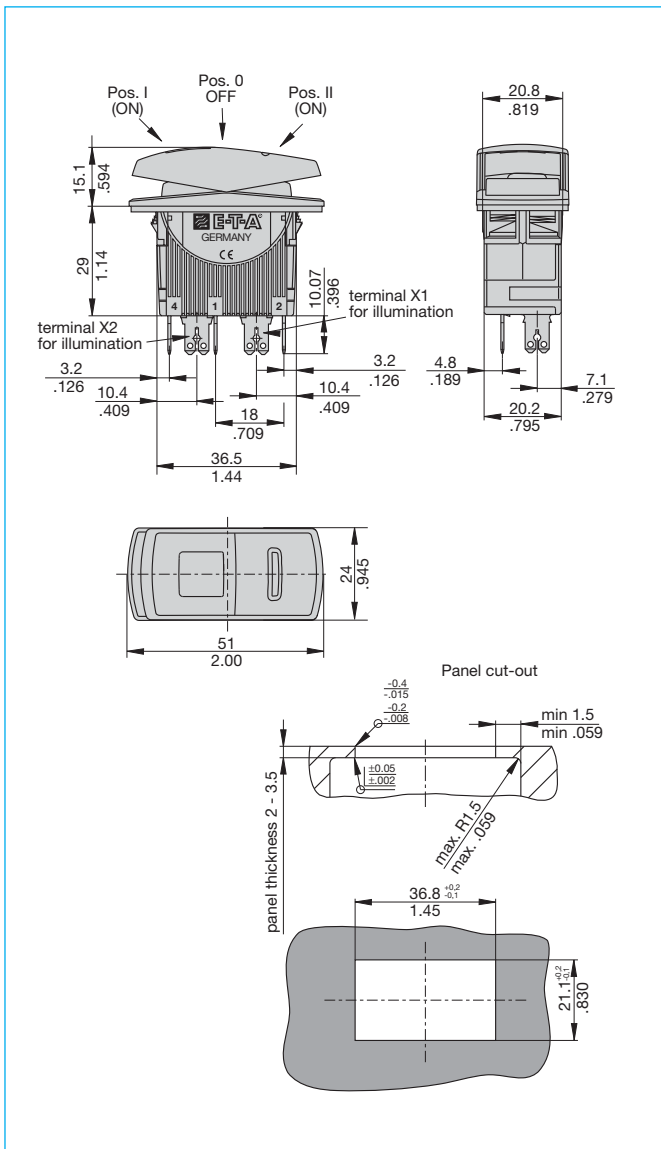
## Approvals

### Authority

UL 1500 Ignition Protected



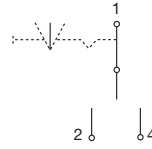
## Dimensions



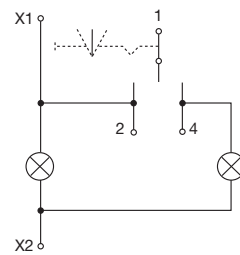
## Internal connection diagrams

### latching switch

#### without illumination

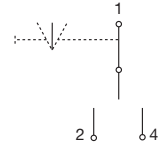


#### with illumination

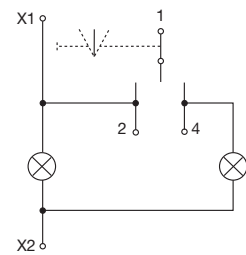


### momentary switch

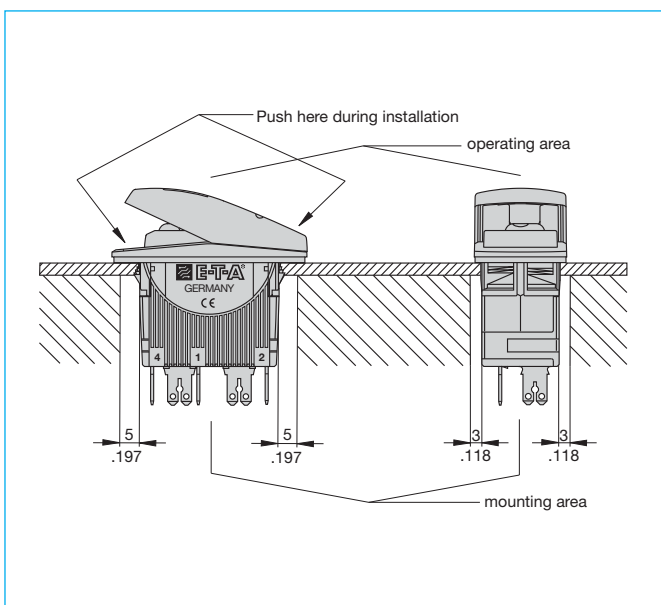
#### without illumination



#### with illumination



## Installation drawing



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

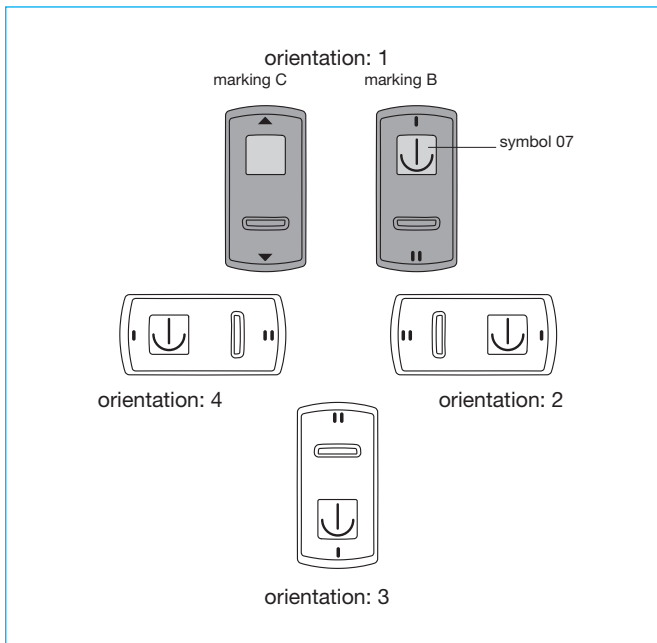
## List of available legends

		Ordering information
Anchor		07
Windshield wiper		08
Bilge pump		09
Ventilation fan		12
Trim tabs		25
Mast lift		26

Further symbols upon request

## Ordering Information X3131-...

<b>Type number</b>	
X3131	module for type 3131
<b>Actuator style</b>	
W	rocker soft-touch, two illumination windows
<b>Actuator colour</b>	
A	blue / white translucent
B	black / white translucent
C	skyblue / white translucent
<b>Rocker legends</b>	
00	without
...	see separate survey of legends
<b>Rocker marking</b>	
0	without
B	I and II
C	◀ and ▶ (orientation 1 only)
<b>Orientation</b>	
0	without orientation
1	orientation 1 (standard)
2	orientation 2
3	orientation 3
4	orientation 4
X3131 - W A 07 0 1 ordering example	



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

## Description

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

## Typical applications

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

## Ordering information

<b>Type No.</b>	3140	four pole switch or three pole switch/circuit breaker
<b>Mounting</b>	F	snap in frame
<b>Frame</b>	1	standard
	2	splash water protected version
<b>Number of poles</b>	3	3-pole, thermally protected
	7	4-pole, thermally protected on 3 poles only
	C	3-pole, unprotected, switch only
	D	4-pole, unprotected, switch only
<b>Frame mounting</b>	0	panel thickness 1-6.35 mm (.04-.25 in)
<b>Terminal design</b>	P7	blade terminals 2x2.8x0.8 mm (QC 2x.110), DIN 46244-C
	N7	as P7, but with shunt terminal
	H7	as P7, but for terminals x.1 terminal screws M3.5 (required with X3140 fitted)
	G7	as H7, but with shunt terminal
<b>Characteristic curve</b>	T1	thermal
	Q1	switch only (10,000 operations)*
<b>Switch style</b>	S	2 push buttons (ON/OFF)
<b>Switch colour</b>	GRX	green/red
<b>Current rating range</b>	0.1...16 A	
<b>3140 - F 1 3 0 - P7 T1 - S GRX - 10 A ordering example</b>		

\* only with terminal design N7 or G7

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance per pole (Ω)	Current rating (A)	Internal resistance per pole (Ω)
0.1	94	3.5	0.0595
0.2	24	4	0.0435
0.3	12	4.5	0.0325
0.4	5.30	5	0.0325
0.5	4.20	6	0.0215
0.6	2.90	7	0.0165
0.8	1.50	8	0.0125
1	0.9	10	< 0.02
1.2	0.80	12	< 0.02
1.5	0.45	14	< 0.02
2	0.27	15	< 0.02
2.5	0.0785	16	< 0.02
3	0.0595		



3140

## Technical data

For further details please see chapter: Technical Information

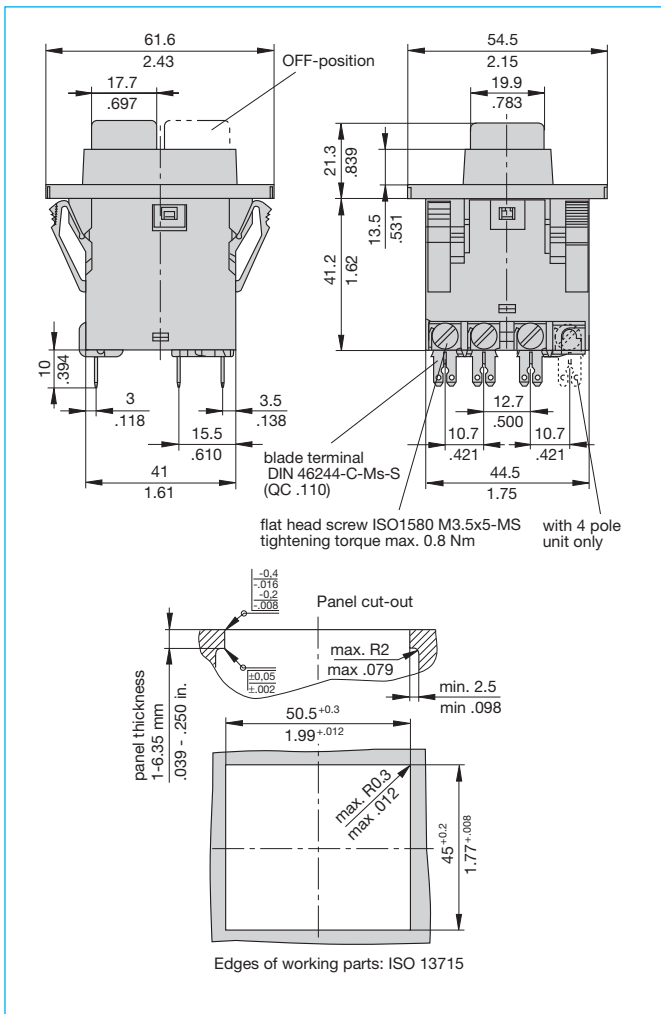
Voltage rating	3 AC 415 V; DC 50 V		
Current rating range	0.1...16 A		
Typical life	<b>3-pole</b>	10,000 operations at 1 x I <sub>N</sub> , inductive 10,000 operations at 1 x I <sub>N</sub> , resistive	
	<b>4-pole</b>	10,000 operations at 1 x I <sub>N</sub> , inductive 10,000 operations at 1 x I <sub>N</sub> , resistive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage	pollution degree	2
	2.5 kV	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A) operating area between poles (3-pole)	test voltage	AC 3,000 V AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.1...2 A	10 x I <sub>N</sub>	150 A
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	3- and 4-pole
	0.1...16 A	AC 250 V	5,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 (IP66 with water splash protection) terminal area IP00		
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	20 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab		
Mass	approx. 68		

## Approvals

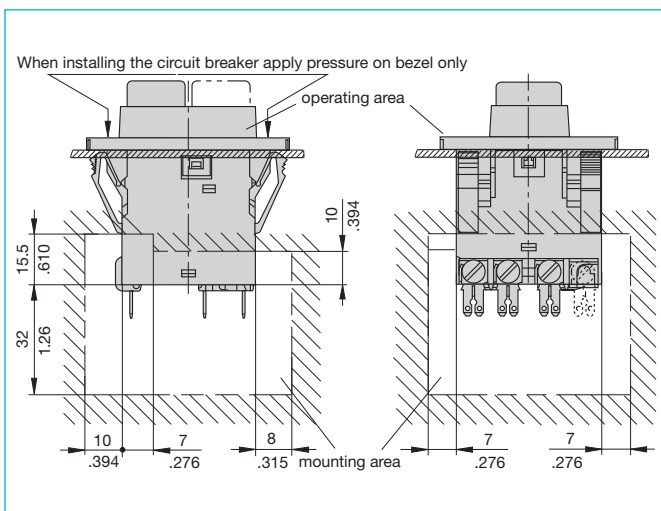
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V	0.1...16 A 3 + 4-pole
UL	AC 250 V	0.1...16 A 3 + 4-pole
CCC	3 AC 415 V	0.1...16 A 3 + 4-pole

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

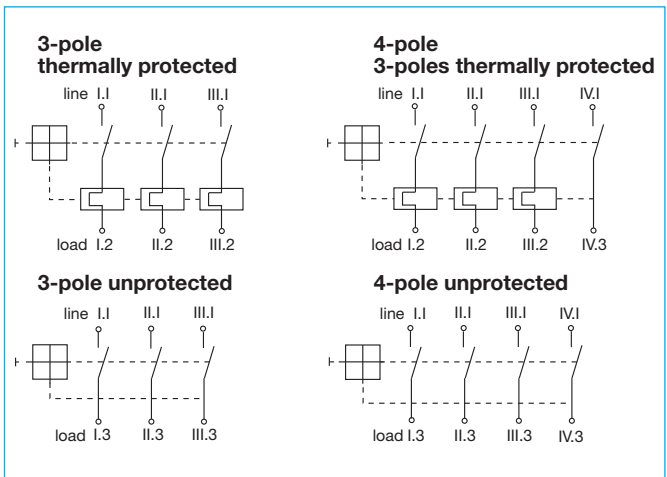
## Dimensions



## Installation drawing

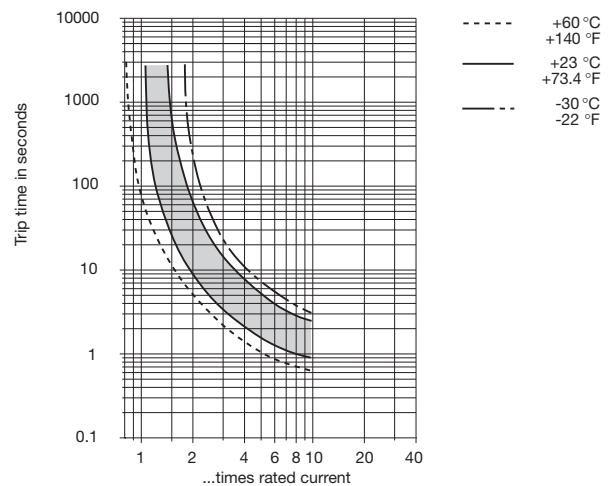


## Internal connection diagrams

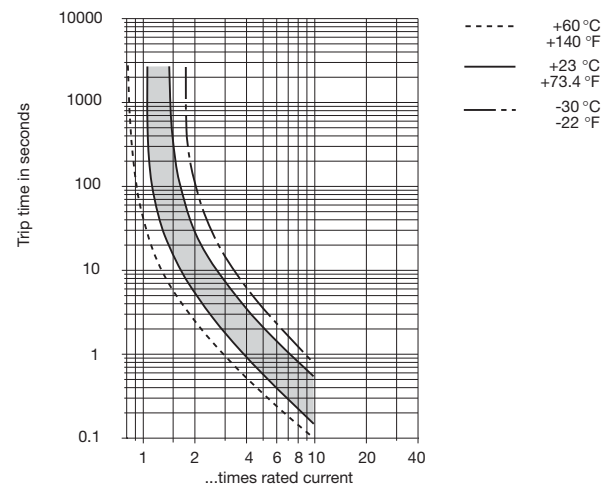


## Typical time/current characteristics

### 0.1 ... 2 A



### 2.5 ... 16 A



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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

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

## Description

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

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

## Typical applications

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

## Ordering information

### Type No.

**X3140** Module for type 3140

### Function

**U** undervoltage release module

### Terminal design

- 00** standard (without separate connections)
- 01** one blade terminal 2.8x0.8 (QC .110)
- 02** two blade terminals 2.8x0.8 (QC .110)
- 03** as 01, with flying lead 0.5 mm<sup>2</sup> (l = 250 mm) and female connector 6.3x1 DIN 46247-MS

### Voltage ratings

- 00** AC 400 V 50/60 Hz
- 03** DC 24 V
- 09** AC 230 / 240 V 50/60 Hz

### Assembly status

- M** module mounted to the circuit breaker

**X3140 - U 00 00 M** ordering example

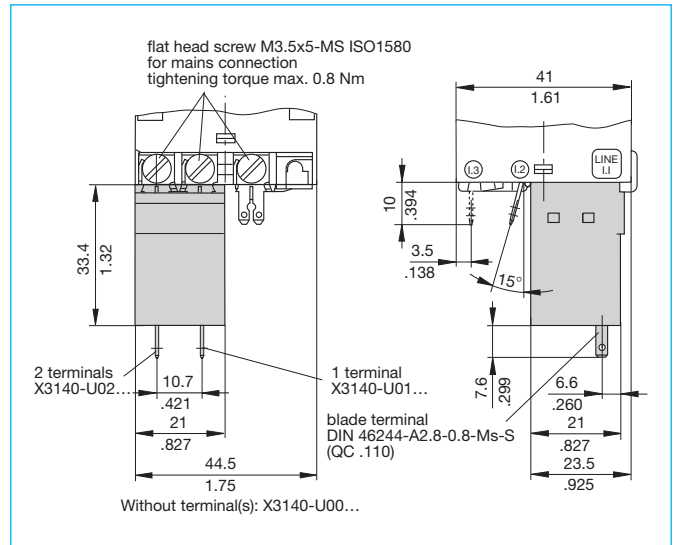
## Technical data

Voltage ratings	AC 400 V 50/60 Hz; AC 230 V; DC 24 V
Voltage tolerance	+10%/-15%
Current consumption	approx. 2.0 mA
Release values	$0.2 \times U_N < U < 0.7 \times U_N$ (at a rated voltage of AC 400 V the device may release at 280 V and must release at 80 V)
Release delay	$t < 20$ ms
Latch-in values	$\geq 85 \% U_N$
Ambient temperature	-30...+60 °C (-22...+140 °F)
Vibration	5 g (57-500 Hz) $\pm$ 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	20 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 90 g (complete assembly)

## Approvals (complete circuit breaker/module assembly)

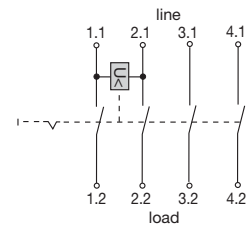
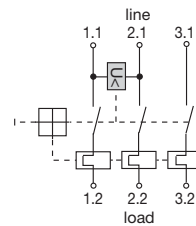
Authority	Voltage ratings
VDE (EN 60934)	AC 400 V; AC 230/240 V; DC 24 V

## Dimensions

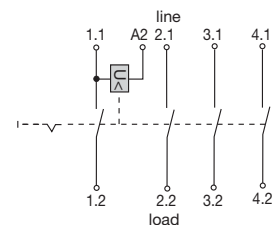
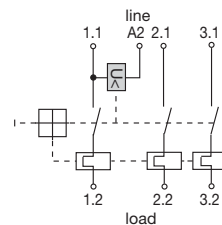


## Internal connection diagrams

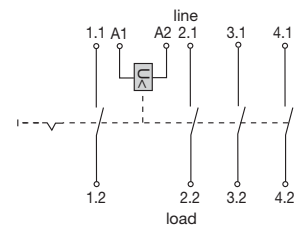
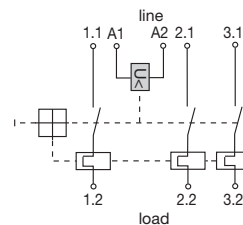
### X3140-U00



### X3140-U01



### X3140-U02



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

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

## Typical applications

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

## Ordering information

<b>Type No.</b>			
<b>X3120</b>	Module for type 3120 and type 3140		
<b>Function</b>			
<b>S</b>	auxiliary contact module		
<b>Contact configuration</b>			
<b>0</b>	change-over contact		
<b>Terminal design</b>			
<b>1</b>	blade terminals 2.8 x 0.5 (QC .110), silver plated		
<b>Contact rating</b>			
AC		DC (not approved)	
Voltage rating	Current rating	Voltage rating	Current rating
<b>A</b> 10 V-250 V	0.1...4 A	12 V	0.1...4 A
		24 V	0.1...4 A
		60 V	0.1...1 A
		110 V	0.1...0,5 A
220 V	0.1...0,25 A		
<b>B</b> 5 V-250 V	0,05...1 A	5 V-250 V	0.05...1 A
<b>Assembly status</b>			
<b>M</b>	module mounted to circuit breaker 3140-...		
<b>X3120 - S 0 1 A M</b> ordering example			

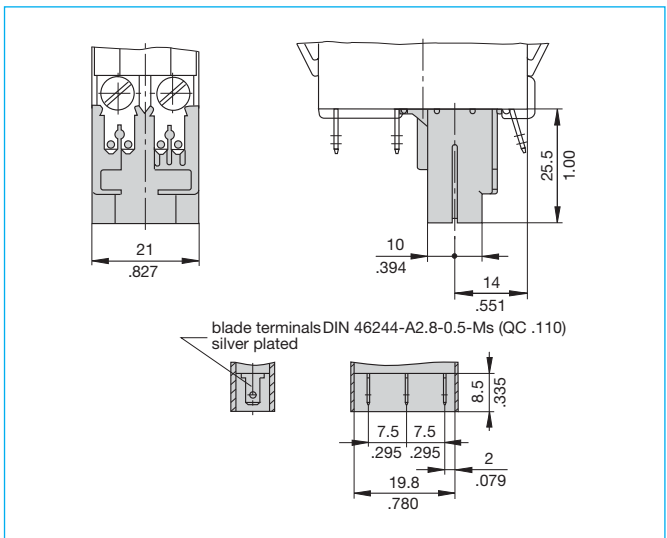
## Technical data

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

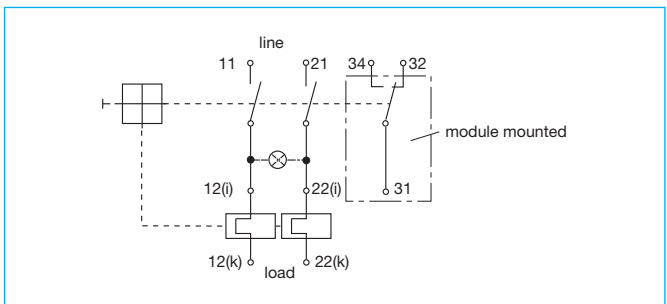
## Approvals (complete circuit breaker/module assembly)

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

## Dimensions



## Internal connection diagram



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

## Typical applications

Motors, transformers, solenoids, hand tools, appliances.

## Ordering information

### Type No.

**2-4100** threadneck panel mounting (hardware bulk shipped)

### Terminal design

**L10** solder terminals

**P10** blade terminals A6.3-0.8 mm (QC .250)

**P50** blade terminals A4.8-0.8 mm (QC .190)

### Shunt terminal (optional)

**A3** shunt terminal (3 A max. load)

### Current ratings

0.05...10 A

**2-4100 -L10 - .. - .. - 5 A** ordering example

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

## Standard current ratings and typical internal resistance values

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

## Approvals

Authority	Voltage rating	Current rating
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...10 A
CSA	AC 250 V	0.05...3.5A
UL	AC 250 V	0.05... 5 A

-A3 versions are not UL approved



2-4100-...

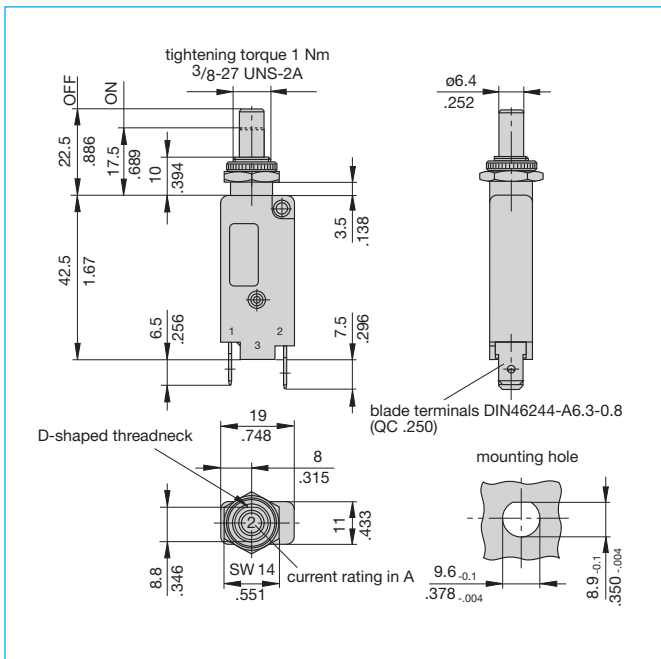
## Technical data

For further details please see chapter: Technical Information

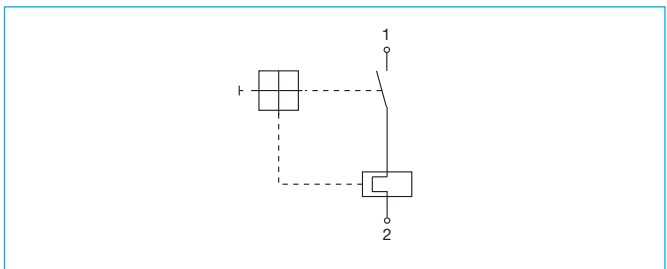
Voltage rating	AC 250 V; DC 28 V		
Current rating range	0.05...10 A		
Typical life	AC 250 V / DC 28 V: 2,000 operations at 2 x I <sub>N</sub> , resistive		
	DC 28 V: 0.05...10 A 1,000 operations at 2 x I <sub>N</sub> , inductive		
Ambient temperature	-20...+60 °C (-4...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664 A)	test voltage	operating area	
	AC 3,000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.05...2 A	10 x I <sub>N</sub>	
	2.5...6 A	8 x I <sub>N</sub>	
	7...10 A	6 x I <sub>N</sub>	
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.05...4.5 A	AC 250 V	200 A
	5 A	AC 250 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40		
	terminal area IP00		
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 15 g		

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

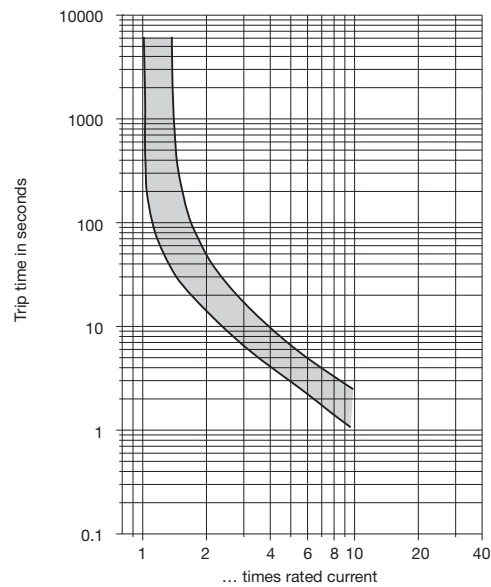
## Dimensions



## Internal connection diagram



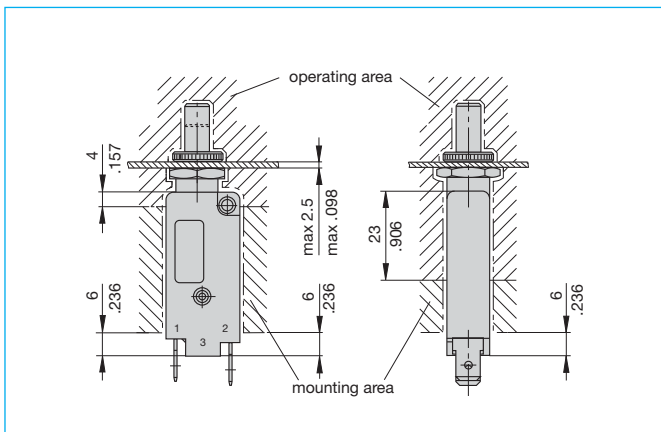
## Typical time/current characteristics at +23 °C/+73.4 °F



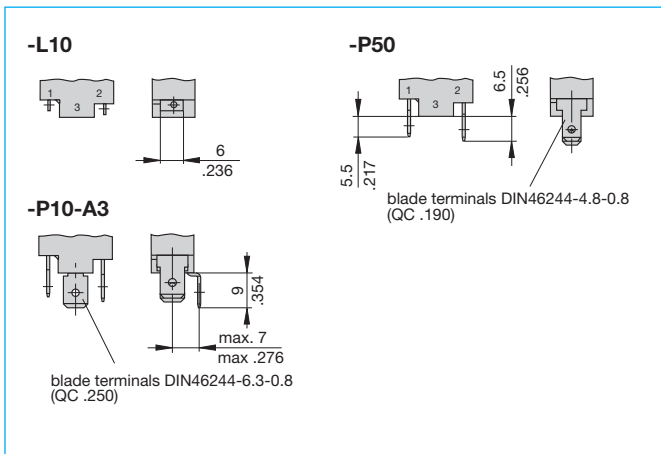
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

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

## Installation drawing

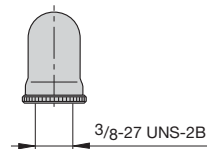


## Terminal design



## Accessories

**Water splash cover, transparent Y 300 538 01,  
bonded to knurled nut Y 300 628 01  
X 200 799 01 (IP64)**



**Water splash cover, transparent  
bonded to special knurled nut  
X 200 798 02 (IP64)**

**Hex nut with splash cover,  
black X 210 739 01 (IP64)  
Water splash cover,  
transparent with hex nut  
X 201 296 03 (IP64)**



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



## Description

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

## Typical applications

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

## Ordering information

<b>Type No.</b>			
4130	single pole thermal circuit breaker		
<b>Mounting</b>			
G	threadneck panel mounting		
<b>Threadneck design</b>			
2	M12x1, knurled nut (bulk shipped)		
4	M12x1, hex nut and knurled nut (bulk shipped)		
<b>Number of poles</b>			
1	single pole, thermally protected		
<b>Actuator configuration</b>			
1	black push button		
<b>Terminal design</b>			
K4	terminal M6x8		
screw and washer bulk shipped			
<b>Characteristic curve</b>			
M1	medium delay		
<b>Current ratings</b>			
20... 70 A			
4130 - G 2 1 1 - K4 M1 - 20 A ordering example			

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
20	< 0.02	40	< 0.01
25	< 0.02	50	< 0.01
30	< 0.02	60	< 0.01
35	< 0.02	70	< 0.01

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 50 V	20...70 A
UL	AC 240 V; AC 120 V; DC 50 V	20...80 A

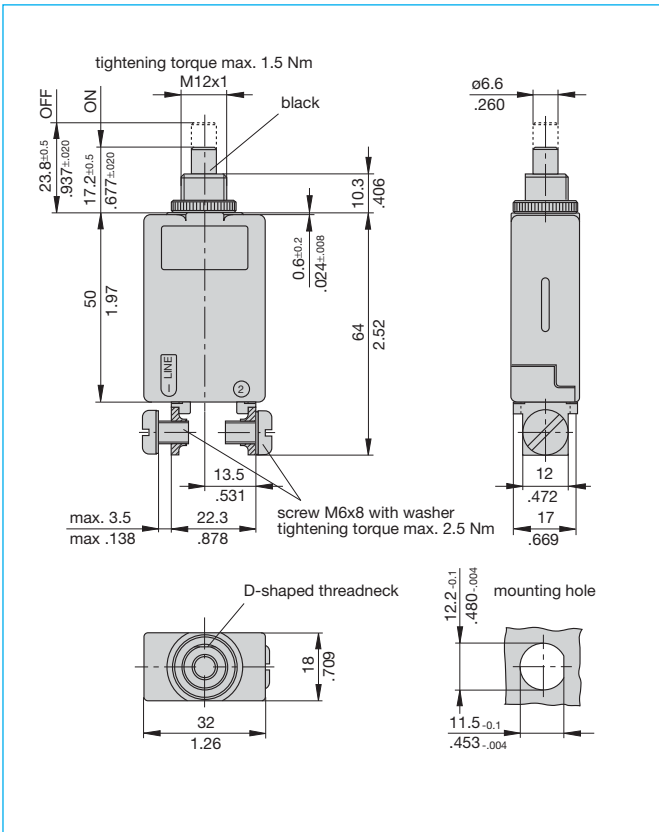


4130-...

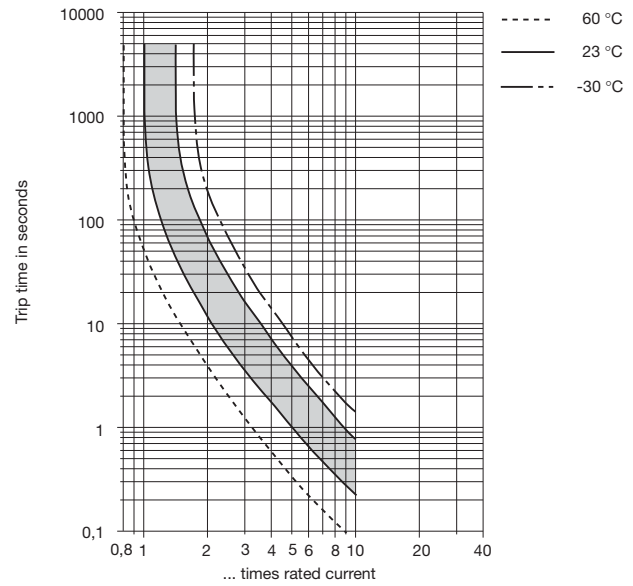
## Technical data

<b>For further details please see chapter: Technical Information</b>			
Voltage rating	AC 240 V; DC 50 V		
Current rating range	20...70 A		
Typical life	AC 240 V: 20...70 A 100 operations at 2 x I <sub>N</sub> , inductive 500 operations at 2 x I <sub>N</sub> , resistive DC 50 V: 20...80 A 500 operations at 2 x I <sub>N</sub> , inductive		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664)	rated impulse withstand voltage 2.5 kV (reinforced insulation in the mounting area)	pollution degree 2	
Dielectric strength operating area	test voltage AC 3,000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	800 A		
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	20...70 A	AC 240 V	1,000 A
	20...60 A	AC 120 V	3,500 A
	70 A	AC 120 V	2,000 A
	20...50 A	DC 50 V	3,500 A
	60...70 A	DC 50 V	2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00		
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-7, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 55 g		

## Dimensions



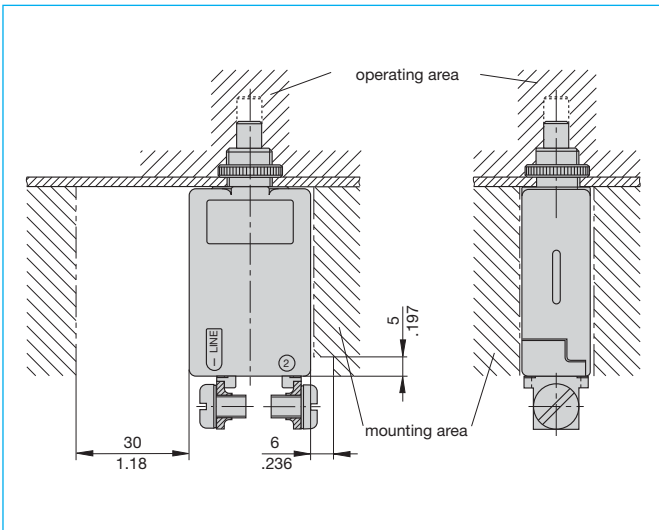
## Typical time/current characteristics



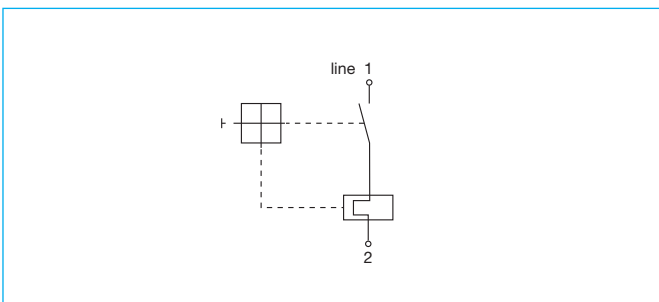
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.68	0.76	0.84	0.92	1	1.08	1.16	1.24

## Installation drawing



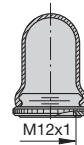
## Internal connection diagram



## Accessories

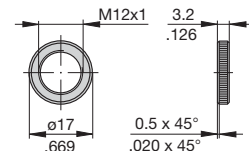
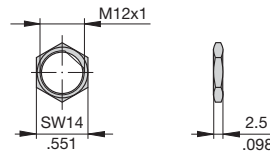
Hex nut with splash cover, black  
X 201 296 01 without O ring (IP64)  
X 200 801 03 with O ring (IP66 /IP67)  
Hex nut with splash cover,  
transparent  
X 200 801 08 with O ring (IP66/IP67)

Water splash cover,  
transparent with knurled  
nut and O ring (IP64)  
X 210 663 01



Separate hardware  
Hex nut Y 300 116 02

Knurled nut  
Y 302 065 01



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

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

## Description

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

## Typical applications

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

## Ordering information

<b>Type No.</b>	
2-5000	flange mounting
2-5700	threadneck panel mounting (hardware bulk shipped)
<b>Threadneck design – type 2-5700 only</b>	
iG1	moulded threadneck 3/8"-27UNS-2A
iG2	moulded threadneck M12x1
<b>Terminal design</b>	
P10	blade terminals 6.3-0.8 mm (QC .250)
K10	screw terminals M4x6
<b>Shunt terminal (optional) -P10 only</b>	
A3	shunt terminal (up to $I_N$ 2.5 A/6 A max. load)
<b>Manual release (optional)</b>	
H	manual release facility (type 2-5000 only)
DD	push to release/push to reset (type 2-5700 only)
<b>Current ratings</b>	
0.05...25 A	
2-5700 -iG1 - P10 - ... - DD - 8 A ordering example	

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.05	280	3	0.1
0.08	100	3.5	0.06
0.1	110	4	0.06
0.2	29	4.5	0.05
0.3	14	5	0.05
0.4	7	6	0.02
0.5	4.9	7	0.02
0.6	3.4	8	0.02
0.7	2.5	10	< 0.02
0.8	1.8	12	< 0.02
1	1.2	13	< 0.02
1.2	0.8	15	< 0.02
1.5	0.6	16	< 0.02
1.8	0.4	20	< 0.02
2	0.3	22	< 0.02
2.5	0.2	25	< 0.02



## Technical data

For further details please see chapter: Technical Information

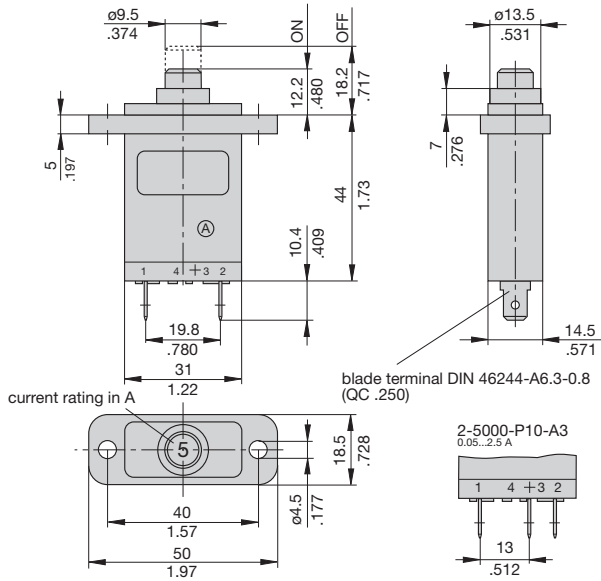
Voltage rating	AC 250 V; DC 28 V (UL: AC 250 V; DC 50 V)	
Current rating range	0.05...25 A	
Typical life	AC 250 V / DC 28 V: 0.05...16 A 5,000 operations at $2 \times I_N$ , inductive 17...25 A 5,000 operations at $2 \times I_N$ , resistive	
Ambient temperature	-20...+60 °C (-4...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	pollution degree 2
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity $I_{cn}$	0.05...2.5 A 3...5 A 6...12 A  13...25 A	$8 \times I_N$ $20 \times I_N$ 200 A (higher interrupting capacity available to special order) 400 A
Interrupting capacity (UL 1077)	$I_N$ 0.05...20 A 0.05...25 A (higher values upon request)	$U_N$ AC 250 V 2,000 A DC 50 V 2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	8 g (57-500 Hz) $\pm$ 0.61 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 29 g	

## Approvals

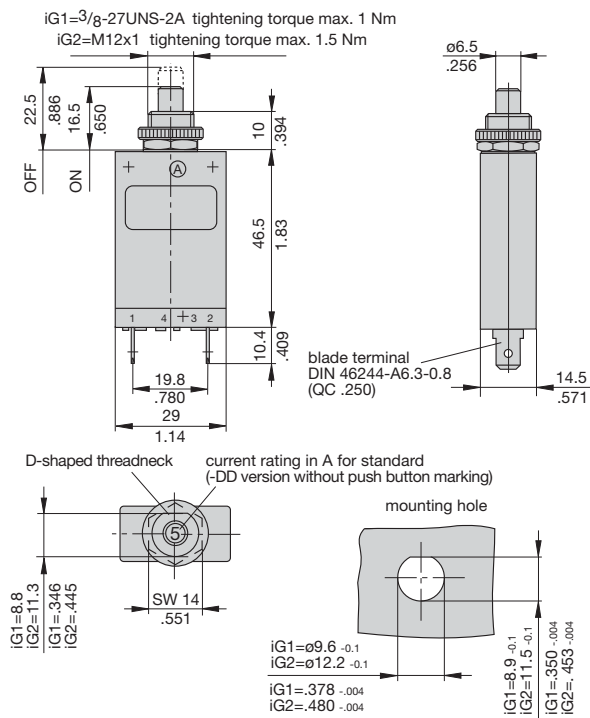
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
CSA/ UL	AC 250 V; DC 50 V	0.05...20 A
CCC	AC 250 V	0.05...25 A
SEV	AC 250 V; DC 28 V	0.05...25 A

## Dimensions

### 2-5000-P10

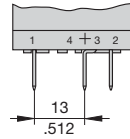


### 2-5700-P10

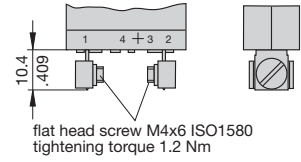


## Terminal design

### -P10-A3 0.05...2.5 A

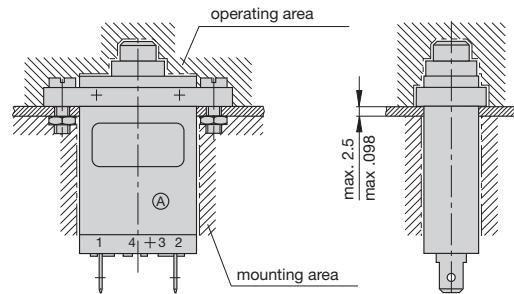


### -K10

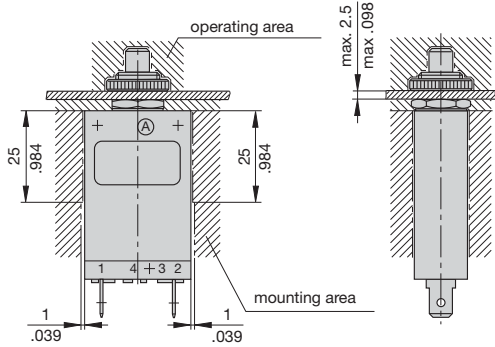


## Installation drawings

### 2-5000-P10



### 2-5700-P10

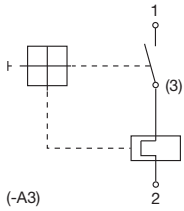


This is a metric design and millimeter dimensions take precedence ( $\frac{mm}{inch}$ )

## Internal connection diagrams

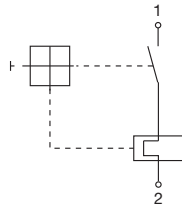
**0.05 ... 2.5 A**

(with or without shunt terminal)

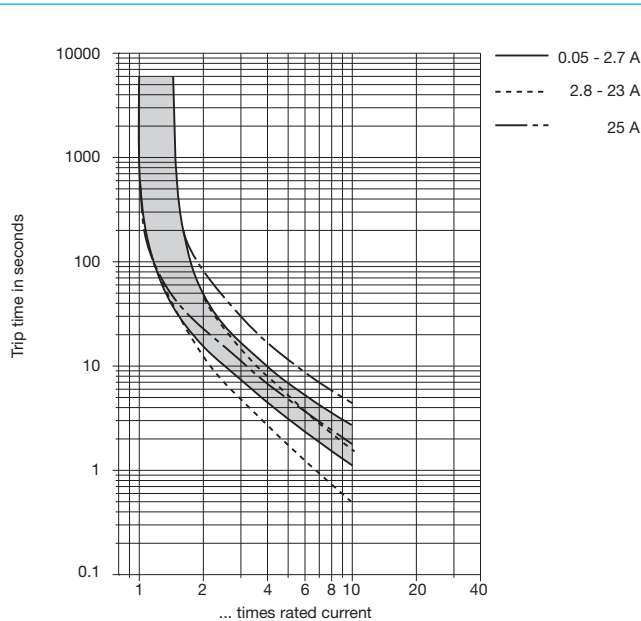


**3 ... 25 A**

(without shunt terminal)



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

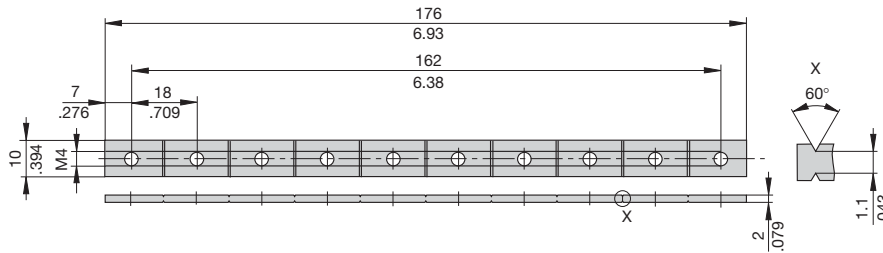


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

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

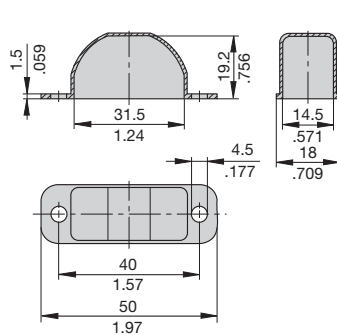
## Accessories for types 2-5000 and 2-5700 with screw terminals -K10

**Bus bar  
Y 303 563 01**

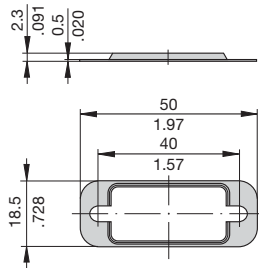


## Accessories for type 2-5000-...

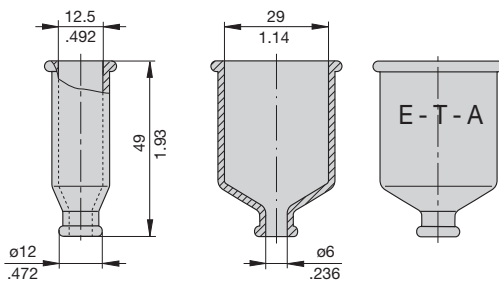
**Water splash cover, transparent  
for push button (IP64)  
Y 300 728 01**



**Fixing plate  
Y 301 056 02**



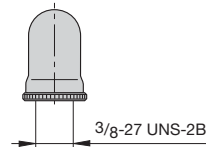
**Rear terminal shroud, transparent (IP64)  
Y 300 476 01**



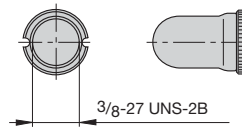
## Accessories for type 2-5700-...

**With 3/8" threadneck (-iG1)**

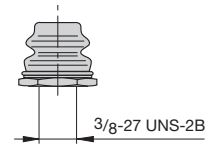
**Water splash cover, transparent Y 300 538 01 and  
knurled nut Y 300 628 01  
X 200 799 01 (IP64)**



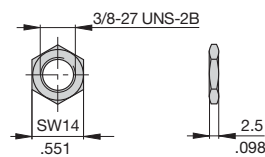
**Water splash cover,  
transparent with  
special knurled nut  
X 200 798 02 (IP64)**



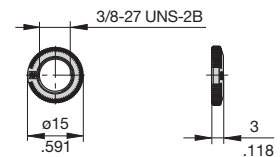
**Hex nut with splash  
cover black without O ring  
X 210 739 01 (IP64)  
transparent splash cover  
X 201 296 03 (IP64)**



**Separate hardware  
Hex nut  
Y 300 192 01**



**Knurled nut  
Y 307 117 02**



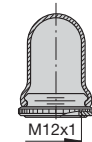
**With M12 threadneck (-iG2)**

**Hex nut with splash cover, black  
X 201 296 01 without O ring (IP64)  
X 200 801 03 with O ring  
(IP66 and IP67)**

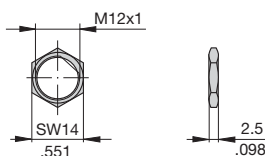
**Hex nut with splash cover,  
transparent  
X 200 801 08 with O ring  
(IP66 and IP67)**



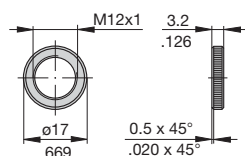
**Water splash cover,  
transparent with knurled nut  
and O ring  
X 210 663 01 (IP64)**



**Hex nut  
Y 300 116 02**



**Knurled nut  
Y 302 065 01**



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

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 thermal circuit breaker with push-to-reset, tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934; M-type when fitted with optional manual release feature). Designed for plug-in mounting with E-T-A sockets 10 and 16.

## Typical applications

Extra low voltage wiring systems and components.

## Ordering information

<b>Type No.</b>	
2-5200	plug-in
<b>Manual release (optional)</b>	
H	manual release facility
<b>Current ratings</b>	
0.05...16 A	
2-5200 -H - .. - 5 A      ordering example	

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	280	2.5	0.2
0.08	100	3	0.1
0.1	110	3,5	0.065
0.2	29	4	0.065
0.3	14	4.5	0.05
0.4	7	5	0.05
0.5	4.9	6	0.02
0.6	3.4	7	0.02
0.7	2.5	8	< 0.02
0.8	1.8	10	< 0.02
1	1.2	12	< 0.02
1.2	0.84	13	< 0.02
1.5	0.6	15	< 0.02
1.8	0.4	16	< 0.02
2	0.25		

## Approvals

Authority	Voltage ratings	Current ratings
UL	AC 250 V; DC 50 V	0.05...20 A



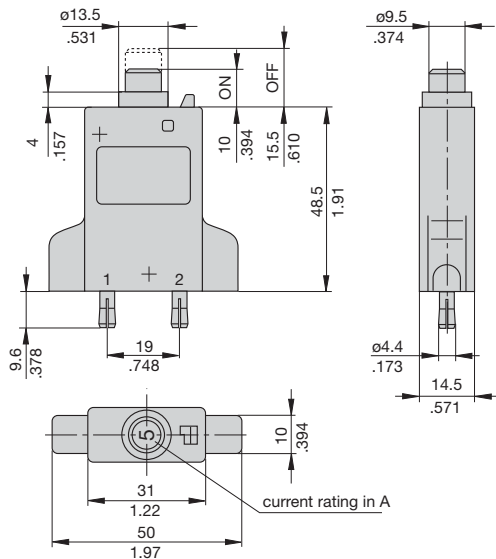
## Technical data

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

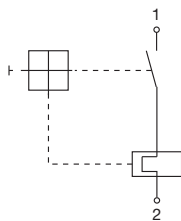
Voltage rating	DC 28 V (UL: AC 250; DC 50 V)	
Current rating range	0.05...16 A (up to 25 A to special order)	
Typical life	AC 250 V / DC 28 V: 0.05...16 A 5,000 operations at 2 x I <sub>N</sub> , inductive	
Ambient temperature	-20...+60 °C (-4...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	0.05...2.5 A 3...5 A 6...16 A (25 A)	8 x I <sub>N</sub> 20 x I <sub>N</sub> 400 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	8 g (57 to 500 Hz) ± 0.61 mm, (10-57 Hz), to IEC 60068-2-6, test Fc,	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 35 g	

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

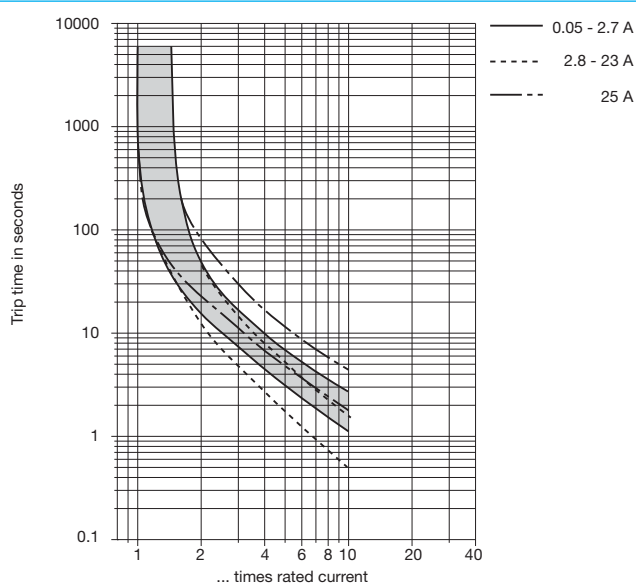
## Dimensions



## Internal connection diagram



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



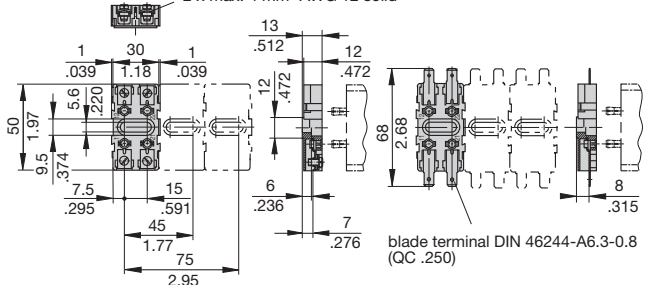
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

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

## Accessories

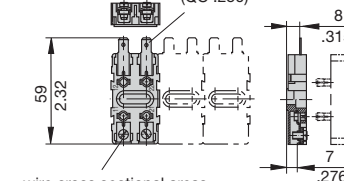
### Sockets 10R-K10

wire cross sectional areas  
 2 x max. 2.5 mm<sup>2</sup> AWG 14 stranded  
 2 x max. 4 mm<sup>2</sup> AWG 12 solid



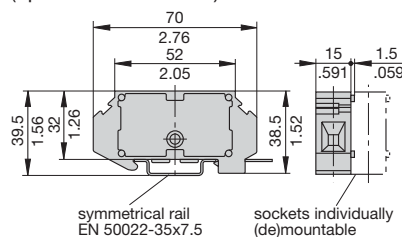
### 10R-A10

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



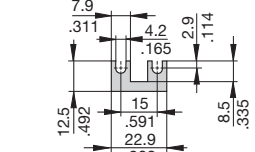
### Socket 16

(up to 16 A max. load)

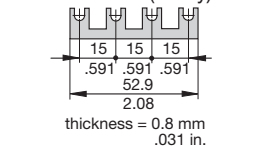


### Bus bar for sockets 10...

**Y 301 166 02 (2 way)**



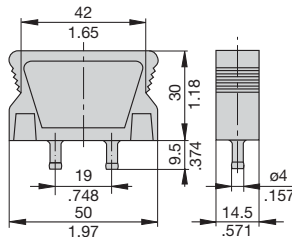
**Y 301 166 01 (4 way)**



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

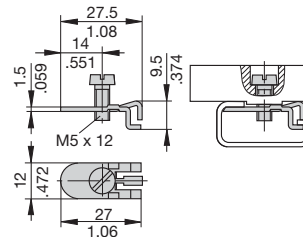
### Blanking plug

**Y 301 477 01**  
 for sockets 10R-P10/K10



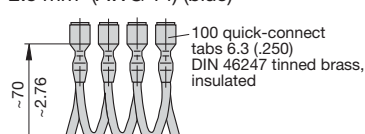
### Terminal for mounting rack

**X 200 800 01**  
 for sockets 10R, 10F on EN rail 50 035-G32



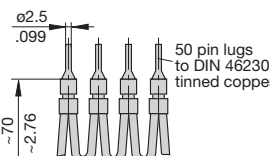
### Connector bus links -P10

**X 210 588 01/**  
 1.5 mm<sup>2</sup> (AWG 16) (brown)  
**X 210 588 02/**  
 2.5 mm<sup>2</sup> (AWG 14) (black)  
**X 210 588 03/**  
 2.5 mm<sup>2</sup> (AWG 14) (red)  
**X 210 588 04/**  
 2.5 mm<sup>2</sup> (AWG 14) (blue)



### Connector bus links -K10

**X 210 589 01/**  
 2.5 mm<sup>2</sup> (AWG 14) (black)  
**X 210 589 02/**  
 1.5 mm<sup>2</sup> (AWG 16) (brown)



1.5 mm<sup>2</sup> - up to 13 A max. load  
 2.5 mm<sup>2</sup> - up to 20 A max. load

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



## Description

Single pole thermal circuit breakers with push-to-reset, tease-free, trip-free, snap action mechanism (R type TO CBE to EN 60934; M-type when fitted with manual release features/type 2-6200 only). Featuring auxiliary contacts (1 x N/C; 1 x N/O) as standard. Options include manual release (type 2-6200 only), an additional unprotected circuit tap (-A3) and a centre reset position in which all contacts are open (-ZR: type 2-6200-H only). Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Motors, transformers, solenoids, controls for oil and gas boilers.

## Ordering information

### Type No.

**2-6200** flange mounting, with auxiliary contacts  
**2-6400** threadneck panel mounting, with auxiliary contacts mounting hardware bulk shipped

### Mounting (type 2-6400 only)

**iG1** moulded threadneck 3/8-27UNS-2A

**iG2** moulded threadneck M12x1

### Terminal design - main circuit

**L10** solder terminals

**P10** blade terminals A6.3-0.8 mm (QC .250)

### Shunt terminal (optional)

**A3** shunt terminal same as main terminal (up to 7/5 A max. load; up to 16 A/10 A max. load)

### Manual release (optional)

**H** manual release facility (type 2-6200 only)

### Intermediate position (optional)

**ZR** intermediate position (type 2-6200-H only)

### Auxiliary contacts (standard)

**Si** N/O and N/C contacts, solder terminals

### Current ratings

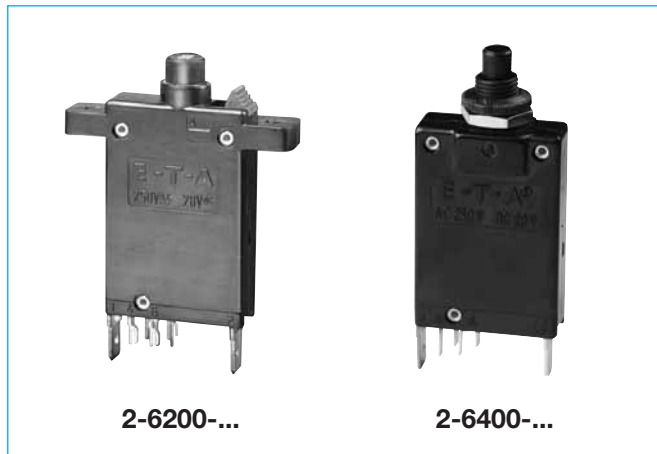
0.05...16 A

**2-6200 - .. - P10 - .. - .. - Si - 8 A** ordering example

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

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	257	2	0.30
0.08	138	2.5	0.20
0.1	90	3	0.12
0.2	32.2	3,5	0.10
0.3	14.6	4	0.07
0.4	8.4	4.5	0.056
0.5	5.15	5	0.046
0.6	3.82	6	0.035
0.7	2.80	7	0.03
0.8	2.15	8	< 0.02
1	1.42	10	< 0.02
1.2	0.96	12	< 0.02
1.5	0.51	15	< 0.02
1.8	0.40	16	< 0.02



## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 250 V; DC 28 V		
Current rating range	0.05...16 A		
Auxiliary circuit	1 A, AC 250 V/DC 28 V		
Typical life	AC 250 V / DC 28 V: 0.05...16 A 5,000 operations at 2 x I <sub>N</sub> , inductive		
Ambient temperature	-20...+60 °C (-4...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage	pollution degree 2	
	2.5 kV	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A)	test voltage	AC 3,000 V	
	operating area	AC 1,500 V	
	main circuit	AC 840 V	
	to aux. circuit	AC 1,500 V	
	aux. circuit 4-5 to 6-7	AC 840 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	10 x I <sub>N</sub>		
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.05...4.5 A	AC 250 V	200 A
	5...7 A	AC 250 V	1,000 A
	8...15 A	AC 250 V	2,000 A
	16 A	AC 250 V	3,500 A

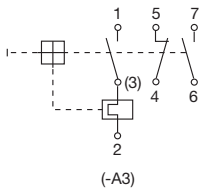
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	40 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 25 g

## Approvals

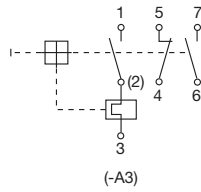
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...16 A
CSA/ UL	AC 250 V; DC 28 V	0.05...16 A

## Internal connection diagrams

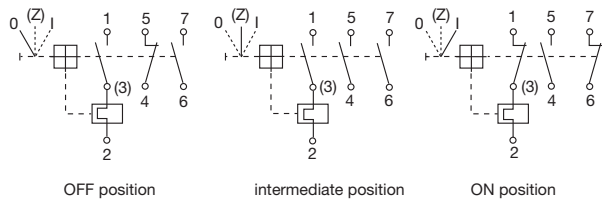
### 0.05 ... 7 A



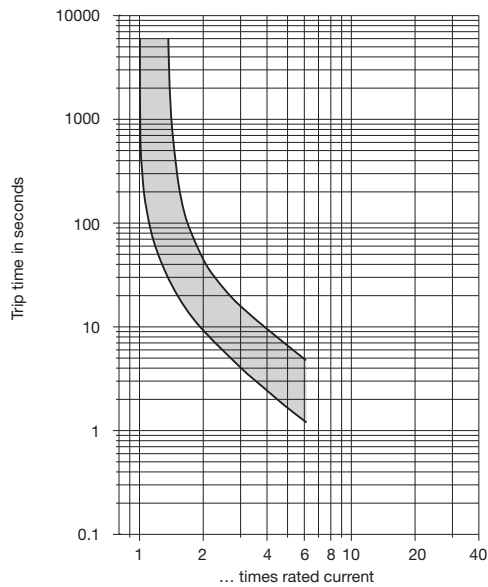
### 8 ... 16 A



### 2-6200-...-ZR



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

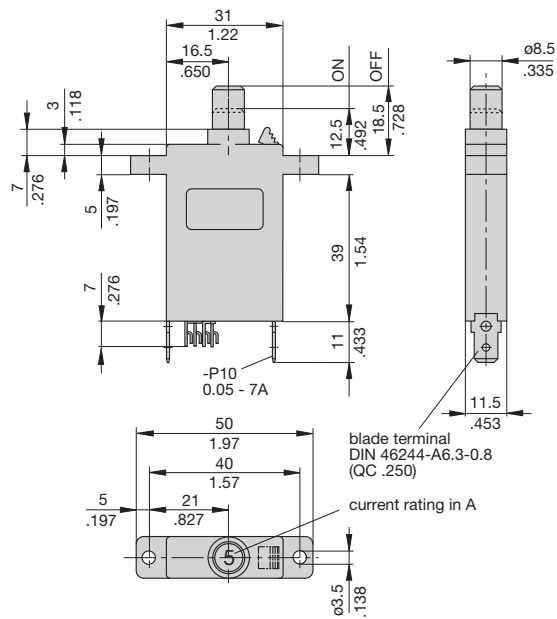


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

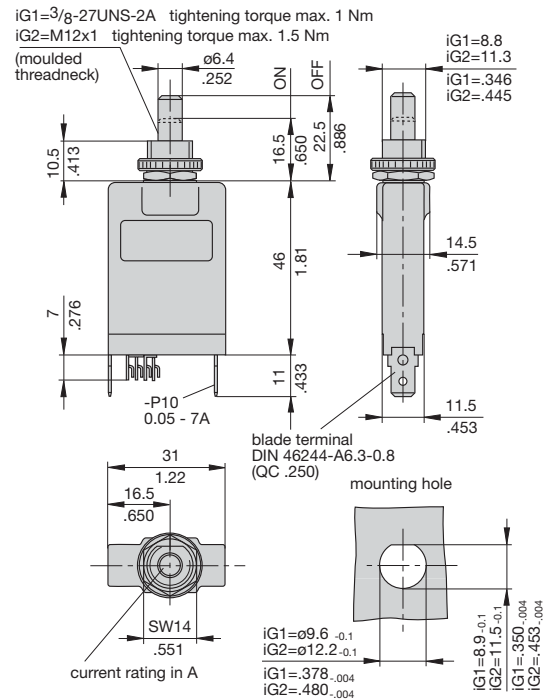
Ambient temperature °F	-4	+14	+32	+73.4	+104	+122	+140
°C	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.84	0.92	1	1.08	1.16	1.24

## Dimensions

### 2-6200-...



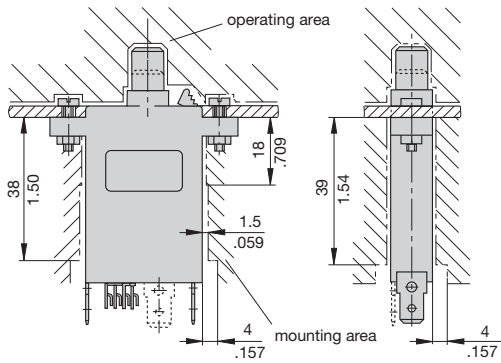
### 2-6400-...



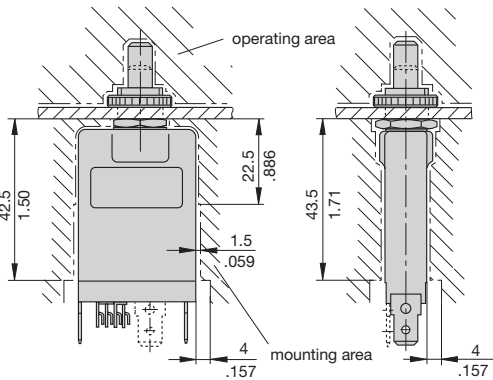
This is a metric design and millimeter dimensions take precedence (mm)  
inch

## Installation drawings

### 2-6200-...



### 2-6400-...

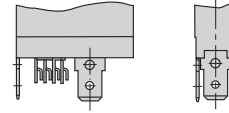


## Terminal design

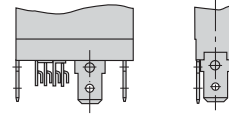
### -P10 0.05...7 A

See dimension diagram.

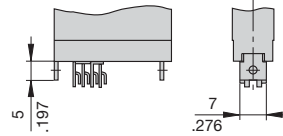
### -P10 8...16 A



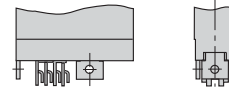
### -P10-A3 0.05...16 A



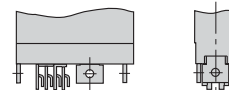
### -L10 0.05...7 A



### -L10 8...16 A



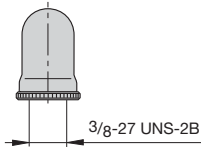
### -L10-A3 0.05...16 A



## Accessories for type 2-6400-...

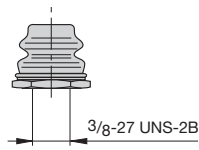
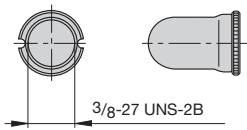
With 3/8" threadneck (-iG1)

Water splash cover, transparent Y 300 538 01 and knurled nut Y 300 628 01 X 200 799 01 (IP64)



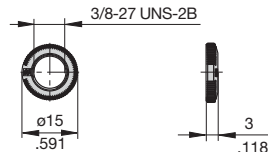
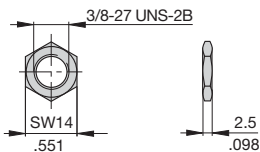
Water splash cover, transparent with special knurled nut X 200 798 02 (IP64)

Hex nut with splash cover black without O ring X 210 739 01 (IP64)  
transparent splash cover X 201 296 03 (IP64)



Separate hardware  
Hex nut Y 300 192 01

Knurled nut Y 307 117 02

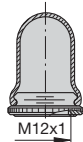


With M12 threadneck (-iG2)

Hex nut with splash cover, black X 201 296 01 without O ring (IP64)  
X 200 801 03 with O ring (IP66 and IP67)

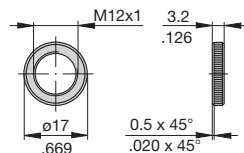
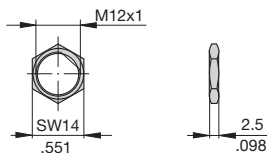
Water splash cover, transparent with knurled nut and O ring X 210 663 01 (IP64)

Hex nut with splash cover, transparent X 200 801 08 with O ring (IP66 and IP67)



Hex nut Y 300 116 02

Knurled nut Y 302 065 01



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

Bimetal operated single pole motor protection control with automatic reset actuation, small physical size, reliable snap-action mechanism.

**Caution:** In specifying this product, care should be taken to ensure that automatic motor re-start does not represent a safety hazard.

## Typical applications

Motors, transformers, extra low voltage wiring.

## Ordering information

<b>Type No.</b>	
<b>2-6500</b>	surface type with flange
<b>Terminal design</b>	
<b>P10</b>	blade terminals 6.3-0.8 (QC .250)
<b>Shunt terminal (optional)</b>	
<b>A3</b>	blade terminals or solder terminals; max. load 5 A
<b>Current ratings</b>	
<b>0.1...10 A</b>	
<b>2-6500 - P10 - ... - 6 A</b> 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)
0.1	140	2	0.47
0.2	47.5	2.5	0.33
0.3	20.5	3	0.212
0.4	11.4	3.5	0.155
0.5	7.25	4	0.107
0.6	5.35	4.5	0.095
0.7	3.8	5	0.072
0.8	2.95	6	0.054
1	1.92	7	0.032
1.2	1.32	8	0.02
1.5	0.85	9	< 0.02
1.8	0.59	10	< 0.02

## Approvals

Authority	Voltage rating	Current rating
UL	AC 250 V; DC 28 V	0.1...10 A

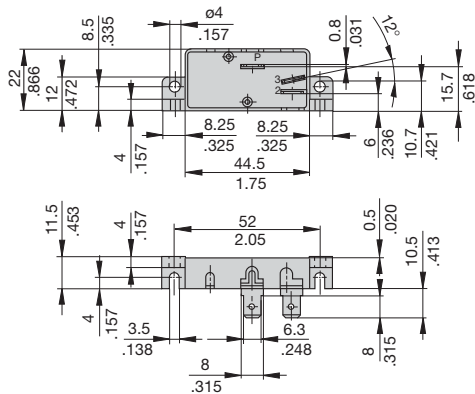


**2-6500-...**

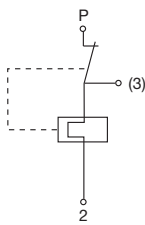
## Technical data

Voltage rating	AC 250 V (50/60 Hz); DC 28 V	
Current ratings	0.1...10 A (up to 15 A upon request)	
Typical life	100,000 operations at $2 \times I_N$ Protection is ensured for 18 days of continuous locked rotor condition with $I_k \leq 6 \times I_N$ , max. 30 A (unsupervised duty)	
Ambient temperature	-10...+60 °C (-10...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree
	2.5 kV	3
Dielectric strength (IEC 60664 and 60664A)	test voltage AC 2,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity	$8 \times I_N$ (co-co-co)	
Reset time at 23 °C	≥ 30 sec ≤ 70 sec	
Degree of protection (IEC 60529/DIN 40050)	housing IP30 terminal area IP00	
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	15 g (11 ms) test to IEC 60068-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 20 g	

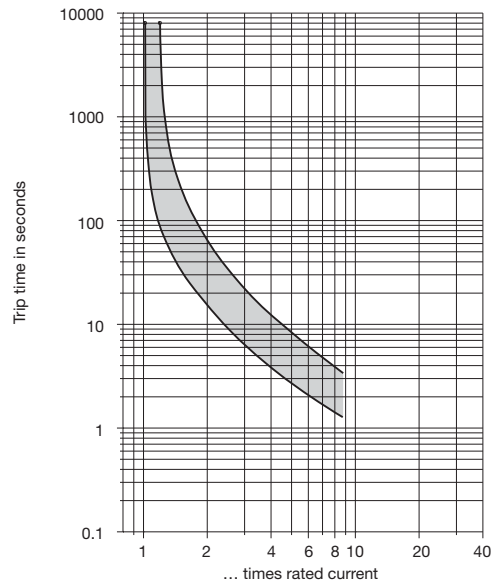
## Dimensions



## Internal connection diagram



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



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

Ambient temperature °F	+14	+32	+50	+73.4	+86.1	+104	+122	+140
°C	-10	0	+10	+23	+30	+40	+50	+60
Derating factor	0.84	0.92	1	1	1	1.08	1.16	1.24

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 thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Featuring a narrow profile housing, recessed terminals, standard EN rail mounting, and precision CBE performance. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Process control systems, instrumentation, rail vehicles.

## Ordering information

Type No.	
201	single pole, rail mounted version
201-WA	low-resistance version
	<b>Option</b>
2705	fitted with adapter X 200 409 01
	<b>Current ratings</b>
	0.05...16 A (type 201)
	0.05...10 A (type 201-WA)
201 - .. - .... - 10 A	ordering example

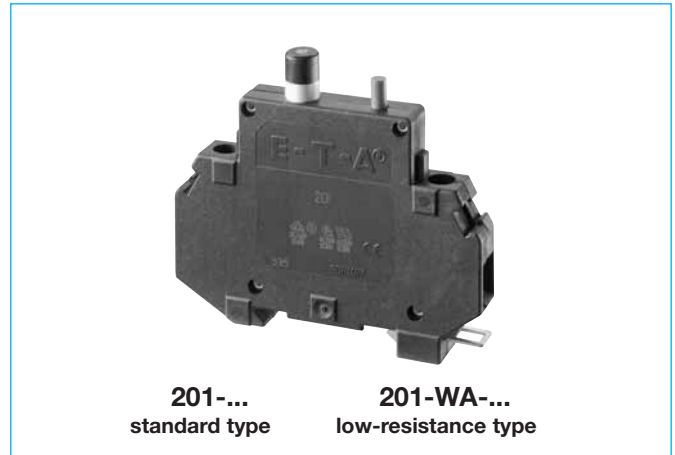
The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )		Current rating (A)	Internal resistance ( $\Omega$ )	
	201	201-WA		201	201-WA
0.05	447	211	3	0.19	0.054
0.1	131	48	4	0.090	0.035
0.2	40	12.4	5	0.061	0.025
0.3	19.3	5.7	6	0.041	< 0.02
0.4	10.4	3.1	7	0.034	< 0.02
0.5	7.1	2.0	8	< 0.02	< 0.02
0.6	4.3	1.32	10	< 0.02	< 0.02
0.8	2.5	0.76	12	< 0.02	< 0.02
1	1.67	0.49	14	< 0.02	< 0.02
1.5	0.61	0.21	15	< 0.02	< 0.02
2	0.38	0.101	16	< 0.02	< 0.02
2.5	0.24	0.078			

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60 934)	AC 240 V; DC 65 V	0.05...16 A
CSA, UL	AC 250 V; DC 80 V	0.05...16 A
UL	DC 65 V	0.05...25 A

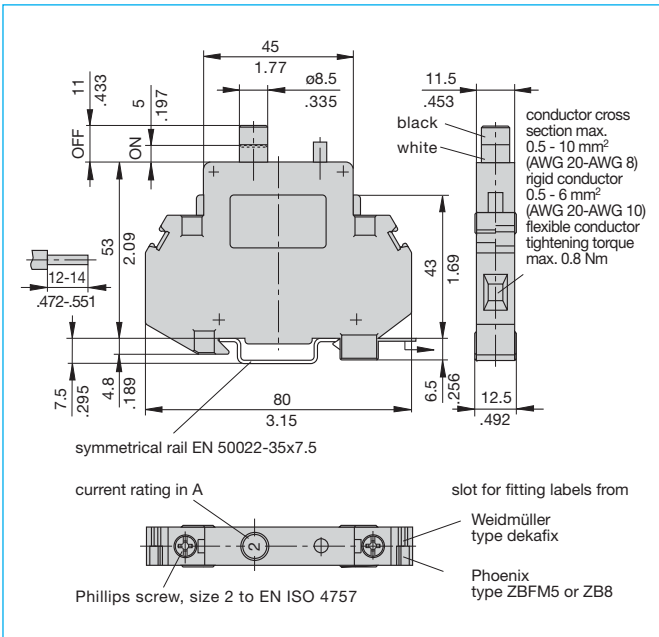


## Technical data

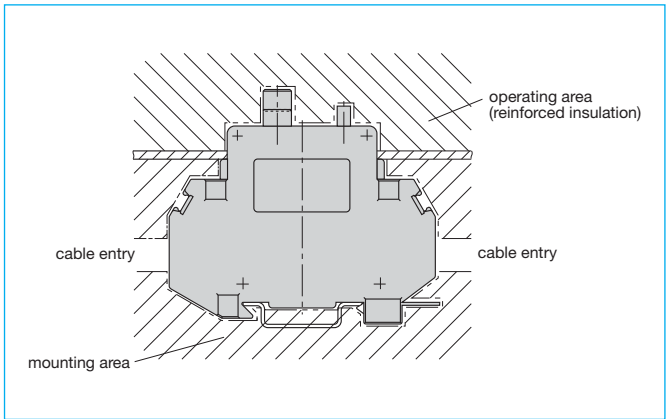
For further details please see chapter: Technical Information

Voltage rating	AC 240 V (50/60 Hz); DC 65 V (UL: AC 250 V; DC 80 V)		
Current rating range	201: 0.05...16 A 201-WA: 0.05...10 A		
Typical life	5,000 operations at 1 x $I_N$ , inductive 5,000 operations at 2 x $I_N$ , resistive		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV reinforced insulation	pollution degree 2 in operating area	
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V		
Insulation resistance	> 100 M $\Omega$ (DC 500 V)		
Interrupting capacity $I_{cn}$	201 0.05...0.8 A 1...2 A 2.5...16 A	201-WA 0.05...0.2 A 0.3...2 A 2.5...10 A	self-limiting 200 A 400 A
Interrupting capacity (UL 1077)	$I_N$ 0.05...16 A 0.05...16 A	$U_N$ AC 250 V DC 80 V	1,000 A 1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP20		
Vibration	5 g (57-500 Hz), $\pm$ 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 60 g		

## Dimensions

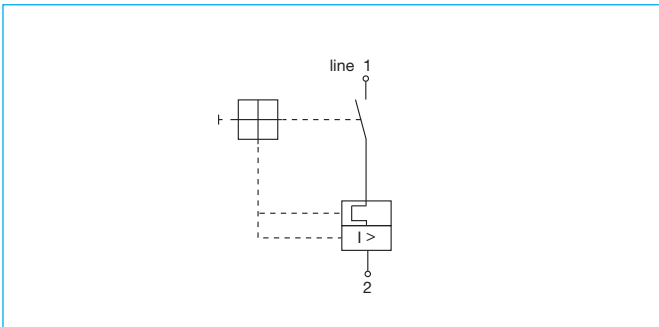


## Installation drawing



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

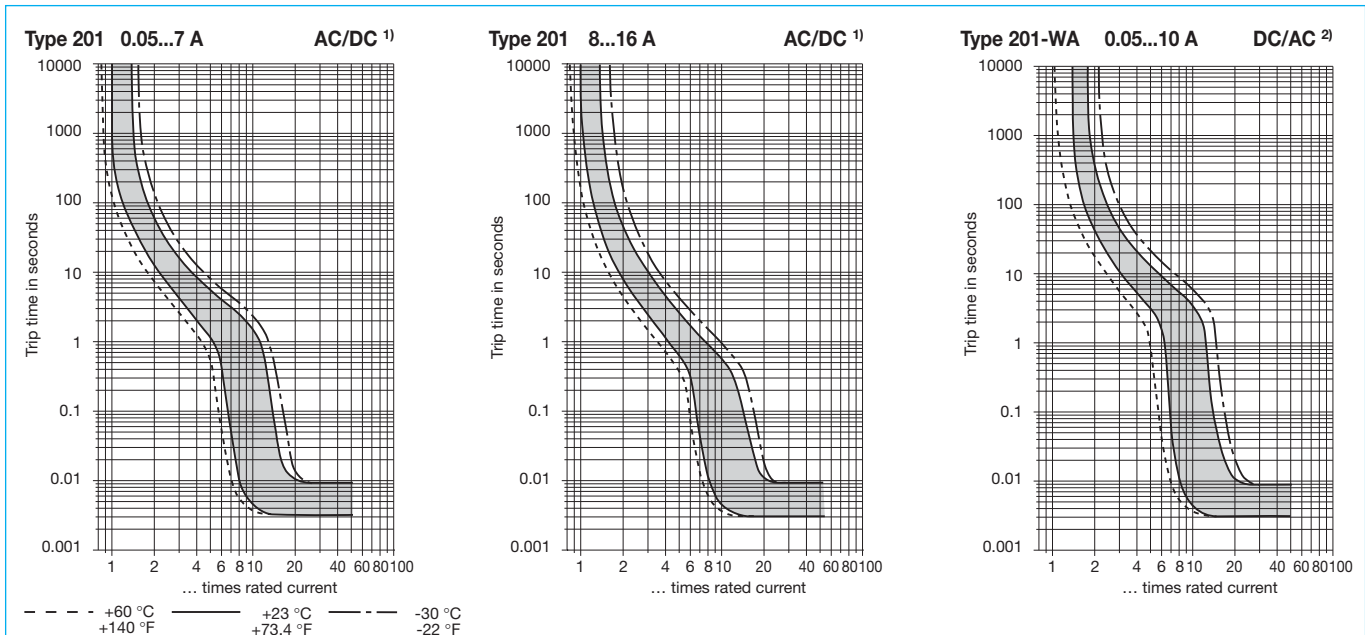
## Internal connection diagram



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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.08	1.16	1.24

## Typical time/current characteristics



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

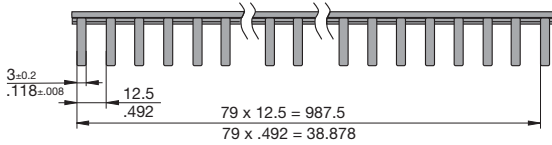
<sup>2)</sup> Magnetic tripping currents are decreased by 20% on AC supplies.



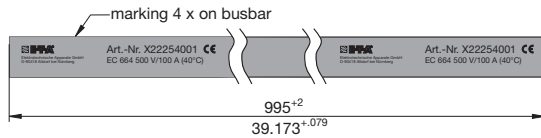
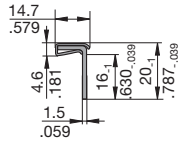
## Accessories

### Busbar 1-pole, 90° X 222 540 01

The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.  
I<sub>max</sub> - busbar 100 A (40°C)

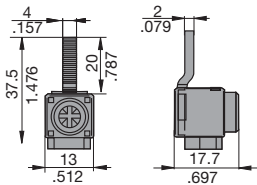


### Plug-on cap, 1-pole Y 307 851 01

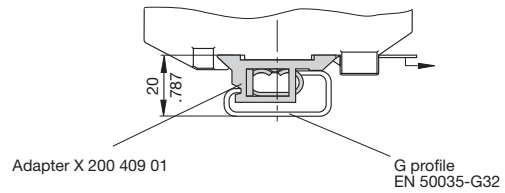


### Supply terminal I<sub>max</sub> 63 A Y 308 551 01

Max. tightening torque of terminal screw 2 Nm  
Max. cable cross section: 25 mm<sup>2</sup> / single strand  
16 mm<sup>2</sup> / multistrand with wire end ferrule

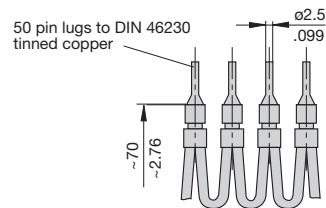


### Adapter for EN rail 50035-G32 specified as a separate item X 200 409 01



### Connector bus links -K10

X 210 589 01/2.5 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



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

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## Description

One, two and three pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934/IEC 934). Designed for panel or plug-in mounting. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling. Two and three pole models are internally linked to ensure that both/all poles trip in the event of an overload on one pole, even if the actuator is held in the ON position. A choice of characteristic curves further extends the range of applications possibilities for these CBEs. Special auxiliary contact versions for industrial atmosphere and low voltages (e.g. 5 V) available on request.

Approved to CBE standard EN 60934 (IEC 60934). Suitable for use in distribution rails – see section 7.

## Typical applications

Process control equipment, robotics, machine tool control, communications systems, instrumentation, rail vehicles. Special versions, e.g. for aggressive environmental conditions and low voltages (e.g. 5 V) on request.

## Ordering information

<b>Type No.</b>	
<b>2210</b>	single or multipole thermal-magnetic circuit breaker
<b>Mounting</b>	
<b>S</b>	socket or panel mounting
<b>Actuator design</b>	
<b>2</b>	toggle
<b>Number of poles</b>	
<b>1</b>	1-pole protected
<b>2</b>	2-pole protected
<b>3</b>	3-pole protected
<b>5</b>	2-pole, protected on one pole only
<b>Panel mounting</b>	
<b>0</b>	without hardware
<b>1</b>	with M3 thread
<b>2</b>	with 6/32 thread
<b>Terminal design (main contacts)</b>	
<b>P1</b>	blade terminals 6.3-0.8 (QC .250)
<b>Characteristic curve</b>	
<b>F1</b>	fast acting: therm. 1.01-1.4xI <sub>N</sub> ; magn. 2-4xI <sub>N</sub> DC (DC only)
<b>F2</b>	fast acting: therm. 1.01-1.4xI <sub>N</sub> ; magn. 3.5-6.5xI <sub>N</sub> AC/ 4.5-8.5xI <sub>N</sub> DC
<b>M1</b>	standard delay: therm. 1.01-1.4xI <sub>N</sub> ; magn. 6-12xI <sub>N</sub> AC; 7.8-15.6xI <sub>N</sub> DC
<b>T1</b>	delayed: therm. 1.01-1.4xI <sub>N</sub> ; magn. 10-20xI <sub>N</sub> AC
<b>T2</b>	thermal only, 1.01-1.4xI <sub>N</sub>
<b>M3</b>	standard delay, low resistance: therm. 1.4-1.8xI <sub>N</sub> ; magn. 6-12xI <sub>N</sub> AC; 7.8-15.6xI <sub>N</sub> DC
<b>Intermediate position</b>	
<b>H</b>	without intermediate position (standard)
<b>Z</b>	with intermediate position
<b>Auxiliary contacts</b>	
<b>0</b>	without auxiliary contacts
<b>1</b>	with auxiliary contacts in all poles
<b>2</b>	with auxiliary contacts in pole 1 (only multipole devices)
<b>3</b>	with auxiliary contacts in poles 1 and 3 (≥ 3-pole devices)
<b>Auxiliary contact function (see diagram)</b>	
<b>1</b>	one each N/C and N/O (standard)
<b>2</b>	one N/O contact (23/24)
<b>3</b>	one N/C contact (11/12)
<b>Auxiliary contact - terminal design</b>	
<b>1</b>	same as main terminals
<b>Current ratings</b>	
	<b>0.1...25 A</b>
<b>2210 - S 2 1 0 - P1 F1 - H 1 1 1 - 10 A</b>	ordering example

Remote trip coil available to special order.



2210-S2..

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 250 V*; 3 AC 433 V (50-60Hz); DC 65 V (*UL: AC 277 V; DC 65 V)		
Current rating range	0.1...25 A for curves M1, T1, T2 0.1...16 A for curves F1, F2, M3		
Auxiliary circuit	1 A, AC 240 V/DC 65 V		
Typical life	10,000 operations at 1 x I <sub>N</sub> , inductive		
Ambient temperature	-30...+60 °C (-22...+140 °F) T 60		
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
operating area	AC 3,000 V		
main/aux. circuit	AC 1,500 V		
aux. circuit 11-12/23-24 pole/pole	AC 1,000 V		
	AC 1,500 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>CN</sub>	0.1...5 A	400 A	
	6...25 A	800 A	
curves F1, F2, M1, T1:	0.1...16 A	2,500 A	(at DC 32 V)
curve T2 :	0.1...25 A	15 x I <sub>N</sub>	
curve M3:	0.1...2 A AC	200 A / DC 400 A	
Interrupting capacity (UL 1077)	I <sub>N</sub>	0.1...8 A	10...16 A
	U <sub>N</sub>	AC 250 V	AC 125 V
		AC 250 V	AC 250 V
	1-pole	1,000 A	2,000 A
	2-pole	2,000 A	2,000 A
	3-pole	3AC 250V	3AC 250V
		2,000 A	2,000 A
		3,500 A	3,500 A
		3,500 A	2,000 A
		3,500 A	2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00		
Vibration	curve F1:	3 g (57-500 Hz), ± 0.23 mm (10-57 Hz)	
	curves M1, M3, T1, T2:	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz)	
		to IEC 60068-2-6, test Fc	
		10 frequency cycles/axis	
Shock	curve F1:	25 g (11 ms), directions 1, 2, 3, 4, 5	
		10 g (11 ms), direction 6	
	curves M1, M3, T1, T2:	25 g (11 ms), directions 1, 2, 3, 4, 5	
		20 g (11 ms), direction 6	
		to IEC 60068-2-27, test Ea	
Corrosion	96 hours in 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 50 g per pole		



# Thermal-Magnetic Circuit Breaker 2210-S2..

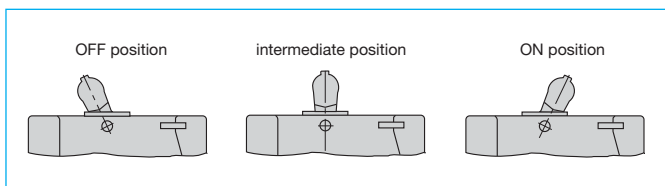
## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)					
	F1 fast acting for DC only	F2 fast acting delay for AC + DC	M1 standard for AC + DC	T1 delayed low resistance nur für AC	M3 standard delay for AC + DC	T2 thermal for AC + DC
0.1	162	162	92	81	42	77
0.2	39.3	39.3	26.1	24.2	11.7	23
0.3	17.5	17.5	11.6	10.4	5.6	10.2
0.4	9.2	9.2	6,6	6.0	2.9	5.7
0.5	6.8	6.8	4,1	3.9	1.75	3.7
0.6	4.2	4.2	3	2.7	1.42	2.6
0.8	2.8	2.8	1.65	1.53	0.75	1.39
1	1.6	1.6	1,10	0.98	0.5	0.9
1.5	0.78	0.78	0.47	0.42	0.22	0.36
2	0.42	0.42	0.28	0.24	0.136	0.19
2.5	0.26	0.26	0.183	0.17	0.083	0.141
3	0.18	0.18	0.124	0.12	0.057	0.091
4	0.12	0.12	0.077	0.073	0.041	0.051
5	0.092	0.092	0.063	0.055	0.032	0.040
6	0.054	0.054	0.045	0.039	0.021	0.027
8	0.025	0.025	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
10	0.022	0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
20	-	-	≤ 0.02	≤ 0.02	-	≤ 0.02
25	-	-	≤ 0.02	≤ 0.02	-	≤ 0.02

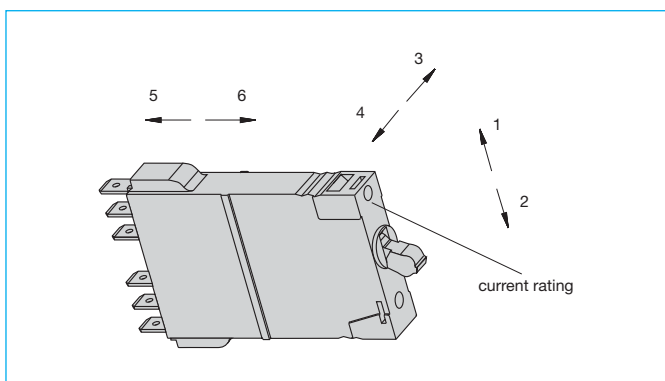
## Approvals

Authority	Voltage ratings	Current ratings
GL, VDE (EN 60934)	AC 250 V; DC 65 V; 3 AC 433 V	0.1...25 A
UL, CSA	AC 277 V; DC 65 V; AC 277/480 V	0.1...25 A

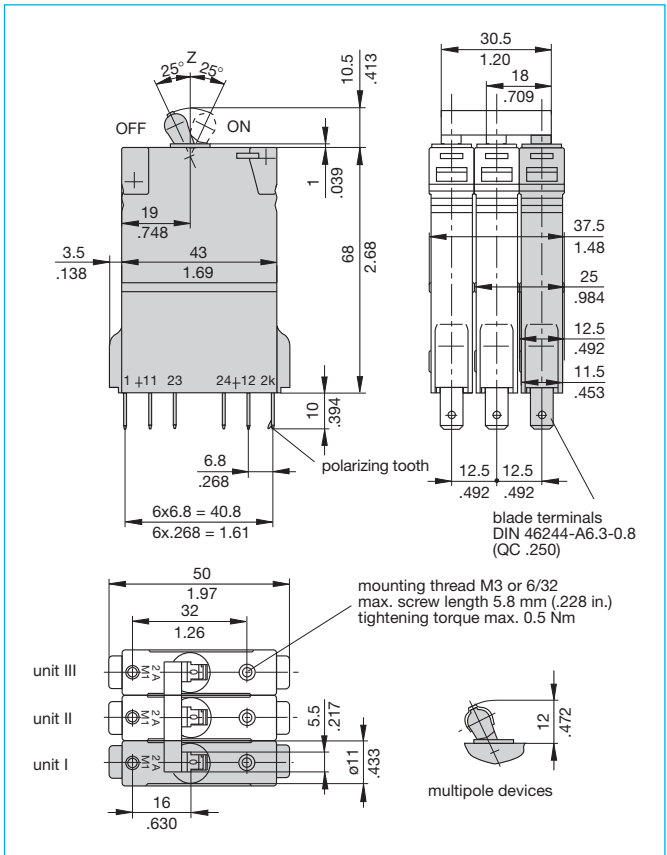
## Toggle positions



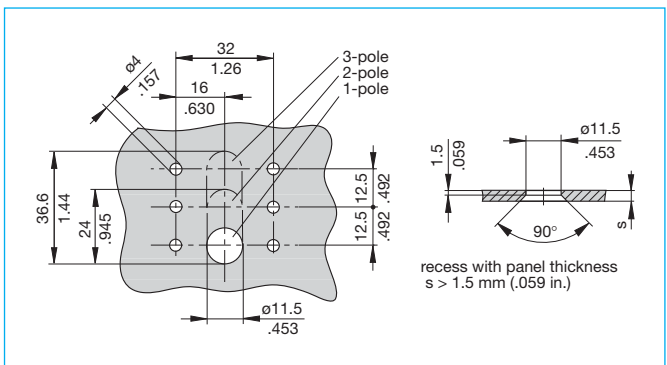
## Shock directions



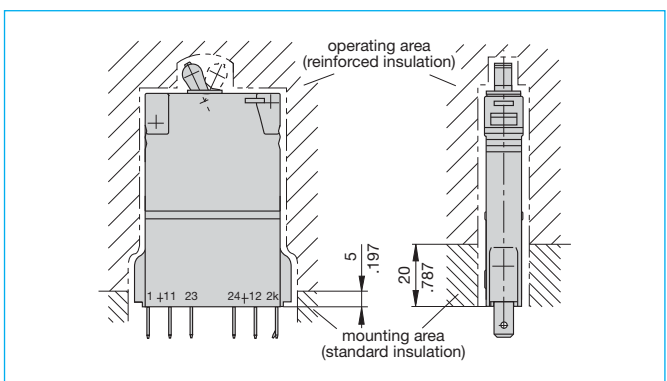
## Dimensions



## Cut-out dimensions



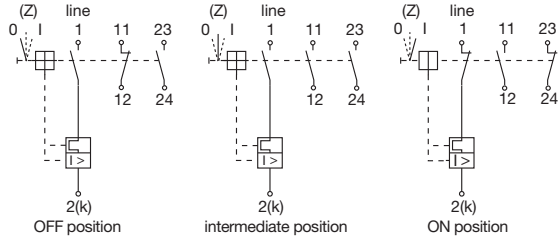
## Installation drawing



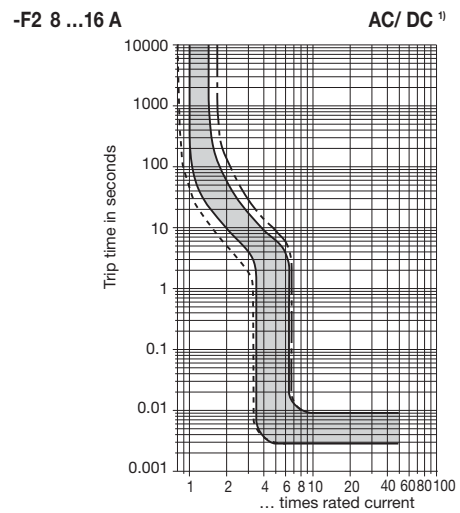
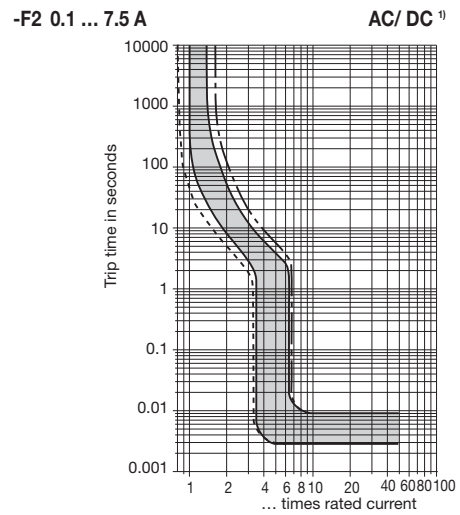
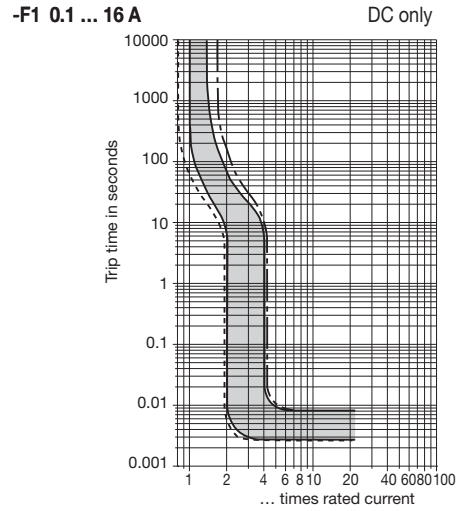
This is a metric design and millimeter dimensions take precedence (mm / inch)

## Internal connection diagrams

**with auxiliary contact function 1** (one each N/O and N/C)  
 (...-H111-...) without intermediate position  
 (...-Z111-...) with intermediate position



## Typical time/current characteristics



--- +60 °C / +140 °F    ——— +23 °C / +73.4 °F    - - - -30 °C / -22 °F

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies.

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.04	1.11	1.19	1.29

Multipole devices: all poles symmetrically loaded. With single pole overload, thermal tripping will be at max.  $1.7 \times I_N$  with curves F1, F2, M1 and T2, and at max.  $2.2 \times I_N$  with curve M3.

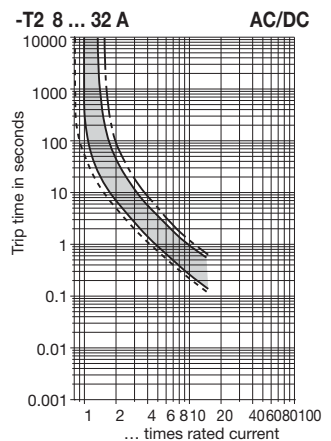
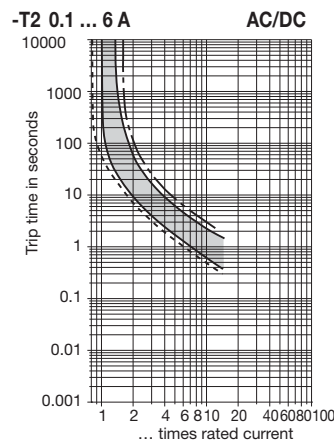
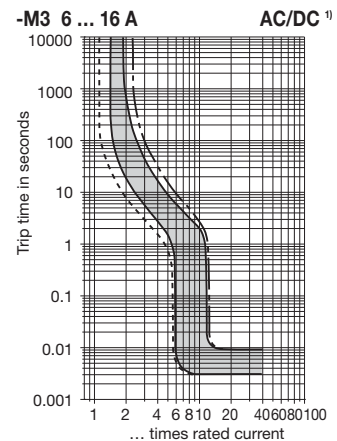
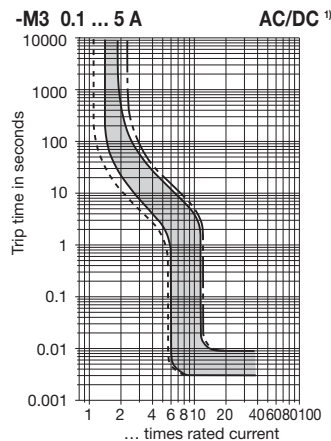
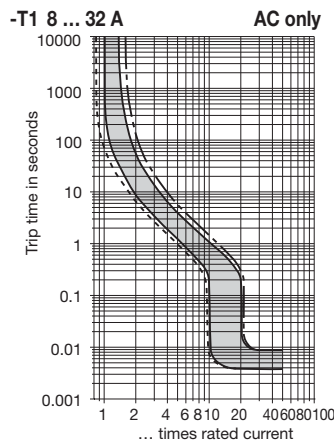
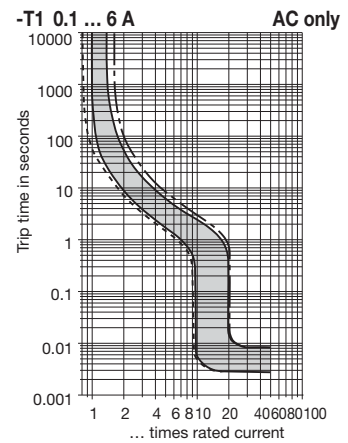
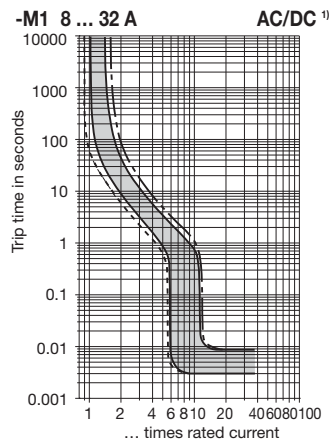
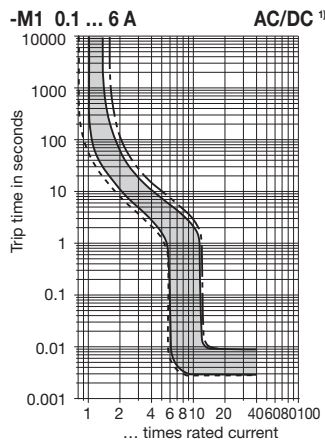
## Typical time/current characteristics

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.04	1.11	1.19	1.29

Multi pole devices: all poles symmetrically loaded. With single pole overload, thermal tripping will be at max.  $1.7 \times I_N$  with curves F1, F2, M1 and T2, and at max.  $2.2 \times I_N$  with curve M3.

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies (curves M1, M3, T1).

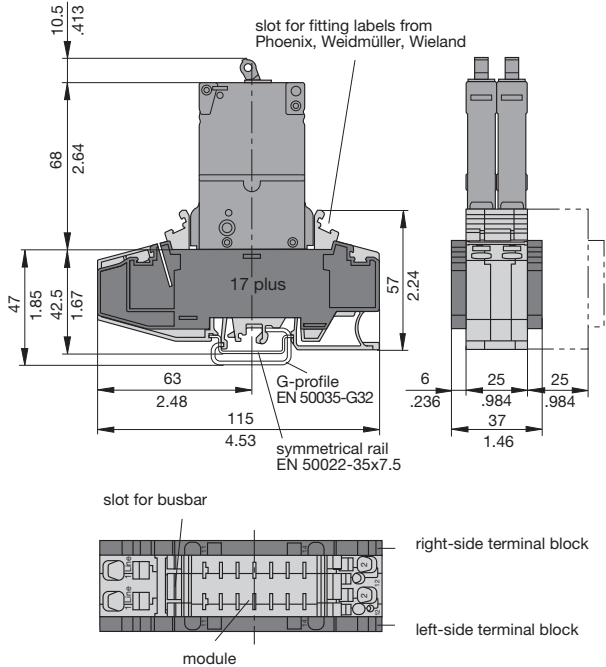


- - - +60 °C    ——— +23 °C    - - - -30 °C  
                   +140 °F    +73.4 °F    -22 °F

## Accessories

### Module 17plus

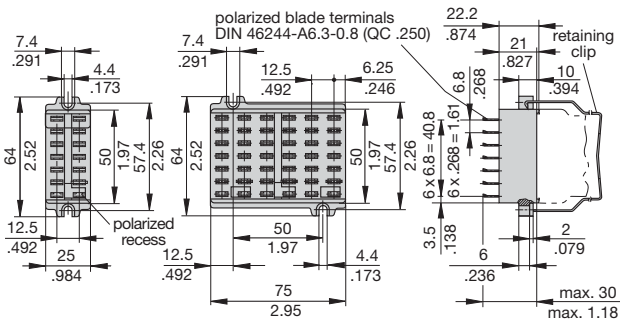
For technical data see section 7 - Power distribution systems



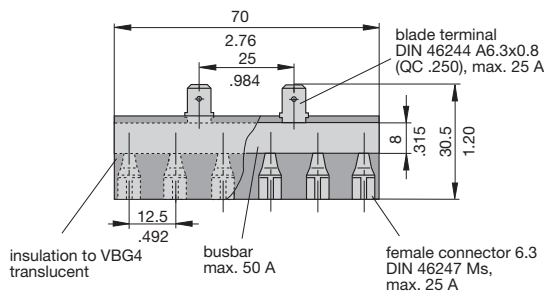
### 2-way mounting socket 23-P10-Si

(up to 16 A max. load)  
(retaining clip Y 302 974 01 available on request)

### 6-way mounting socket 63-P10-Si



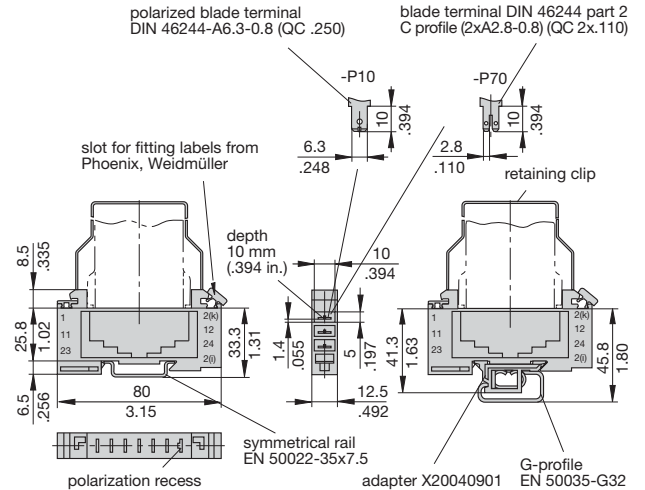
### Bus bar 50 A, 6-way, for type 63-P10-Si socket X 221 760 11



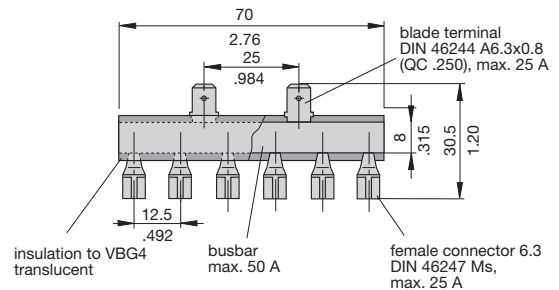
### Single mounting sockets (with adapter)

(up to 16 A max. load)

17-P10-Si  
17-P70-Si  
(retaining clip Y 302 974 21 available on request)



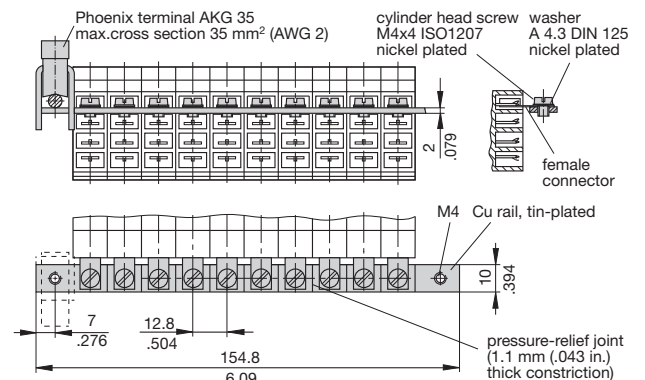
### Bus bar 50 A (6-way) for type 17-P10-Si socket X 221 760 01



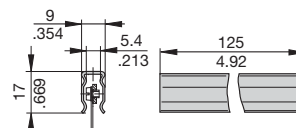
### Bus bar (10-way) (supplied as a complete package) for type 17 socket

(for max. 100 A continuous load), more positions available on request

X 211 157 01 with terminal  
X 211 157 02 without terminal



### Insulating sleeving for bus bar (10-way) Y 303 824 01



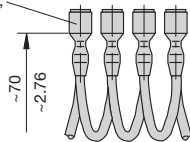
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Accessories

### Connector bus links -P10

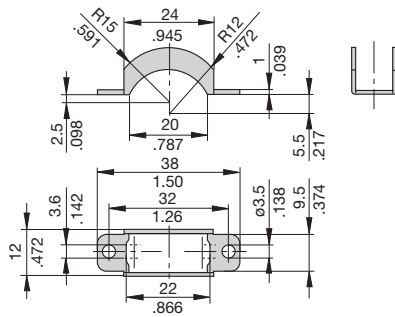
- X 210 588 01/ 1.5 mm<sup>2</sup>, (AWG 16), brown (up to 13 A max. load)
- X 210 588 02/ 2.5 mm<sup>2</sup>, (AWG 14), black (up to 20 A max. load)
- X 210 588 03/ 2.5 mm<sup>2</sup>, (AWG 14), red (up to 20 A max. load)
- X 210 588 04/ 2.5 mm<sup>2</sup>, (AWG 14), blue (up to 20 A max. load)

100 quick-connect tabs 6.3 (.250)  
DIN 46247 tinned brass,  
insulated



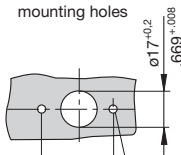
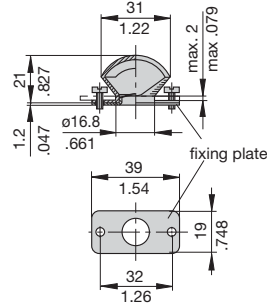
### Toggle guard for 1-pole units, black

X 221 617 01



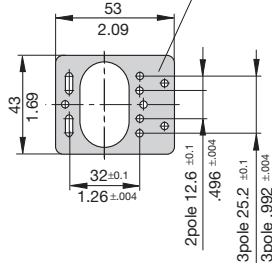
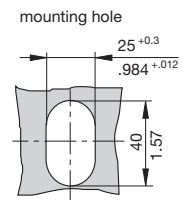
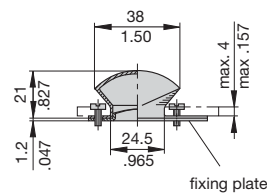
For front panel mounting.

### Splash cover (transparent) with fixing plate and screws (IP54) for type 2210-S211-... (1-pole) X 211 117 02



mounting dimensions:  
M3 - hole dia. 3.5 mm/.138 in.

### Splash cover (transparent) with fixing plate and screws (IP54) for type 2210-S221-... (2-pole) and type 2210-S231-... (3-pole) X 211 118 01



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

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

## Description

Single pole thermal-magnetic circuit breaker with trip-free mechanism and toggle actuation. Two-chamber construction with cascade contact arrangement to provide high voltage DC capability and high switching performance.

Designed for plug-in mounting in distribution rail X2210-S0606J (see section 7) or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Communications systems, power supplies, process control equipment.

## Ordering information

<b>Type No.</b>	2210 thermal-magnetic circuit breaker, toggle operated
<b>Mounting</b>	<b>S291</b> socket or panel mounting with M3 thread
<b>Terminal design</b>	<b>P9</b> blade terminals, for distribution rails X2210-S.. and X2210-K..
<b>Characteristic curve</b>	<b>M2</b> medium delay
<b>Style</b>	<b>410033</b> single pole with two chambers (one chamber protected only), 1 break contact Si1
<b>Current ratings</b>	<b>1...25 A</b>
<b>2210 - S291 - P9 M2 - 410033 - 10 A</b> ordering example	

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)
1	1.10
2	0.25
3	0.13
4	0.07
6	0.04
8	0.02
10	0.02
16	< 0.02
25*	< 0.02

\*80% I<sub>N</sub> continuous load

## Approvals

Authority	Voltage ratings	Current ratings
GL, VDE (EN 60934)	AC 250 V; DC 65 V	1...25 A



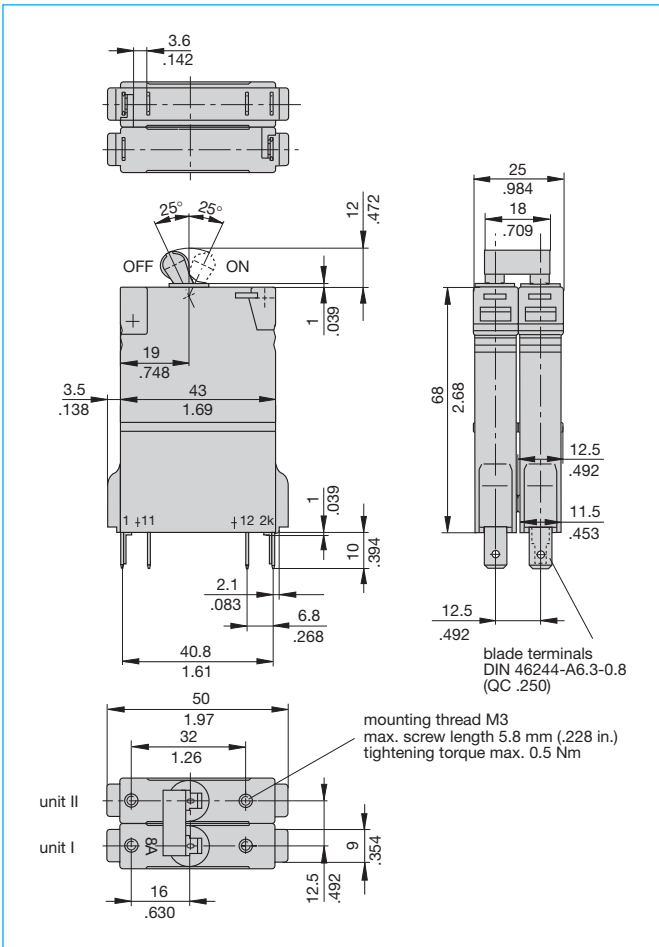
2210-S291-P9M2-410033-...A

## Technical data

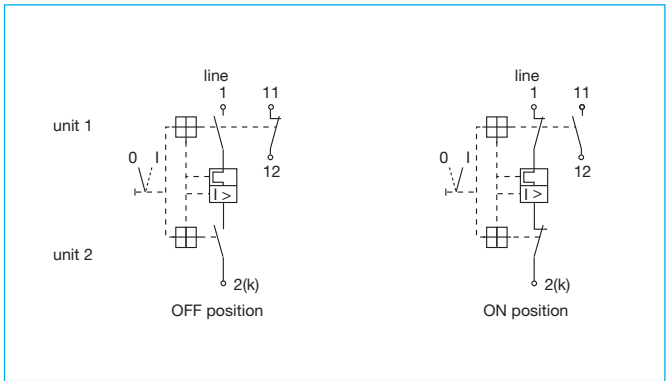
Voltage rating	AC 250 V; DC 65 V
Current rating range	1...25 A
Auxiliary circuit	1 A, AC 240 V/DC 65 V
Typical life	> 10,000 operations at 1 x I <sub>N</sub> > 20,000 operations mechanical
Ambient temperature	-30°C...+60 °C (-22...+140 °F)
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,000 V main to aux. circuit AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity I <sub>cn</sub>	AC 250 V 1,000 A cosφ = 0.8 DC 65 V 2,000 A L/R = 4 ms
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	25 g (11ms) directions 1, 2, 3, 4, 5 20 g (11 ms) direction 6 to IEC 60068-2-27, test Ea
Corrosion	96 hours in 5 % salt mist to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 80 g



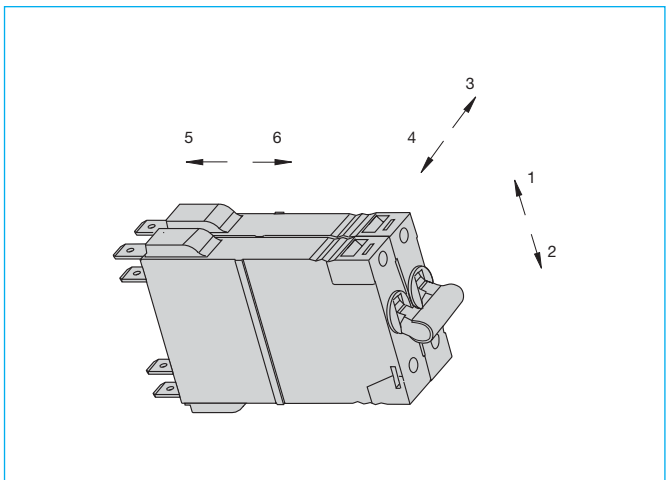
## Dimensions



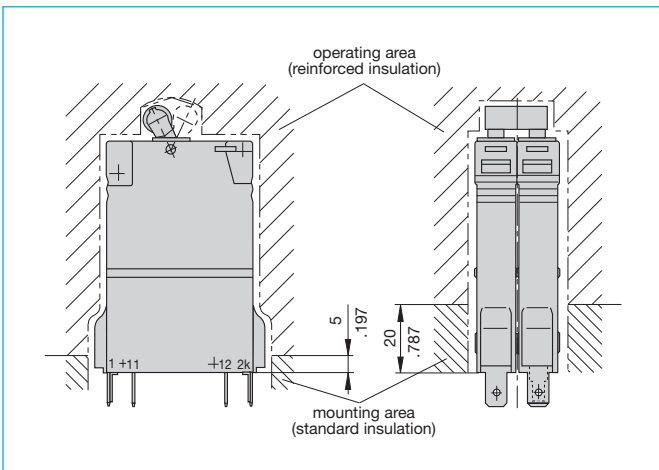
## Internal connection diagrams



## Shock directions



## Installation drawing



## Typical time/current characteristics

See page 2 - 21.

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 thermal-magnetic circuit breaker with trip-free mechanism and toggle actuation. Two-chamber construction with cascade contact arrangement to provide high voltage DC capability and high switching performance.

Designed for plug-in mounting in distribution rail X2210-S0606J (see section 7) or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Communications systems, power supplies, process control equipment.

## Ordering information

<b>Type No.</b>	2210	thermal-magnetic circuit breaker, toggle operated
<b>Mounting</b>	S291	socket or panel mounting with M3 thread
<b>Terminal design</b>	P9	blade terminals, for distribution rails X2210-S.. and X2210-K..
<b>Characteristic curve</b>	M2	medium delay
<b>Style</b>	410005	single pole with two chambers (protected), 1 break contact Si1
<b>Current ratings</b>	10 A	0.4...25 A
2210 - S291 - P9 M2 - 410005 - 10 A ordering example		

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.4	6.87	6	0.09
0.65	2.96	8	0.03
1	1.84	10	0.03
1.6	0.75	12	0.02
2	0.50	16	< 0.02
2.5	0.35	20*	< 0.02
3	0.25	25*	< 0.02
4	0.15	*80 % I <sub>N</sub> continuous load	

## Approvals

Authority	Voltage ratings	Current ratings
GL, VDE (EN 60934)	AC 250 V; DC 65 V	0.4...25A

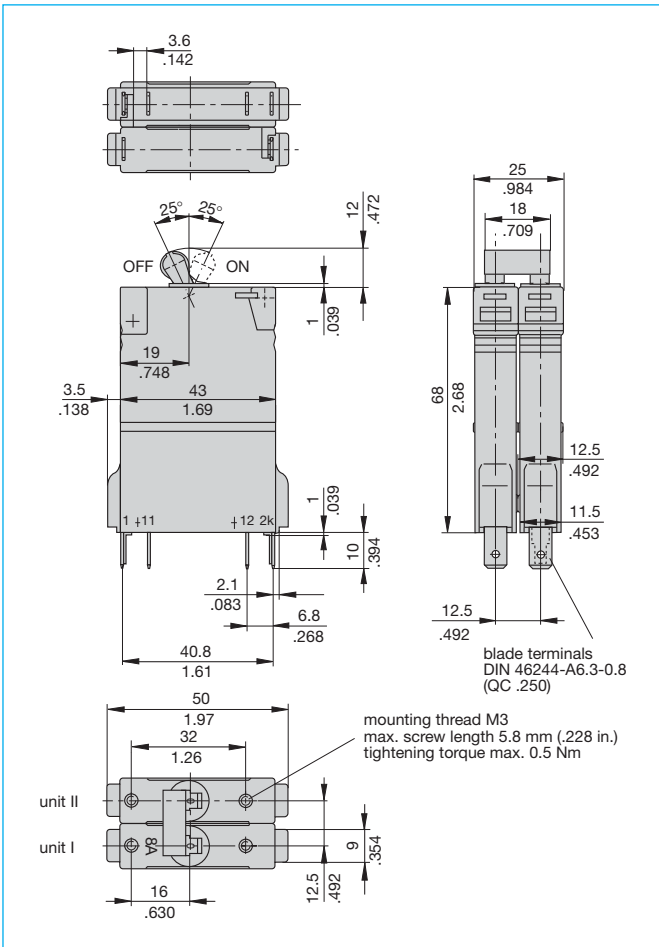


2210-S291-P9M2-410005-...A

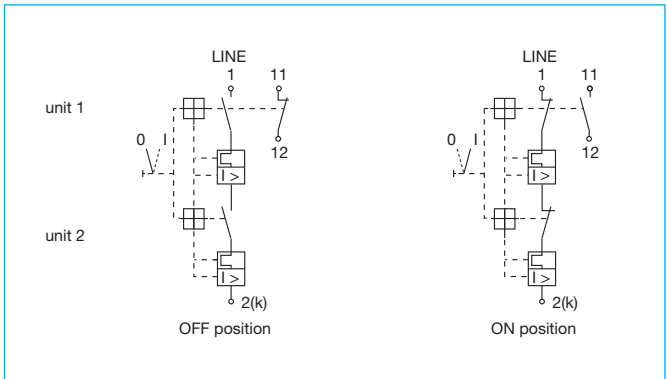
## Technical data

Voltage rating	AC 250 V; DC 65 V	
Current rating range	0.4...25 A	
Auxiliary circuit	1 A, AC 240 V/DC 65 V	
Typical life	> 10,000 operations at 1 x I <sub>N</sub> > 20,000 operations mechanical	
Ambient temperature	-30°C...+60 °C (-22...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV	pollution degree 2
	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,000 V main to aux. circuit AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	AC 250 V 0.4...1 A 1.6...25 A DC 65 V 0.4...4 A 6...25 A	cosφ = 0.8 self-limiting 2,000 A L/R = 4 ms self-limiting 3,500 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00	
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11ms) directions 1, 2, 3, 4, 5 20 g (11 ms) direction 6 to IEC 60068-2-27, test Ea	
Corrosion	96 hours in 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 80 g	

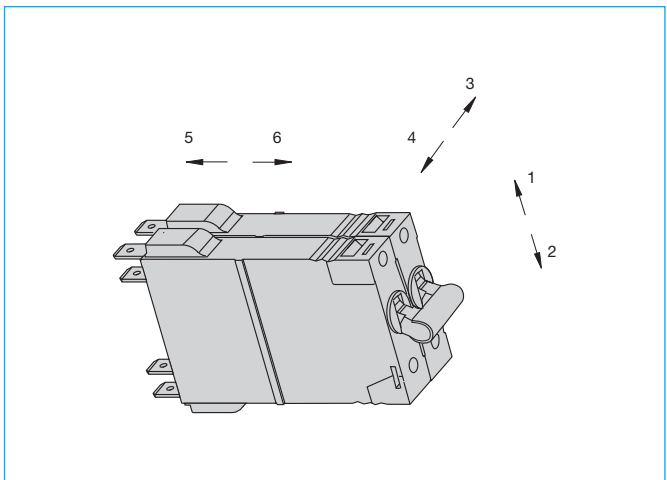
## Dimensions



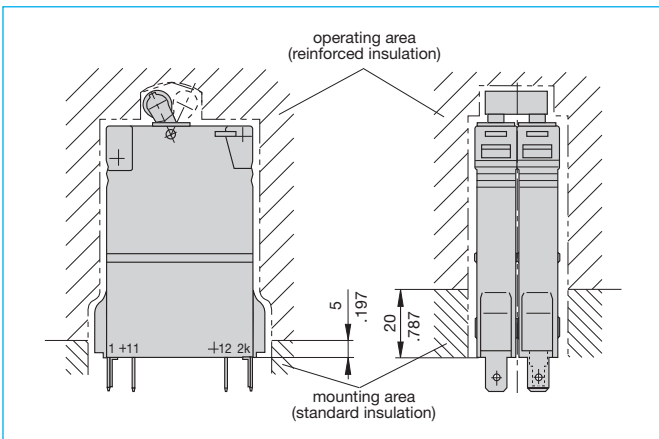
## Internal connection diagrams



## Shock directions



## Installation drawing



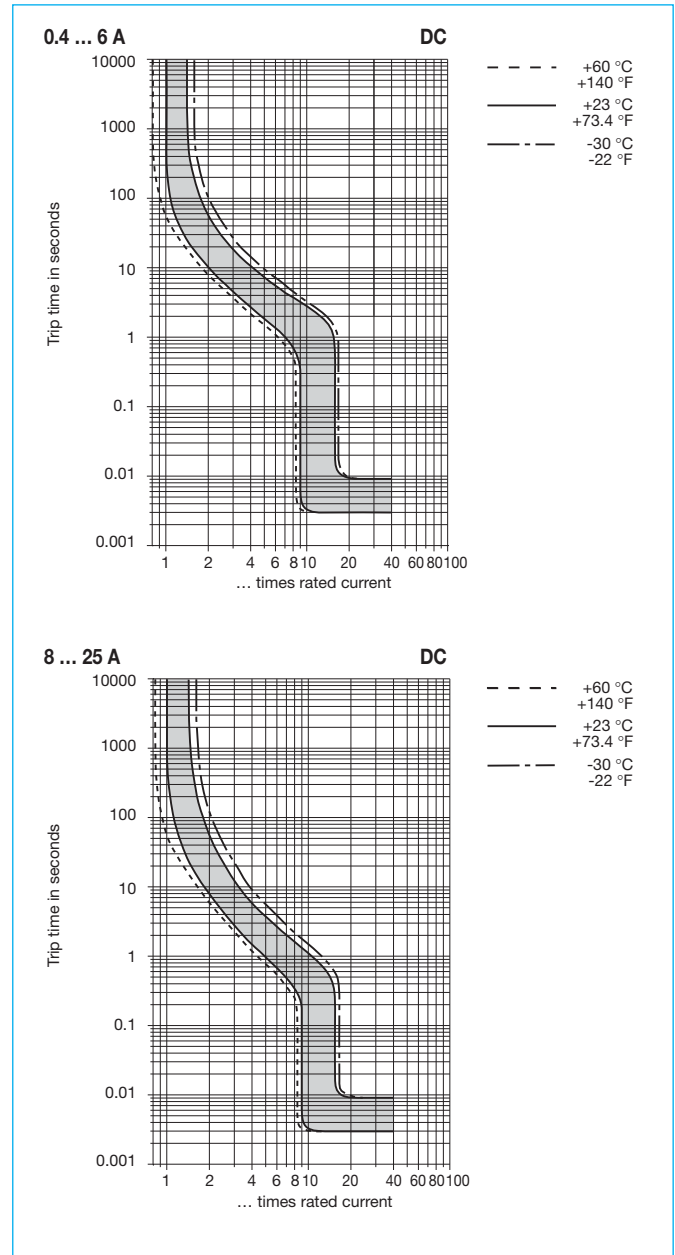
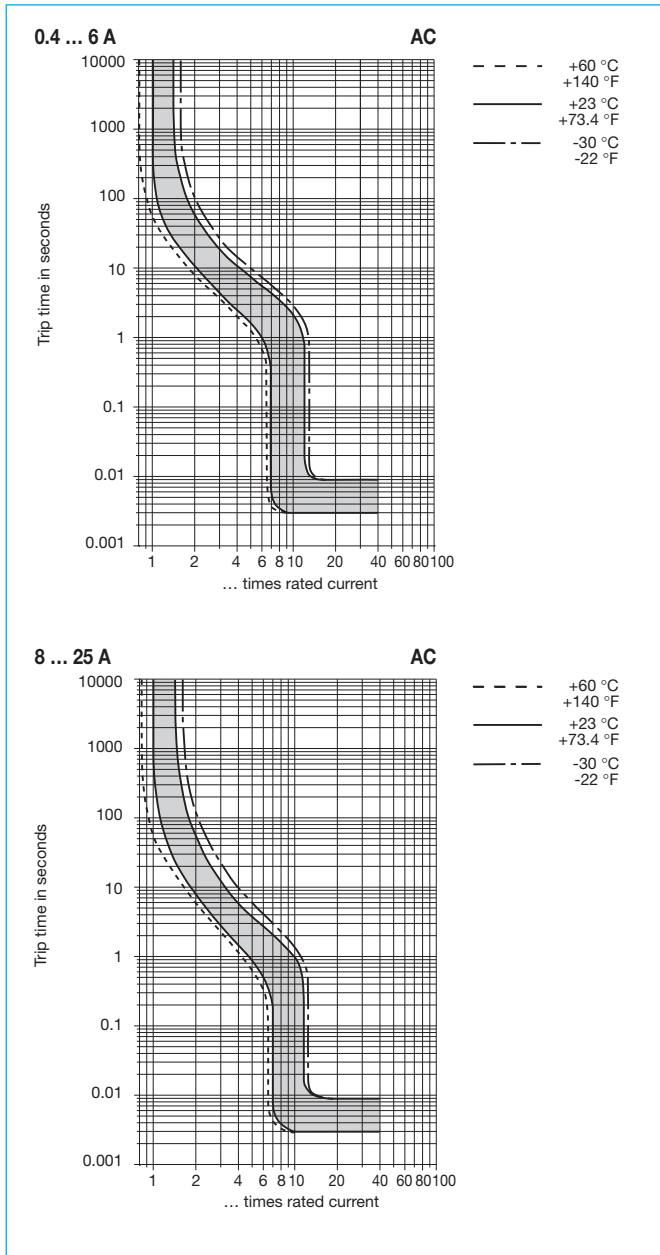
## Selective back-up fuses

Voltage rating	Interrupting capacity	Selective to	
		NH fuse rating	Current rating of 2210-S291-P2M2-410005
60 V DC	3,500 A	35 A	≤ 6 A
		50 A	≤ 12 A
		63 A	≤ 20 A
		80 A	≤ 25 A
		100 A	≤ 25 A
250 V AC	2,000 A	35 A	≤ 3 A
		50 A	≤ 8 A
		63 A	≤ 20 A
		80 A	≤ 25 A
		100 A	≤ 25 A

NH fuse according to VDE 0636, part 21 (IEC 269)  
NH fuse = low voltage power fuse

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

## Typical time/current characteristics

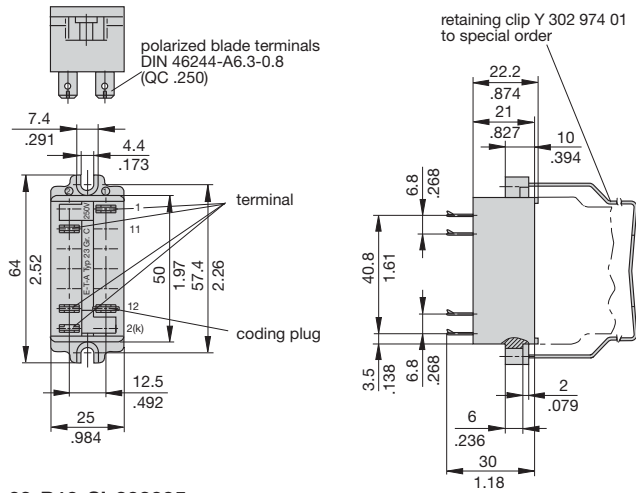


The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

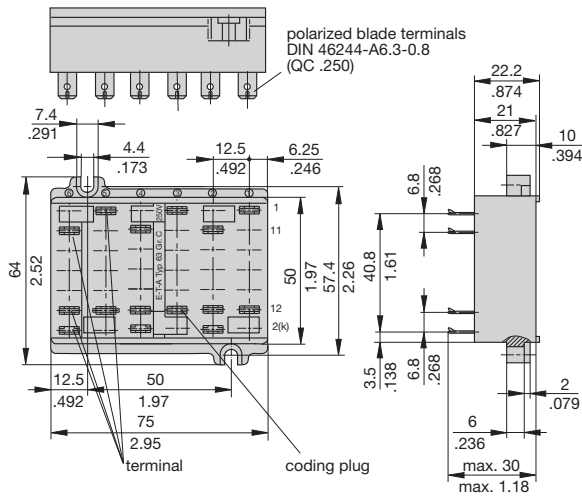
Ambient temperature °F	-22	-4	+14	+32	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.04	1.11	1.19	1.29

## Accessories

### Mounting sockets 23-P10-Si-202005



### 63-P10-Si-202005



Distribution rail X2210-S06... see section 7.

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

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

One, two and three pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934/IEC 934). Featuring a combi-foot design for both symmetric and asymmetric rail mounting. Available with auxiliary contact (1 x N/O or 1 x N/C) for status signalling. Two and three pole models are internally linked to ensure that both/all poles trip in the event of an overload on one pole, even if the actuator is held in the ON position. This CBE can be supplied in current ratings up to 32 A with a choice of characteristic curves. All screw terminals are recessed for safety. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

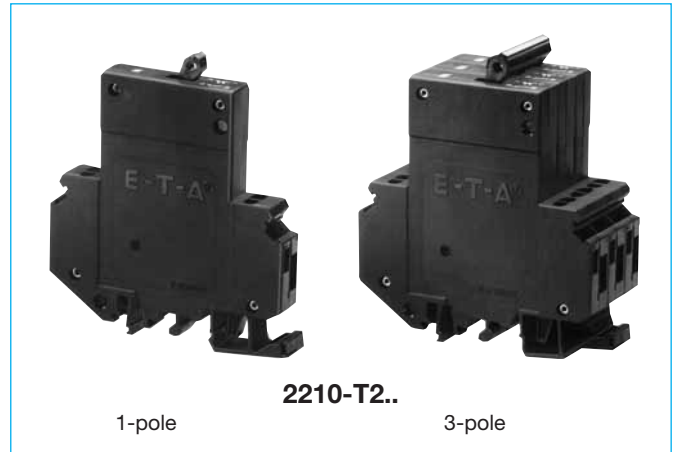
Process control equipment, robotics, machine tool control, communications systems, instrumentation.

## Ordering information

<b>Type No.</b>	
2210	single and multipole thermal-magnetic circuit breaker
<b>Mounting</b>	
T	rail mounting
<b>Actuator design</b>	
2	toggle
<b>Number of poles</b>	
1	single pole protected
2	2-pole protected
3	3-pole protected
5	2-pole, protected on one pole only
<b>Accessories</b>	
0	without accessories
<b>Terminal design (main contacts)</b>	
K0	screw terminals
<b>Characteristic curve</b>	
F1	fast acting: therm. 1.01-1.4xI <sub>N</sub> ; magn. 2-4xI <sub>N</sub> DC (DC only)
F2	fast acting: therm. 1.01-1.4xI <sub>N</sub> ; magn. 3.5-6.5xI <sub>N</sub> AC/4.5-8.5xI <sub>N</sub> DC
M1	standard delay: therm. 1.01-1.4xI <sub>N</sub> ; magn. 6-12xI <sub>N</sub> AC, 7.8-15.6xI <sub>N</sub> DC
T1	delayed: therm. 1.01-1.4xI <sub>N</sub> ; magn. 10-20xI <sub>N</sub> AC
T2	thermal only, 1.01-1.4xI <sub>N</sub>
M3	standard delay, low resistance: therm. 1.4-1.8xI <sub>N</sub> ; magn. 6-12xI <sub>N</sub> AC, 7.8-15.6xI <sub>N</sub> DC
<b>Auxiliary contact design</b>	
H	without intermediate position
<b>Auxiliary contacts</b>	
0	without auxiliary contacts
1	with auxiliary contacts
2	auxiliary contacts on pole 1 only (multipole devices)
3	auxiliary contacts on pole 1 and 3 (3-pole devices)
<b>Auxiliary contact function (see diagrams)</b>	
2	1 N/O contact
3	1 N/C contact
<b>Auxiliary contact - terminal design</b>	
1	screw terminals
<b>Current ratings</b>	
0.1...32 A	
2210 - T 2 1 0 - K0 M1 - H 1 2 1 - 10 A ordering example	

## Approvals

Authority	Voltage ratings	Current ratings
GL, VDE (EN 60934)	3 AC 433 V; AC 250 V; DC 65 V	0.1...32 A
UL, CSA	3 AC 480 V; AC 277 V; AC 277/480 V; DC 65 V	0.1...32 A



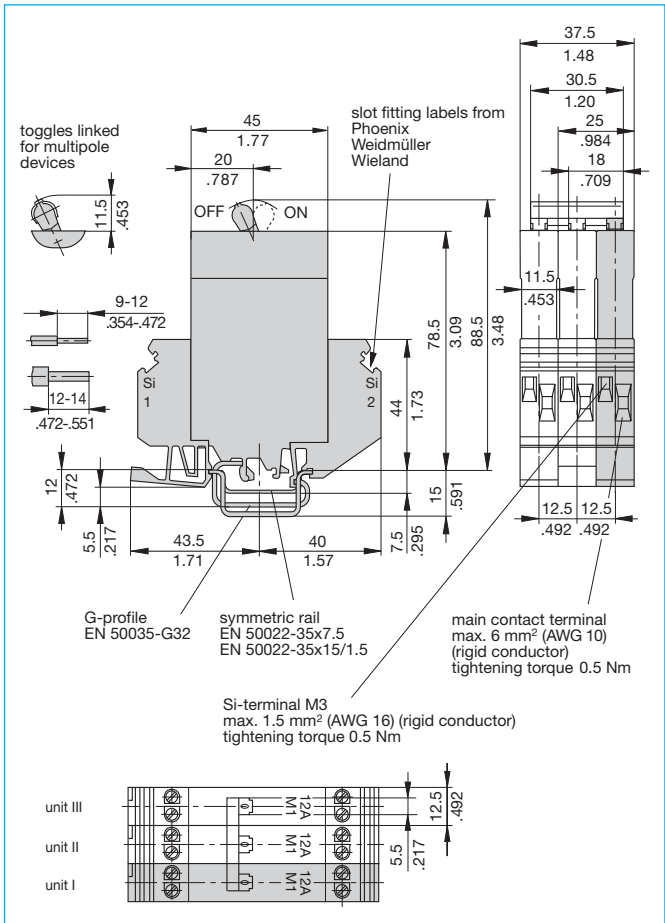
## Technical data

<b>For further details please see chapter: Technical Information</b>		
Voltage rating	AC 250 V; 3 AC 433 V (50/60 Hz); DC 65 V (UL: AC 277/480 V; DC 65 V)	
Current rating range	0.1...32 A for curves M1, T1, T2 0.1...16 A for curves F1, F2, M3	
Auxiliary circuit	1 A, AC 240 V / DC 65 V	
Typical life	3 AC 433 V; AC 250 V: 0.1...25 A 10,000 operations at 1 x I <sub>N</sub> , inductive DC 65 V: 0.1...32 A 10,000 operations at 1 x I <sub>N</sub> , inductive 3 AC 433 V; AC 250 V: 32 A 10,000 operations at 1 x I <sub>N</sub> , resistive	
Ambient temperature	-30...+60 °C (-22...+140 °F) T 60	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area main/aux. circuit pole/pole	AC 3,000 V AC 3,000 V AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	0.1...5 A 400 A 6...32 A 800 A curves F1, F2, M1, T1: 0.1...16 A 2,500 A (at DC 32 V) curve T2: 0.1...32 A 15 x I <sub>N</sub> curve M3: 0.1...2 A AC 200A / DC 400A	
Interrupting capacity (UL 1077)	I <sub>N</sub> 1 + 2-pole 3-pole 1 + 2-pole	0.1...16 A 20...32 A AC 277 V / 5,000 A AC 277 V / 2,000 A 3 AC 480 V / 5,000 A 3 AC 480 V / 2,000 A DC 65 V / 2,000 A DC 65 V / 2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP20	
Vibration	curve F1: 3 g (57-500 Hz), ± 0.23 mm (10-57 Hz) curves M1, M3, T1, T2: 5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	curve F1: 25 g (11 ms), directions 1, 2, 3, 4, 5 10 g (11 ms), direction 6 curves M1, M3, T1, T2: 25 g (11 ms), directions 1, 2, 3, 4, 5 20 g (11 ms), direction 6 to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 60 g per pole	

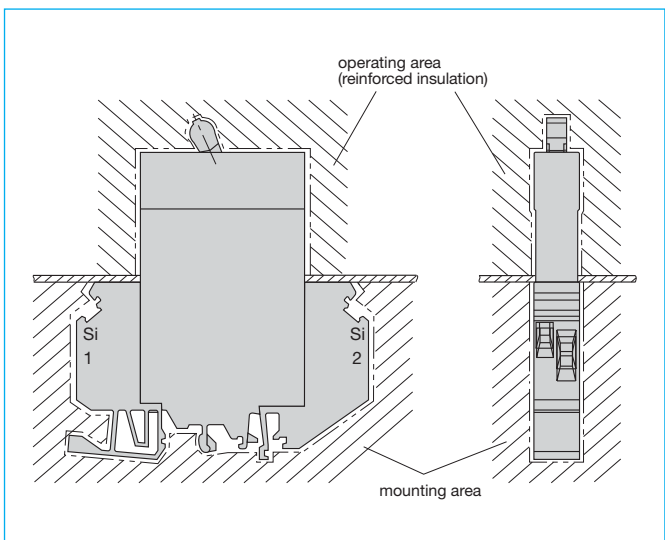
## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)					
	F1 fast acting for DC only	F2 fast acting delay for AC + DC	M1 standard for AC + DC	T1 delayed low resistance nur für AC	M3 standard delay for AC + DC	T2 thermal for AC + DC
0.1	162	162	92	81	42	77
0.2	39.3	39.3	26.1	24.2	11.7	23
0.3	17.5	17.5	11.6	10.4	5.6	10.2
0.4	9.2	9.2	6,6	6.0	2.9	5.7
0.5	6.8	6.8	4,1	3.9	1.75	3,7
0.6	4.2	4.2	3	2.7	1.42	2.6
0.8	2.8	2.8	1.65	1.53	0.75	1.39
1	1.6	1.6	1,10	0.98	0.5	0.9
1.5	0.78	0.78	0.47	0.42	0.22	0.36
2	0.42	0.42	0.28	0.24	0.136	0.19
2.5	0.26	0,26	0.183	0.17	0.083	0.141
3	0.18	0.18	0.124	0.12	0.057	0.091
4	0.12	0.12	0.077	0.073	0.041	0.051
5	0.092	0.092	0.063	0.055	0.032	0.040
6	0.054	0.054	0.045	0.039	0.021	0.027
8	0.025	0.025	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
10	0.022	0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
20	-	-	≤ 0.02	≤ 0.02	-	≤ 0.02
25	-	-	≤ 0.02	≤ 0.02	-	≤ 0.02
32	-	-	≤ 0.02	≤ 0.02	-	≤ 0.02

## Dimensions



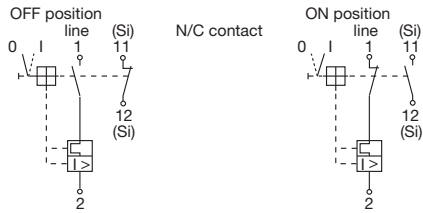
## Installation drawing



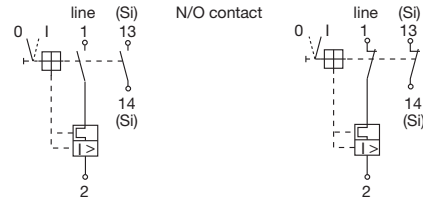
This is a metric design and millimeter dimensions take precedence (mm/inch)

**Internal connection diagrams**

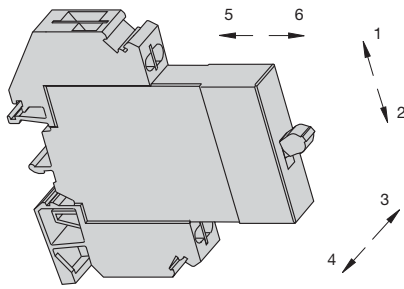
...-H131-...



...-H121-...



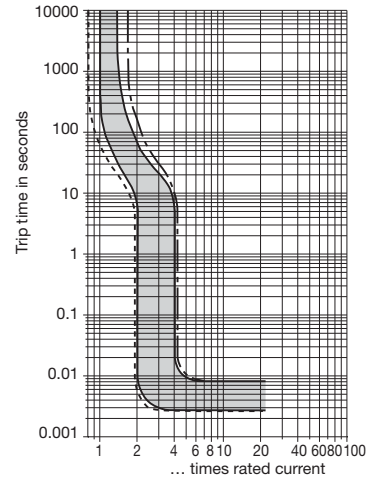
**Shock directions**



**Typical time/current characteristics**

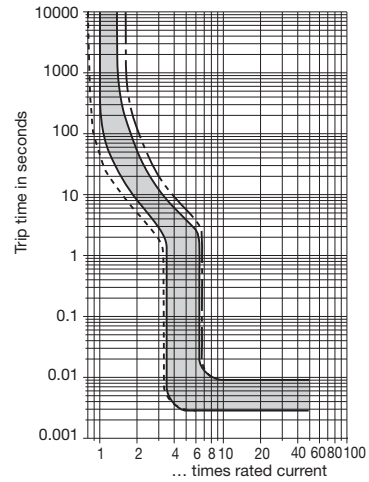
**-F1 0.1 ... 16 A**

DC only



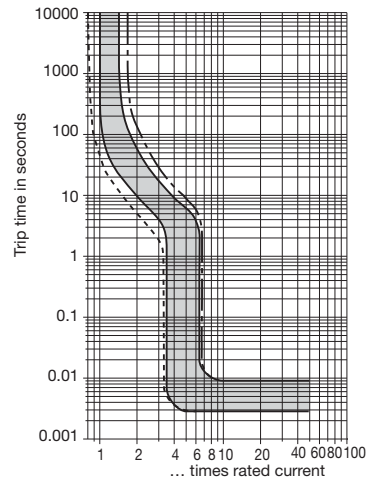
**-F2 0.1 ... 7.5 A**

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



**-F2 8 ... 16 A**

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



--- +60 °C / +140 °F    ——— +23 °C / +73.4 °F    - - - -30 °C / -22 °F

<sup>1)</sup>Magnetic tripping currents are increased by 30% on DC supplies.



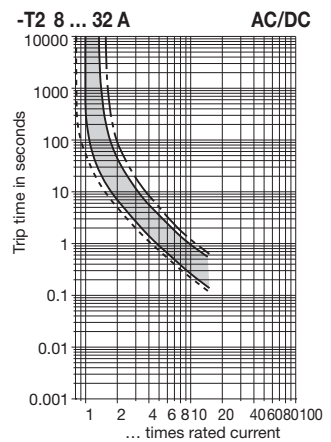
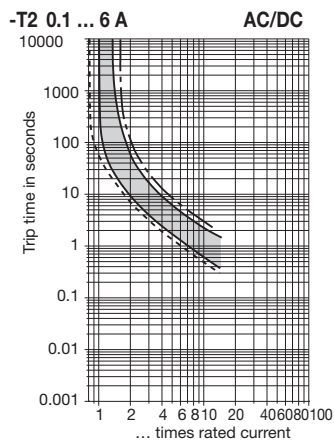
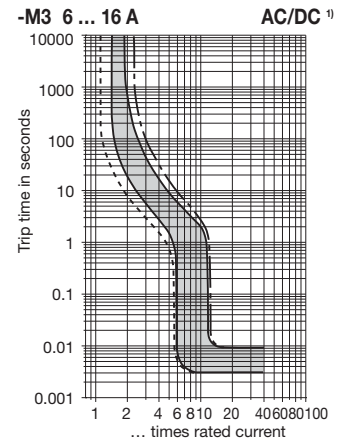
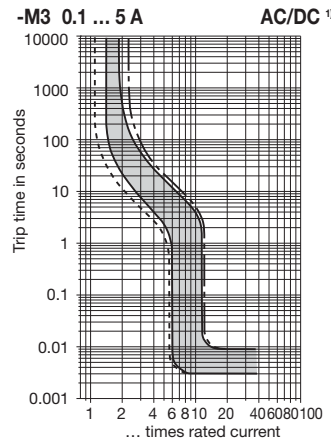
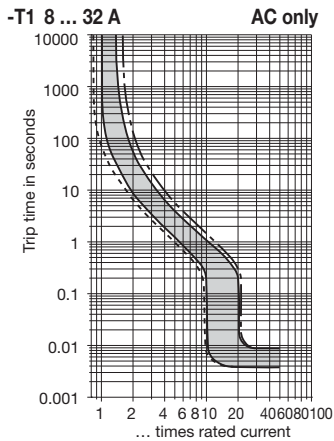
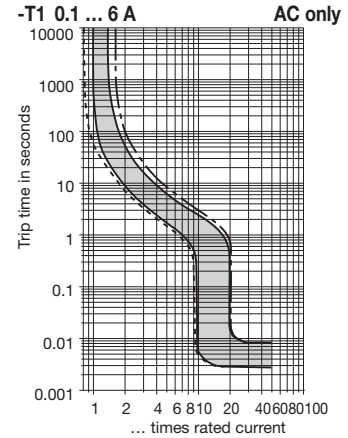
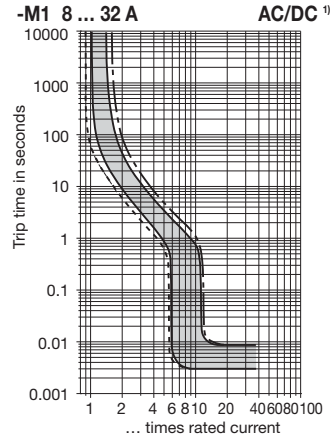
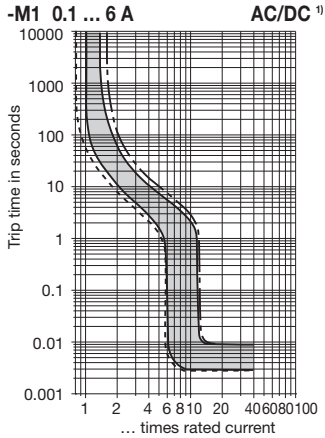
## Typical time/current characteristics

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.04	1.11	1.19	1.29

Multi pole devices: all poles symmetrically loaded. With single pole overload, thermal tripping will be at max.  $1.7 \times I_N$  with curves F1, F2, M1 and T2, and at max.  $2.2 \times I_N$  with curve M3.

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies.

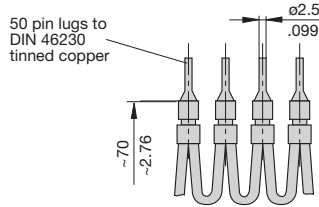


--- +60 °C +140 °F    ——— +23 °C +73.4 °F    - - - -30 °C -22 °F

## Accessories

### Connector bus links -K10

**X210 589 01**/2.5 mm<sup>2</sup>, (AWG 14) (black) up to 20 A max. load  
**X210 589 02**/1.5 mm<sup>2</sup>, (AWG 16) (brown) up to 13 A max. load

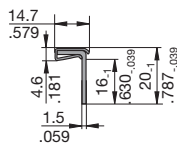
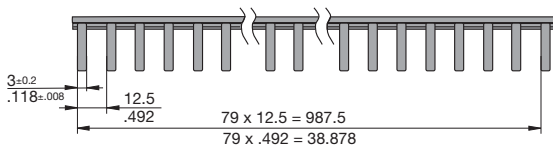


### Busbar 1-pole, 90°

#### X 222 540 01

The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.

$I_{max}$  - busbar 100 A (40°C)

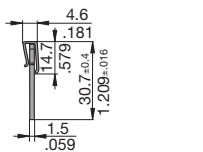
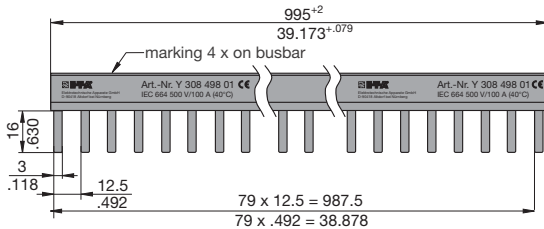


**Plug-on cap, 1-pole**  
**Y 307 851 01**

### Busbar 1-pole

#### Y 308 498 01

$I_{max}$  - busbar 100 A (40°C)

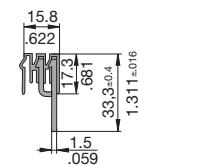
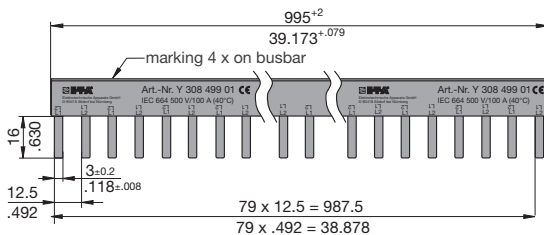


**Plug-on cap, 1-pole**  
**Y 307 851 01**

### Busbar 2-pole

#### Y 308 499 01

$I_{max}$  - busbar 100 A (40°C)

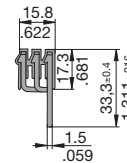
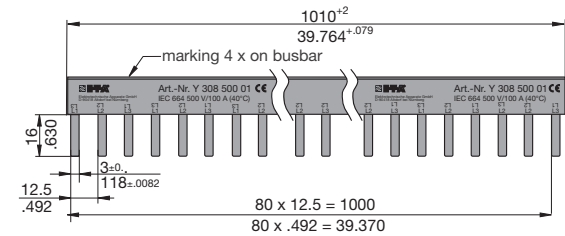


**Plug-on cap, busbar 2/3-pole**  
**Y 308 506 01**

### Busbar 3-pole

#### Y 308 500 01

$I_{max}$  - busbar 100 A (40°C)



**Plug-on cap, busbar 2/3-pole**  
**Y 308 506 01**

### Supply terminal

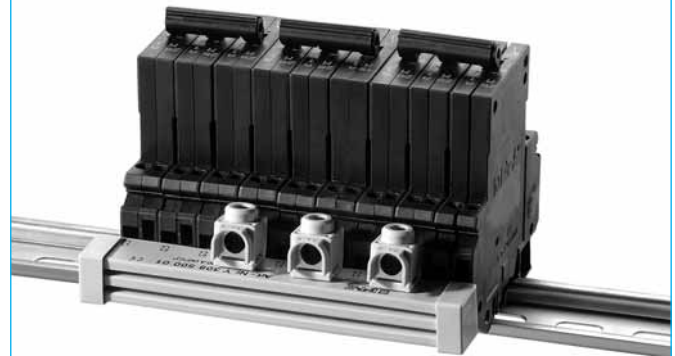
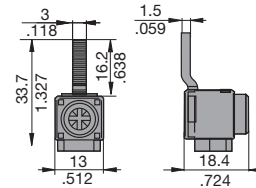
#### Y 308 503 01

$I_{max}$  63 A with 1-pole busbar,

**50 A with multipole busbar**

Max. tightening torque of terminal screw 2 Nm

Max. cable cross section: 25 mm<sup>2</sup> / single strand  
 16 mm<sup>2</sup> / multistrand with wire end ferrule



### Caution:

When using multipole busbars please leave at least one pole's width between two adjacent line entry terminals.

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

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

## Description

Miniaturised single pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934). Two designs provide the option of either printed circuit board or threadneck panel mounting. A separate shunt tap terminal and auxiliary contacts are available. Fast acting, medium or long delay characteristics can be specified for both models.

**Suitable for use in distribution rails – see section 7.**  
Complies with CBE standard EN 60934 (IEC 60935).

## Typical applications

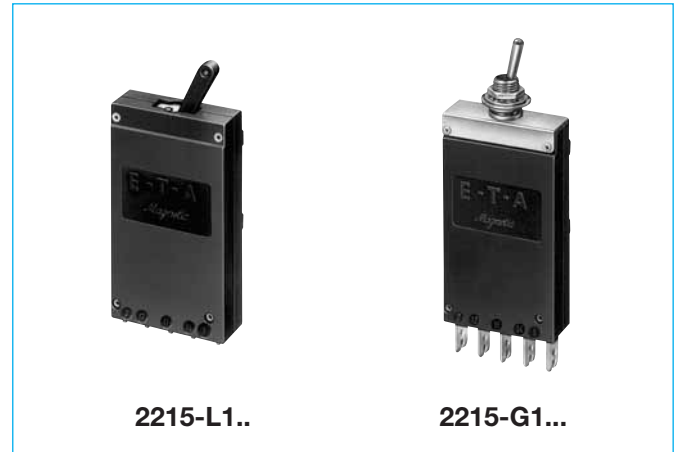
Control equipment, communications systems, instrumentation.  
Suitable for mounting on Euro cards.

## Ordering information

Type No.	Description
2215	single pole thermal-magnetic circuit breaker
<b>Mounting</b>	
G1	threadneck panel mounting
L1	PCB mounting
<b>Number of poles</b>	
1	1-pole protected
<b>Mounting hardware</b>	
0	without accessories
1	2 hex nuts 1/4"-40 UNS-2A, serrated washer, location pin (-G1 only)
<b>Terminal design (main contacts)</b>	
P1	blade terminals 6.3-0.8, without shunt terminal
B1	blade terminals 6.3-0.8, with shunt terminal
L1	solder pins, without shunt terminal
M1	solder pins, with shunt terminal
<b>Characteristic curve</b>	
F1	fast acting: 1.01-1.4xI <sub>N</sub> ; magn. 2-4xI <sub>N</sub> DC (DC only)
M1	standard delay: therm. 1.01-1.4xI <sub>N</sub> ; magn. 4.5-10.5xI <sub>N</sub> DC; magn. 3.5-8xI <sub>N</sub> AC
T1	delayed: therm. 1.01-1.4xI <sub>N</sub> ; DC magn. 8-17xI <sub>N</sub> DC, 6-13xI <sub>N</sub> AC
T3	delayed: therm. 1.01-1.4xI <sub>N</sub> ; magn. 13-20xI <sub>N</sub> DC magn. 9.5-15.5xI <sub>N</sub> AC
<b>Auxiliary contacts</b>	
S0	without auxiliary contact
S1	with auxiliary contact (change over)
<b>Auxiliary contact - terminal design</b>	
1	blade terminals 6.3x0.8 (QC .250)
2	solder pins
<b>Current ratings</b>	
0.05...10 A	
2215 - G1 1 1 - P1 F1 - S1 1 - 0.5 A ordering example	

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance (Ω)	Current ratings (A)	Internal resistance (Ω)
0.05	440	1.5	0.55
0.1	108	2	0.34
0.2	29.9	2.5	0.21
0.3	14.2	3	0.15
0.4	7.9	4	0.084
0.5	5.0	5	0.057
0.6	3.5	6	0.043
0.8	1.8	8	≤ 0.02
1	1.2	10	≤ 0.02



## Technical data

Voltage rating	AC 250 V (50/60 Hz); DC 50 V (UL: AC 250 V; DC 75 V)		
Current rating range	0.05...10 A (higher current ratings to special order)		
Auxiliary circuit	1 A, AC 250 V/DC 28 V		
Typical life	10,000 operations at 1 x I <sub>N</sub>		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2	reinforced insulation in operating area
Dielectric strength IEC 60664 and 60664A)	test voltage operating area AC 3,000 V main/aux. circuit AC 1,500 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	300 A		
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.05 A	AC 250 V	200 A
	0.1...6 A	AC 250 V	1,000 A
	8...10 A	AC 250 V	2,000 A
	0.05...10 A	DC 50 V	1,000 A
	0.05...10 A	DC 75 V	800 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00		
Vibration	curve F1: 6 g (57-500 Hz), ± 0.46 mm (10-57 Hz) curves M1, T1, T3: 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	curves F1, M1, T1, T3: 30 g (11 ms), directions 1, 2, 3, 4, 5, curve F1: 10 g (11 ms), direction 6 curves M1, T1, T3: 15 g (11 ms), direction 6 to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 25 g		

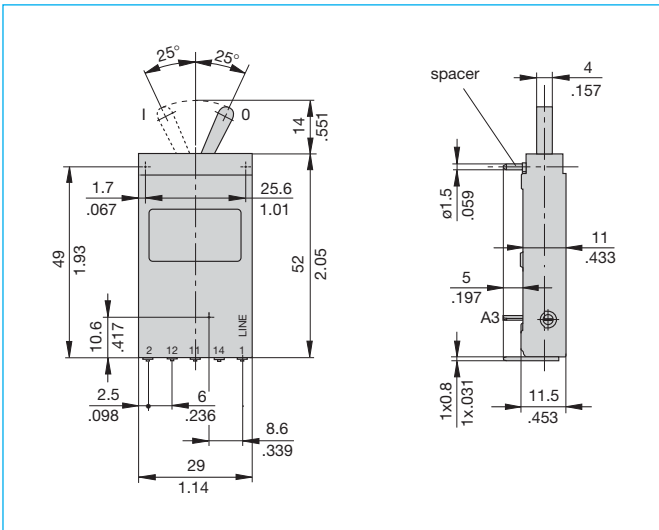
## Approvals

Authority	Voltage ratings	Current ratings
UL	AC 250 V DC 75 V	0.05...10 A 0.05...20 A
CSA	AC 250 V; DC 48 V	0.05...10 A

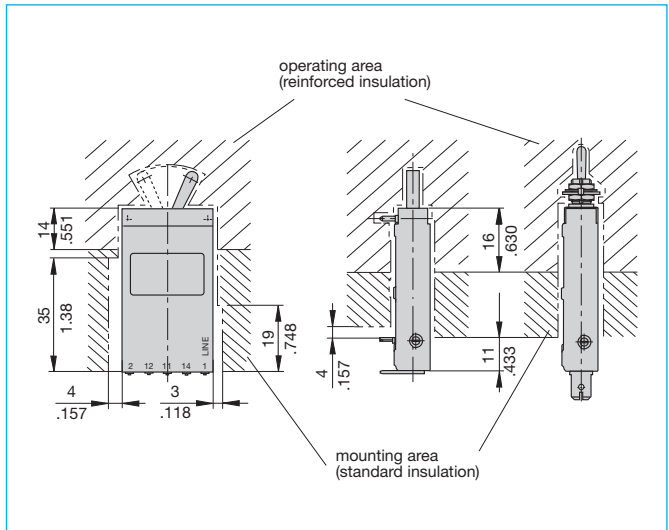


# Thermal-Magnetic Circuit Breaker 2215-L.../G...

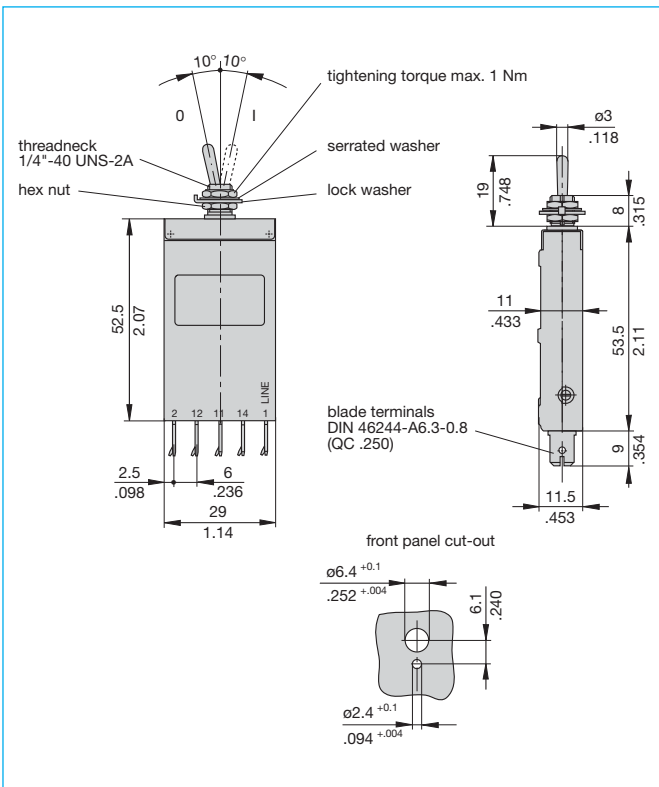
## Dimensions 2215-L1..



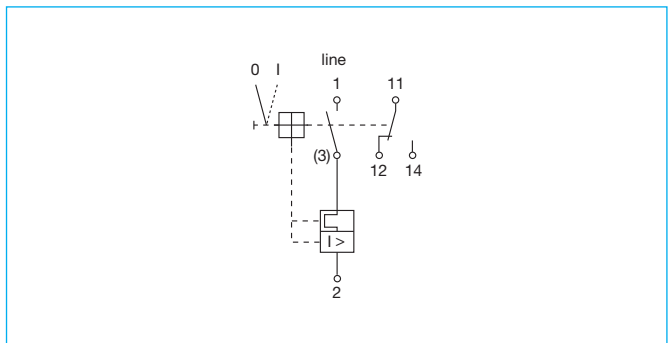
## Installation drawing



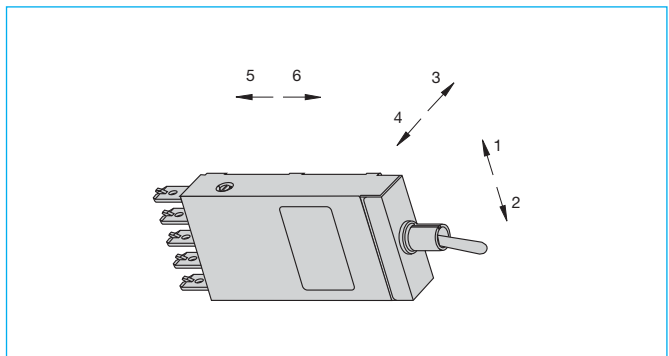
## Dimensions 2215-G1..



## Internal connection diagram



## Shock directions



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

## Typical time/current characteristics

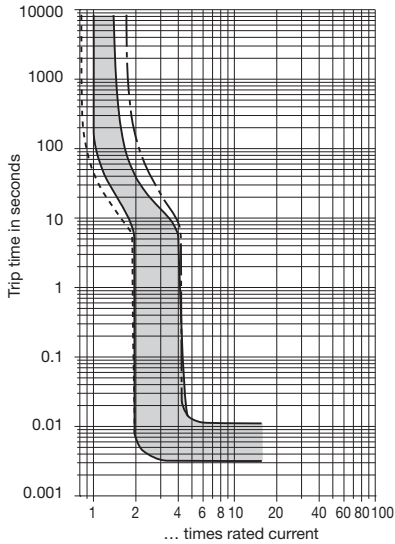
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 - Technical information.

### 0.05...10 A:

Ambient temperature °F	-22	-4	+14	+32	+50	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

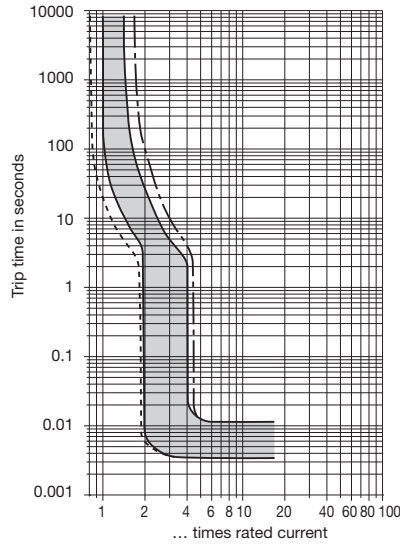
**-F1 0.05 ... 6 A**

**DC only**



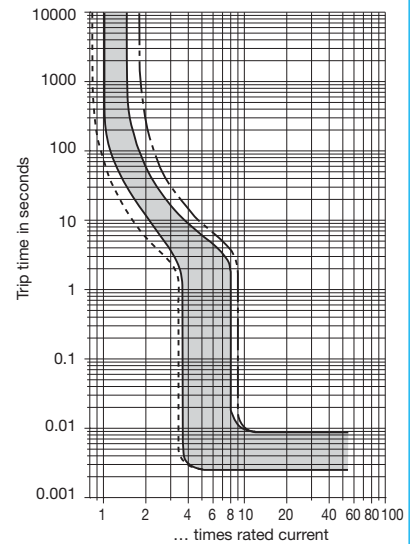
**-F1 8 ... 10 A**

**DC only**



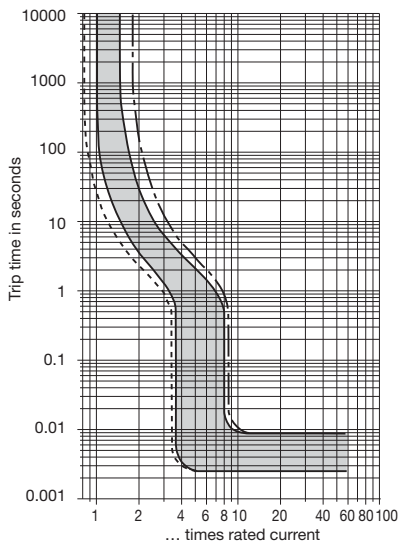
**-M1 0.05 ... 6 A**

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



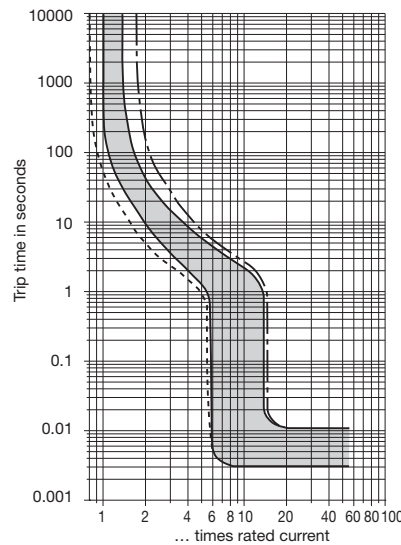
**-M1 8 ... 10 A**

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



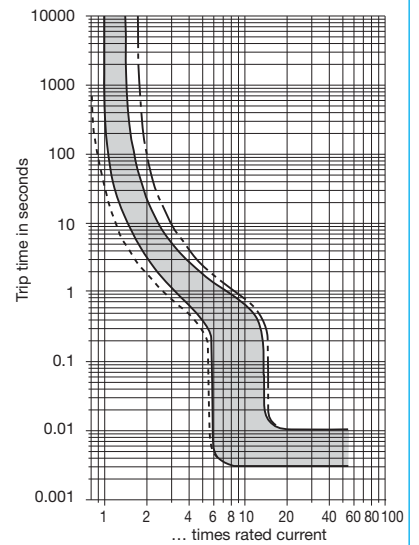
**-T1 0.05 ... 6 A**

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



**-T1 8 ... 10 A**

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



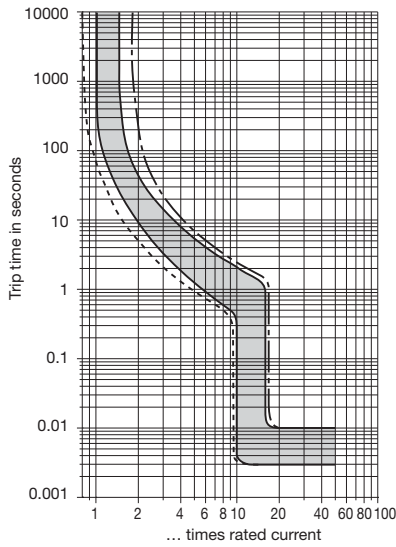
- - - +60 °C    ——— +23 °C    - - - -30 °C  
           +140 °F    +73.4 °F    -22 °F

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies (curve M1 and T1).

## Typical time/current characteristics

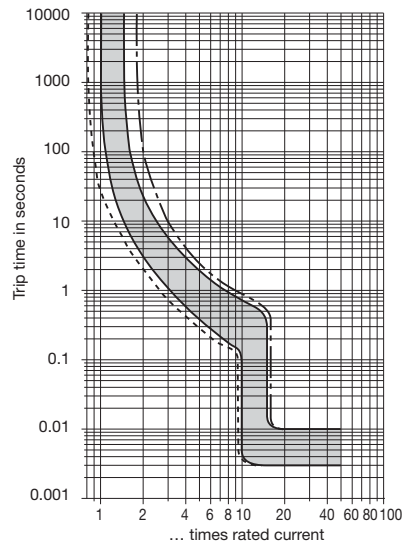
-T3 0.05 ... 6 A

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



-T3 8 ... 10 A

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



--- +60 °C  
+140 °F  
— +23 °C  
+73.4 °F  
- · - -30 °C  
-22 °F

<sup>1)</sup>Magnetic tripping currents are increased by 30% on DC supplies.

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

## Description

Miniaturised two pole thermal-magnetic circuit breakers with trip-free mechanism and toggle actuation (S-type TM CBE to EN 60934). Fitted with panel mounting flange and push-on termination, also suitable for mounting on Euro Cards. Available with auxiliary contacts and a choice of fast, medium or long delay characteristics. Complies with CBE standard EN 60934 (IEC 60934).

## Typical applications

Control equipment, communications systems, instrumentation.

## Ordering information

<b>Type No.</b>	2215	double pole thermal-magnetic circuit breaker
<b>Mounting</b>	<b>F1</b>	flange mounting, with M3 mounting thread
<b>Number of poles</b>	<b>2</b>	2-pole protected
	<b>5</b>	2-pole, protected on one pole only
<b>Accessories</b>	<b>0</b>	without
<b>Terminal design (main contacts)</b>	<b>P1</b>	blade terminals 6.3x0.8mm (QC .250) without shunt terminal
<b>Characteristic curve</b>	<b>F1</b>	fast acting: 1.01-1.4xI <sub>N</sub> ; magn. 2-4xI <sub>N</sub> DC (DC only)
	<b>M1</b>	standard delay: therm. 1.01-1.4xI <sub>N</sub> ; magn. 4.5-10.5xI <sub>N</sub> DC; magn. 3.5-8xI <sub>N</sub> AC
	<b>T1</b>	delayed: therm. 1.01-1.4xI <sub>N</sub> ; magn. 8-17xI <sub>N</sub> DC; magn. 6-13xI <sub>N</sub> AC
	<b>T3</b>	delayed: therm. 1.01-1.4xI <sub>N</sub> ; magn. 13-20xI <sub>N</sub> DC magn. 9.5-15.5xI <sub>N</sub> AC
<b>Auxiliary contacts</b>	<b>S0</b>	without auxiliary contacts
	<b>S1</b>	with auxiliary contacts (change over)
	<b>S2</b>	with auxiliary contact on pole 1 only
<b>Auxiliary contact - terminal design</b>	<b>1</b>	blade terminals 6.3x0.8
<b>Current ratings</b>	<b>0.05...10 A</b>	
2215 - F1 2 0 - P1 F1 - S1 1 - 0.5 A ordering example		

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance per pole (Ω)	Current ratings (A)	Internal resistance per pole (Ω)
0.05	440	1.5	0.55
0.1	108	2	0.34
0.2	29.9	2.5	0.21
0.3	14.2	3	0.15
0.4	7.9	4	0.096
0.5	5.0	5	0.069
0.6	3.5	6	0.055
0.8	1.8	8	≤ 0.02
1	1.2	10	≤ 0.02



2215-F1...

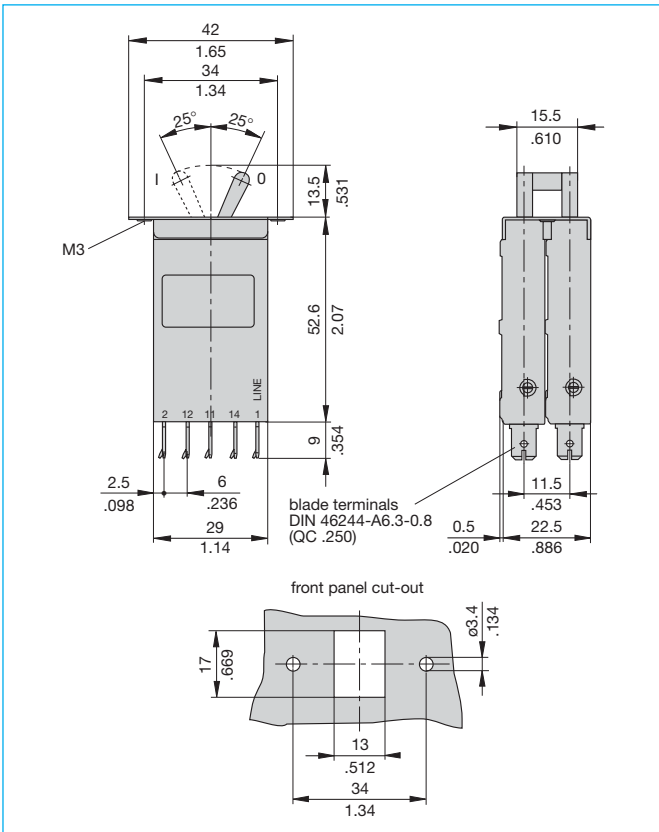
## Technical data

Voltage rating	AC 250 V (50/60 Hz); DC 50 V (UL: AC 250 V; DC 75 V) (higher DC voltage to special order)
Current rating range	0.05...10 A
Auxiliary circuit	1 A, AC 250 V/DC 28 V resistive load
Typical life	10,000 operations at 1 x I <sub>N</sub>
Ambient temperature	-30...+60 °C (-22...+140 °F)
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,000 V pole/pole AC 1,500 V main/aux. circuit AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity I <sub>cn</sub>	600 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00
Vibration	curve F1: 6 g (57-500 Hz), ± 0.46 mm (10-57 Hz) curves M1, T1, T3: 8 g (57-500 Hz), ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	curves F1, M1, T1, T3: 30 g (11 ms), directions 1, 2, 3, 4, 5 curve F1: 10 g (11 ms), direction 6 curves M1, T1, T3: 15 g (11 ms) direction 6 to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 50 g

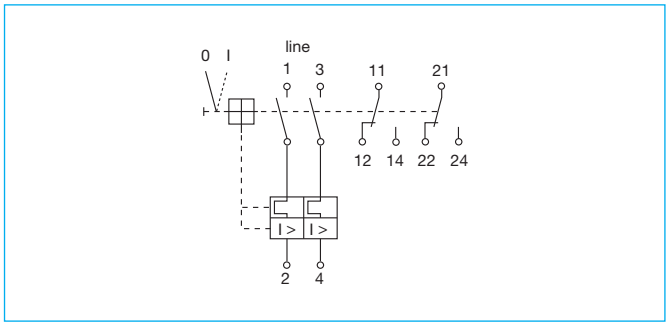


# Thermal-Magnetic Circuit Breaker 2215-F1...

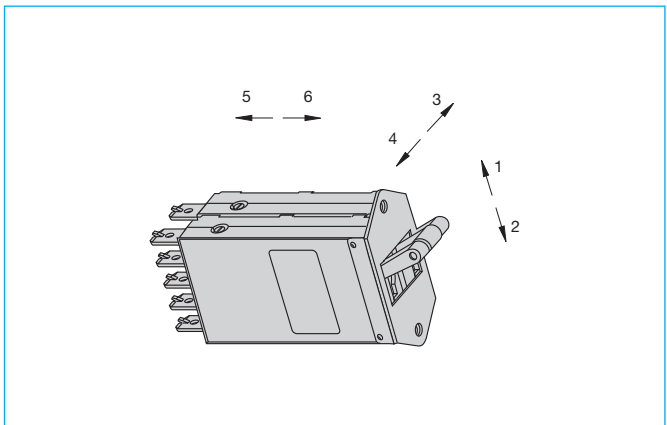
## Dimensions 2215-F1...



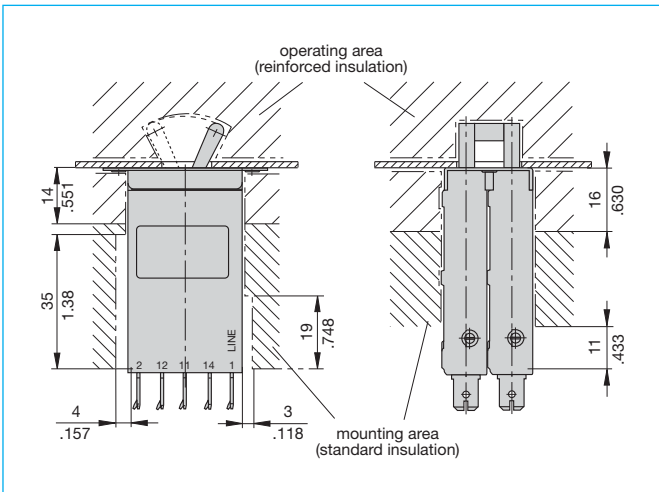
## Internal connection diagram



## Shock directions



## Installation drawing



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



## Typical time/current characteristics

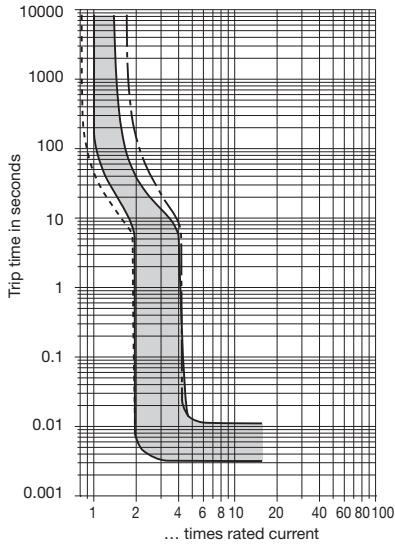
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 - Technical information.

### 0.05...10 A:

Ambient temperature °F	-22	-4	+14	+32	+50	+73.4	+86	+104	+122	+140
°C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

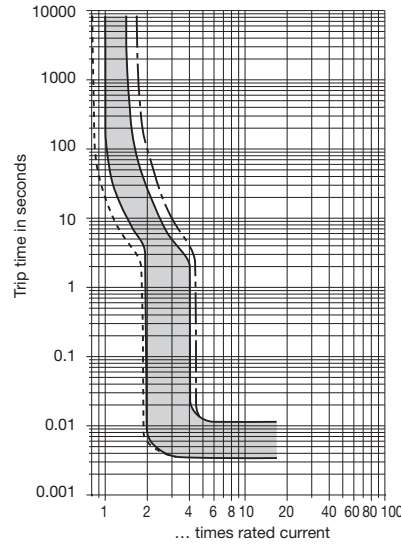
**-F1 0.05 ... 6 A**

**DC only**



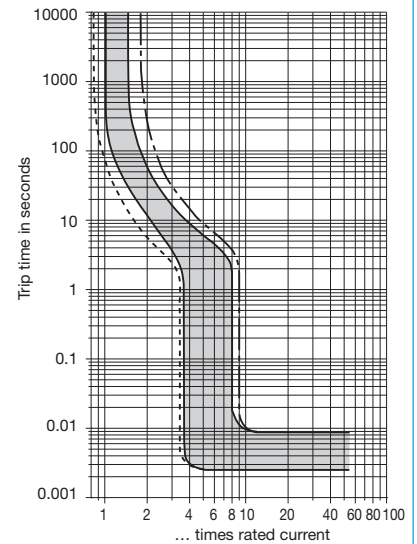
**-F1 8 ... 10 A**

**DC only**



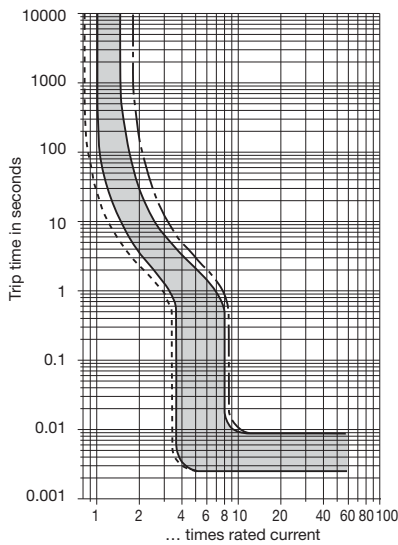
**-M1 0.05 ... 6 A**

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



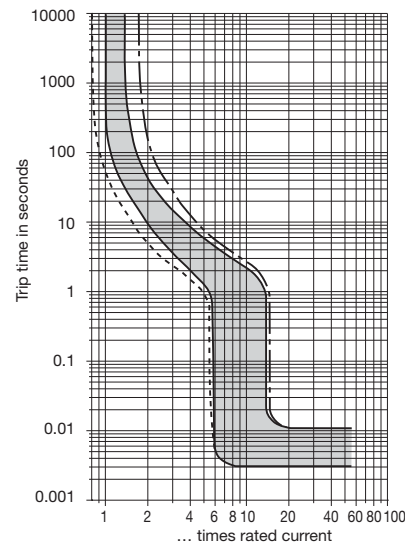
**-M1 8 ... 10 A**

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



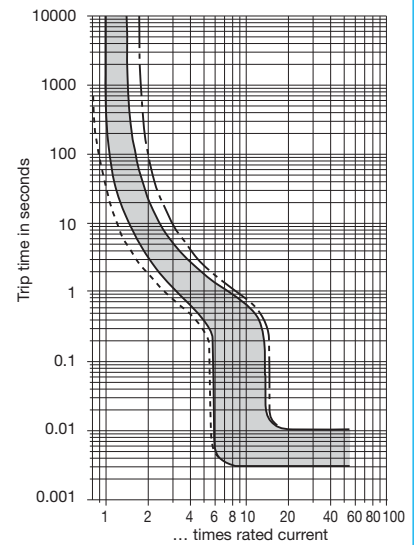
**-T1 0.05 ... 6 A**

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



**-T1 8 ... 10 A**

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



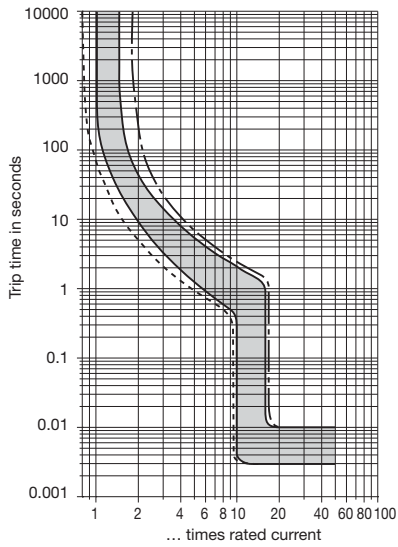
- - - +60 °C    ——— +23 °C    - - - -30 °C  
           +140 °F    +73.4 °F    -22 °F

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies (curve M1 and T1).

## Typical time/current characteristics

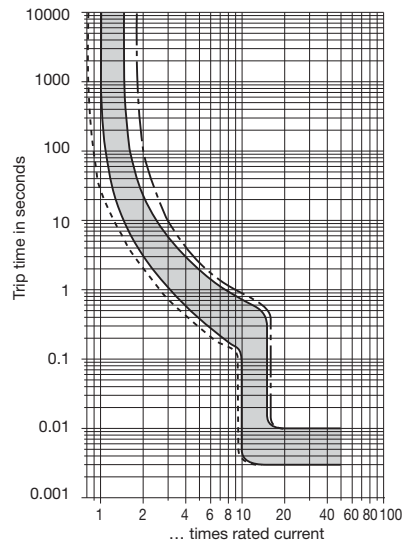
-T3 0.05 ... 6 A

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



-T3 8 ... 10 A

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



--- +60 °C  
+140 °F  
— +23 °C  
+73.4 °F  
- · - -30 °C  
-22 °F

<sup>1)</sup> Magnetic tripping currents are increased by 30% on DC supplies.

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

## Description

Single or two pole rocker switch/thermal-magnetic circuit breaker with trip-free mechanism (S-type TM CBE to EN 60934). The addition of a magnetic tripping module to the type 3120 range described in catalogue section 1 extends the choices available to include single pole with thermal-magnetic protection; double pole switching with thermal-magnetic protection on one pole, thermal protection on the other; double pole switching with thermal-magnetic protection on one pole only. All are offered with rocker switch or push button control - two buttons for ON/OFF or one button press-to-reset only, in designs to suit one of three different panel cut-out sizes. Illumination is optional. Approved to CBE standard EN 60934 (IEC 60934).

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

## Typical applications

Motors, machine tools, office equipment, appliances.

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance per pole (Ω)	
	thermal-magn.	thermal
0.1	165	94
0.2	42.5	24
0.3	20.2	12
0.4	9.7	5.40
0.5	7.17	4.30
0.6	4.9	3
0.8	2.65	1.50
1	1.49	0.9
1.2	1.25	0.7
1.5	0.74	0.45
2	0.49	0.29
2.5	0.20	0.0785
3	0.14	0.0595
3.5	0.114	0.0565
4	0.092	0.0435
5	0.06	0.0325
6	0.043	0.0215
7	0.030	0.0215
8	0.029	0.02
10	0.021	0.02
12	< 0.02	< 0.02
14	< 0.02	< 0.02
15	< 0.02	< 0.02
16	< 0.02	< 0.02

## Illumination voltage / Power consumption

Operating voltage	Power consumption		
	Y + R	G	T
6 V	2 mA	3.6 mA	4.9 mA
12 V	2 mA	3.5 mA	4.9 mA
24 V	2 mA	3.5 mA	4.9 mA
48 V	2 mA	3.5 mA	4.9 mA
115 V	0.9 mA	2.8 mA	2.2 mA
230 V	0.9 mA	2.8 mA	2.2 mA



3120-...-M...

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V (50/60 Hz); DC 50 V		
Current ratings	0.1...16 A		
Typical life	<b>1-pole</b>		
	AC 240 V: 0.1...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V: 0.1...4 A	30,000 operations at 1 x I <sub>N</sub> , inductive		
	4.5...16 A	30,000 operations at 1 x I <sub>N</sub> , resistive	
DC 28 V: 4.5...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive		
AC 240 V: 0.1...16 A	<b>2-pole</b>		
	17...20 A	50,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V: 0.1...16 A	30,000 operations at 1 x I <sub>N</sub> , inductive		
	17...20 A	10,000 operations at 1 x I <sub>N</sub> , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area	AC 3,000 V	
	current path/current path	AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.1...2 A	100 x I <sub>N</sub>	
	2.5...16 A	250 A 2-pole	
		150 A 1-pole	
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.1...4 A	AC 250 V	200 A
	5...10 A	AC 250 V	2,000 A
	12...14 A	AC 125 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 (with water splash protection IP54) terminal area IP00		
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 53 g (2-pole) approx. 50 g (1-pole)		

## Ordering information

<b>Type</b>																																	
3120	rocker switch/circuit breaker																																
<b>Mounting</b>																																	
<b>F</b> snap-in frame																																	
<b>Size of frame</b>																																	
<b>3</b>	to fit in cut-out 50.5 x 21.5 mm panel thickness 1 - 6.35 mm (.039-.250 in)																																
<b>5</b>	to fit in cut-out 44.5 x 22 mm panel thickness 1 - 4 mm (.039-.157 in)																																
<b>6</b>	to fit in cut-out 45 x 33.7 mm panel thickness 1.2 - 2.4 mm (.047-.091 in)																																
<b>Number of poles</b>																																	
<b>1</b>	1-pole, thermal-magnetic protection																																
<b>2</b>	2-pole, thermal-magnetic protection on one pole, thermally protected on the other pole																																
<b>5</b>	2-pole, thermal-magnetic protection on one pole, unprotected on the other pole																																
<b>Mounting frame design</b>																																	
<b>1</b>	collar height 1 mm (.039 in)																																
<b>3</b>	collar height 9 mm (.354 in) (with safety frame)																																
<b>4</b>	collar height 2 mm (.079 in) with water splash protection (IP54) (not with -F6 frame)																																
<b>U</b>	with water splash protection and actuator guard																																
<b>Terminal configuration</b>																																	
<b>P7</b>	blade terminals 2x2.8-0.8 mm (QC 2x.110) (terminals 12(k), 22(k), 11, 21)																																
<b>H7</b>	12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8 (QC 2x.110)																																
<b>N7</b>	as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)																																
<b>G7</b>	as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)																																
<b>Characteristic curve</b>																																	
<b>M1</b>	standard delay, therm. 1.01-1.4 x I <sub>N</sub> ; magn. 4-9 x I <sub>N</sub> AC																																
<b>Switch style</b>																																	
<b>W</b>	rocker																																
<b>Switch colour designation</b>																																	
OPAQUE	TRANSLUCENT (for illuminated versions)																																
<b>01</b> black	<b>12</b> white																																
<b>02</b> white	<b>14</b> red																																
<b>04</b> red	<b>15</b> orange																																
	<b>16</b> sky blue																																
	<b>19</b> green																																
<b>Rocker markings</b>																																	
A B C D E F X	<table border="1"> <tr> <td>0</td> <td>AUS</td> <td>OFF</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>I</td> <td>EIN</td> <td>ON</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>0</td> <td>AUS</td> <td>OFF</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td>I</td> <td>EIN</td> <td>ON</td> <td></td> <td></td> </tr> </table> <p>A B C D E F X X = without marking</p>	0	AUS	OFF									I	EIN	ON						0	AUS	OFF						I	EIN	ON		
0	AUS	OFF																															
			I	EIN	ON																												
			0	AUS	OFF																												
			I	EIN	ON																												
<b>Rocker illumination (optional)</b>																																	
<b>G</b>	green LED																																
<b>Y</b>	yellow LED																																
<b>R</b>	red LED																																
<b>T</b>	blue LED																																
<b>Illumination voltage range</b> (= operating voltage)																																	
<b>0</b>	0 - 4 V AC/DC																																
<b>1</b>	10 - 14 V AC/DC																																
<b>2</b>	20 - 28 V AC/DC																																
<b>3</b>	90 - 140 V AC																																
<b>4</b>	185 - 275 V AC																																
<b>5</b>	42 - 54 V AC/DC																																
<b>Current ratings</b>																																	
<b>0.1...16 A</b>																																	

3120 - F3 2 1 - N7 M1 - W 12 A R 4 - 10 A ordering example

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

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

<b>Type</b>	
3120	push button switch/circuit breaker
<b>Mounting</b>	
<b>F</b> snap-in frame	
<b>Size of frame</b>	
<b>2</b>	special frame for fitting splash cover
<b>3</b>	to fit in cut-out 50.5 x 21.5 mm panel thickness 1 - 6.35 mm
<b>Number of poles</b>	
<b>1</b>	1-pole, thermal-magnetic protection
<b>2</b>	2-pole, thermal-magnetic protection on one pole, thermally protected on the other pole
<b>5</b>	2-pole, thermal-magnetic protection on one pole, unprotected on the other pole
<b>Mounting frame design</b>	
<b>F</b>	frame with two push buttons
<b>G</b>	frame with one push button
<b>Terminal configuration</b>	
<b>P7</b>	blade terminals 2x2.8-0.8 mm (QC 2x.110) (terminals 12(k), 22(k), 11, 21)
<b>H7</b>	12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8 (QC 2x.110)
<b>N7</b>	as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)
<b>G7</b>	as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)
<b>Characteristic curve</b>	
<b>M1</b>	standard delay, therm. 1.01-1.4 x I <sub>N</sub> ; magn. 4-9 x I <sub>N</sub> AC
<b>Switch style/colour</b>	
<b>D</b>	1 push button (reset only)
<b>01X</b>	black
<b>04X</b>	red
<b>12X</b>	white translucent
<b>19X</b>	green translucent
<b>S</b>	2 push buttons ON/OFF
<b>GRX</b>	green translucent/red
<b>WRX</b>	white translucent/red
<b>WBX</b>	white translucent/black
<b>Push button illumination (optional)</b>	
<b>G</b>	green LED, AC/DC
<b>Y</b>	yellow LED, AC/DC
<b>R</b>	red LED, AC/DC
<b>Illumination voltage range</b> (= operating voltage)	
<b>0</b>	0 - 4 V AC/DC
<b>1</b>	10 - 14 V AC/DC
<b>2</b>	20 - 28 V AC/DC
<b>3</b>	90 - 140 V AC
<b>4</b>	185 - 275 V AC
<b>5</b>	42 - 54 V AC/DC
<b>Current ratings</b>	
<b>0.1...16 A</b>	

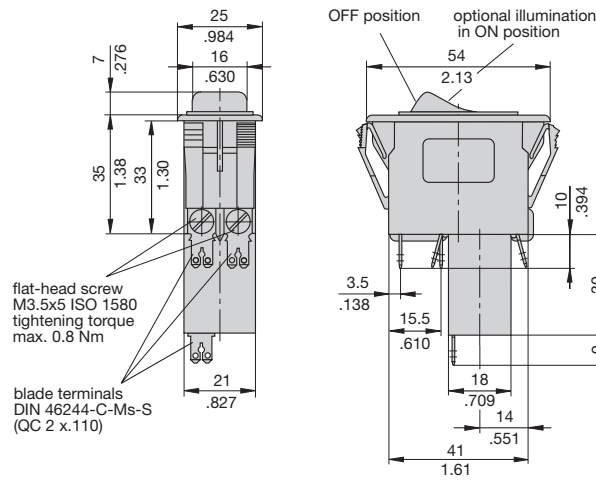
3120 - F3 2 F - N7 M1-S GRX G 4 - 10 A ordering example

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V DC 50 V DC 50 V	0.1...16 A 0.1...16 A double pole 0.1...10 A single pole
CSA, UL	AC 250 V AC 125 V	0.1...10 A 0.1...16 A
CCC	AC 250 V; DC 50 V	0.1...20 A

## Dimensions

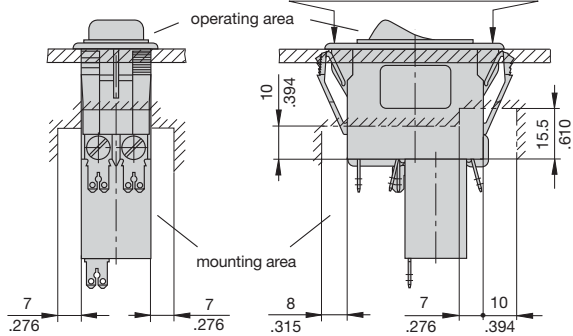
### Mounting style -F3.1, with rocker – Collar height 1 mm



## Installation drawing

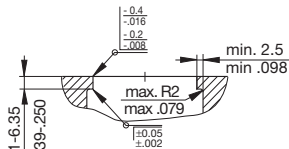
### Required safety distances for rocker and push button

When installing the circuit breaker apply pressure on bezel only.

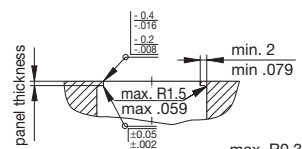


## Cut-out dimensions

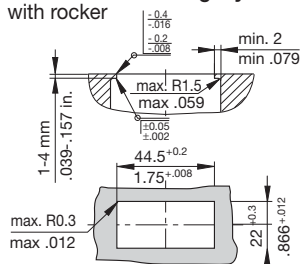
### Cut-out for mounting style -F3 with rocker and push button



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



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

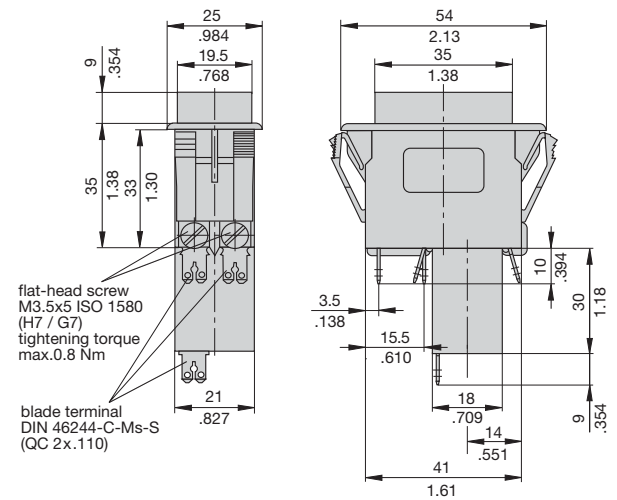


panel thickness	mm	1.2 <sup>+0.4</sup>	1.6 <sup>+0.8</sup>	2.4 <sup>+1</sup>
	inch	.047 <sup>±.016</sup>	.063 <sup>±.031</sup>	.094 <sup>±.039</sup>
dimension	mm	45 <sup>+0.2</sup>	45 <sup>+1.1</sup>	45 <sup>+2.2</sup>
	inch	1.77 <sup>±.008</sup>	1.77 <sup>±.043</sup>	1.77 <sup>±.087</sup>

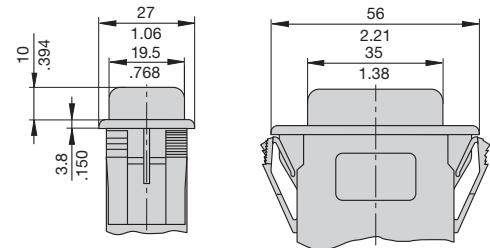
Edges of working parts: ISO 13715

## Mounting frame variants

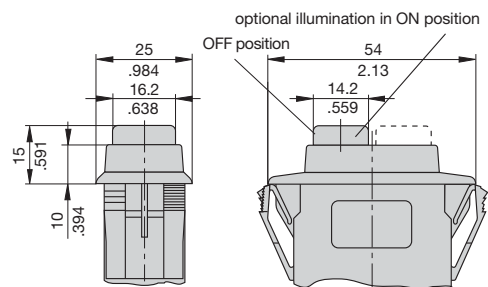
### Mounting style F3.3 with rocker collar height 9 mm (.354 in.)



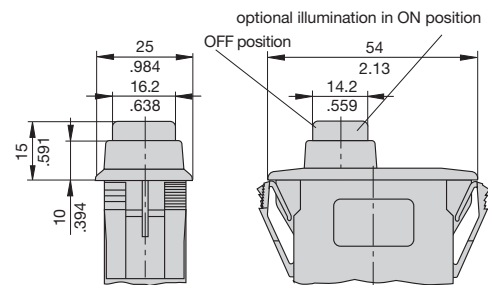
### Mounting style F3.4 with rocker collar height 2 mm (.079 in.), with water splash protection



### Mounting style F3.F-...-S-... with 2 push buttons



### Mounting style F3.G-...-D-... with 1 push button

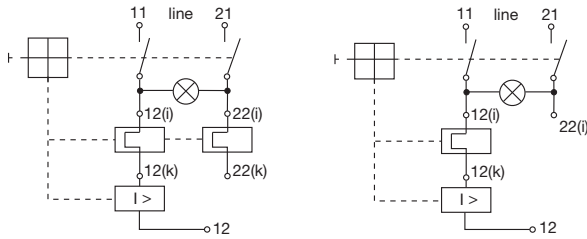


For mounting styles -F2.., -F5.., -F6.. please see section 1.

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

## Internal connection diagrams

therm.-magn. protection on one pole thermally protected on the other pole      therm.-magn. protection on one pole unprotected on the other pole

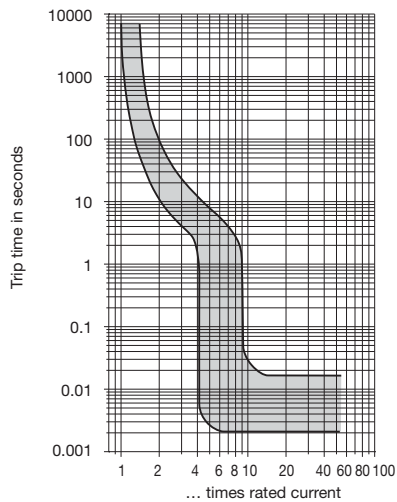


## Typical time/current characteristics at +23°C/+73.4°F

Single or double pole load

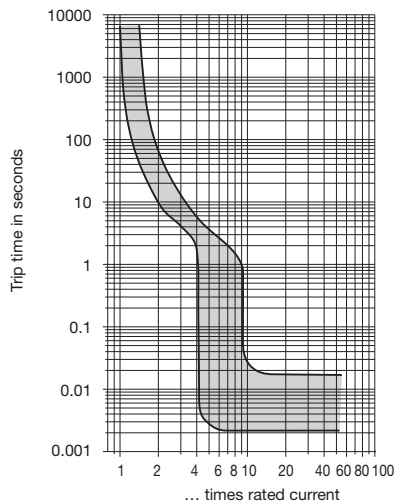
0.1 ... 2 A

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



2.5 ... 16 A

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



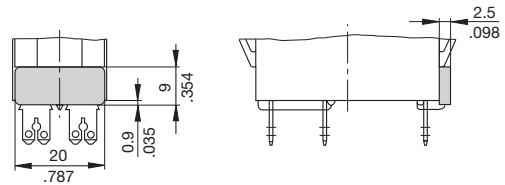
<sup>1)</sup> Magnetic tripping currents are increased by 25% on DC supplies.

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

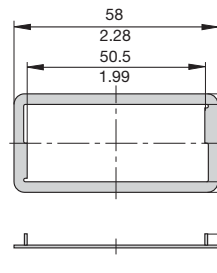
Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

## Accessories

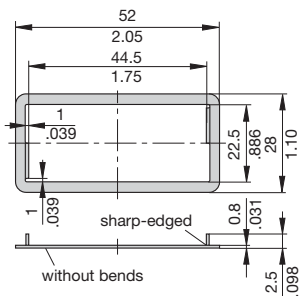
### Insulated cover Y 303 068 01



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

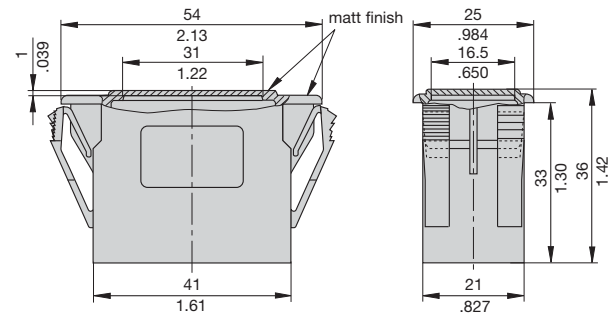


### Spacer for 3120-F5... Y 303 676 01

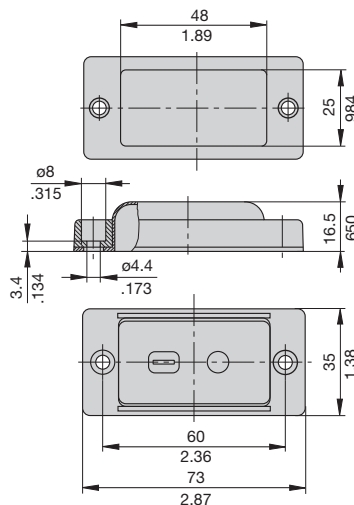


\* Y 303 675 01 suitable for panel thickness < 2 mm (.079 in)  
\* Y 303 675 02 suitable for panel thickness < 4 mm (.157 in)

### Blanking piece in -F3... size mounting frame Y 303 885 31



### Separate water splash cover, transparent (IP66) for use with -F5.. size mounting frames X 221 619 01



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

## Description

Single or two pole rocker switch/thermal-magnetic circuit breaker with trip-free mechanism (S-type TM CBE to EN 60934). The addition of a magnetic tripping module to the type 3120 range described in catalogue section 1 extends the choices available to include single pole with thermal-magnetic protection; double pole switching with thermal-magnetic protection on one pole, thermal protection on the other; double pole switching with thermal-magnetic protection on one pole only. All are offered with rocker switch actuation. Illumination is optional.

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

## Typical applications

Motors, machine tools, office equipment, appliances.

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance per pole (Ω)	
	thermal-magn.	thermal
0.1	165	94
0.2	42.5	24
0.3	20.2	12
0.4	9.7	5.40
0.5	7.17	4.30
0.6	4.9	3
0.8	2.65	1.50
1	1.49	0.9
1.2	1.25	0.7
1.5	0.74	0.45
2	0.49	0.29
2.5	0.20	0.0785
3	0.14	0.0595
3.5	0.114	0.0565
4	0.092	0.0435
5	0.06	0.0325
6	0.043	0.0215
7	0.030	0.0215
8	0.029	0.02
10	0.021	0.02
12	< 0.02	< 0.02
14	< 0.02	< 0.02
15	< 0.02	< 0.02
16	< 0.02	< 0.02

## Illumination voltage / Power consumption

Operating voltage	Power consumption LED
6 V	4.9 mA
12 V	4.9 mA
24 V	4.9 mA
48 V	4.9 mA
115 V	2.2 mA
230 V	2.2 mA



3120-F7..-M1..

## Technical data

For further details please see chapter: Technical Information

Voltage rating	AC 240 V, 50/60 Hz; DC 50 V		
Current ratings	0.1...16 A		
Typical life	<b>1-pole</b>		
	AC 240 V: 0.1...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V:	0.1...4 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
	4.5...16 A	30,000 operations at 1 x I <sub>N</sub> , resistive	
DC 28 V:	4.5...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
	<b>2-pole</b>		
AC 240 V:	0.1...16 A	50,000 operations at 1 x I <sub>N</sub> , inductive	
	17...20 A	30,000 operations at 1 x I <sub>N</sub> , inductive	
DC 50 V:	0.1...16 A	50,000 operations at 1 x I <sub>N</sub> , inductive	
	17...20 A	10,000 operations at 1 x I <sub>N</sub> , inductive	
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area	AC 3,000 V	
	current path/current path	AC 1,500 V	
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	0.1...2 A	100 x I <sub>N</sub>	
	2.5...16 A	250 A 2-pole	
		150 A 1-pole	
Interrupting capacity (UL 1077)	I <sub>N</sub>	U <sub>N</sub>	
	0.1...4 A	AC 250 V	200 A
	5...10 A	AC 250 V	2,000 A
	12...14 A	AC 125 V	1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 (with water splash protection IP54) terminal area IP00		
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 53 g (2-pole) approx. 50 g (1-pole)		

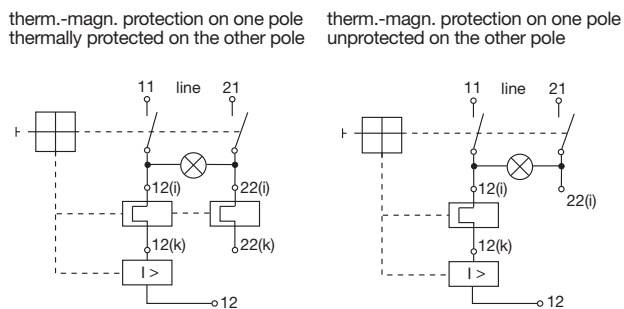
## Ordering information

<b>Type</b>	
3120	rocker switch/circuit breaker
<b>Mounting</b>	
F snap-in frame	
<b>Size of frame</b>	<b>panel thickness</b>
7 to fit in cut-out 44.5 x 22 mm	1 - 4 mm (.039-.157 in)
<b>Number of poles</b>	
1	1-pole, thermal-magnetic protection
2	2-pole, thermal-magnetic protection on one pole, thermally protected on the other pole
5	2-pole, thermal-magnetic protection on one pole, unprotected on the other pole
<b>Mounting frame design</b>	
N	new design, grey
P	snap-on actuator guard grey
Q	snap-on splash cover grey
R	new design, black
S	snap-on actuator guard black
T	snap-on splash cover black
<b>Terminal configuration</b>	
P7	blade terminals 2x2.8-0.8 mm (QC 2x.110) (terminals 12(k), 22(k), 11, 21)
H7	12(k), 22(k): blade terminals 2x2.8-0.8 (QC 2x.110) 11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8 (QC 2x.110)
N7	as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)
G7	as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8 (QC 2x.110)
<b>Characteristic curve</b>	
M1	standard delay, therm. 1.01-1.4 x I <sub>N</sub> ; magn. 4-9 x I <sub>N</sub> AC
<b>Betätigungselement</b>	
A Switch style	
<b>Switch colour designation</b>	
OPAQUE	TRANSLUCENT
(for illuminated versions)	
20 blue	30 blue
26 sky blue	36 sky blue
<b>Rocker markings</b>	
Q	permanently raised marking
<b>Rocker illumination</b>	
T LED, blue	
<b>Illumination voltage range</b> (= operating voltage)	
0	4 - 7 V
1	10 - 14 V
2	20 - 28 V
3	90 - 140 V
4	185 - 275 V
5	42 - 54 V AC/DC
<b>Current ratings</b>	
0.1...16 A	
3120 - F7 2 N - N7 M1- A 30 Q T 4 - 10 A ordering example	

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 28 V	0.1...16 A
	DC 50 V	0.1...16 A double pole
	DC 50 V	0.1...10 A single pole
CSA, UL	AC 250 V	0.1...10 A
	AC 125 V	0.1...16 A
CCC	AC 250 V; DC 50 V	0.1...20 A

## Internal connection diagrams

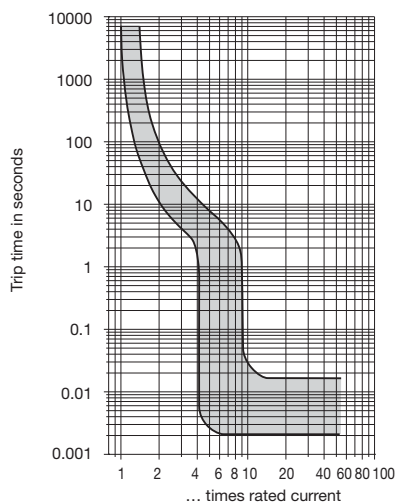


## Typical time/current characteristics at +23°C/+73.4°F

Single or double pole load

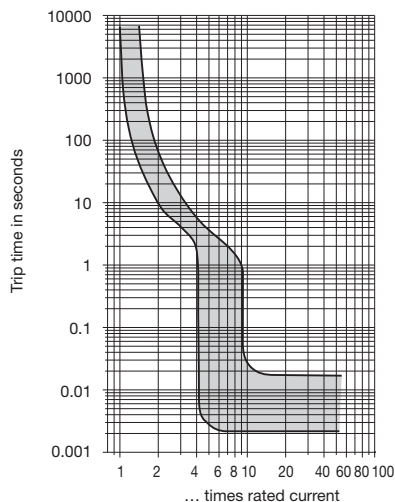
0.1 ... 2 A

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



2.5 ... 16 A

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



<sup>1)</sup> Magnetic tripping currents are increased by 25% on DC supplies.

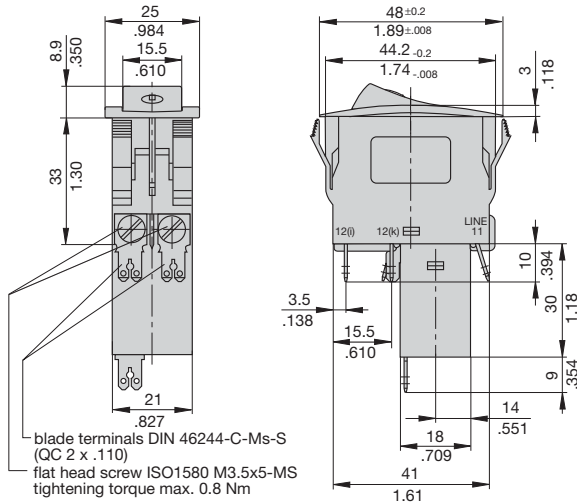
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.8	0.76	0.84	0.92	1	1.08	1.16	1.24

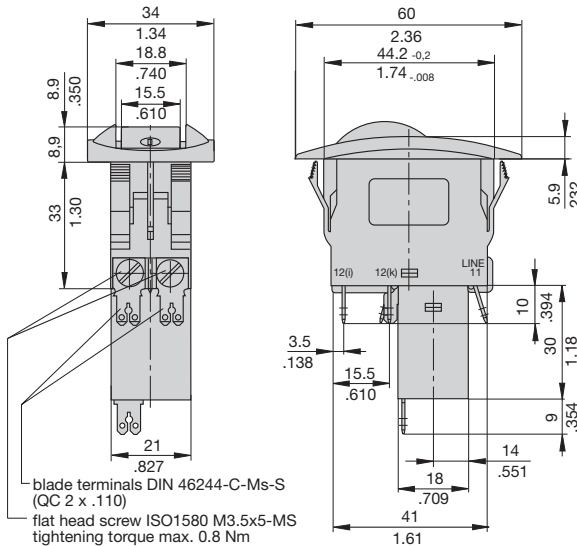


## Dimensions

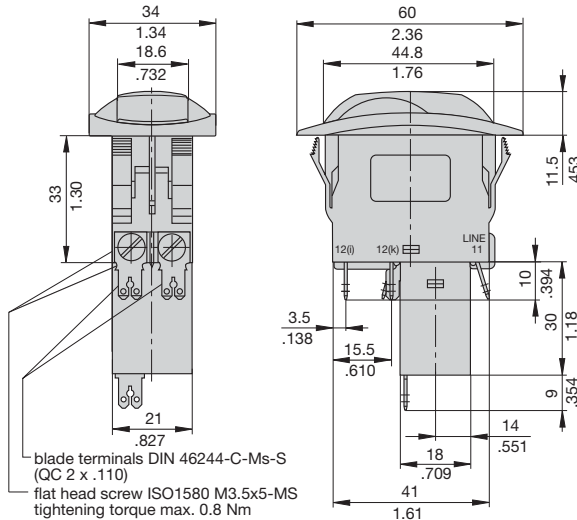
### Mounting style -F7.N and -F7.R



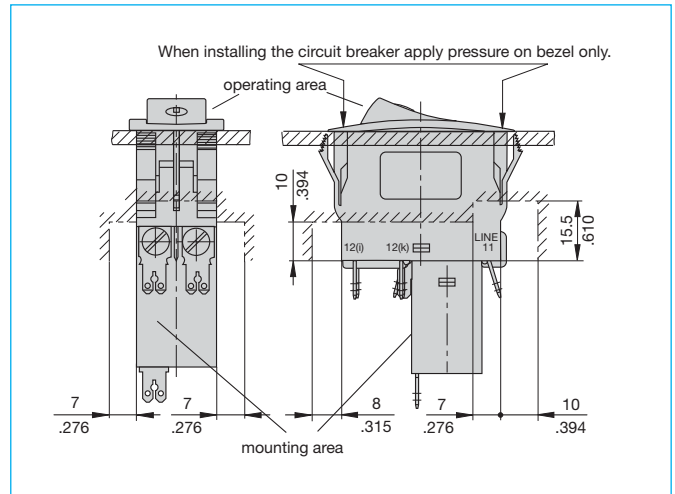
### Mounting style -F7.P and -F7.S



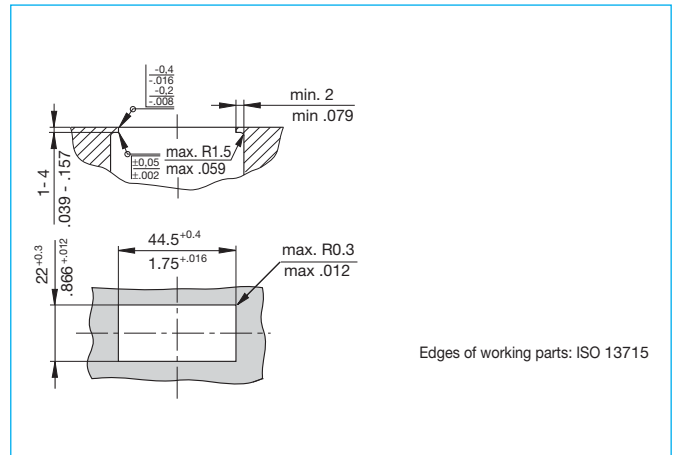
### Mounting style -F7.Q and -F7.T



## Installation drawing



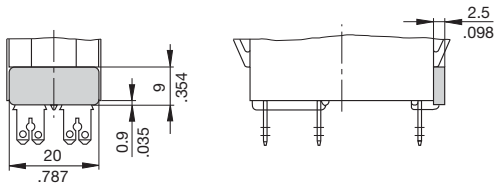
## Cut-out dimensions



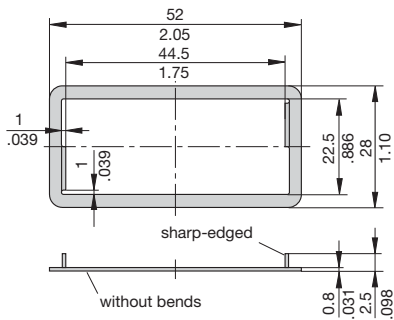
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories

### Insulated cover Y 303 068 01



### Spacer for 3120-F7... Y 303 676 01

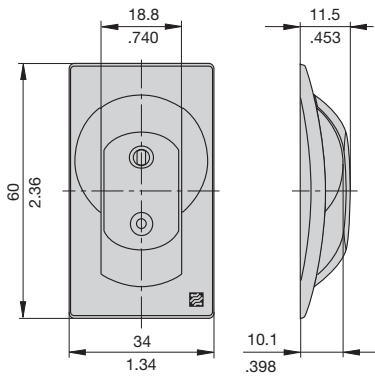


### Translucent water splash cover (IP54)

X 222 143 01

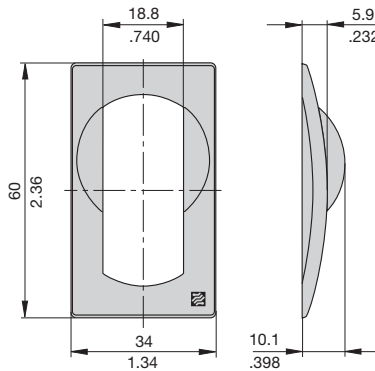
Consisting of

- Y 307 097 01 snap-on frame with actuator guard
- Y 307 096 01 soft plastic cover



### Snap-on frame with actuator guard (can be snapped on as switch-on protection or switch-off protection)

Y 307 097 01



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

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 thermal-magnetic circuit breaker with tease-free, trip-free, press-to-reset, snap action mechanism and additional manual release (M-type TM CBE to EN 60934). Designed for plug-in mounting with E-T-A sockets 10 and 16.

Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Control equipment, extra-low voltage wiring systems and components.

## Ordering information

### Type No.

3200 plug-in

### Current ratings

0.05...25 A

3200 - 5 A ordering example

## Standard current ratings and typical internal resistances

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.05	534	4	0.141
0.1	149	5	0.107
0.2	56	6	0.060
0.3	24.2	7	0.049
0.4	13.6	8	< 0.02
0.5	8.1	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	0.90	16	< 0.02
2	0.51	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
CSA	AC 250 V; DC 28 V	0.05...15 A



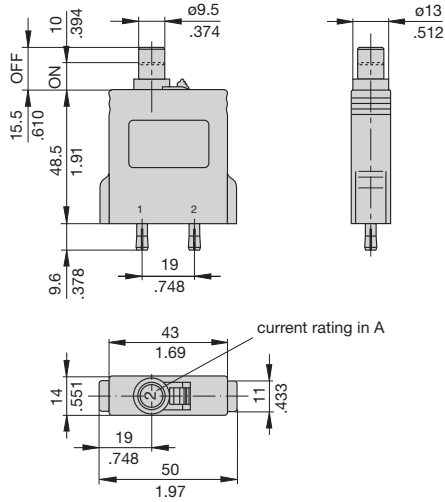
3200-...

## Technical data

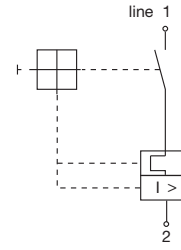
For further details please see chapter: **Technical Information**

Voltage rating	AC 240 V, 50/60 Hz; DC 28 V	
Current ratings	0.05...25 A	
Typical life	500 operations at $1 \times I_N$ , inductive 4,000 operations at $1 \times I_N$ , resistive	
Ambient temperature	-30...+60 °C (-22...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2
	reinforced insulation in operating area	
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V double insulation	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity $I_{cn}$	0.05...0.8 A 1...2 A 2.5...25 A	self-limiting 200 A 400 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	5 g (57-500 Hz), $\pm 0.38$ mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 50 g	

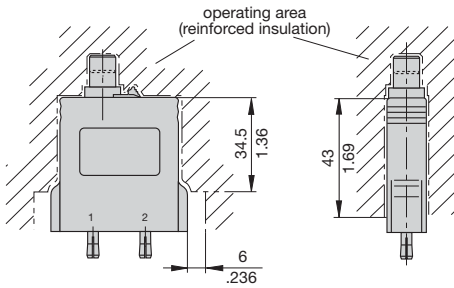
## Dimensions



## Internal connection diagram



## Installation drawing

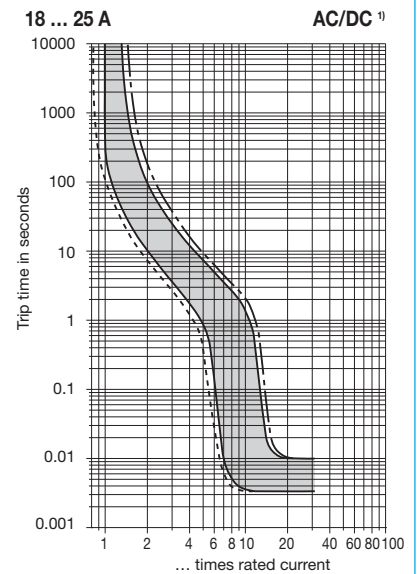
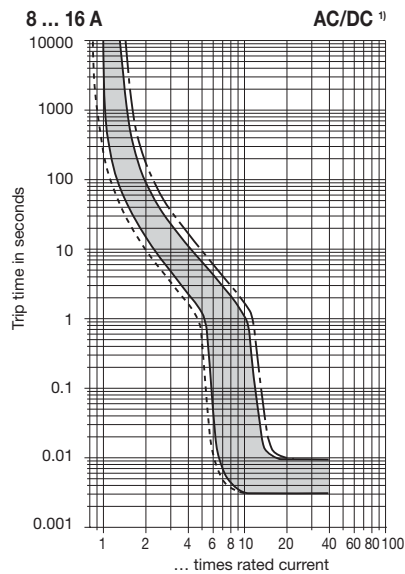
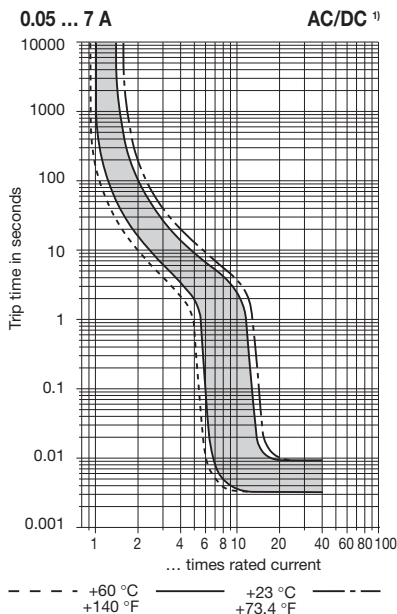


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.08	1.16	1.24

## Typical time/current characteristics

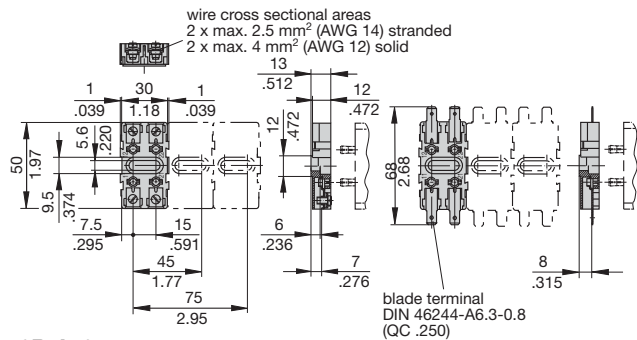


<sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.

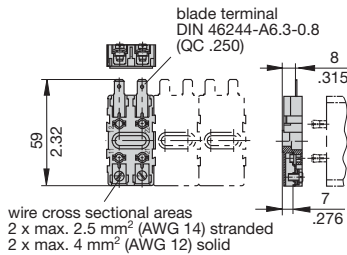
## Accessories

### Sockets 10R-K10

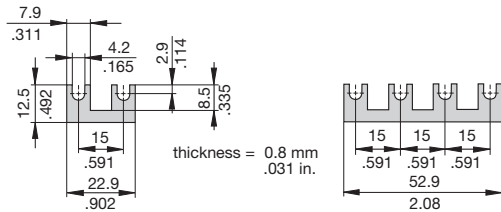
### 10R-P10



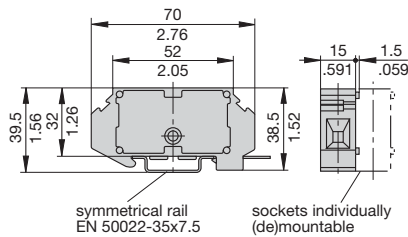
### 10R-A10



### Bus bars for sockets 10... (up to 20 A max. load) Y 301 166 02, 2-way Y 301 166 01, 4-way

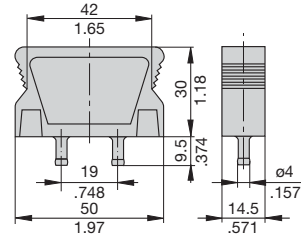


### Socket 16 (up to 16 A max. load)

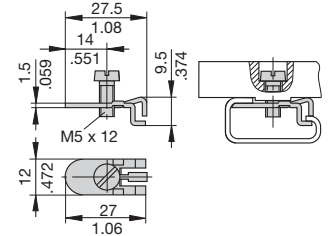


**Adapter  
 for socket 16  
 X 200 409 01**  
 for track mounting  
 to EN 50035-G32  
 (G profile)  
 on request

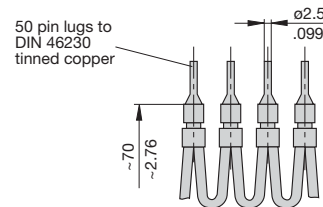
### Blanking plug Y 301 477 01 for sockets 10R-P10/K10/A10



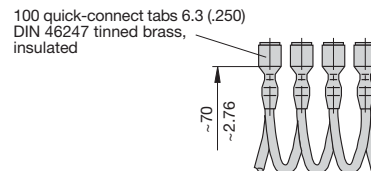
### Terminal for mounting rack (DIN/EN 50 035-G32) X 200 800 01 for sockets 10R



### Connector bus links -K10 X 210 589 01/ 2.5 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 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 for sockets 10R-P10, 10R-A10



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 thermal-magnetic circuit breakers with tease-free, trip-free, press-to-reset, snap action mechanism (R-type TM CBE to EN 60934; M-type with manual release (-H)). Available with fast acting and standard magnetic tripping characteristics - types 3300 and 3400 - both with threadneck panel mounting. Options include auxiliary contacts, a separate shunt tap terminal (-A3), and pull-to-trip manual release (-H). Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics.

## Ordering information

### Type No.

3300 fast acting

3400 standard delay

### Mounting

iG2 moulded threadneck M12x1 (bulk-shipped), not with -H;

... leave blank for metal threadneck, required for -H

### Terminal design

P10 blade terminals 6.3-0.8 (QC .250)

K20 screw terminals M3.5x5.5 with clamp (not for -Si and -A3)

### Shunt terminal (optional)

A3 same as main terminals, up to  $I_N=7$  A max. load 5 A

### Manual release (optional)

H manual release facility (pull), without reinforced insulation in operating area, for M12x1 metal threadneck only. Metal threadneck version for -H is not approved.

### Auxiliary contacts (optional)

Si with silver-plated solder terminals (N/O and N/C)

### Push button marking (optional)

1 without

### Current ratings

0.05...16 A

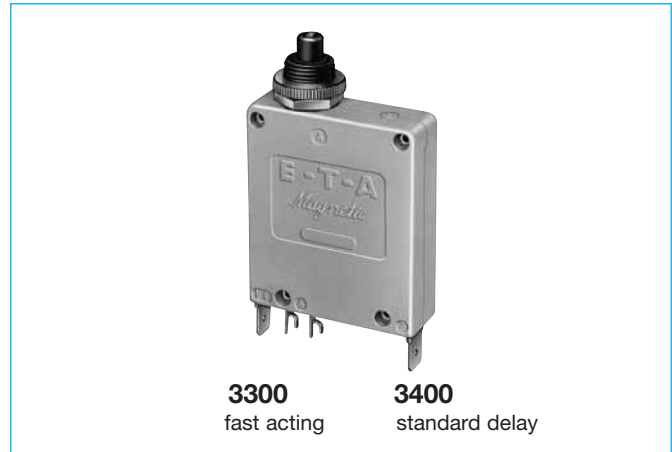
3400 - iG2 - P10 - ... - Si - ... - 10 A ordering example, without manual release and with moulded threadneck

3400 - ... - P10 - ... - H - Si - ... - 10 A ordering example, with manual release and metal threadneck

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

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance ( $\Omega$ )		Current ratings (A)	Internal resistance ( $\Omega$ )	
	3300	3400		3300	3400
0.05	447	211	3	0.18	0.19
0.1	131	131	4	0.109	0.090
0.2	41	40	5	0.066	0.061
0.3	19.6	19.3	6	0.046	0.041
0.4	10.4	10.4	7	0.032	0.034
0.5	7.2	7.1	8	0.02	$\leq 0.02$
0.6	4.8	4.3	10	$\leq 0.02$	$\leq 0.02$
0.8	2.5	2.5	12	$\leq 0.02$	$\leq 0.02$
1	1.93	1.67	13	$\leq 0.02$	$\leq 0.02$
1.5	0.81	0.61	14	$\leq 0.02$	$\leq 0.02$
2	0.44	0.38	15	$\leq 0.02$	$\leq 0.02$
2.5	0.27	0.24	16	$\leq 0.02$	$\leq 0.02$



**3300**  
fast acting

**3400**  
standard delay

## Technical data

For further details please see chapter: Technical Information

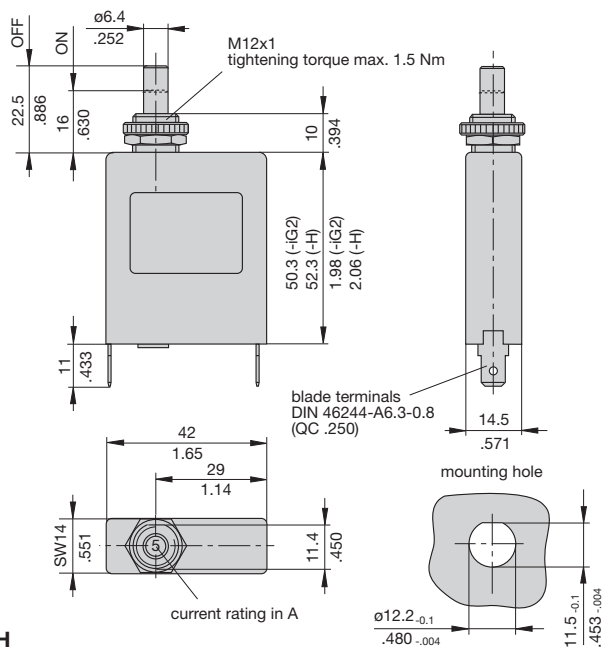
Voltage rating	AC 240 V, 50/60 Hz; DC 65 V (UL: AC 250 V; DC 80 V)	
Current ratings	0.05...16 A	
Auxiliary circuit	1 A, AC 240 V / DC 65 V	
Typical life with -H:	5,000 operations at 1 x $I_N$ , inductive 5,000 operations at 2 x $I_N$ , resistive 5,000 operations at 2 x $I_N$ , inductive 1,500 operations at 2 x $I_N$ , inductive	
without -H:	0.05...8 A > 8 A	
Ambient temperature	-30...+60 °C (-22...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A) operating area	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V double insulation	
main circuit/aux. circuit	AC 1,500 V	
aux. circuit 4-5/6-7	AC 840 V	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity $I_{cn}$	0.05...0.8 A 1...2 A 2.5...16 A	self-limiting 200 A 400 A
Interrupting capacity (UL 1077)	$I_N$ 0.05...16 A 0.05...16 A	$U_N$ AC 250 V 1,000 A DC 80 V 1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	5 g (57-500 Hz), $\pm 0.38$ mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab	
Mass	3300: approx. 55 g 3400: approx. 50 g	

## Approvals

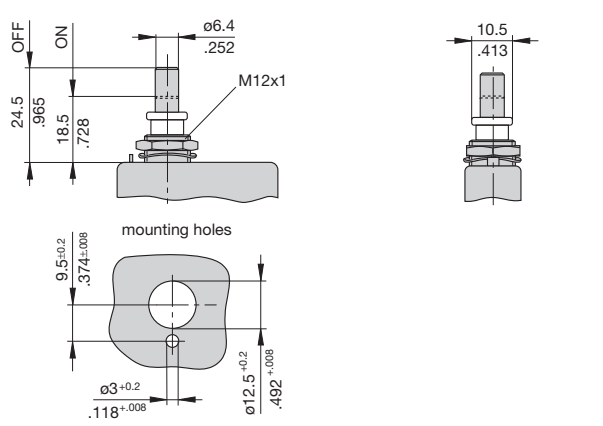
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 240 V; DC 65 V	0.05...16 A
CSA, UL	AC 250 V; DC 80 V	0.05...16 A
UL: only type 3400	DC 65 V	0.05...25 A

## Dimensions

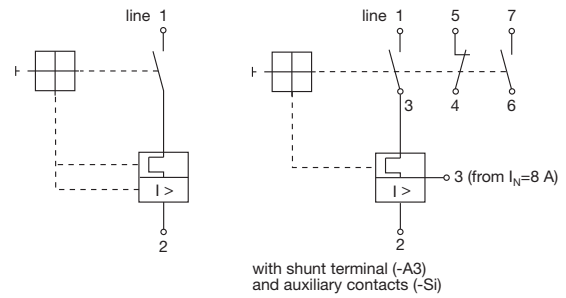
### -iG2-P10



### -H

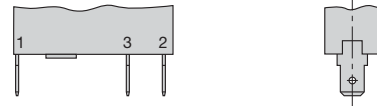


## Internal connection diagrams

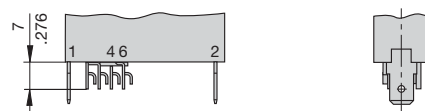


## Terminal design

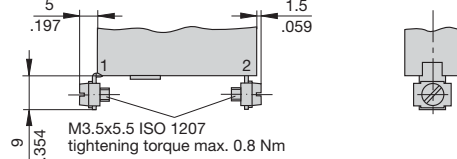
### -P10-A3



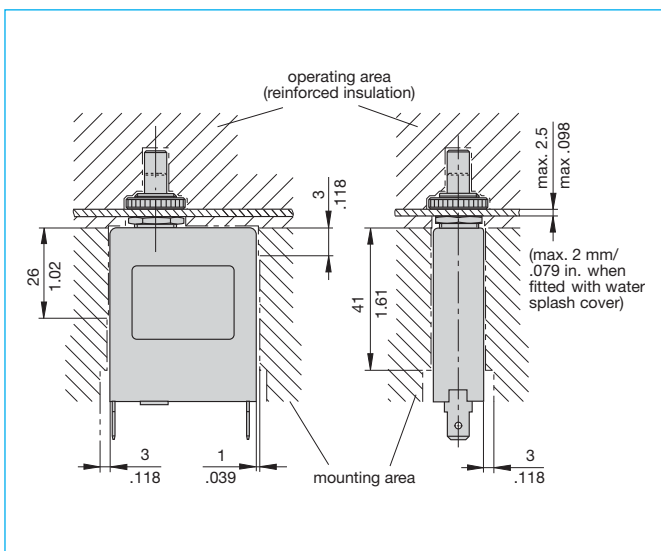
### -P10-Si



### -K20



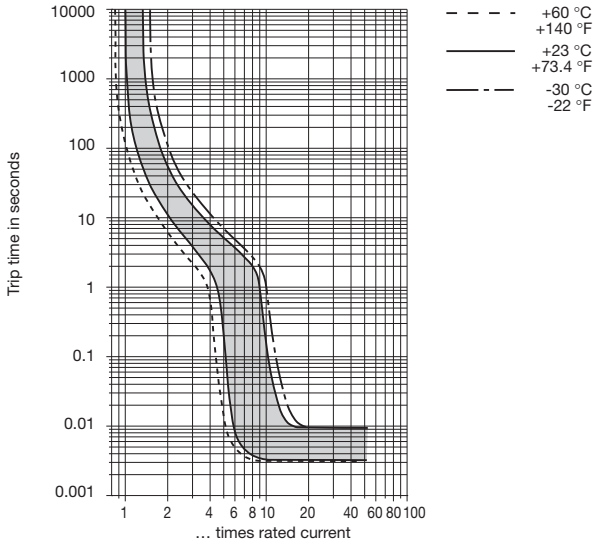
## Installation drawing



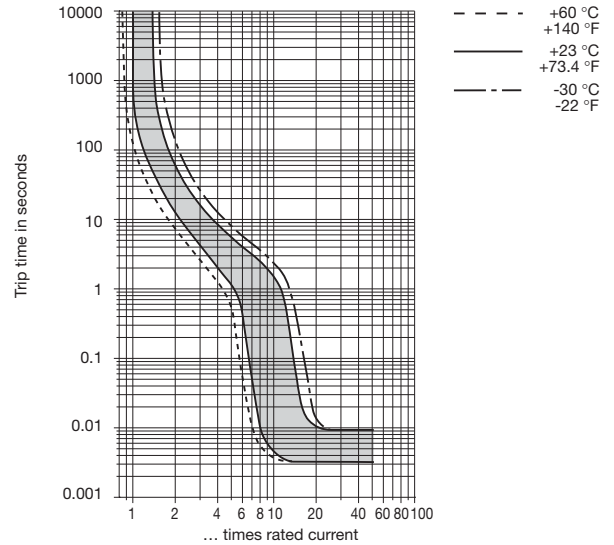
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics

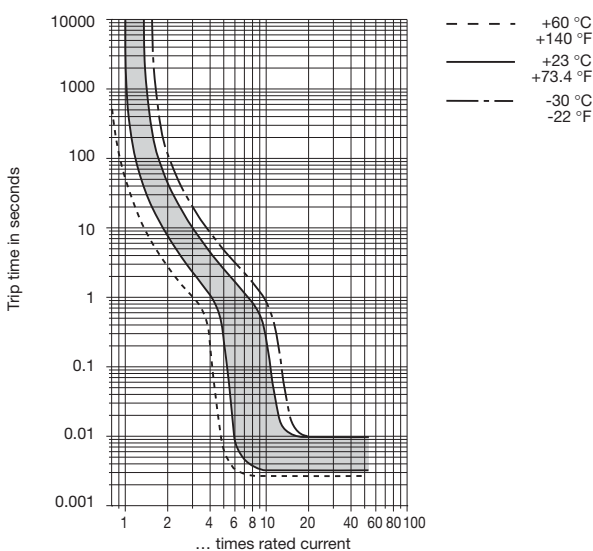
**Type 3300 0.05 ... 7 A AC/DC <sup>1)</sup>**



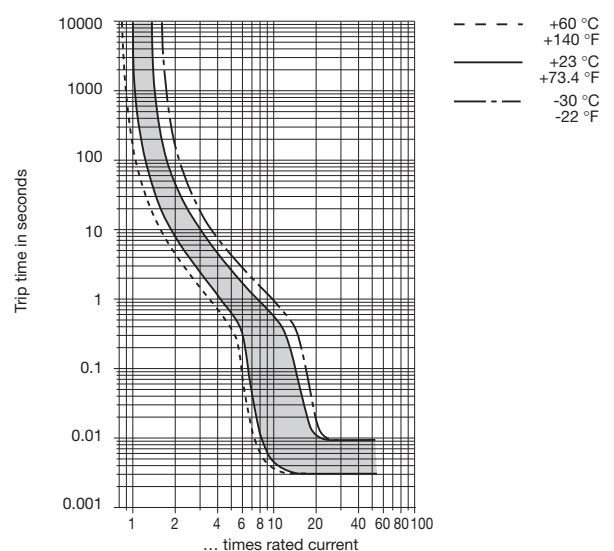
**Type 3400 0.05 ... 7 A AC/DC <sup>1)</sup>**



**Type 3300 8 ... 16 A AC/DC <sup>1)</sup>**



**Type 3400 8 ... 16 A AC/DC <sup>1)</sup>**



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

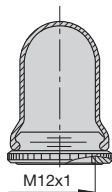
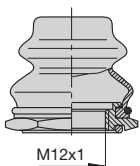
<sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.

## Accessories

**For push buttons with M12 moulded threadneck (-iG2)**  
(not with manual release -H)

**Hex nut with splash cover**  
X 201 296 01 black (IP64)  
X 200 801 08 transparent,  
with O-ring (IP66 and IP67)

**Water splash cover, transparent with knurled nut**  
X 210 663 01 (IP64)



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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.08	1.16	1.24

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



## Description

Single pole thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Featuring a flange for panel mounting, and optional auxiliary contacts and unprotected shunt tap terminal. Type 4000 offers lower internal resistance values and is fitted as standard with auxiliary contacts and an intermediate reset position in which all contacts are isolated.

Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics, communications systems.

## Ordering information

<b>Type No.</b>	
3500	standard version
4000	low resistance version
<b>Mounting (optional)</b>	
F11	flange with additional M3 insertion nuts
<b>Terminal design</b>	
P10	blade terminals 6.3-0.8 (QC .250), tinned
K20	screw terminals M3.5x5.5 with clamp (not with -Si or type 4000)
<b>Shunt terminal (optional)</b>	
A3	same as main terminals (up to $I_N = 7$ A, max. load 5 A)
<b>Auxiliary contacts (optional with type 3500)</b>	
Si	auxiliary contacts, silver plated terminals one each N/O and N/C
ZR-Si	auxiliary contacts with intermediate position (standard with type 4000)
<b>Current ratings</b>	
0.05...16 A (type 3500)	
0.05...10 A (type 4000)	
3500 - .. - P10 - A3 - Si - 10 A ordering example	

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

## Standard current ratings and typical internal resistance values

Current ratings (A)	Internal resistance ( $\Omega$ )		Current ratings (A)	Internal resistance ( $\Omega$ )	
	3500	4000		3500	4000
0.05	447	211	3	0.19	0.054
0.1	131	48	4	0.090	0.035
0.2	40	12.4	5	0.061	0.025
0.3	19.3	5.4	6	0.041	$\leq 0.02$
0.4	10.4	3.1	7	0.034	$\leq 0.02$
0.5	7.1	2.0	8	$\leq 0.02$	$\leq 0.02$
0.6	4.3	1.32	10	$\leq 0.02$	$\leq 0.02$
0.8	2.5	0.76	12	$\leq 0.02$	
1	1.67	0.49	14	$\leq 0.02$	
1.5	0.61	0.21	15	$\leq 0.02$	
2	0.38	0.101	16	$\leq 0.02$	
2.5	0.24	0.078			



**3500**  
standard type

**4000**  
low-resistance type

## Technical data

For further details please see chapter: Technical Information

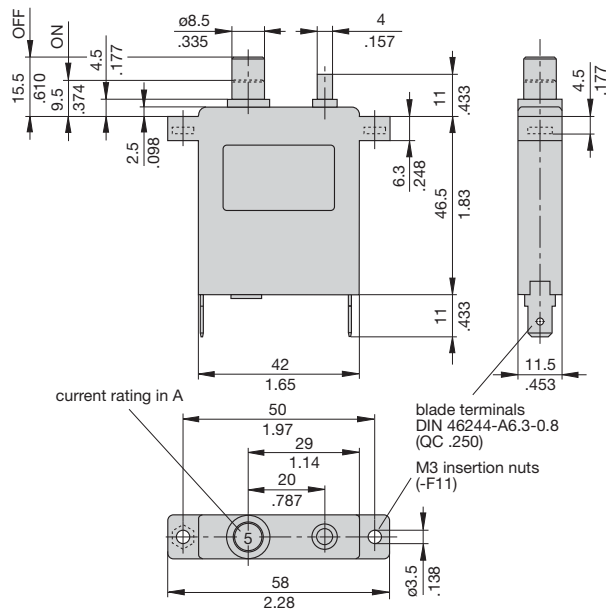
Voltage rating	AC 240 V, 50/60 Hz; DC 65 V (UL: AC 250 V; DC 80 V)		
Current rating range	3500: 0.05...16 A 4000: 0.05...10 A		
Auxiliary circuit	1 A, AC 240 V / DC 65 V		
Typical life	5,000 operations at 1 x $I_N$ , inductive 5,000 operations at 2 x $I_N$ , resistive		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area AC 3,000 V		
	main/aux. circuit AC 1,500 V		
	aux. circuit 4-5/6-7 AC 840 V		
Insulation resistance	> 100 M $\Omega$ (DC 500 V)		
Interrupting capacity $I_{cn}$	3500 0.05...0.8 A 1...2 A 2.5...16 A	4000 0.05...0.2 A 0.3...2 A 2.5...10 A	self-limiting 200 A 400 A
Interrupting capacity (UL 1077)	$I_N$ 0.05...16 A type 3500: 0.05...16 A	$U_N$ AC 250 V DC 80 V	1,000 A 1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00		
Vibration	5 g (57-500 Hz), $\pm 0.38$ mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 40 g		

## Approvals

Authority	Voltage ratings	Current ratings
<b>3500:</b>		
VDE (EN 60934)	AC 240 V; DC 65 V	0.05...16 A
CSA, UL	AC 250 V; DC 80 V	0.05...16 A
UL	DC 65 V	0.05...25 A
<b>4000:</b>		
VDE (EN 60934)	AC 240 V; DC 65 V	0.05...10 A
CSA	AC 250 V; DC 80 V	0.05...10 A

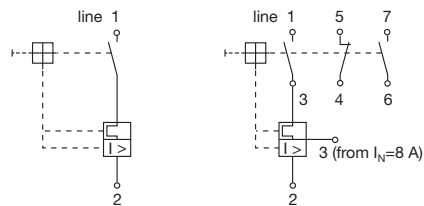
## Dimensions

### Version -P10

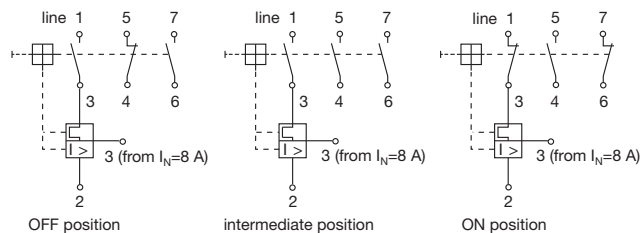


## Internal connection diagrams

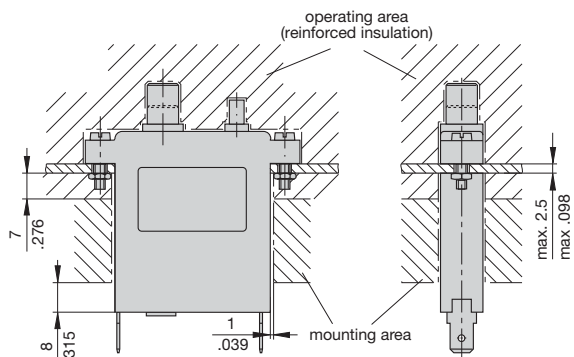
### with shunt terminal (-A3) and auxiliary contacts (-Si)



### Switching position with intermediate position and auxiliary contacts (-ZR-Si)

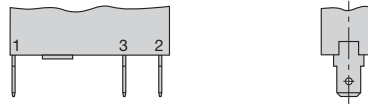


## Installation drawing

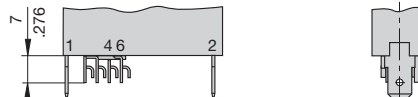


## Terminal design

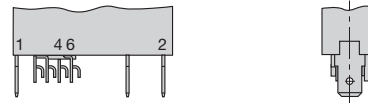
### -P10-A3



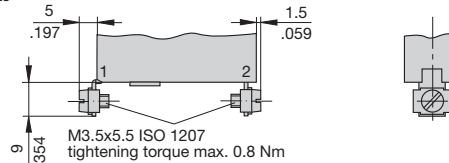
### -P10-Si



### -P10-A3-Si



### -K20

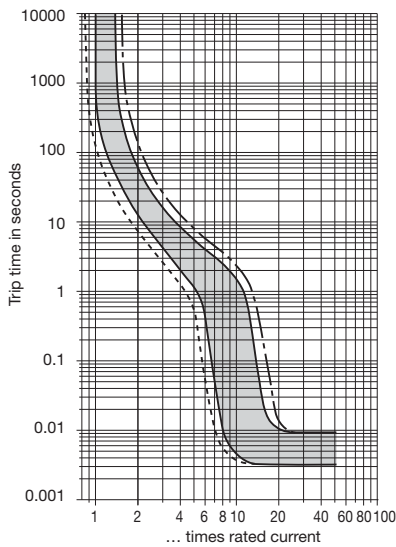


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics

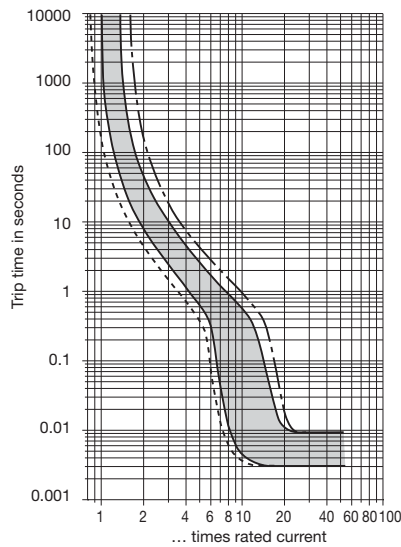
**3500 0.05 ... 7 A**

AC <sup>1)</sup>



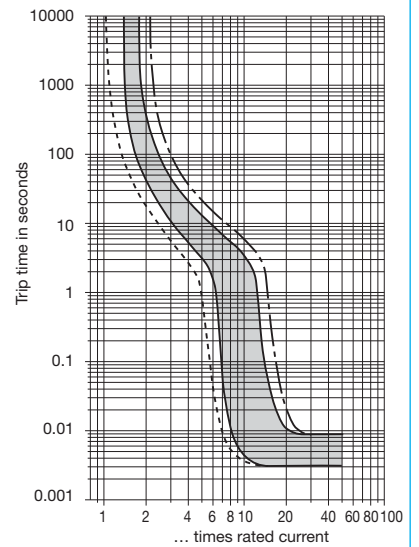
**3500 8 ... 16 A**

AC <sup>1)</sup>



**4000 0.05 ... 10 A**

DC <sup>2)</sup>



--- +60 °C +140 °F    ——— +23 °C +73.4 °F    - - - -30 °C -22 °F

- <sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.
- <sup>2)</sup> Magnetic tripping currents are decreased by 20% on AC supplies.

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

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.08	1.16	1.24

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.

## Special version 3500-...-2100

Single pole thermal-magnetic overcurrent circuit breaker with slow magnetic trip curve, suitable for high inrush currents (up to  $12 \times I_N$ ). Suffix -2100 is also available for types 3400 and 3600. Enquire for further details.

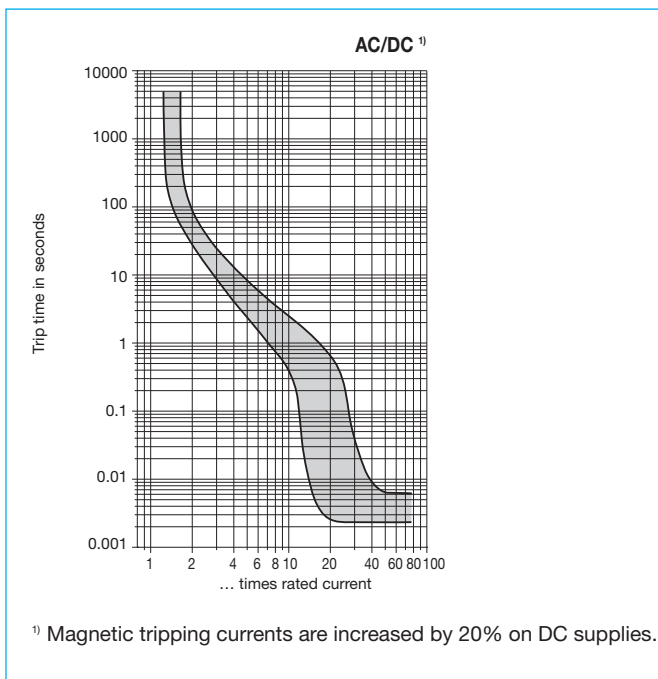
## Typical applications

Industrial control systems, telecommunications, etc.

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.06	292	3	0.18
0.1	165	4	0.11
0.2	41.7	5	0.067
0.3	19.7	6	0.052
0.4	12.1	7	0.035
0.5	7.9	8	0.031
0.6	5.5	10	0.022
0.8	2.6	12	$\leq 0.02$
1	1.88	14	$\leq 0.02$
1.5	0.77	15	$\leq 0.02$
2	0.42	16	$\leq 0.02$
2.5	0.24		

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



## Special version 3500-...-2350

Single pole thermal-magnetic circuit breaker suitable for high ambient temperatures. The special rating of the circuit breaker allows resetting at no load in ambient temperatures up to +80 °C. Suffix -2350 is also available for types 3400 and 3600. Enquire for further details.

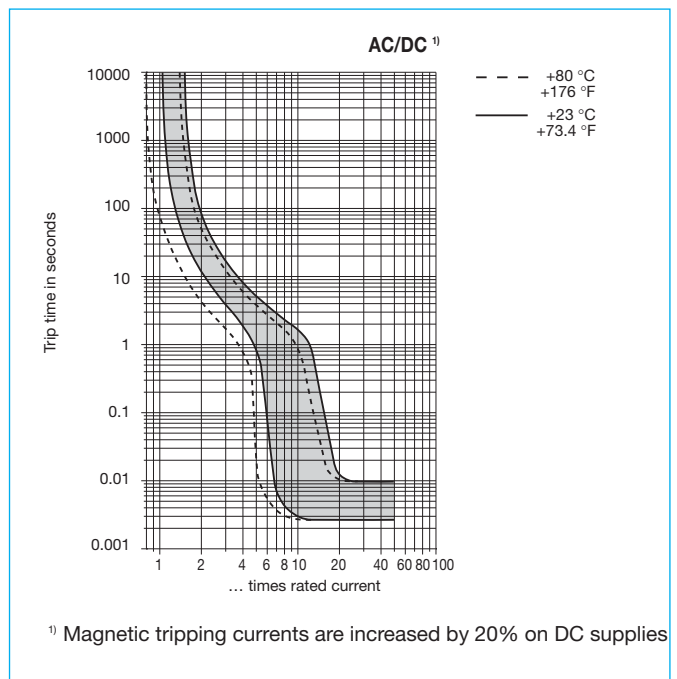
## Typical applications

Industrial control systems.

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ )	Current rating (A)	Internal resistance ( $\Omega$ )
0.05	583	2.5	0.42
0.1	167	3	0.21
0.2	49.9	4	0.13
0.3	23.1	5	0.11
0.4	12.8	6	0.056
0.5	8.7	10	0.022
0.8	3.45	12	$\leq 0.02$
1	2.3	15	$\leq 0.02$
1.5	0.89	16	$\leq 0.02$
2	0.48		

## Typical time/current characteristics



## Description

Single pole thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Designed for plug-in mounting with E-T-A sockets 17-P10-Si, 23-P10-Si, 63-P10-Si; or panel mounting using E-T-A clips. Featuring an unprotected shunt tap terminal and optional auxiliary contacts. Type 3900 offers lower internal resistance values and is fitted as standard with auxiliary contacts and an intermediate reset position in which all contacts are isolated.

Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Process control systems, instrumentation, communications systems, rail vehicles.

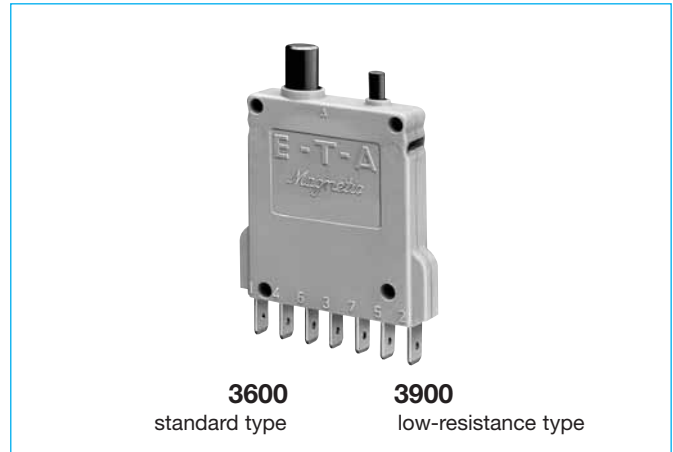
## Ordering information

<b>Type No.</b>	
<b>3600</b>	standard version with shunt tap terminal -3
<b>3900</b>	low-resistance version
<b>Terminal design</b>	
<b>P10</b>	blade terminals 6.3-0.8 (QC .250)
<b>Auxiliary contacts (3900: intermediate position as standard)</b>	
<b>Si</b>	with blade terminals 6.3-08, one each NO/NC,
<b>Si60</b>	special auxiliary contact (only 3900) 1 NO, closed in the intermediate and ON position
<b>ZR-Si</b>	auxiliary contacts with intermediate position (only 3600)
<b>ZR-Si60</b>	special auxiliary contact (only 3600) 1 NO, closed in the intermediate and ON position
<b>Si3-R</b>	special auxiliary contacts, 2 NC contacts with reset button (not approved)
<b>Current ratings</b>	
	<b>0.05...16 A</b> (type 3600)
	<b>0.05...10 A</b> (type 3900)
<b>3600 - P10 - Si - 10 A</b> 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)	
	3600	3900		3600	3900
0.05	447	211	3	0.19	0.054
0.1	131	48	4	0.090	0.035
0.2	40	12.4	5	0.061	0.025
0.3	19.3	5.4	6	0.041	≤ 0.02
0.4	10.4	3.1	7	0.034	≤ 0.02
0.5	7.1	2.0	8	≤ 0.02	≤ 0.02
0.6	4.3	1.32	10	≤ 0.02	≤ 0.02
0.8	2.5	0.76	12	≤ 0.02	
1	1.67	0.49	14	≤ 0.02	
1.5	0.61	0.21	15	≤ 0.02	
2	0.38	0.101	16	≤ 0.02	
2.5	0.24	0.078			



**3600**  
standard type

**3900**  
low-resistance type

## Technical data

For further details please see chapter: Technical Information

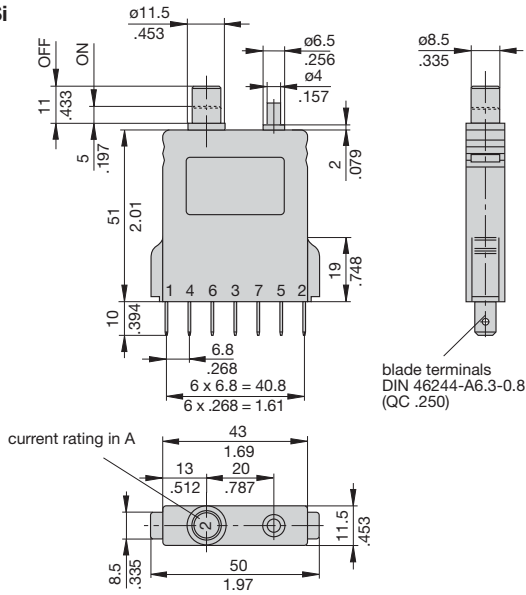
Voltage rating	AC 240 V, 50/60 Hz; DC 65 V (UL: AC 250 V; DC 65 V)		
Current rating range	3600: 0.05...16 A 3900: 0.05...10 A		
Auxiliary circuit	1 A, AC 240 V / DC 65 V		
Typical life	5,000 operations at 1 x I <sub>N</sub> , inductive 5,000 operations at 2 x I <sub>N</sub> , resistive		
Ambient temperature	-30...+60 °C (-22...+140 °F)		
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 2.5 kV	pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area main/aux. circuit aux. circuit 4-5/6-7	AC 3,000 V AC 1,500 V AC 840 V	
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	3600 0.05...0.8 A 1...2 A 2.5...16 A	3900 0.05...0.2 A 0.3...2 A 2.5...10 A	self-limiting 200 A 400 A
Interrupting capacity (UL 1077)	I <sub>N</sub> 0.05...16 A type 3600: 0.05...16 A	U <sub>N</sub> AC 250 V DC 80 V	1,000 A 1,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00		
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Mass	approx. 45 g		

## Approvals

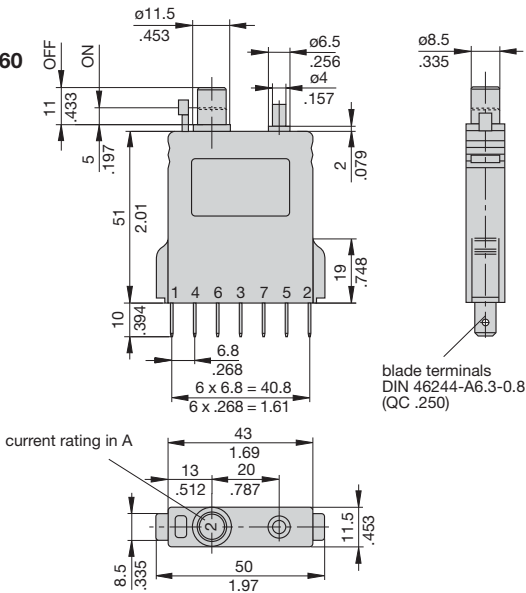
Authority	Voltage ratings	Current ratings
<b>3600:</b>		
VDE (EN 60934)	AC 240 V; DC 65 V	0.05...16 A
CSA/UL	AC 250 V; DC 80 V	0.05...16 A
UL	DC 65 V	0.05...25 A
<b>3900:</b>		
VDE (EN 60934)	AC 240 V; DC 65 V	0.05...10 A

## Dimensions

### -P10-Si

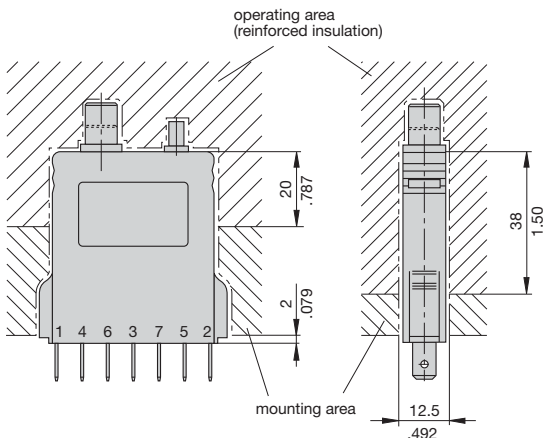


### -Si3-R -Si60 -ZR-Si60 -ZR-Si



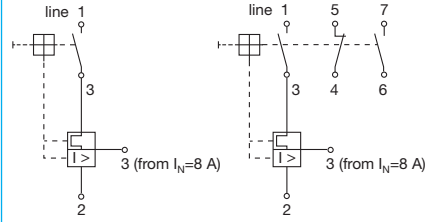
Intermediate position: Holding down reset button and actuating manual release simultaneously.

## Installation drawing

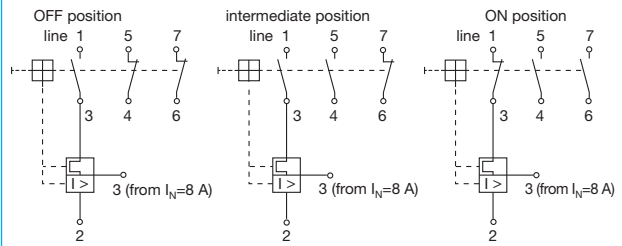


## Internal connection diagrams

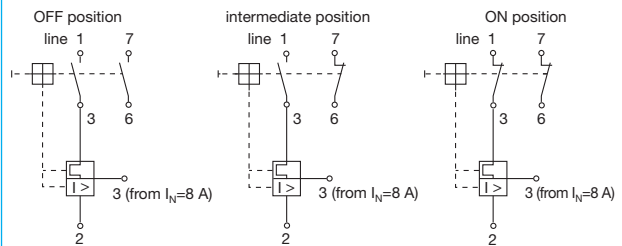
### with shunt terminal (standard) and auxiliary contacts (-Si) only 3600



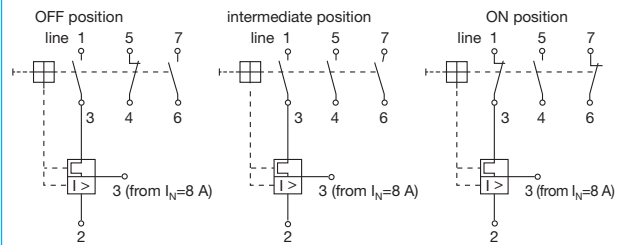
### Switching position with auxiliary contacts and reset button (-Si3-R)



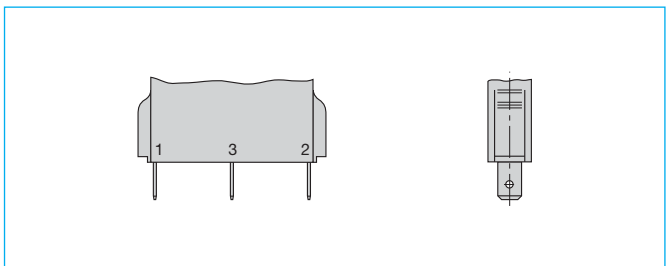
### Switching position with special auxiliary contact (-Si60, -ZR-Si60)



### Switching position with intermediate position and auxiliary contacts (3600: -ZR-Si, 3900: -Si)

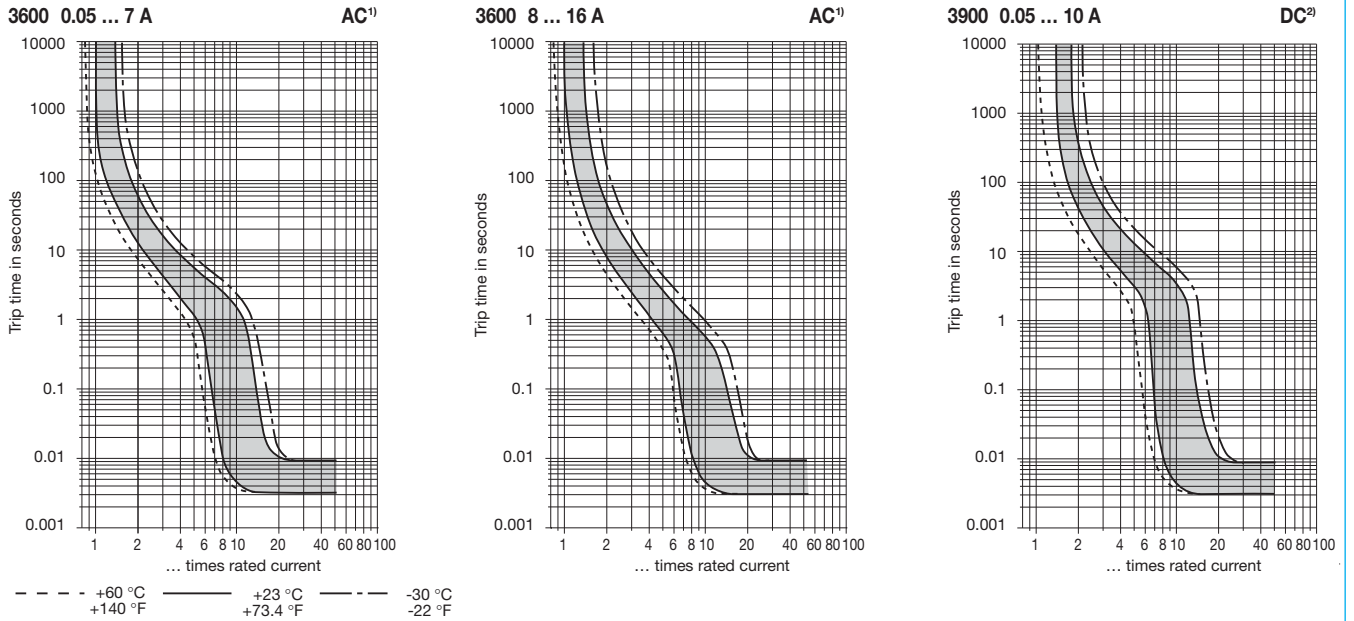


## Terminal design -P10



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

## Typical time/current characteristics



- <sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.
- <sup>2)</sup> Magnetic tripping currents are decreased by 20% on AC supplies.

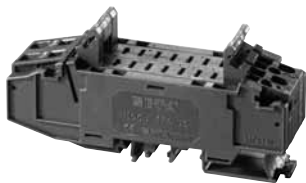
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below. See also section 9 – Technical information.

Ambient temperature °F	-22	-4	+14	+32	+73.4	+104	+122	+140
°C	-30	-20	-10	0	+23	+40	+50	+60
Derating factor	0.76	0.79	0.83	0.88	1	1.08	1.16	1.24

## Accessories

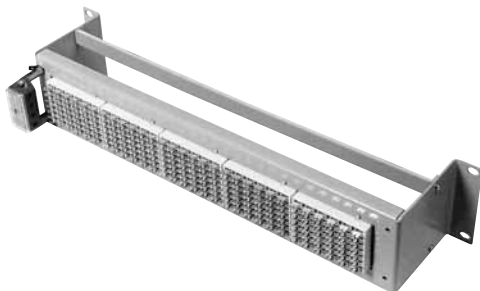
### Module 17plus

Modular power distribution system for circuit breakers 2210-S, 3600 or 3900.  
For technical details see product group 7.

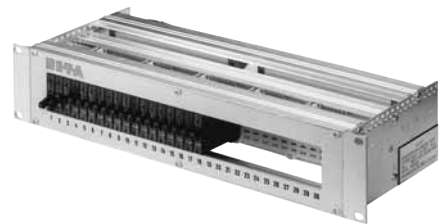


### Power-D-Box with sockets

accommodating up to 30 E-T-A thermal-magnetic circuit breakers type 3600-P10-Si or 3900-P10-Si.  
For technical data see product group 7.



**Power-D-Box with sockets pre-wired 19BGT2 2U**  
for 18, 24 or 30 circuits.  
For technical data see product group 7.



## Accessories

### Sockets

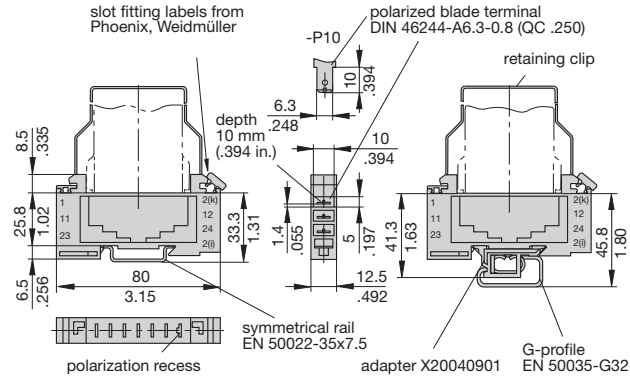
#### 17-P10-Si

(up to 16 A max. load)

Retaining clip Y 300 581 11 to special order.

#### 17-P10-Si-20025

mounted with adapter



### Sockets

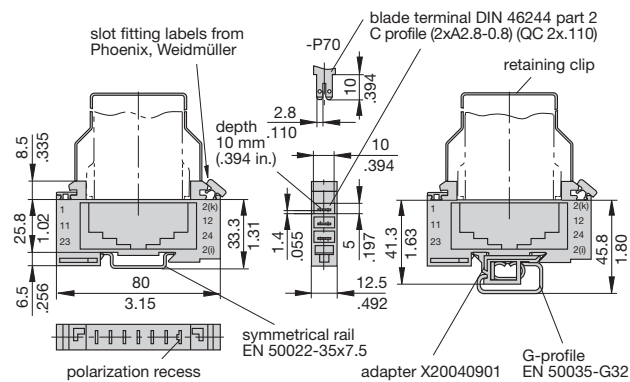
#### 17-P70-Si

(up to 16 A max. load)

Retaining clip Y 300 581 11 to special order.

#### 17-P70-Si-20025

mounted with adapter



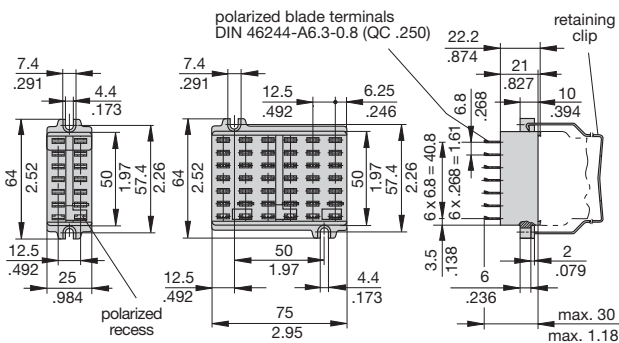
### Sockets

#### 23-P10-Si

(up to 16 A max. load)

Retaining clip Y 300 581 03 to special order.

#### 63-P10-Si



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

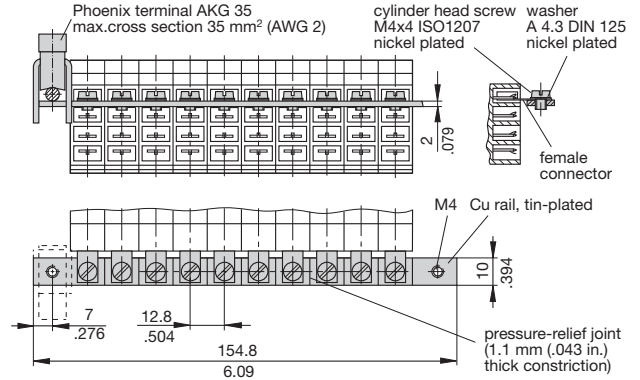
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

### Bus bar (10-way) (supplied as a complete package) for socket 17 (for max. 100 A continuous load)

#### X 211 157 01 with terminal

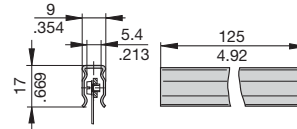
#### X 211 157 02 without terminal

(more positions available on request)



### Insulate sleeving for bus bar

#### Y 303 824 01



### Connector bus links -P10

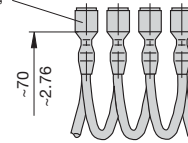
X 210 588 01/ 1.5 mm<sup>2</sup> (AWG 16), brown up to 13 A max. load

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

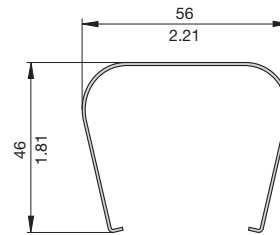
X 210 588 04/ 2.5 mm<sup>2</sup> (AWG 14), blue up to 20 A max. load

100 quick-connect tabs 6.3 (.250) DIN 46247 tinned brass, insulated



### Extraction tool

#### Y 301 398 02

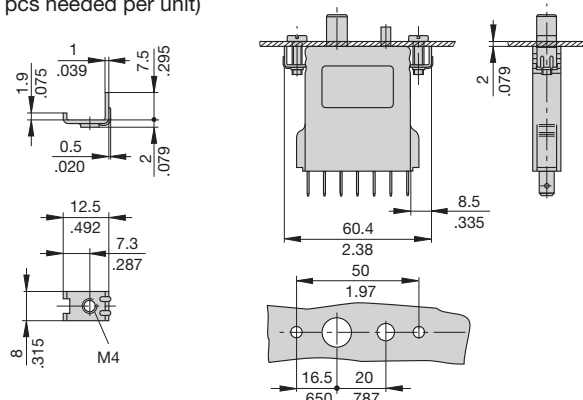


### Mounting clip

#### Y 300 504 02

(2 pcs needed per unit)

Installation drawing with mounting clips Y 300 504 02





## Description

Single, double and three pole thermal-magnetic circuit breakers with high rupture capacity to UL 489 (5 kA), EN/IEC 60934 (6kA) and UL 1077 (5 kA). With toggle actuation, positively trip-free mechanism, a choice of characteristic curves and a wide range of current ratings in finely graded steps from 0.1 A through 32 A. Auxiliary contacts (make or break contacts) are optionally available. Track-mountable design, width only 12.5 mm. Ease of wiring by means of an integral busbar concept: line entry busbar LINE+ and signal busbars/signal jumpers.

## Typical applications

Protection of power supplies, equipment and cables in centralised control systems and in decentralised installations serving automation, petro-chemical, power plant, steel industry and similar industrial applications.

## Ordering Information

<b>Type number</b>	
4220	thermal-magnetic high performance circuit breaker
<b>Mounting</b>	
T1	track-mounting
<b>Number of poles</b>	
1	single pole
2	double pole
3	three pole
<b>Additional feature</b>	
0	without actuator guard
1	with actuator guard
<b>Main terminals</b>	
K0	screw terminals 16 mm <sup>2</sup> / 10 mm <sup>2</sup>
<b>Characteristic curve</b>	
F1	thermal-magnetic, extremely fast, DC
F2	thermal-magnetic, fast, AC/DC
M1	thermal-magnetic, medium delay, AC/DC
T1	thermal-magnetic, long delay, AC/DC
<b>Auxiliary contacts</b>	
H0	without
H1	with auxiliary contacts in all poles
H2	with auxiliary contacts only in pole 1 (2-pole plus)
H3	with auxiliary contacts only in poles 1+3 (3-pole plus)
H4	with auxiliary contacts only in pole 2 (3-pole plus)
H5	with auxiliary contacts only in the last pole
H6	with auxiliary contacts only in poles 1+2 (3-pole plus)
<b>Auxiliary contact function</b>	
0	without
2	make contact (N/O)
3	break contact (N/C)
A	pole 1 make contact, all other poles break contacts (2-pole plus)
B	poles 1+2 make contacts, other poles break contacts (3-pole plus)
C	pole 1 break contact, other poles make contacts (2-pole plus)
<b>Auxiliary contacts – terminal design</b>	
0	without
1	screw terminals 1 mm <sup>2</sup>
<b>Voltage rating</b>	
A	≤ AC 277 V or ≤ DC 60 V
<b>Current rating range</b>	
	0.1...32 A
<b>Approval logo</b>	
V	UL 489
4220 - T1 1 0 - K0 M1- H1 2 1 - A - 10 A - V ordering example	

**NEW**



single pole



4220-T...

three pole

## Technical data

For further details please see catalogue section: Technical Information

Voltage rating	3 AC 415 V; 3 AC 480 V; AC 277 V; AC 240 V; AC 120 V; DC 60 V
Current rating range	0.1...32 A
Auxiliary circuit	DC 10 - 30 V, 10 - 500 mA
Typical life	
IEC 60934	3 AC 415 V 1,000 cycles at 1 x I <sub>N</sub> , inductive load AC 240 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load DC 60 V: 6,000 cycles at 1 x I <sub>N</sub> , resistive load
UL 489	AC 120 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load
UL 1077	3 AC 415 V 3,000 cycles at 1 x I <sub>N</sub> , inductive load AC 277 V: 6,000 cycles at 1 x I <sub>N</sub> , inductive load DC 60 V: 6,000 cycles at 1 x I <sub>N</sub> , resistive load
Ambient temperature	-30...+60°C (-22...+140°F, T60)
Storage temperature	-40 ... 60°C (-40 ... +140°F)
Insulation co-ordination	IEC 60664 2,5 kV / 2 re-inforced insulation in the operating area
Dielectric strength operating area	IEC 60934 test voltage AC 3,000 V (reinforced insulation) test voltage AC 1,500 V
pole to pole main circuit to auxiliary circuit	test voltage AC 1,500 V
open main circuit	test voltage AC 1,500 V
open auxiliary circuit	test voltage AC 250 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity	
I <sub>nc</sub> PC1	AC 240 V, 6,000 A
IEC 60934	DC 60 V, 6,000 A
Interrupting capacity UL 489	AC 120 V, 5,000 A
Interrupting capacity UL 1077	AC 277 V, 5,000 A DC 60 V, 5,000 A
Protection class (IEC 60529)	operating area IP30 terminal area IP00
Vibration (sinusoidal)	± 0.38 mm (10-57 Hz), 5 g (57-500 Hz) test to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms) test to IEC 60068-2-27, test Ea
Corrosion	96 hrs in 5% salt mist, test to IEC 60068-2-11, test Ka
Humidity	240 hrs in 95% RH, to IEC 60068-2-78, test Cab
Housing material	moulded material
Mounting	on symmetrical rail to EN 50022-35x7.5
Mounting dimension (w x h x d)	12.5 x 89.3 x 87.1

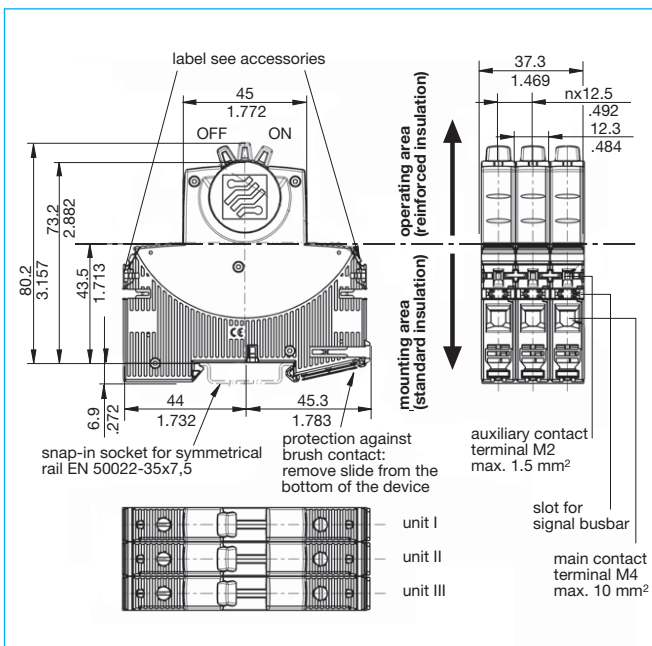
## Technical data

LINE terminal (LINE and/or DC+)	
screw terminals	M5
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	1 – 16 mm <sup>2</sup>
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	1 – 6 mm <sup>2</sup>
flexible with TWIN wire end ferrule with plastic sleeve	0.75 – 10 mm <sup>2</sup>
wire stripping length	14 mm
tightening torque	2.5 – 3 Nm
LOAD terminal	
screw terminals	M4
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.5 – 10 mm
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	0.5 – 2.5 mm <sup>2</sup>
flexible with TWIN wire end ferrule with plastic sleeve	0.5 – 6 mm <sup>2</sup>
wire stripping length	10 mm
tightening torque	1.2 – 1.4 Nm
Auxiliary contact terminals	
screw terminals	M2
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.25 – 0.75 mm <sup>2</sup>
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	0.25 – 0.34 mm <sup>2</sup>
wire stripping length	6 mm
tightening torque	0.22 – 0.25 Nm
Mass	approx. 90 g per pole with aux. contact

## Current ratings and typical internal resistance values

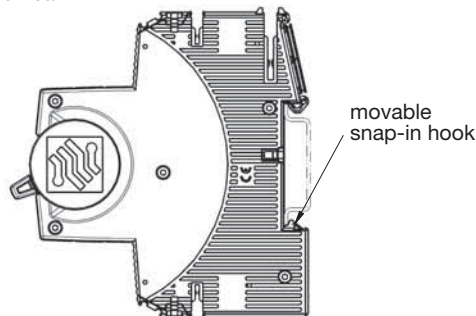
Current rating (A)	Internal resistance per pole (Ω)			
	trip curve F1 fast DC only	trip curve F2 fast AC + DC	trip curve M1 medium delay AC + DC	trip curve T1 long delay AC + DC
0.1	166	148	122	104
0.2	45	41	34	29
0.3	19	17	14	12
0.4	12	11	7.9	7.3
0.5	6.8	5.6	4.7	4.2
0.6	4.9	4.5	3.7	3.4
0.8	2.9	2.7	2.1	1.7
1	1.8	1.6	1.3	1.1
1.5	0.93	0.76	0.62	0.58
2	0.47	0.40	0.34	0.31
2.5	0.30	0.27	0.23	0.21
3	0.22	0.20	0.17	0.15
3.5	0.17	0.16	0.13	0.12
4	0.11	0.11	0.084	0.077
5	0.086	0.082	0.066	0.062
6	0.064	0.062	0.053	0.049
8	0.029	0.026	≤ 0.02	≤ 0.02
10	≤ 0.022	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
15	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
18	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
20	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
25	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
32	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02

## Dimensions



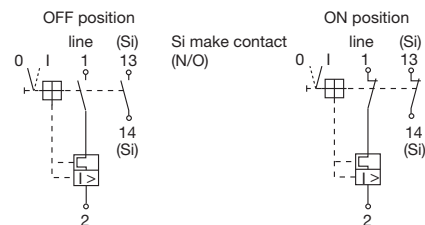
## Installation drawing

allowable mounting position:  
vertical

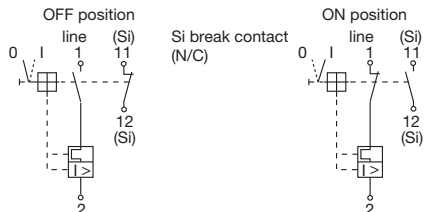


## Internal connection diagrams

### ...-H121-...



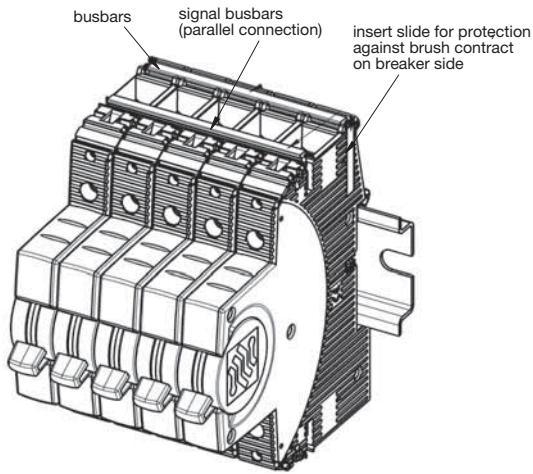
### ...-H131-...



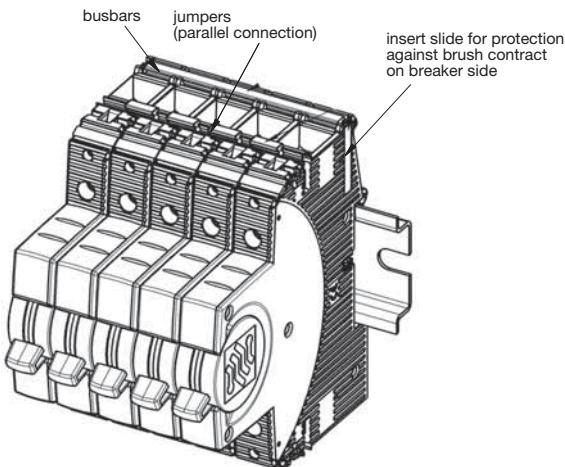
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Termination examples

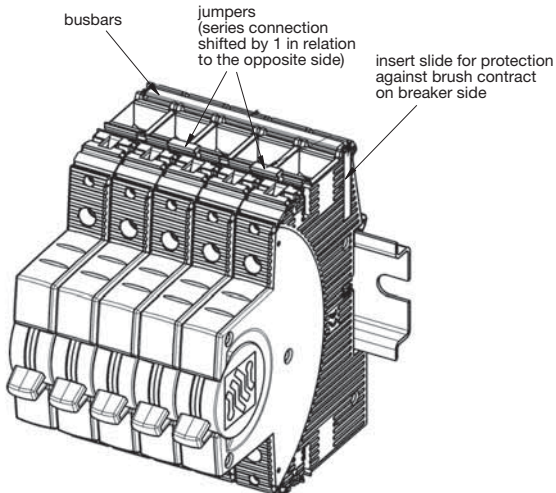
### 4220-T with busbars and signal busbars (auxiliary contacts connected in parallel)



### 4220-T with busbars and jumpers (auxiliary contacts connected in parallel)



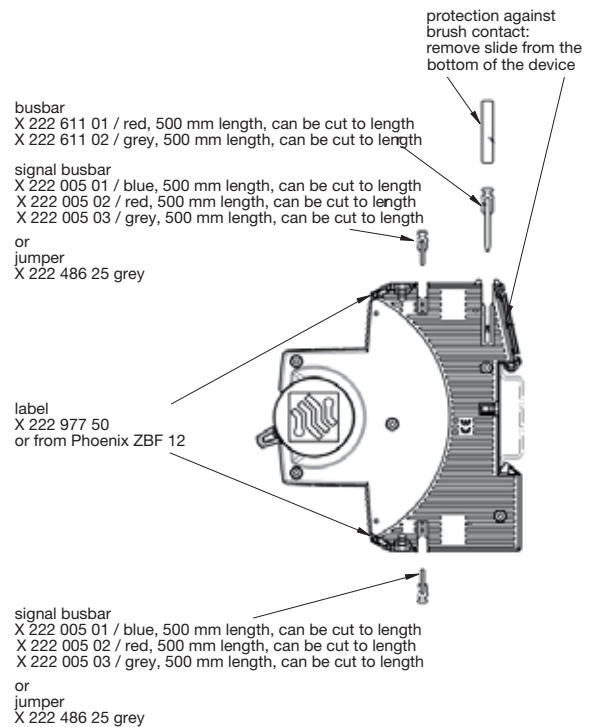
### 4220-T with busbars and signal busbars (auxiliary contacts connected in serie)



**Busbars, signal busbars and jumpers: see accessories**

## Accessories

Description	Part number
busbar red, 500 mm length, can be cut to length	X 222 611 01
busbar grey, 500 mm length, can be cut to length	X 222 611 02
signal busbar blue, 500 mm length, can be cut to length	X 222 005 01
signal busbar red, 500 mm length, can be cut to length	X 222 005 02
signal busbar grey, 500 mm length, can be cut to length	X 222 005 03
signal busbar grey (packing unit 25 pcs)	X 222 486 25
Label (packing unit 50 pcs) or from Phoenix ZBF 12	X 222 977 50



push in busbars and slide  
for protection against brush  
contact to be flush with  
housing sides

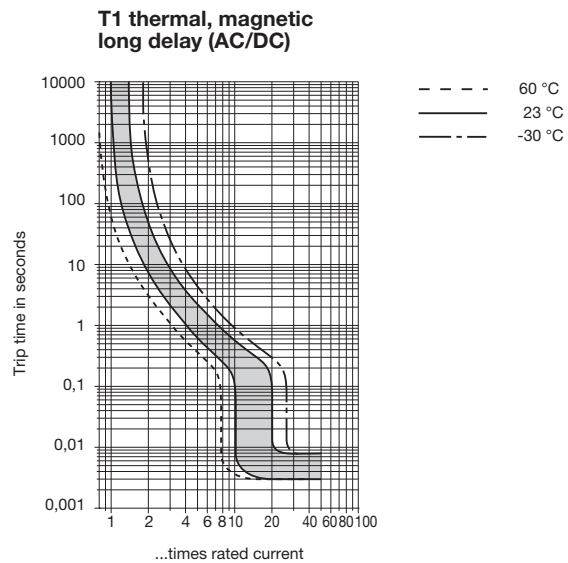
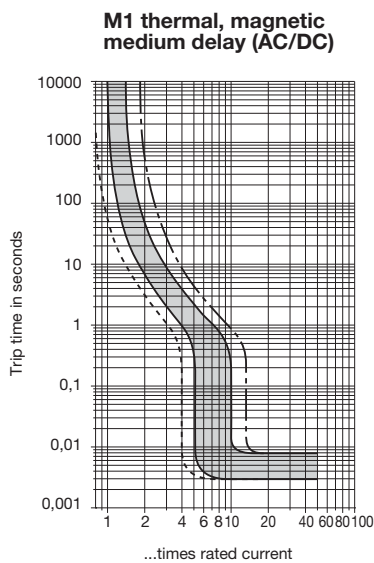
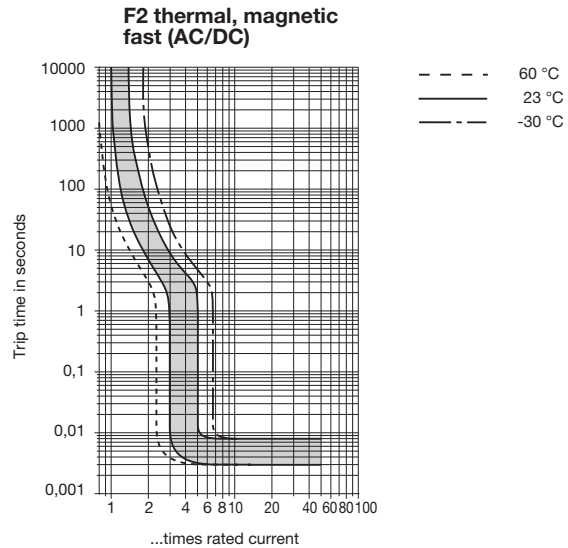
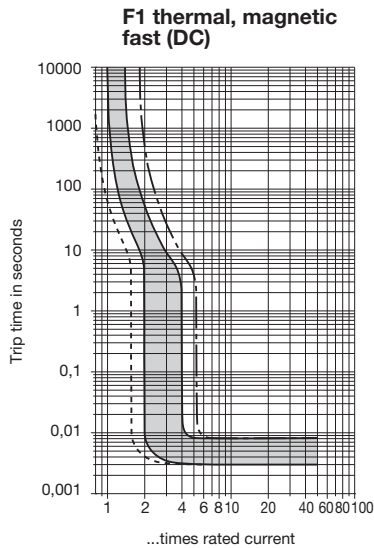
push up signal busbars  
and jumpers  
against housing

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

## Typical time/current characteristics

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

Ambient temperature	°F	-22	-4	+14	+32	+50	+73.4	+86	+104	+122	+140
	°C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Derating factor		0,76	0,79	0,83	0,88	0,93	1	1,04	1,12	1,22	1,35



Magnetic tripping currents are increased by 30 % on DC supplies.

When several devices are mounted together, an air gap between each is recommended. If this is not possible, each device should carry only 80 % of its rating.

## Approvals

Test authority	Voltage ratings	Current ratings
UL 489	AC 120 V	0.1...32 A
VDE IEC 60934	AC 240 V; DC 60 V	0.1...32 A
UL 1077	AC 277 V; DC 60 V	0.1...32 A

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 magnetic circuit breakers with unique high-speed operating mechanism and push/pull on/off manual actuation. Fitted with electrically separate excitation and switching circuits, and one pair of auxiliary contacts which close when the main circuit is open. Also suitable for impulse operation. Designed for printed circuit board mounting. Low temperature sensitivity.

## Typical applications

Printed circuit boards and components, safety and control systems.

## Ordering information

### Type No.

808	fast-acting
	<b>Manual release</b>
01	press-to-reset button, blue
B	manual release facility, blue (Standard)
	<b>Current ratings</b>
	0.01...5 A

808 - B - 5 A ordering example

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.01	625	0.8	0.096
0.02	170	0.9	0.085
0.03	77	1	0.073
0.04	47	1.2	0.050
0.05	29.2	1.5	0.031
0.08	10.3	2	≤ 0.02
0.1	5.6	2.5	≤ 0.02
0.2	1.65	3	≤ 0.02
0.3	0.89	3.25	≤ 0.02
0.4	0.39	4	≤ 0.02
0.5	0.28	4.5	≤ 0.02
0.6	0.198	5	≤ 0.02
0.7	0.143		

## Approvals

Authority	Voltage ratings	Current ratings
CSA	AC 120 V; DC 60 V	0.01...5 A
UL	DC 60 V AC 120 V	0.01...5 A 0.01...5 A



808

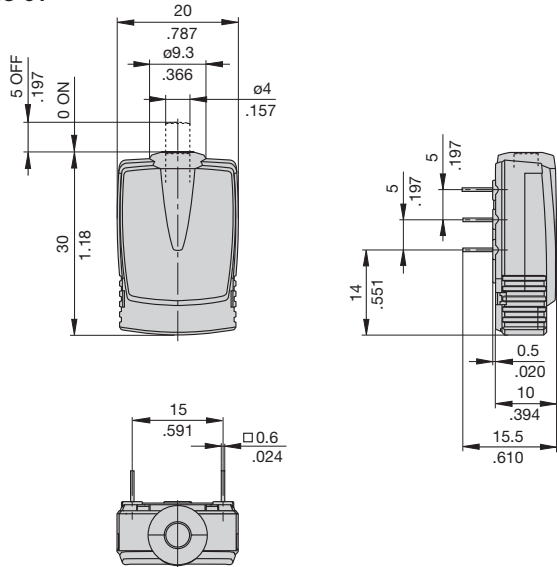
## Technical data

Voltage rating	DC 24 V (higher voltages to special order) UL: AC 120 V; DC 60 V	
Current ratings	0.01...5 A (higher current ratings to special order)	
Max. continuous load excitation circuit (2-3)	2.65 x I <sub>N</sub>	
Max. continuous load switching circuit 6-7 auxiliary circuit 4-5	5 A	
Typical life	6,000 operations at 5 A for switching circuit	
Ambient temperature	-30...+70 °C (-22...+158 °F)	
Insulation co-ordination (IEC 60664-1)	rated impulse withstand voltage 1.5 kV	pollution degree 2
Dielectric strength (UL 1077)	test voltage operating area excitation to switching circuit excitation to auxiliary circuit	AC 1,240 V AC 1,240 V AC 1,240 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity (o-o-o)	100 A	
Interrupting capacity (UL 1077)	2,000 A AC 120 V 1,000 A DC 60 V	
Degree of protection (IEC 60529/DIN 40050)	operating area IP30 terminal area IP00	
Vibration	3 g (57-500 Hz), ± 0.23 mm (10-57 Hz), to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 10 g	

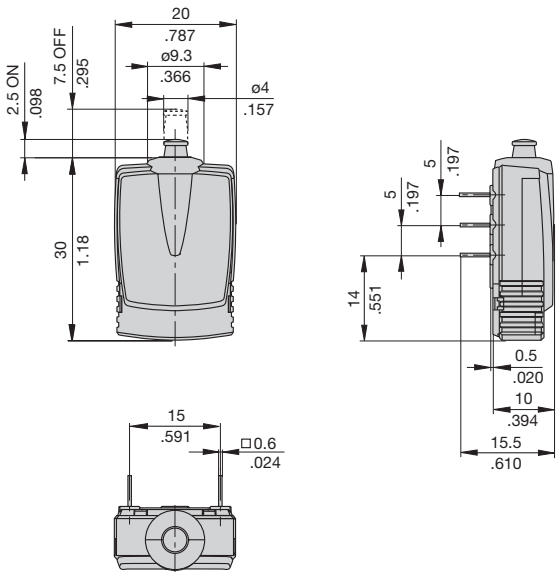


## Dimensions

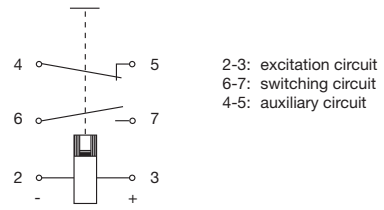
### 808-01



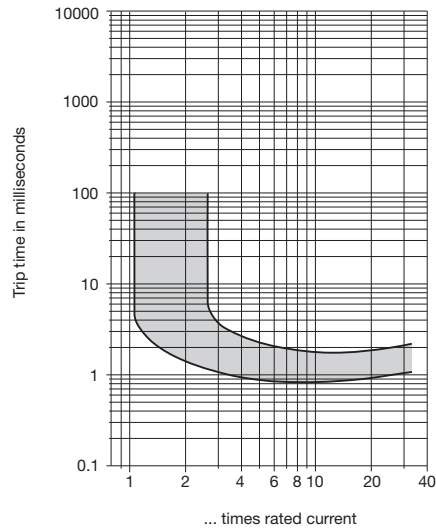
### 808-B



## Internal connection diagram



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



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

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, two and three pole magnetic circuit breakers with trip-free mechanism and push/pull on/off manual actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Convenient threadneck panel or plug-in mounting, and with a white push button indicator band showing clearly the tripped/off position. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling and fitted with an unprotected shunt tap terminal as standard. Approved to CBE standard EN 60934 (IEC 60934).

## Typical application

Control equipment, communications systems, power semiconductors.

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ ) per pole		
	curve -F4/F5	curves -E1/H1/R1	curves -E2/H2/R2
0.02	583	2441	2449
0.05	94	376	365
0.08	35.8	148	144
0.1	23	94	84
0.15	9.9	39	38
0.2	5	30.5	22.4
0.3	2.44	9.9	9.7
0.5	0.79	3.16	3.1
0.75	0.39	1.55	1.51
1	0.25	0.79	0.77
1.25	0.15	0.58	0.56
1.5	0.10	0.37	0.36
1.75	0.083	0.30	0.29
2	0.059	0.20	0.24
2.5	0.044	0.146	0.138
3	0.028	0.10	0.099
4	< 0.02	0.059	0.057
5	< 0.02	0.040	0.038
6	< 0.02	0.026	0.026
8	< 0.02	< 0.02	< 0.02
10	< 0.02	< 0.02	< 0.02
12	< 0.02	< 0.02	< 0.02
15	< 0.02	< 0.02	< 0.02
16	< 0.02	< 0.02	< 0.02
20	< 0.02	< 0.02	< 0.02
25	< 0.02*	< 0.02	< 0.02
30	< 0.02*	< 0.02	< 0.02
40		< 0.02	
50		< 0.02	

\* 50 % ON duty / 60 min.

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V; AC 240 V; DC 80 V DC 80 V	0.02...30 A 0.02...50 A 1-pole
UL 1077, CSA	DC 80 V 3 AC 250 V; AC 250 V	0.02...50 A 1, 2-pole 0.02...30 A 1,2,3-pole
UL 489 A	DC 80 V	0.05...30 A 1, 2-pole
CCC	3 AC 415 V; AC 240 V; DC 80 V DC 80 V	0.02...30 A 0.02...50 A 1, 2-pole



1-pole

8340-G2...

2-pole

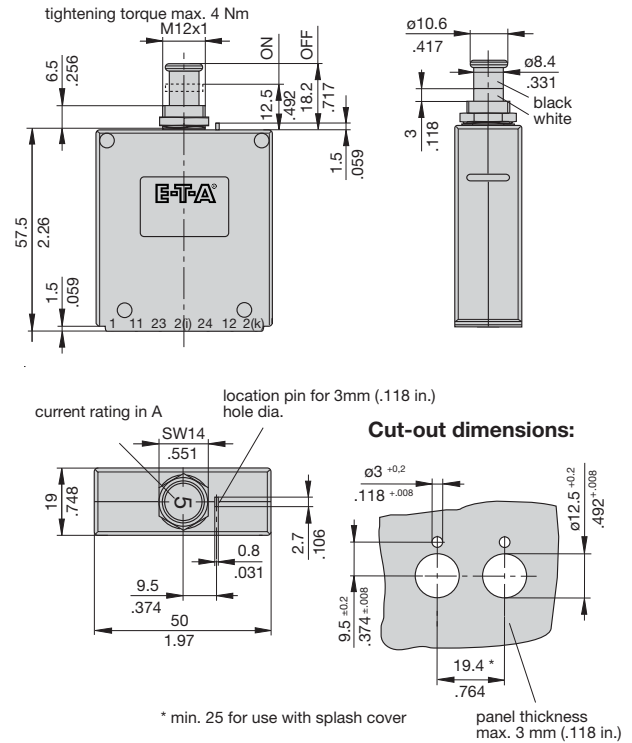
## Technical data

For further details please see chapter: Technical Information		
Voltage rating	3 AC 415 V; AC 240 V, 50/60 Hz; DC 80 V	
Current ratings	0.02...50 A single pole (40+50 A DC only) 0.02...30 A multipole	
Auxiliary circuit	1 A, AC 240 V/DC 65 V 0.5 A, DC 80 V	
Typical life	3 AC 415 V, AC 240 V: 0.02...30 A 6,000 operations at 1 x I <sub>N</sub> , inductive 10,000 operations at 1 x I <sub>N</sub> , resistive DC 80 V: 0.02...25 A 6,000 operations at 1 x I <sub>N</sub> , inductive 0.02...30 A 10,000 operations at 1 x I <sub>N</sub> , resistive 40 + 50 A 5,000 operations at 1 x I <sub>N</sub> , resistive	
Ambient temperature	-40...+85 °C (-40...+185 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V pole to pole (2 + 3-pole) AC 1,500 V main to auxiliary circuit AC 1,500 V aux. circuit 11-12/23-24 AC 1,000 V switching to trip circuit (-X) AC 1,500 V	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	1,200 A at AC; 2,000 A at DC	
Interrupting capacity (UL 1077)	I <sub>N</sub> 0.02...20 A 25...30 A	
	AC:	
	1-pole AC 250 V/3,500A	AC 250 V/3,500A
	2-pole AC 250 V/3,500A	AC 250 V/5,000A
	3-pole 3AC 250V/3,500A	3AC250V/5,000A
	DC:	
	1-pole 0.02...50 A	DC 80 V/3,500 A
	2-pole 0.02...30 A	DC 80 V/3500 A
Interrupting capacity (UL 489A)	2,000 A	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	with button down: 10 g (57-2000 Hz), $\pm$ 0.76 mm (10-57 Hz) at 0.9 x I <sub>N</sub> other mounting planes: 10 g (57-2000 Hz) at I <sub>N</sub> to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	100 g (11 ms) at 1 x I <sub>N</sub> , directions 1,2,3,4,5 100 g (11 ms) at 0.8 x I <sub>N</sub> , direction 6 to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 70 g per pole	

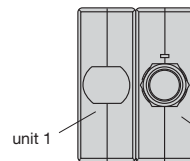
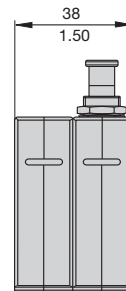
## Ordering information

<b>Type No.</b>	
8340	Magnetic push/pull circuit breaker
<b>Mounting</b>	
G	threadneck panel mounting
<b>Threadneck design</b>	
2	M12x1
<b>Number of poles (main current paths)</b>	
0	single pole, switch only
1	single pole, protected
2	two pole, protected
3	three pole, protected
5	two pole, protected on one pole only
<b>Panel hardware</b>	
0	without panel hardware
1	with hex nut M12x1 and washer 12/15
<b>Terminal design</b>	
P1	blade terminals A6.3-0.8 mm (QC.250)
K3	screw terminals M4 recommended for $I_N > 20$ A
K4	screw terminals M5 recommended for $I_N > 40$ A
R1	round connectors $\phi 6$
X1	blade terminals A6.3-0.8 mm (QC.250), separate switching and trip circuit
<b>Characteristic curve</b>	
F4	instantaneous trip: magn. $1.5-2.2 \times I_N$ DC ( $I_N \leq 30$ A)
F5	magn. $1.2-1.7 \times I_N$ AC 50/60 Hz ( $I_N \leq 30$ A)
E1	short delay: magn.-hydr. $1.01-1.4 I_N$ , DC
E2	short delay: magn.-hydr. $1.01-1.4 I_N$ , AC 50/60 Hz
H1	medium delay: magn.-hydr. $1.01-1.4 I_N$ , DC
H2	medium delay: magn.-hydr. $1.01-1.4 I_N$ , AC 50/60 Hz
R1	long delay: magn.-hydr. $1.01-1.5 I_N$ , DC
R2	long delay: magn.-hydr. $1.01-1.5 I_N$ , AC 50/60 Hz
<b>Actuator colour</b>	
A	black with white trip indicator band
<b>Actuator marking</b>	
0	without marking
4	rated current (legible with location pin above) standard
7	rated current (legible with location pin below)
<b>Auxiliary contacts</b>	
H0	without auxiliary contacts
H1	with auxiliary contacts
H2	with auxiliary contacts on pole 1 only (2 and 3-pole types)
H3	with auxiliary contacts on poles 1 and 3 (3-pole type)
<b>Auxiliary contact function</b>	
1	one each N/O and N/C
2	1 pair N/O (23/24)
3	1 pair N/C (11/12)
<b>Auxiliary contact terminal design</b>	
1	blade terminals A6.3-0.8 mm
<b>Current ratings (optional)</b>	
0.02...50 A	
<b>Approval (optional)</b>	
U UL 489 A	
8340 - G 2 1 1 - P1 F4 - A 4 H1 1 1 - 8 A - U ordering example	

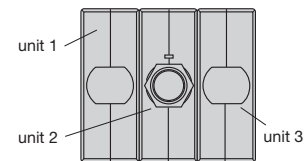
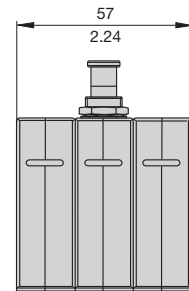
## Dimensions (1-pole)



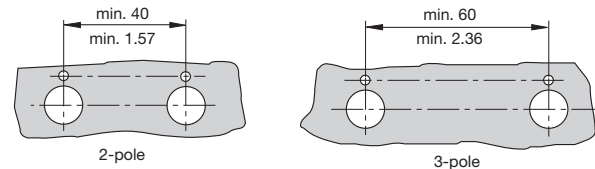
### 2-pole



### 3-pole



### Cut-out dimensions:



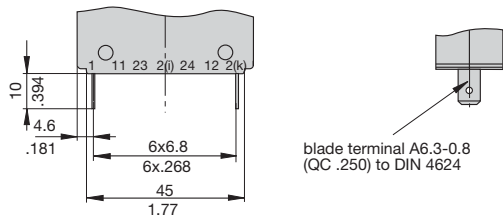
panel thickness max. 3 mm (.118 in.)

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

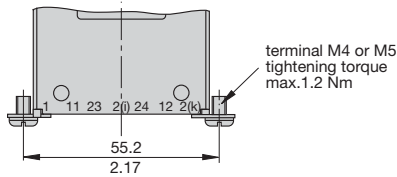


## Terminal design

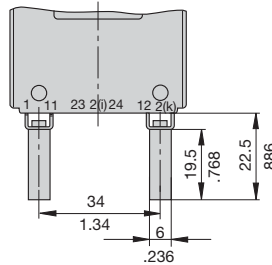
### Terminal design -P1



### Terminal design -K3/-K4

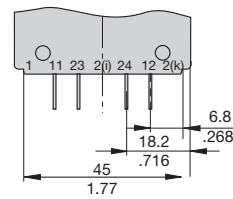


### Terminal design -R

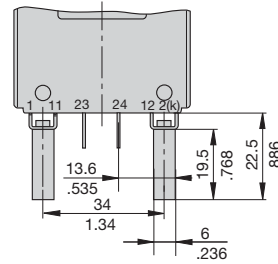


## Auxiliary contact terminal design

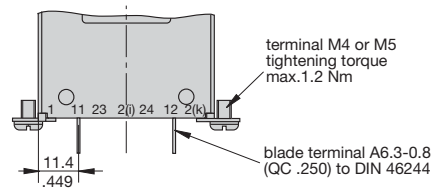
### 1 N/O, 1 N/C



### 1 N/O

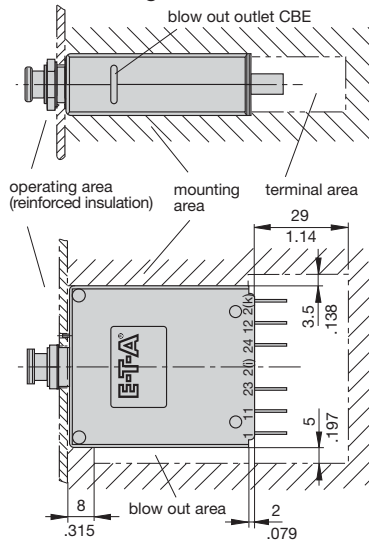


### 1 N/C

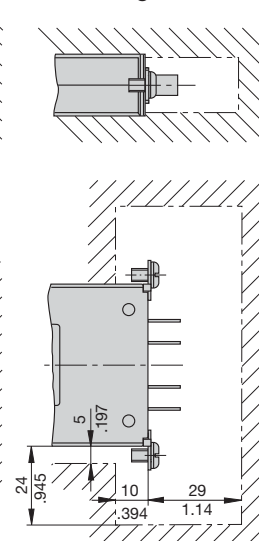


## Installation drawings

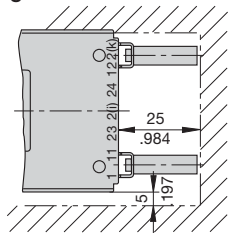
### Terminal design -P



### Terminal design -K

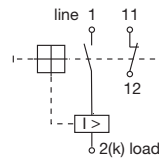


### Terminal design -R

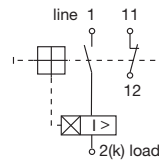


## Internal connection diagrams

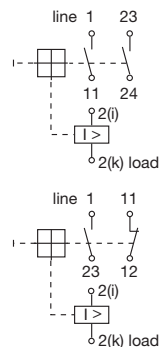
### 1-pole, protected magnetically



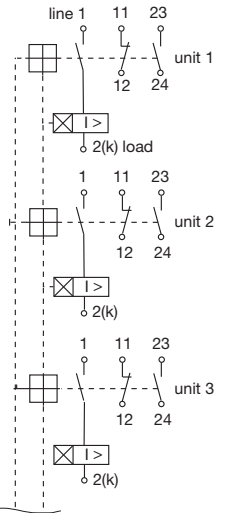
### 1-pole, protected hydraulic-magnetically



### Circuit variants 1-pole



### multipole



### 8340-G211-X1F4-A4H121-...A

1 - 11 switching circuit  
2(i) - 2(k) magnetic trip circuit  
23 - 24 auxiliary circuit (N/O)

### 8340-G211-X1F4-A4H131-...A

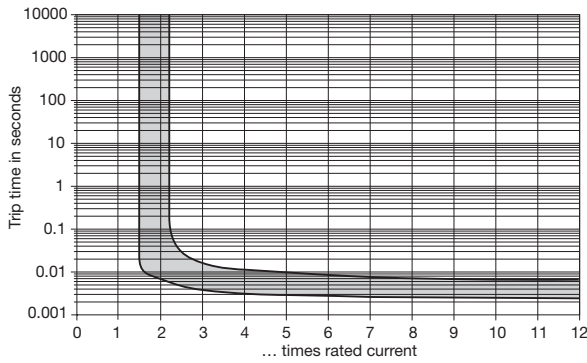
1 - 23 switching circuit  
2(i) - 2(k) magnetic trip circuit  
11 - 12 auxiliary circuit (N/C)

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

## Typical time/current characteristics

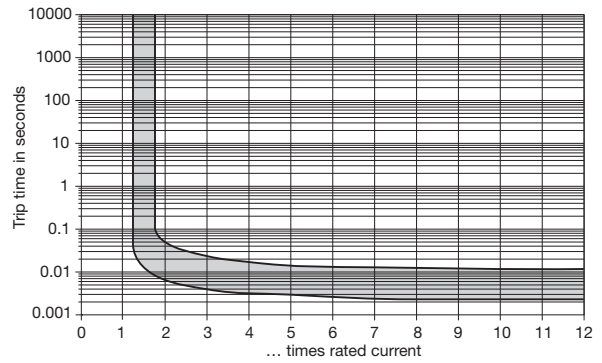
### Curve F4 for DC, magnetic (undelayed)

( $I_N > 20$  A, 50% ON period, 60 min.) at +23 °C / +73.4 °F

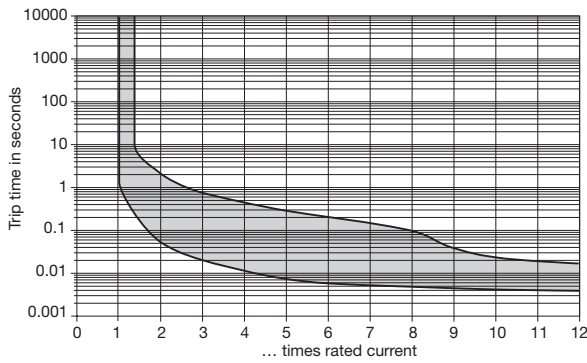


### Curve F5 for AC 50/60 Hz, magnetic (undelayed)

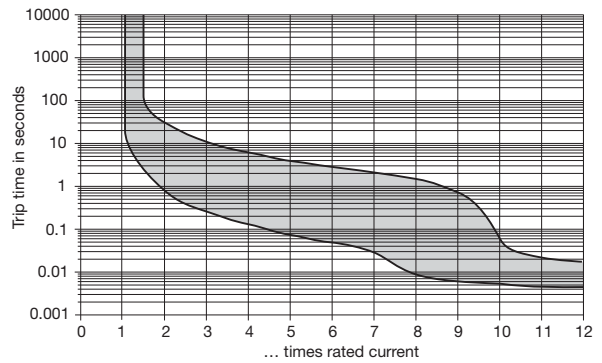
( $I_N > 20$  A, 50% ON period, 60 min.) at +23 °C / +73.4 °F



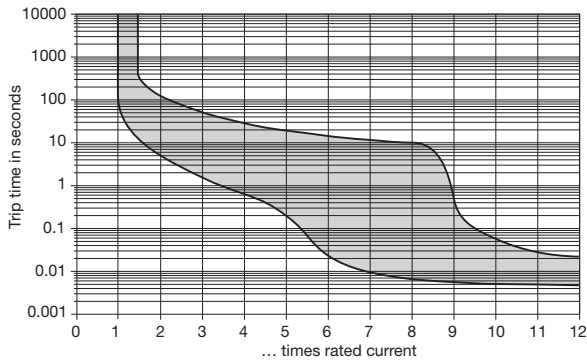
### Short delay curves E1 for DC and E2 for AC 50/60 Hz, hydraulic-magnetic



### Medium delay curves H1 for DC and H2 for AC 50/60 Hz, hydraulic-magnetic



### Long delay curves R1 for DC and R2 for AC 50/60 Hz, hydraulic-magnetic



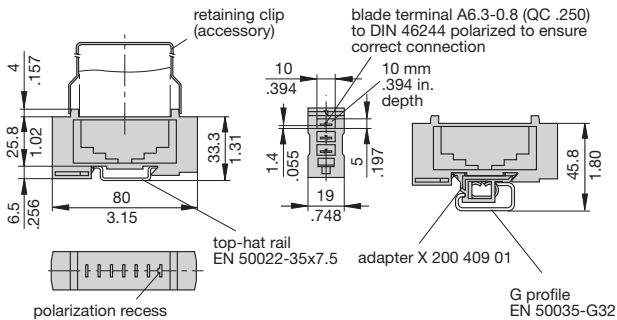
**N.B.** Curves E1, E2, H1, H2, R1 and R2 will only be maintained if the escutcheon is mounted on a vertical surface.

Other curves upon request ( e. g. impulse delay).

## Accessories

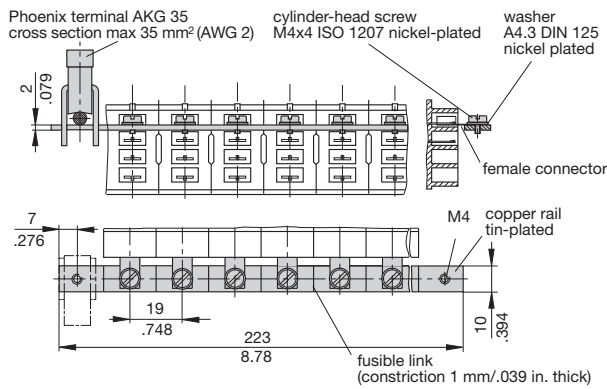
### Socket 18-P10-Si

(for ratings >16 A please contact E-T-A)

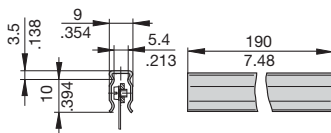


### Bus bar (10-way) (supplied as a complete package) for type 18 socket

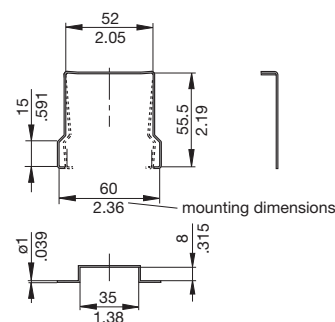
(for max. 100 A continuous load), more positions available on request  
**X 211 158 01 with terminal**  
**X 211 158 02 without terminal**



### Insulated sleeving for bus bars Y 303 824 11

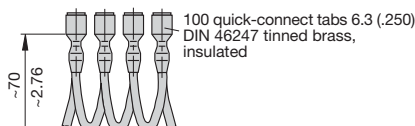


### Retaining clip for socket 18-P10-Si Y 300 579 11

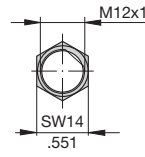


### Connector bus link -P10

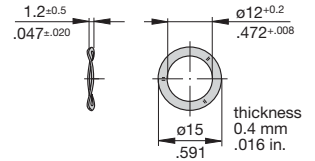
- X 210 588 01**/1.5 mm<sup>2</sup> (AWG 16), brown (up to 13 A max. load)
- X 210 588 02**/2.5 mm<sup>2</sup> (AWG 14), black (up to 20 A max. load)
- X 210 588 03**/2.5 mm<sup>2</sup> (AWG 14), red (up to 20 A max. load)
- X 210 588 04**/2.5 mm<sup>2</sup> (AWG 14), blue (up to 20 A max. load)



### Hex nut Y 300 116 02



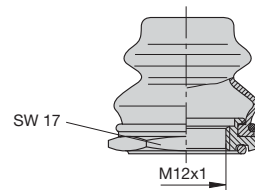
### Spring washer Y 300 118 03



### Accessories for push button

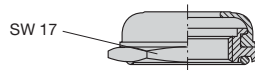
#### Splash cover with hex nut and O ring (IP66 and IP67)

- X 200 801 08** (nickel plated hex nut M12x1, splash cover transparent)
- X 200 801 03** (black finish hex nut M12x1, splash cover black)



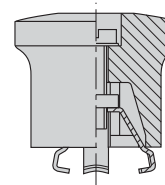
#### Splash seal, black, hex nut and O ring (IP54)

- X 200 802 01** (nickel plated hex nut M12x1, splash seal black)

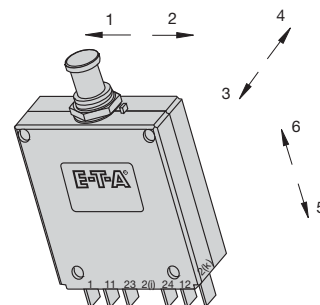


#### Actuator extension

- X 200 803 01** (black button)



## Shock directions / Mounting attitudes



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 and two pole magnetic circuit breakers with trip-free mechanism and push/pull on/off manual actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Convenient threadneck panel or plug-in mounting, and with a white push button indicator band showing clearly the tripped/off position. Available with auxiliary contacts (1 x N/O, 1 x N/C) for status signalling and fitted with an unprotected shunt tap terminal as standard. Reliable tripping with even the smallest overcurrents. Approved to CBE standard EN 60934 (IEC 60934).

## Typical application

Railway vehicles, telecommunications, process control.

## Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance ( $\Omega$ ) per pole	
	curve -F4	curves -E1/H1/R1
0.02	583	2441
0.05	94	376
0.08	34	148
0.1	23	94
0.15	25.1	39
0.2	14.6	30.5
0.3	6.32	9.9
0.5	0.79	3.16
0.75	0.39	1.55
1	0.25	0.79
1.5	0.27	0.37
2	0.059	0.20
2.5	0.044	0.146
3	0.028	0.10
4	0.04	0.059
5	< 0.02	0.040
6	< 0.02	0.026
8	< 0.02	< 0.02
10	< 0.02	< 0.02
12	< 0.02	< 0.02
15	< 0.02	< 0.02
16	< 0.02	< 0.02
20	< 0.02	< 0.02
25	< 0.02*	< 0.02
30	< 0.02*	< 0.02
40		< 0.02
50		< 0.02

\* 50 % ON duty / 60 min.



## Technical data

For further details please see chapter: Technical Information

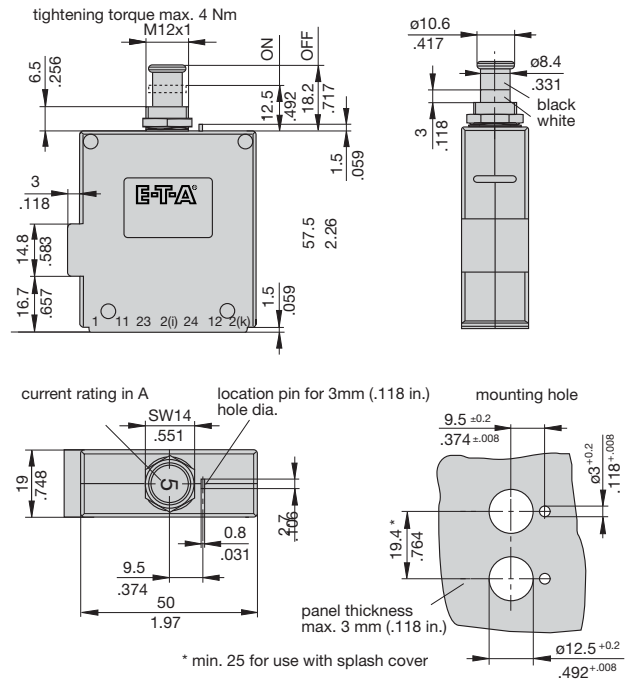
Voltage rating	DC 110 V $\pm$ 25 %	
Current ratings	0.02...50 A single pole 0.02...30 A 2-pole	
Auxiliary circuit	AC 240 V/DC 65 V 1 A DC 110 V $\pm$ 25 % 0,3 A	
Typical life	DC 110 V: 0.02...35 A 10,000 operations at 1 x I <sub>N</sub> 40 + 50 A 3,000 operations at 1 x I <sub>N</sub> 0.02...30 A 5,000 operations at 2 x I <sub>N</sub>	
Ambient temperature	-40...+85 °C (-40...+185 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage	
	operating area	AC 3,000 V
	pole to pole (2-pole)	AC 1,500 V
	main to auxiliary circuit	AC 1,500 V
	aux. circuit 11-12/23-24	AC 1,000 V
	switching to trip circuit (-X)	AC 1,500 V
Insulation resistance	> 100 M $\Omega$ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	1,000 A	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration		
	with button down:	10 g (57-2000 Hz), $\pm$ 0.76 mm (10-57 Hz) at 0.9 x I <sub>N</sub>
	other mounting planes:	10 g (57-2000 Hz) at I <sub>N</sub> to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	100 g (11 ms) at 1 x I <sub>N</sub> , directions 1,2,3,4,5 100 g (11 ms) at 0.8 x I <sub>N</sub> , direction 6 to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab	
Mass	approx. 70 g per pole	

## Ordering information

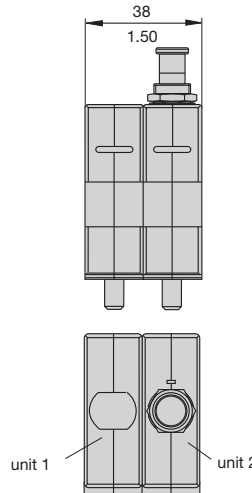
<b>Type No.</b>	
8340	Magnetic push/pull circuit breaker
<b>Mounting</b>	
G	threadneck panel mounting
<b>Threadneck design</b>	
2	M12x1
<b>Number of poles (main current paths)</b>	
1	single pole, protected
2	two pole, protected
5	two pole, protected on one pole only
<b>Panel hardware</b>	
0	without panel hardware
1	with hex nut M12x1 and washer 12/15
<b>Terminal design</b>	
P1	blade terminals A6.3-0.8 mm (QC.250)
K3	screw terminals M4 recommended for $I_N > 20$ A
K4	screw terminals M5 recommended for $I_N > 40$ A
R1	round connectors $\phi 6$
X1	blade terminals A6.3-0.8 mm (QC.250), separate switching and trip circuit
<b>Characteristic curve</b>	
F4	instantaneous trip: magn. $1.5-2.2 \times I_N$
E1	short delay: magn.-hydr. $1.01-1.4 \times I_N$
H1	medium delay: magn.-hydr. $1.01-1.4 \times I_N$
R1	long delay: magn.-hydr. $1.01-1.5 \times I_N$
<b>Actuator colour</b>	
A	black with white trip indicator band
<b>Actuator marking</b>	
4	rated current (legible with location pin above) standard
7	rated current (legible with location pin below)
<b>Auxiliary contacts</b>	
H0	without auxiliary contacts
H1	with auxiliary contacts
H2	with auxiliary contacts on pole 1 only (2- and 3-pole types)
<b>Auxiliary contact function</b>	
1	one each N/O and N/C
2	1 pair N/O (23/24)
3	1 pair N/C (11/12)
<b>Auxiliary contact terminal design</b>	
1	blade terminals A6.3-0.8 mm
<b>Voltage rating</b>	
D	DC 110 V
E	DC 110 V + higher flammability rating
<b>Current ratings</b>	
0.02...50 A	

8340 - G 2 1 1 - P1 H1 - A 4 H1 1 1 D - 8 A ordering example

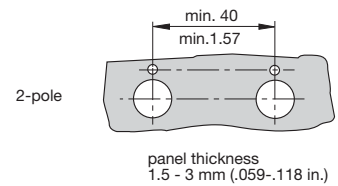
## Dimensions (1-pole)



## 2-pole



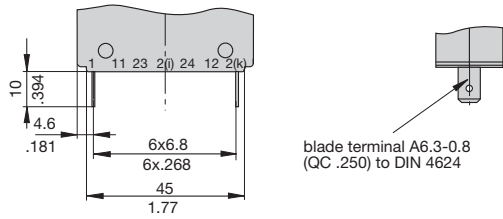
## Cut-out dimensions:



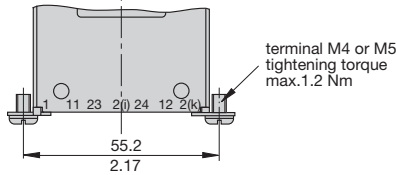
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Terminal design

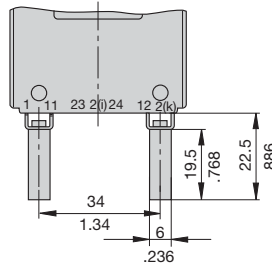
### Terminal design -P1



### Terminal design -K3/-K4

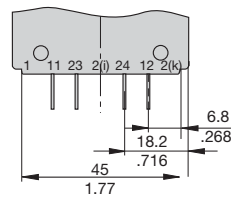


### Terminal design -R

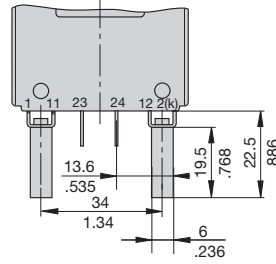


## Auxiliary contact terminal design

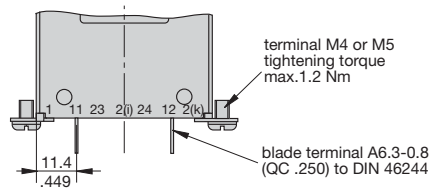
### 1 N/O, 1 N/C



### 1 N/O



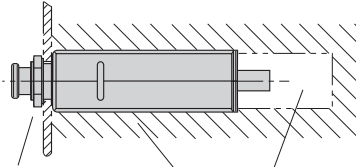
### 1 N/C



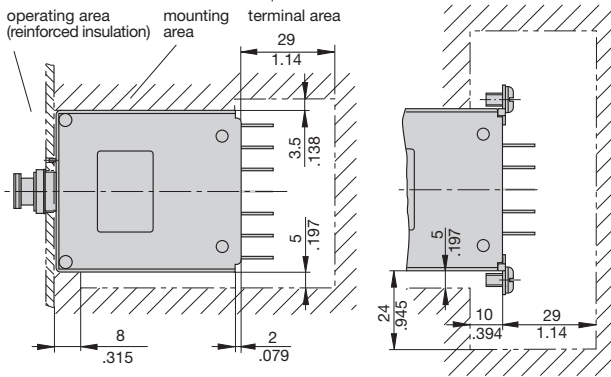
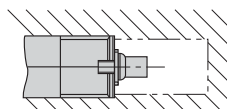
3

## Installation drawings

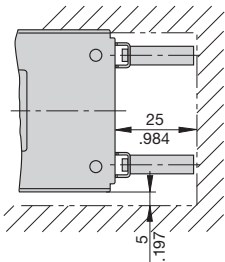
### Terminal design -P



### Terminal design -K

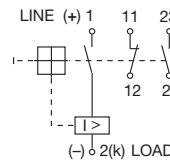


### Terminal design -R

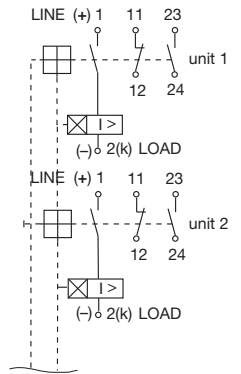


## Internal connection diagrams

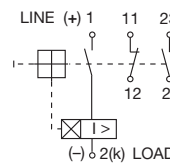
### 1-pole, protected magnetically



### 2-pole



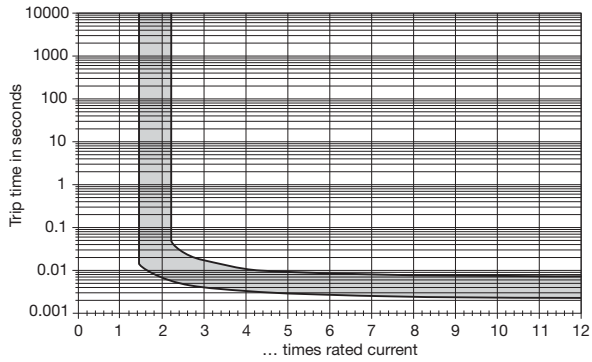
### 1-pole, protected hydraulic-magnetically



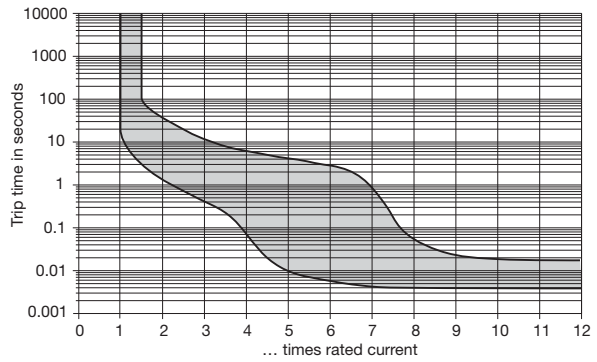
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Typical time/current characteristics

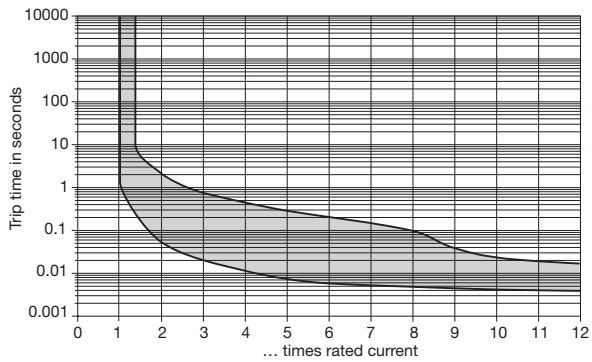
**Curve F4, magnetic (undelayed)**  
at +23 °C / +73.4 °F



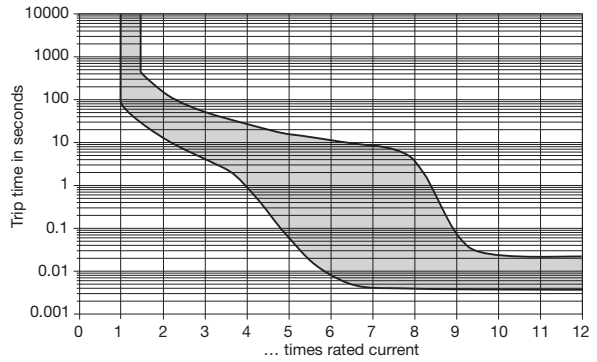
**Medium delay curve H1, hydraulic-magnetic**



**Short delay curve E1, hydraulic-magnetic**



**Long delay curve R1, hydraulic-magnetic**



**N.B.** Curves E1, H1 and R1 will only be maintained if the escutcheon is mounted on a vertical surface.

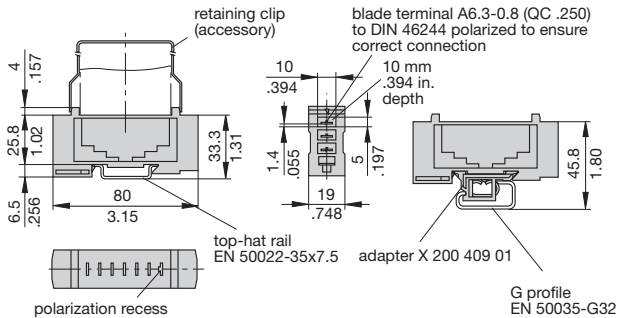
**Other curves upon request (e.g. impulse delay).**

3

## Accessories

### Socket 18-P10-Si

(for ratings >16 A please contact E-T-A)



### Polarized socket with adapter 18-P10-Si-20025

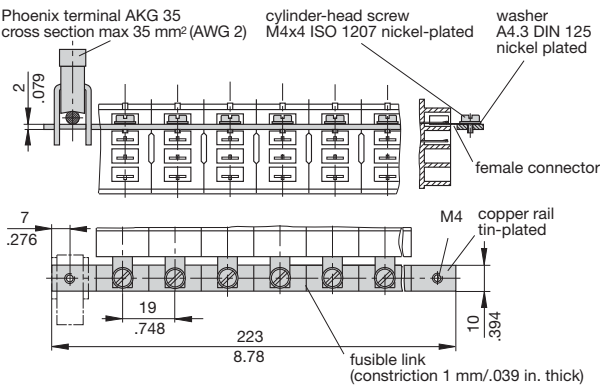
### Bus bar (10-way) (supplied as a complete package)

#### for type 18 socket

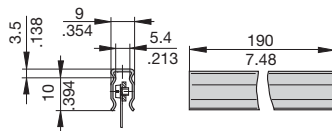
(for max. 100 A continuous load), more positions available on request

#### X 211 158 01 with terminal

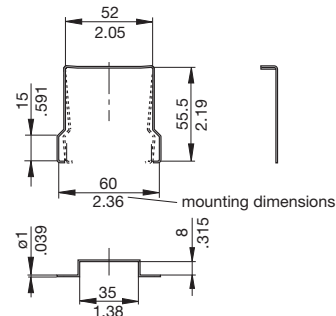
#### X 211 158 02 without terminal



### Insulated sleeving for bus bars Y 303 824 11



### Retaining clip for socket 18-P10-Si Y 300 579 11



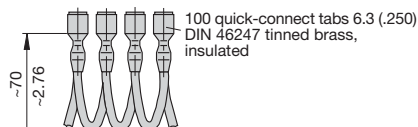
### Connector bus link -P10

X 210 588 01/1.5 mm<sup>2</sup> (AWG 16), brown (up to 13 A max. load)

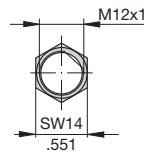
X 210 588 02/2.5 mm<sup>2</sup> (AWG 14), black (up to 20 A max. load)

X 210 588 03/2.5 mm<sup>2</sup> (AWG 14), red (up to 20 A max. load)

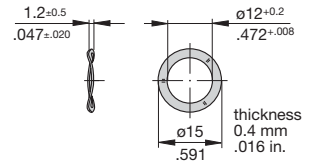
X 210 588 04/2.5 mm<sup>2</sup> (AWG 14), blue (up to 20 A max. load)



### Hex nut Y 300 116 02



### Spring washer Y 300 118 03

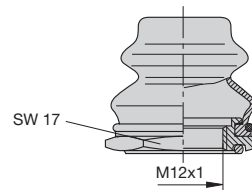


### Accessories for push button

#### Splash cover with hex nut and O ring (IP66 and IP67)

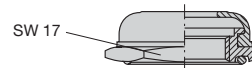
X 200 801 08 (nickel plated hex nut M12x1, splash cover transparent)

X 200 801 03 (black finish hex nut M12x1, splash cover black)



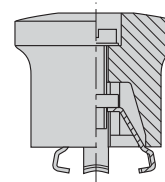
#### Splash seal, black, hex nut and O ring (IP54)

X 200 802 01 (nickel plated hex nut M12x1, splash seal black)

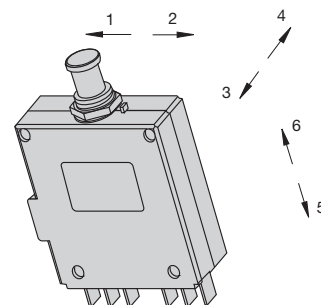


#### Actuator extension

X 200 803 01 (black button)



## Shock directions / Mounting attitudes



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 and multipole magnetic circuit breakers with trip-free mechanism and toggle actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Options include auxiliary changeover contacts, or relay trip function. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 60934).

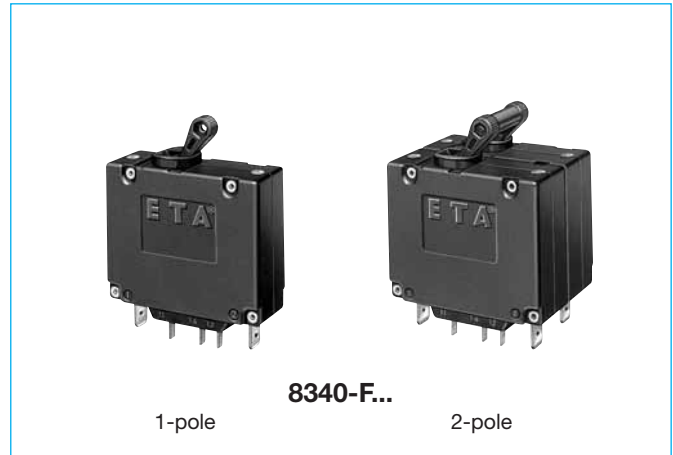
## Typical applications

Control equipment, communications systems, transportation, power supplies.

## Standard current ratings and typical internal resistance values

Current rating (A)	Curves and internal resistance per pole ( $\Omega$ )			
	F1	F2	K1, M1, T1,	K2, M2, T2
0.02	1493	953	2669	2457
0.05	276	152	452	376
0.1	58	37	100	94
0.25	8.2	6.0	15.5	14.7
0.5	2.3	1.47	3.9	3.2
0.75	0.98	0.63	1.65	1.56
1	0.58	0.35	0.95	0.90
2	0.145	0.096	0.26	0.20
2.5	0.096	0.061	0.15	0.15
3	0.065	0.048	0.10	0.10
5	0.025	< 0.02	0.042	0.040
6	< 0.02	< 0.02	0.029	0.028
8	< 0.02	< 0.02	< 0.02	< 0.02
10	< 0.02	< 0.02	< 0.02	< 0.02
12	< 0.02	< 0.02	< 0.02	< 0.02
15	< 0.02	< 0.02	< 0.02	< 0.02
16	< 0.02	< 0.02	< 0.02	< 0.02
20	< 0.02	< 0.02	< 0.02	< 0.02
25	< 0.02	< 0.02	< 0.02	< 0.02
30	< 0.02	< 0.02	< 0.02	< 0.02
40	$\leq 0.01$	-	$\leq 0.01$	-
50	$\leq 0.01$	-	$\leq 0.01$	-

Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 65 g per pole



## Technical data

<b>For further details please see chapter: Technical Information</b>	
Voltage rating	3 AC 415 V; AC 240 V, 50/60 Hz; DC 80 V (higher DC ratings to special order)
Current ratings	0.02...50 A 1-pole (40 + 50 A DC only) 0.02...30 A multipole
Auxiliary circuit	6 A, AC 240 V 3 A, DC 28 V 1 A, DC 65 V 0.5 A, DC 80 V
Typical life	3 AC 415 V, AC 240 V: 0.02...30 A 6,000 operations at 1 x I <sub>N</sub> , inductive 10,000 operations at 1 x I <sub>N</sub> , resistive DC 80 V: 0.02...25 A 6,000 operations at 1 x I <sub>N</sub> , inductive 0.02...30 A 10,000 operations at 1 x I <sub>N</sub> , resistive 40 + 50 A 6,000 operations at 1 x I <sub>N</sub> , resistive
Ambient temperature	-40...+85 °C (-40...+185 °F)
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 2.5 kV pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,000 V pole to pole (2- and 3-pole) AC 1,500 V main to auxiliary circuit AC 3,000 V switching to trip circuit AC 1,500 V (version -X)
Insulation resistance	> 100 M $\Omega$ (DC 500 V)
Interrupting capacity I <sub>cn</sub>	1,200 A at AC - 2,000 A at DC
Interrupting capacity (UL 1077)	I <sub>N</sub> 0.02...20 A 25...30 A AC: 1-pole AC 250 V/3,500A AC 250 V/3,500A 2-pole AC 250 V/3,500A AC 250 V/5,000A 3-pole 3AC 250V/3,500A 3AC250V/5,000A DC: 1-pole 0.02...50 A DC 80 V/3,500 A 2-pole 0.02...30 A DC 80 V/3500 A
Interrupting capacity (UL 489A)	2,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration	with toggle down: 10 g (57-2000Hz) $\pm$ 0.76 mm (10-57 Hz) at 0.9 x I <sub>N</sub> directions 1, 2, 3, 4, 5: 10 g (57-2000 Hz) at 1 x I <sub>N</sub> . with curves F1, F2 in all planes: 10 g (57-2000 Hz) $\pm$ 0.76 mm (10-57 Hz) at 0.8 x I <sub>N</sub> , to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	100 g (11 ms) at 1 x I <sub>N</sub> , directions 1,2,3,4,5 100 g (11 ms) at 0.8 x I <sub>N</sub> , direction 6. with curves F1, F2: 100 g (11 ms) at 0.8 x I <sub>N</sub> to IEC 60068-2-27, test Ea

## Ordering information

<b>Type No.</b>	8340 magnetic circuit breaker with toggle actuator
<b>Mounting</b>	<b>F</b> flange mounting
<b>Configuration</b>	<b>1</b> with mounting nuts 6-32 UNC <b>4</b> with mounting nuts M3 <b>9</b> snap-in frame
<b>Number of poles</b>	<b>0</b> single pole, switch only <b>1</b> single pole protected <b>2</b> two pole protected <b>3</b> three pole protected <b>4</b> four pole protected <b>5</b> two pole, protected on one pole only <b>6</b> four pole, protected on poles 1, 2 and 3 only <b>7</b> two pole, switch only
	<div style="display: flex; align-items: center;"> <div style="font-size: 2em; margin-right: 10px;">}</div> <div>           magnetic, hydraulic-magnetic         </div> </div>
<b>Panel hardware</b>	<b>0</b> without panel hardware
<b>Terminal design (main contact)</b>	<b>K3</b> screw terminals with metric thread, M4 (recommended for $I_N \geq 20$ A) <b>K4</b> screw terminals with metric thread, M5 ( $I_N = 40$ A) <b>P1</b> blade terminals <b>X1</b> blade terminals with separate switching and relay circuit
<b>Characteristic curves</b>	<b>Characteristic curve F, instantaneous trip:</b> <b>F1</b> DC trip at $1.01-1.5 \times I_N$ <b>F2</b> AC 60/50Hz trip at $1.01-1.5 \times I_N$ <b>Characteristic curve K, short delay:</b> <b>K1</b> DC trip time at $2 \times I_N$ : 0.16-1.2 s <b>K2</b> AC 60/50Hz trip time at $2 \times I_N$ : 0.13-1.6 s <b>Characteristic curve M, medium delay:</b> <b>M1</b> DC trip time at $2 \times I_N$ : 0.6-7.5 s <b>M2</b> AC 60/50Hz trip time at $2 \times I_N$ : 2.2-20 s <b>Without characteristic curve:</b> <b>Q0</b> switch only <b>Characteristic curve T, long delay:</b> <b>T1</b> DC trip time at $2 \times I_N$ : 10-70 s <b>T2</b> AC 60/50Hz trip time at $2 \times I_N$ : 15-150 s <b>Relay trip X:</b> <b>X1</b> voltage trip at DC, instantaneous trip <b>X2</b> voltage trip at AC, instantaneous trip <b>Other curves to special order</b> (e.g. pulse delayed, high inrush currents, capacitive loads)
<b>Actuator colour / design</b>	<b>A</b> black, long toggle <b>B</b> white, long toggle <b>C</b> blue, long toggle <b>K</b> black, short toggle <b>L</b> white, short toggle <b>M</b> blue, short toggle <b>Z</b> black, without toggle, with slot
<b>other colours to special order</b>	
<b>Marking on actuator</b>	<b>0</b> without marking <b>L</b> I-O; ON-OFF <b>N</b> I-O; ON-OFF ( $I_N$ on housing top)
<b>Auxiliary contacts</b>	<b>H0</b> without auxiliary contacts <b>H1</b> with auxiliary contacts, gold-flushed <b>H2</b> auxiliary contacts, gold-flushed on one pole only (multipole) <b>H3</b> auxiliary contacts, gold-flushed on poles 1 and 3 (3 and 4-pole)
<b>Auxiliary contact function</b>	<b>4</b> 1 change over contact
<b>Auxiliary contact terminal design</b>	<b>2</b> blade terminal 2.8-0.5 mm
<b>Current ratings</b>	0.02...50 A

8340 - F 1 1 0 - P1 M1 - A L H1 4 2 - 30 A

8340 - F 1 1 0 - P1 M1 - A L H1 4 2 - 30 A

### Voltage rating

only curves X1, X2  
 DC 5, 8, 12, 24 V  
 AC 110, 220, 240 V

### Options

**H** higher flammability rating  
 Approvals upon request

### Approval (optional)

**U** UL 489 A

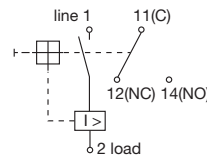
8340 - F 1 1 0 - P1 M1 - A L H1 4 2 - 30 A - ... - ... - U ordering example

## Approvals

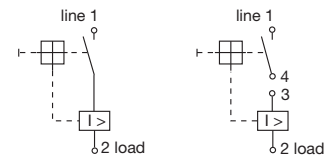
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V; AC 240 V; DC 80 V	0.02...30 A 1 to 6-pole DC 80 V 0.02...50 A 1-pole
UL 1077, CSA	DC 80 V 3 AC 250 V; AC 250 V	0.02...50 A 1 to 6-pole 0.02...30 A 1 to 6-pole
UL 489 A	DC 80 V	0.05...30 A 1, 2-pole
QPL (Sweden)	AC 240 V; DC 50 V	1...30 A
CCC	3 AC 415 V; AC 240 V DC 80 V	0.02...30 A 0.02...50 A 1, 2-pole

## Internal connection diagrams

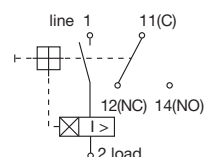
### 1-pole protected magnetically



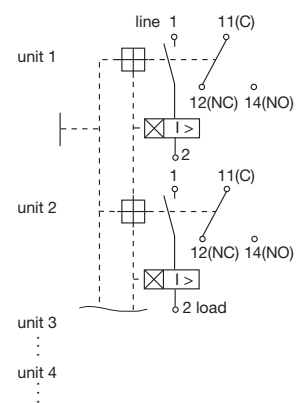
### with separate switching and relay circuit



### 1-pole protected hydraulic-magnetic



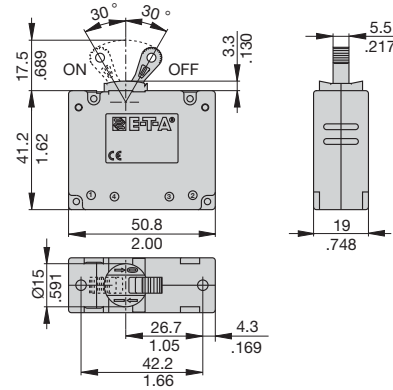
### multipole



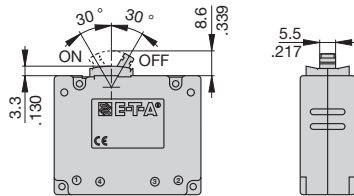
## Dimensions

### Flange mounting Configuration: F1/F4

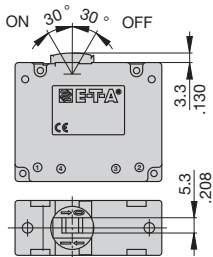
Actuator: long toggle



Actuator: short toggle

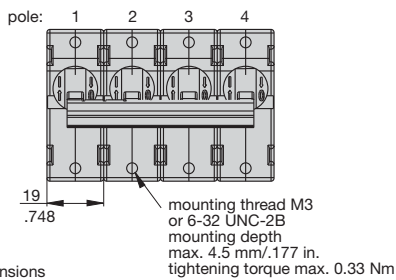


Actuator: without toggle, with slot



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

number of poles: 1-4



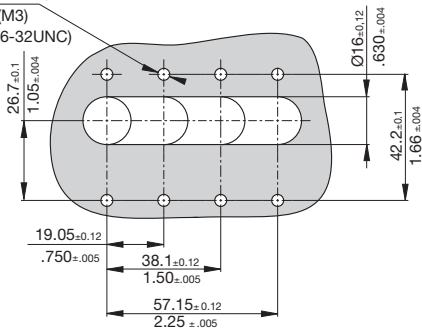
Cut-out dimensions  
max. panel thickness: 3 mm

3.5<sup>+0.1</sup> (M3)

4<sup>+0.1</sup><sub>-0.15</sub> (6-32UNC)

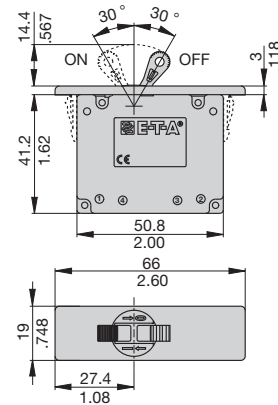
.138<sup>-0.004</sup> (M3)

.157<sup>-0.004</sup> (6-32UNC)

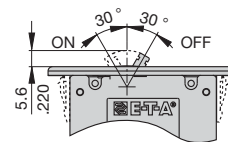


### Configuration: F9

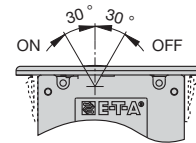
Actuator: long toggle



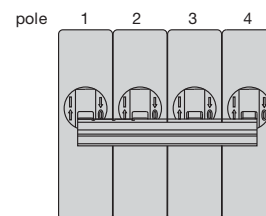
Actuator: short toggle



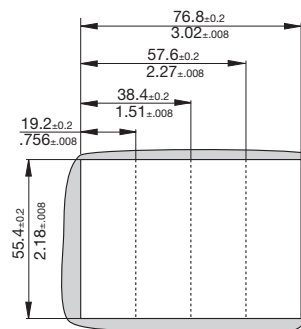
Actuator: without toggle, with slot



number of poles: 1-4



Cut-out dimensions  
max. panel thickness: 2 ± 0,5 mm

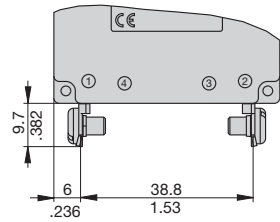


Applicable for nominal dimensions without direct tolerance indication:  
DIN ISO 286 ± IT13

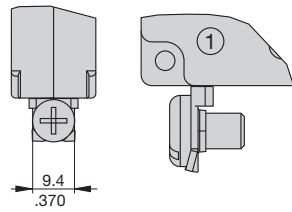
This is a metric design and millimeter dimensions take precedence (mm)  
inch

## Terminal design / Dimensions

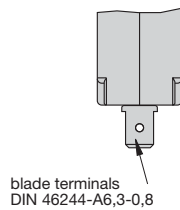
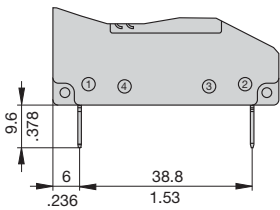
### K 3/4 screw terminals tightening torque max. 1.2 Nm



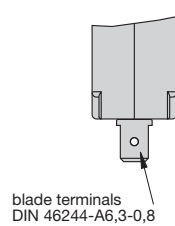
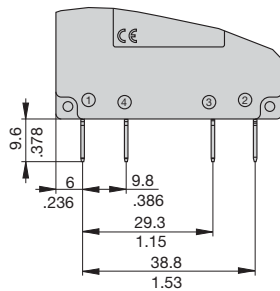
### K3 screw terminals M4 K4 screw terminals M5



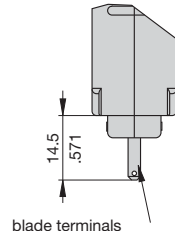
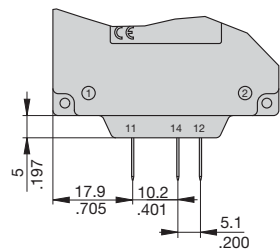
### P1 blade terminals



### X1 blade terminals with separate switching and relay circuit



### Auxiliary contacts version H (standard, asymmetrical gold-flushed terminals, silver contacts)

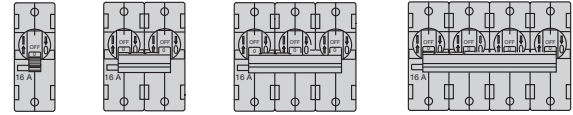


## Actuator configuration

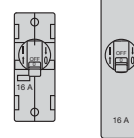
### Actuator design

number of poles: 1 - 4  
Configuration: F1 / F4

### Actuator long

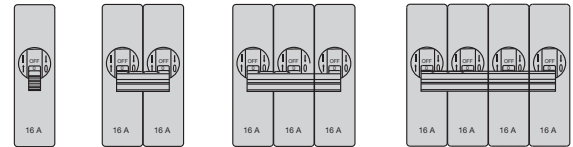


### Actuator short



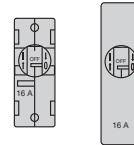
number of poles: 1 - 4  
Configuration: F9

### Actuator long



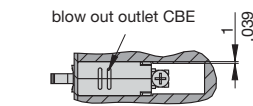
number of poles: 1  
Configuration: F1 / F4 / F9

Actuator: Z (black, without toggle, with slot)

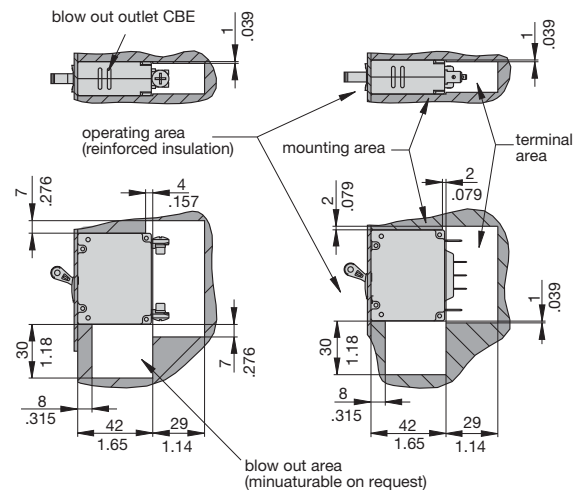


## Installation drawing

### Terminal design K



### Terminal design P

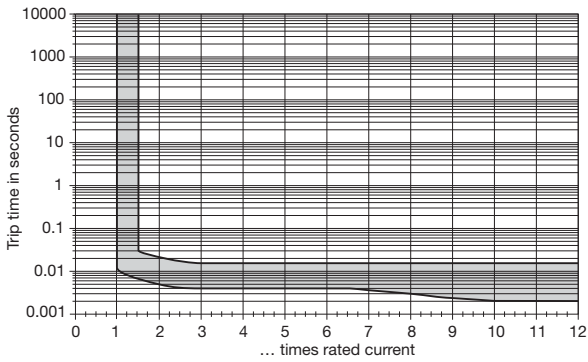


Trip time values indicated for front mounting on a vertical even surface

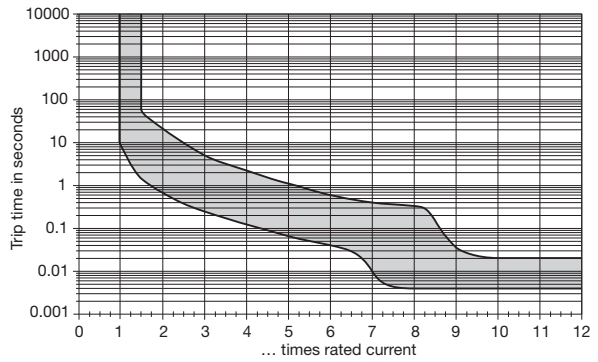
This is a metric design and millimeter dimensions take precedence (mm/inch)

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

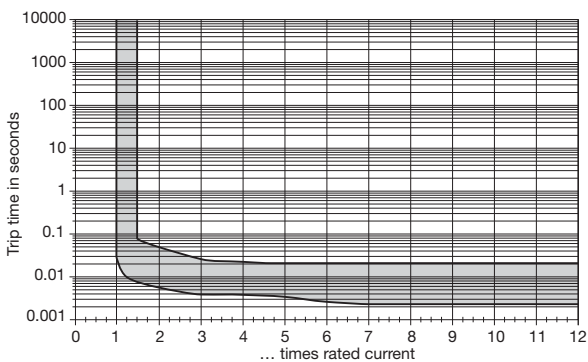
**Curve F1 (instantaneous) for DC**



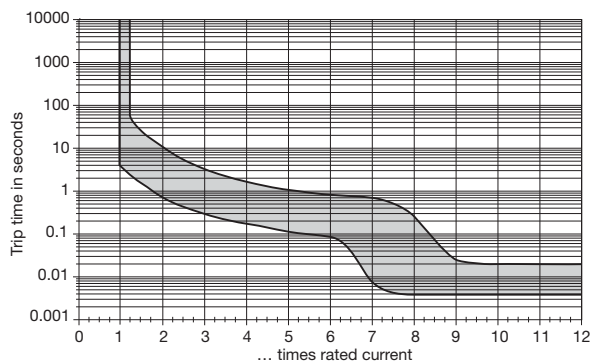
**Curve M0 (medium delay) for AC/DC**



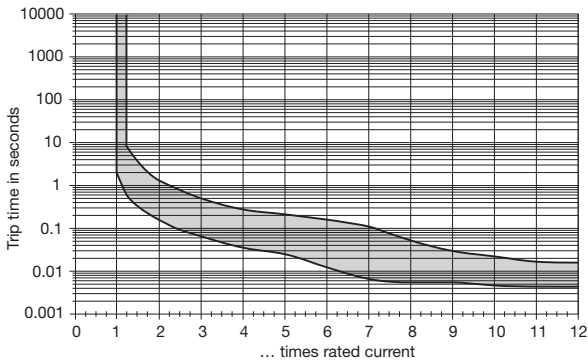
**Curve F2 (instantaneous) for AC 50/60 Hz**



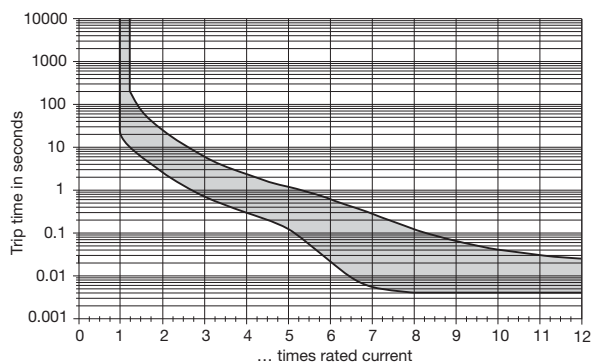
**Curve M1 (medium delay) for DC**



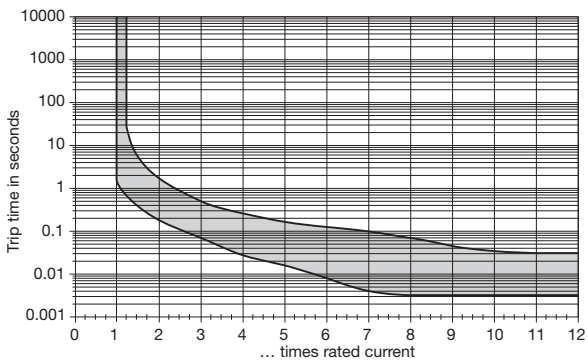
**Curve K1 (short delay) for DC**



**Curve M2 (medium delay) for AC 50/60 Hz**



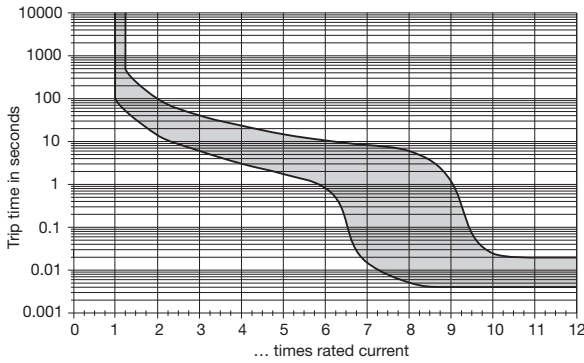
**Curve K2 (short delay) for AC 50/60 Hz**



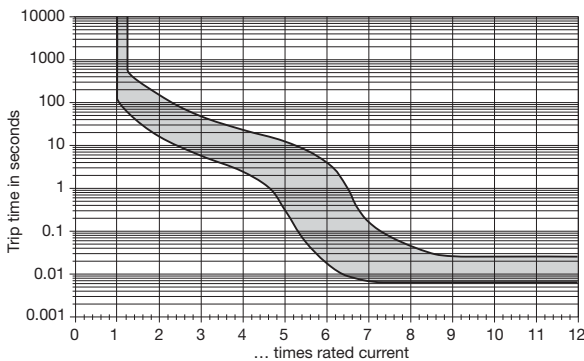
**N.B.** All curves will only be maintained if the escutcheon is mounted on a vertical surface.  
**Other characteristic curves to special order (e. g. with impulse delay for inrush peaks).**

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

**Curve T1 (long delay) for DC**



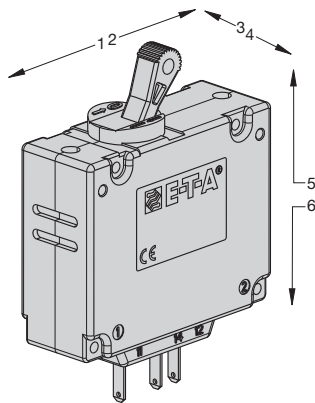
**Curve T2 (long delay) for AC 50/60 Hz**



**N.B.** All curves will only be maintained if the escutcheon is mounted on a vertical surface.

**Other characteristic curves to special order (e. g. with impulse delay for inrush peaks).**

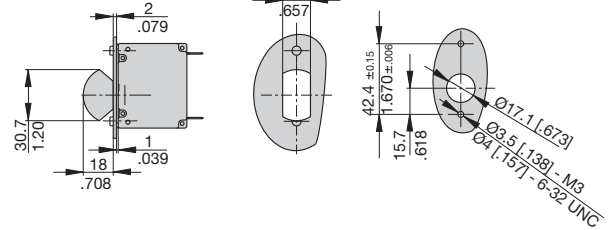
## Shock directions / Mounting attitudes



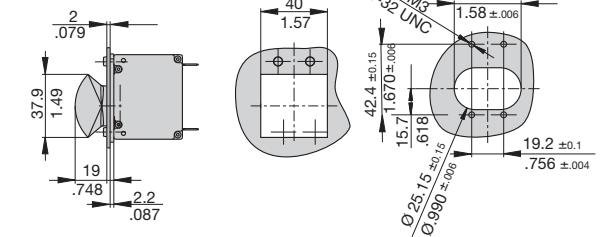
## Accessories

### Splash cover with mounting plate and screws

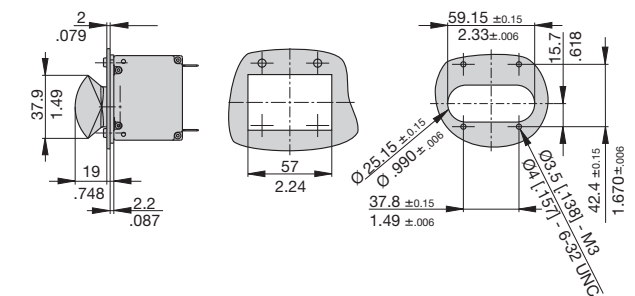
**1 pole**  
Y 303 565 01



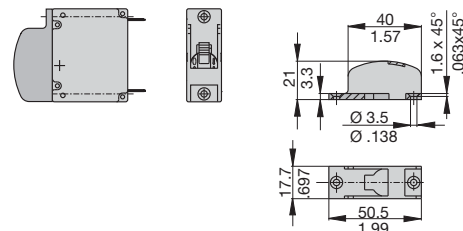
**2 pole**  
X 211 118 01



**3 pole**  
X 211 119 01



**Toggle guard**  
Y 307 250 01



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

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

## Description

Single, two, three and four pole magnetic and hydraulic-magnetic circuit breakers with trip-free mechanism and toggle actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S-type MO or HM CBE to EN 60934) ensures suitability for a wide range of applications. Featuring a combi-foot design for symmetric and asymmetric rail mounting. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 60934).

## Typical applications

Power supplies, control equipment, communication systems, EDP systems.

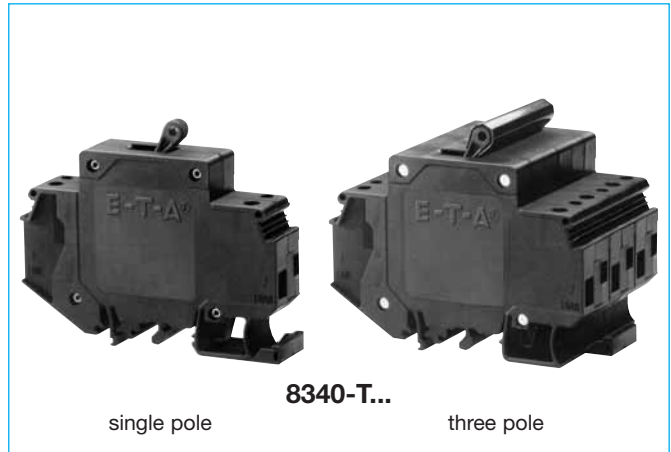
## Standard current ratings and typical internal resistance values

Current rating (A)	Curves and internal resistance per pole ( $\Omega$ )			
	F1	F2	K1, M1, T1	K2, M2, T2
0.02	1493	953	2669	2457
0.05	276	152	452	376
0.1	58	37	100	94
0.25	8.2	6.0	15.5	14.7
0.5	2.3	1.47	3.9	3.2
0.75	0.98	0.63	1.65	1.56
1	0.58	0.35	0.95	0.90
2	0.145	0.096	0.26	0.20
2.5	0.096	0.061	0.15	0.15
3	0.065	0.048	0.10	0.10
5	0.025	< 0.02	0.042	0.040
6	< 0.02	< 0.02	0.029	0.028
8	< 0.02	< 0.02	< 0.02	< 0.02
10	< 0.02	< 0.02	< 0.02	< 0.02
12	< 0.02	< 0.02	< 0.02	< 0.02
15	< 0.02	< 0.02	< 0.02	< 0.02
16	< 0.02	< 0.02	< 0.02	< 0.02
20	< 0.02	< 0.02	< 0.02	< 0.02
25	< 0.02	< 0.02	< 0.02	< 0.02
30	< 0.02	< 0.02	< 0.02	< 0.02
40	$\leq 0.01$	-	$\leq 0.01$	-
50	$\leq 0.01$	-	$\leq 0.01$	-

## Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V; AC 240 V; DC 80 V	0.02...30 A 1 to 6-pole 0.02...50 A 1-pole
UL1077, CSA	DC 80 V 3 AC 250 V; AC 250 V	0.02...50 A 1 to 6-pole 0.02...30 A 1 to 6-pole
UL 489 A	DC 80 V	0.05...30 A 1, 2-pole
CCC	3 AC 415 V; AC 240 V DC 80 V	0.02...30 A 0.02...50 A 1, 2-pole

Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Mass	approx. 98 g per pole



single pole

8340-T...

three pole

## Technical data

For further details please see chapter: Technical Information

Voltage rating	3 AC 415V; AC 240V (50/60Hz); DC 80V (higher DC voltages to special order)		
Current rating range	0.02...50 A single pole (40 + 50 A DC only) 0.02...30 A multipole		
Auxiliary circuit	1 A, AC 240 V/DC 65 V; 0.5 A DC 80 V		
Typical life	3 AC 415 V AC 240 V:		
	0.02...30 A	6,000 operations at 1 x I <sub>N</sub> , inductive 10,000 operations at 1 x I <sub>N</sub> , resistive	
DC 80 V:	0.02...25 A	6,000 operations at 1 x I <sub>N</sub> , inductive	
	0.02...30 A	10,000 operations at 1 x I <sub>N</sub> , resistive	
	40 + 50 A	6,000 operations at 1 x I <sub>N</sub> , resistive	
Ambient temperature	-40...+85 °C (-40...+185 °F)		
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage	pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 60664 and 60664A)	test voltage		
	operating area	AC 3,000 V	
	pole to pole	AC 1,500 V	
	main to aux. circuit	AC 1,500 V	
Insulation resistance	> 100 M $\Omega$ (DC 500 V)		
Interrupting capacity I <sub>cn</sub>	1,200 A at AC 2,000 A at DC		
Interrupting capacity (UL 1077)	I <sub>N</sub>	0.02...20 A	25...30 A
	AC:	1-pole AC 250 V/3,500A	AC 250 V/3,500A
		2-pole AC 250 V/3,500A	AC 250 V/5,000A
		3-pole 3AC 250V/3,500A	3AC250V/5,000A
	DC:	1-pole 0.02...50 A	DC 80 V/3,500 A
		2-pole 0.02...30 A	DC 80 V/3500 A
Interrupting capacity (UL 489A)	2,000 A		
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP20		
Vibration	with toggle down: directions 1, 2, 3, 4, 5: with curves F1, F2:		
	10 g at 0.9 I <sub>N</sub>		
	10 g at 1 x I <sub>N</sub>		
	10 g at 0.8 x I <sub>N</sub> in all planes.		
	(57-2000 Hz) $\pm$ 0.76 mm (10-57 Hz)		
	to IEC 60068-2-6, test Fc		
	10 frequency cycles/axis		
Shock	directions 1, 2, 3, 4, 5: direction 6: with curves F1, F2:		
	100 g (11 ms) at 1 x I <sub>N</sub>		
	100 g (11 ms) at 0.8 x I <sub>N</sub>		
	100 g (11 ms) at 0.8 x I <sub>N</sub>		
	to IEC 60068-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		

## Ordering information

### Type No.

8340 circuit breaker with toggle actuator

### Mounting

T rail mounting

### Configuration

1 snap-on installation

### Number of poles

- 0 single pole, switch only
- 1 single pole protected
- 2 two pole protected
- 3 three pole protected
- 4 four pole protected
- 5 two pole, protected on one poly only
- 6 four pole, protected on poles 1, 2 and 3 only
- 7 two pole, switch only

} magnetic,  
hydraulic-magnetic

### Panel hardware

0 without panel hardware

### Terminal design (main contact)

K1 recessed screw/pressure plates M4

### Characteristic curve

#### Curve F, instantaneous trip:

- F1 DC trip at  $1.01-1.5 \times I_N$
- F2 AC 60/50 Hz trip at  $1.01-1.5 \times I_N$

#### Curve K, short delay:

- K1 DC trip at  $2 \times I_N$  0.16-1.2 s
- K2 AC 60/50 Hz trip at  $2 \times I_N$  0.13-1.6 s

#### Curve M, medium delay:

- M1 DC trip at  $2 \times I_N$  0.6-7.5 s
- M2 AC 60/50 Hz trip at  $2 \times I_N$  2.2-20 s

### Without characteristic curve

Q0 switch only

### Curve T, long delay:

- T1 DC trip at  $2 \times I_N$  10-70 s
- T2 AC 60/50 Hz trip at  $2 \times I_N$  15-150 s

### Other characteristic curves to special order

(e.g. pulse-delayed, high inrush currents, capacitive loads)

### Actuator colour / design

- A black, long toggle
- B white, long toggle
- C blue, long toggle
- K black, short toggle
- L white, short toggle
- M blue, short toggle

### other colours to special order

### Marking on actuator

- 0 without marking
- L I-O; ON-OFF
- M I-O; ON-OFF ( $I_N$ ,  $U_N$ , trip curve, schematic diagram on housing top)
- N I-O; ON-OFF ( $I_N$ , on housing top)

### Auxiliary contacts

- H0 without auxiliary contacts
- H1 with auxiliary contact
- H2 with auxiliary contact on one pole only (multipole)

### Auxiliary contact function

(see internal connection diagrams)

- 2 1 N/O contact
- 3 1 N/C contact

### Auxiliary contact terminal design

6 screw/pressure plate M3

### Current ratings

0.02...50 A

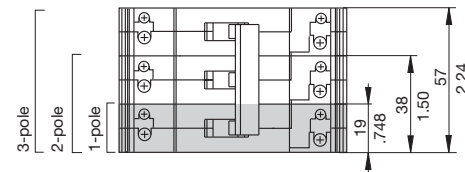
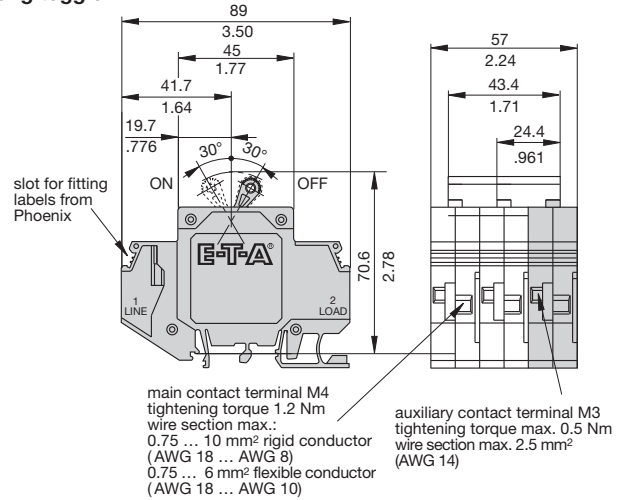
### Approval (optional)

U UL 489 A

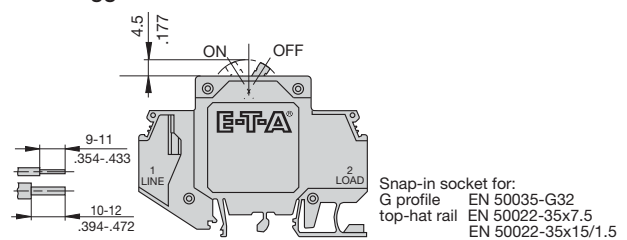
8340 - T 1 1 0 - K1 M1 - A L H1 2 6 - 10 A - U ordering example

## Dimensions

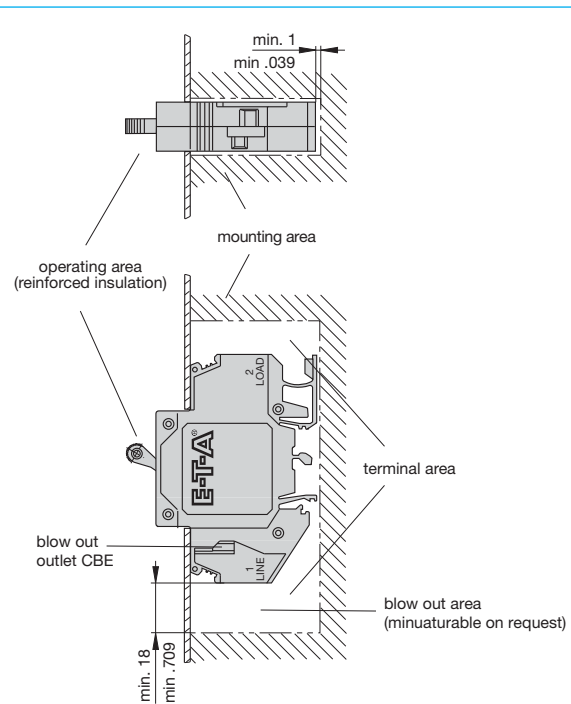
### long toggle



### short toggle



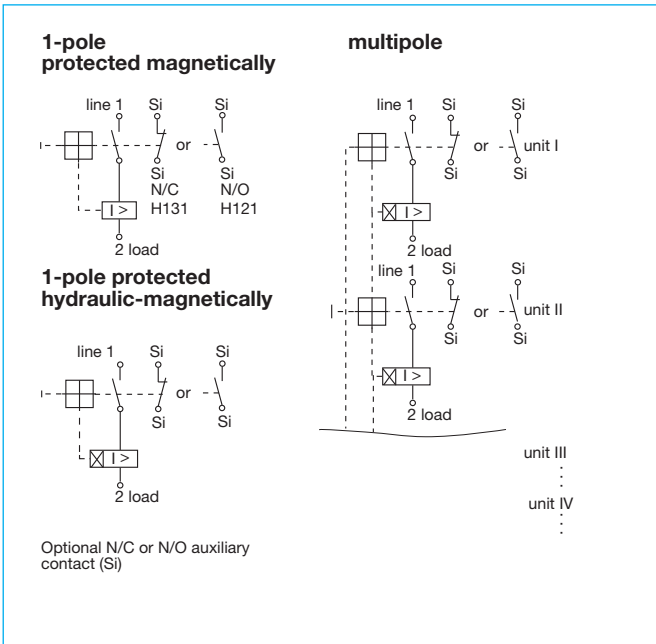
## Installation drawing



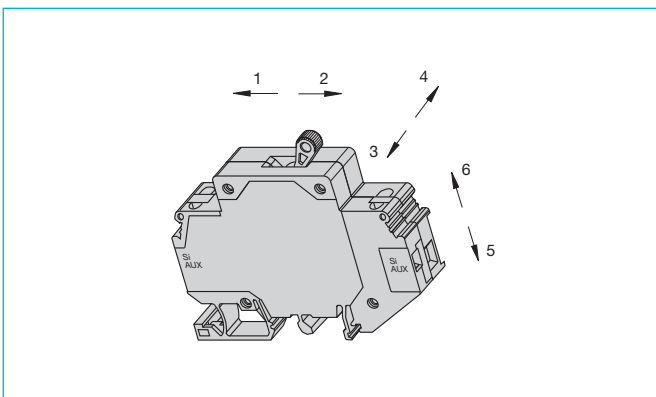
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )



## Internal connection diagrams

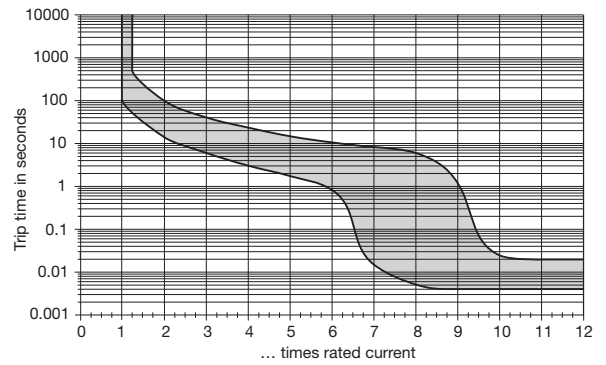


## Shock directions

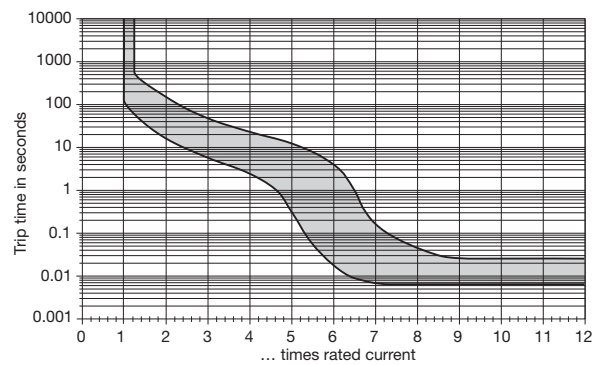


## Typical time/current characteristics at 23 °C / +73.4 °F

**Curve T1 (long delay) for DC**



**Curve T2 (long delay) for AC 50/60 Hz**

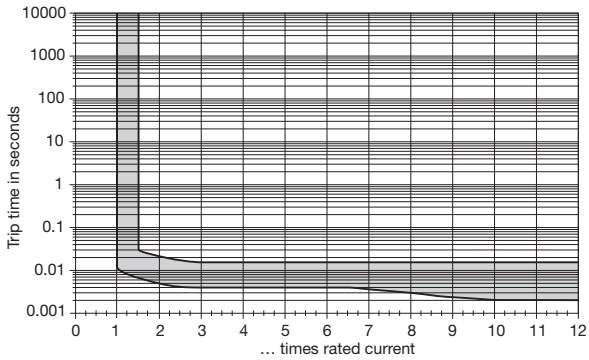


**N.B.** All curves will only be maintained if the escutcheon is mounted on a vertical surface.

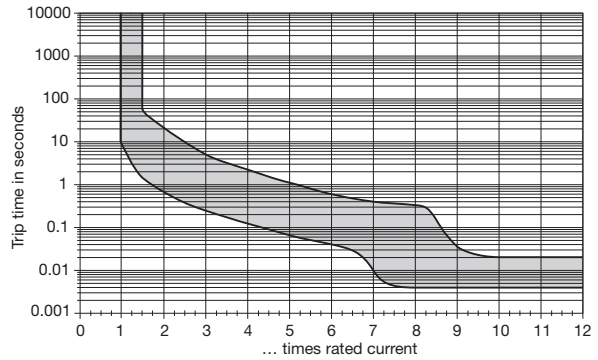
**Other characteristic curves to special order (e. g. with impulse delay for inrush peaks).**

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

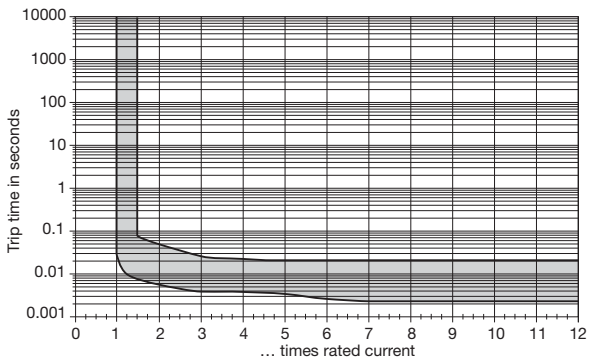
**Curve F1 (instantaneous) for DC**



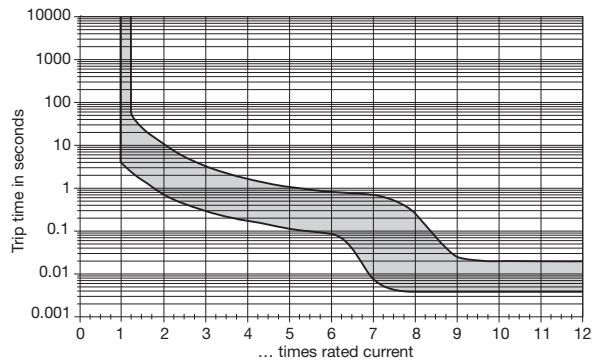
**Curve M0 (medium delay) for AC/DC**



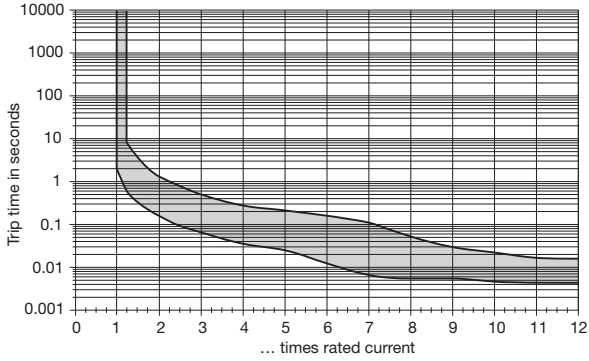
**Curve F2 (instantaneous) for AC 50/60 Hz**



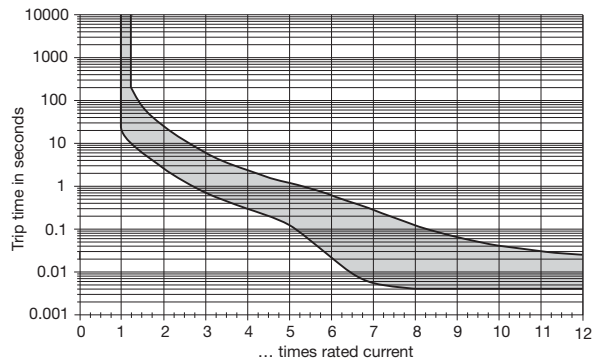
**Curve M1 (medium delay) for DC**



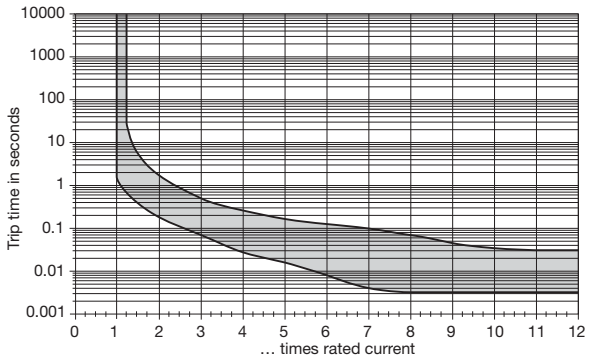
**Curve K1 (short delay) for DC**



**Curve M2 (medium delay) for AC 50/60 Hz**



**Curve K2 (short delay) for AC 50/60 Hz**



**N.B.** All curves will only be maintained if the escutcheon is mounted on a vertical surface.

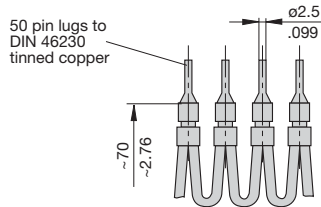
**Other characteristic curves to special order (e. g. with impulse delay for inrush peaks).**

3

## Accessories

### Connector bus links -K10

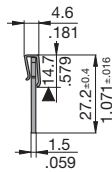
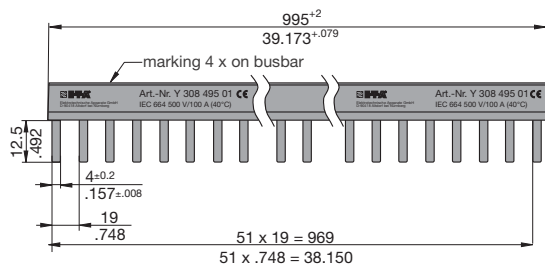
**X210 589 01**/2.5 mm<sup>2</sup>, (AWG 14) (black) up to 20 A max. load  
**X210 589 02**/1.5 mm<sup>2</sup>, (AWG 16) (brown) up to 13 A max. load



### Busbar 1-pole Y 308 495 01

The one metre long busbars can be cut to suitable lengths. Plug-on caps can be fitted on the ends to provide brush contact protection.

$I_{max}$  - busbar 100 A (40°C)

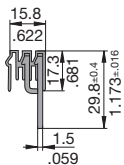
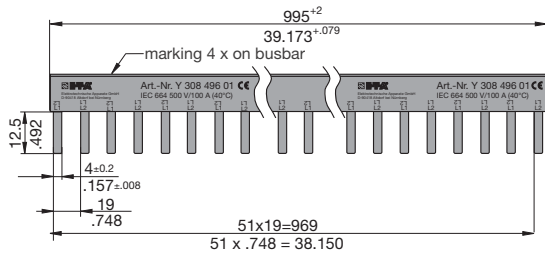


### Plug-on cap, 1-pole Y 307 851 01

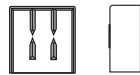


### Busbar 2-pole Y 308 496 01

$I_{max}$  - busbar 100 A (40°C)

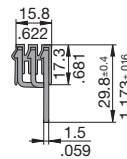
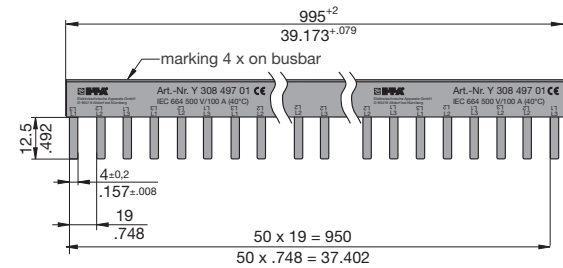


### Plug-on cap, busbar 2/3-pole Y 308 506 01

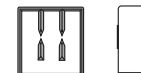


### Busbar 3-pole Y 308 497 01

$I_{max}$  - busbar 100 A (40°C)

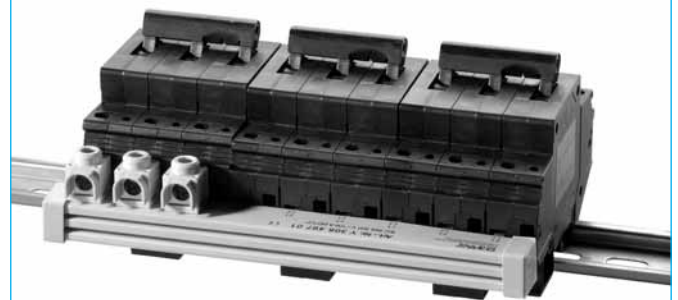
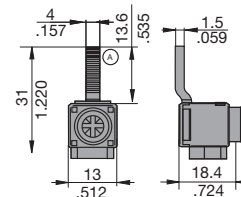


### Plug-on cap, busbar 2/3-pole Y 308 506 01



### Supply terminal $I_{max}$ 63 A Y 308 504 01

Max. tightening torque of terminal screw 2 Nm  
 Max. cable cross section: 25 mm<sup>2</sup> / single strand  
 16 mm<sup>2</sup> / multistrand with wire end ferrule



### Caution:

When using multipole busbars please leave at least one pole's width between two adjacent line entry terminals.

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

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

## Description

Single or multipole hydraulic-magnetic circuit breakers with trip-free-mechanism and toggle actuation. A choice of switching characteristics ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Auxiliary contacts optional. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 60934) S-type HM CBE.

## Typical applications

In the business fields Communication and Transport: power supplies, switchgear, instrumentation and process control engineering.

## Standard current ratings and typical internal resistance values

Current rating (A)	Trip curves and internal resistance (Ω) per pole	
	K1, M1, T1,	K2, M2, T2
0.05	452	376
0.1	100	94
1	0.95	0.90
2	0.26	0.20
3	0.10	0.10
5	0.042	0.040
10	< 0.02	< 0.02
15	< 0.02	< 0.02
20	< 0.02	< 0.02
25	< 0.02	< 0.02
30	< 0.02	< 0.02
40	< 0.01	< 0.01
50	< 0.01	< 0.01
60	< 0.01	< 0.01
80	< 0.01	< 0.01
100	< 0.01	< 0.01
125	< 0.01	< 0.01

## Interrupting capacity to EN 60934, UL 489 and UL 1077

### IEC 60934 – test series E

voltage	number of poles	$I_N$ max. (A)	$I_{cn}$ (A)
DC 80 V	1 + 2	0.02...125	10,000
AC 240/415 V	1 - 6	0.02...80	$6 \times I_N$
AC 240 V	1	0.02...20	5,000

### UL 489 – test sequence Z

voltage	number of poles	$I_N$ max. (A)	$I_{cn}$ (A)
DC 80 V	1 + 2	0.5...125	10,000
AC 120 V	1	0.5...80	5,000
AC 120/240 V	1	0.5...80	5,000
AC 240 V	1 (2)	0.5...20	5,000

### UL 1077

voltage	number of poles	$I_N$ max. (A)	$I_{cn}$ (A)
DC 80 V	1 + 2	0.02...125	10,000
AC 277/480 V	1 - 6	0.02...70	5,000



## Technical data

Voltage rating	3 AC 415 V; AC 277/480 V; AC 120/240 V; AC 240 V; DC 80 V,
Current rating range	0.05...125 A single and multipole 150...180 A single pole, two poles connected in parallel higher ratings upon request
Auxiliary circuit	AC 240 V 6 A DC 28 V 3 A DC 65 V 1 A DC 80 V 0.5 A
Typical life	10,000 operations at $1 \times I_N$
Ambient temperature	-40...+85 °C (-40...+185 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 reinforced insulation in operating area
Dielectric strength	test voltage
operating area	AC 3,000 V
pole to pole	AC 1,500 V
main to auxiliary circuit	AC 3,000 V
switching to trip circuit	AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Degree of protection (IEC 60529)	operating area IP40 terminal area IP00
Vibration	
upside down:	10 g (57-2000 Hz) ± 0,76 mm (10-57 Hz) at $0.9 I_N$
directions 1, 2, 3, 4, 5: with curves F1, F2:	10 g at $1 \times I_N$ 10 g at $0.8 \times I_N$ in all planes. (57-2000 Hz) ± 0.76 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	
directions 1, 2, 3, 4, 5: direction 6: with curves F1, F2:	100 g (11 ms) at $1 \times I_N$ , 100 g (11 ms) at $0.8 \times I_N$ , 100 g (11 ms) at $0.8 \times I_N$ to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5% salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Mass	approx. 90 - 120 g per pole depending on version

## Approvals

VDE (EN 60934)	1- to 6-pole
UL 489	
UL 1077	1- to 6-pole
CCC	1- to 4-pole

## Ordering information for EN 60934 and UL 1077

Type No.  
8345

### Mounting

- B** flange mounting, with rectangular aperture with mounting nut 6-32UNC
- C** flange mounting, with rectangular aperture with mounting nut M3
- E** flange mounting, with round aperture with mounting nut 6-32UNC
- F** flange mounting, with round aperture with mounting nut M3
- X** flange mounting, with rectangular aperture, with 2 mounting brackets

### Configuration

- 0** without barrier
- 1** with small barrier
- 2** with large barrier (requested for multipole AC applications with approvals to UL 489, UL 1077, IEC)

### Number of poles

- 0** single pole unprotected
- 1** single pole protected
- 2** two pole protected
- 3** three pole protected
- 4** four pole protected
- P** one pole protected, two poles connected in parallel characteristic curves E/H/R upon request
- Q** one pole protected, three poles connected in parallel characteristic curves E/H/R upon request
- R** one pole protected, four poles connected in parallel characteristic curves E/H/R upon request
- S** one pole protected, five poles connected in parallel characteristic curves E/H/R upon request

### Actuator configuration

- A** all poles with standard toggle
- B** reduced number of standard toggles
- Z** without actuator

### Terminal design

- L** screw terminals M5 ≤ 50 A
- M** solder terminals ≤ 75 A
- P** blade terminals ≤ 35 A
- R** round connectors 6 mm
- S** stud terminals M5 ≤ 60 A
- T** stud terminals 10-32UNF-3A ≤ 60 A
- U** stud terminals M6 ≤ 125 A
- V** stud terminals 1/4-20UNC-3A ≤ 125 A
- W** laminated round terminals ≤ 125 A

### Terminal hardware

- 0** without
- 3** with washer and nut
- 6** Phillips screws

### Characteristic curve

- K1** short delay DC
- K2** short delay AC
- M0** medium delay AC/DC
- M1** medium delay DC
- M2** medium delay AC
- Q0** switch only
- T1** long delay DC
- T2** long delay AC

### Version

- D** standard

### Colour configuration

- B1** black actuator
- B2** white actuator
- B3** blue actuator

### Marking

- |           |   |               |
|-----------|---|---------------|
|           | front plate   | actuator base |
| <b>B1</b> | without   | ON-OFF        |
| <b>B2</b> | I <sub>N</sub>  | ON-OFF        |
| <b>B3</b> | I <sub>N</sub>  | ON-OFF        |
| <b>B4</b> | I <sub>N</sub> characteristic curve, wiring diagram on side | ON-OFF        |

### Rated voltage

- B** AC or ≤ 80 V DC
- C** DC ≤ 80 V  
AC ≤ 277 V  
(only for configurations 0 and 1 for UL 1077)

8345 - C 0 1 A - U 3 M1 - D B1 B1 B

8345 - C 0 1 A - U 3 M1 - D B1 B1 B

### Current ratings

- 0.05...125 A
- higher current ratings upon request

8345 - C 0 1 A - U 3 M1 - D B1 B1 B - 60 A ordering example

Remote trip coil available to special order!

## Ordering information for auxiliary contact module

Type number

X8345

### Module

- S** auxiliary contact module

### Auxiliary contacts

- 01** in all poles
- 02** in pole 1 only
- 03** in poles 1+ 3 only
- 04** in pole 2 only

### Auxiliary contact version

- H** auxiliary contacts standard, gold-flushed (asymmetrical terminals)
- K** auxiliary contacts, tin-plated (symmetrical terminals)

### Auxiliary contact function

- W1** 1 changeover
- W2** 2 changeover

### Terminal design

- 02** microswitch with blade terminals  
DIN 46244-A2.8-0.5
- M** mounted to base unit

X8345 - S 01 H W1 02 M ordering example

## Ordering information for UL 489

Type No.  
8345

### Mounting

- B** flange mounting, with rectangular aperture with mounting nut 6-32UNC
- C** flange mounting, with rectangular aperture with mounting nut M3
- E** flange mounting, with round aperture with mounting nut 6-32UNC
- F** flange mounting, with round aperture with mounting nut M3
- X** flange mounting, with rectangular aperture, with 2 mounting brackets

### Configuration

- 0** without barrier for DC
- 1** with small barrier for DC (optional)
- 2** with large barrier for AC

### Number of poles

- 1** single pole protected
- 2** two pole protected

### Actuator configuration

- A** all poles with standard toggle
- B** reduced number of standard toggles
- Z** without actuator

### Terminal design

- L** screw terminals M5 ≤ 50 A
- M** solder terminals ≤ 75 A
- P** blade terminals ≤ 35 A
- R** round connectors 6 mm
- S** stud terminals M5 ≤ 60 A
- T** stud terminals 10-32UNF-3A ≤ 60 A
- U** stud terminals M6 ≤ 125 A
- V** stud terminals 1/4-20UNC-3A ≤ 125 A
- W** laminated round terminals ≤ 125 A

### Terminal hardware

- 0** without
- 3** with washer and nut
- 6** Phillips screws

### Characteristic curve

- K1** short delay DC
- K2** short delay AC
- M1** medium delay DC
- M2** medium delay AC
- T1** long delay DC
- T2** long delay AC

### Version

- D** standard

### Colour configuration

- B1** black actuator
- B2** white actuator
- B3** blue actuator

### Marking

- |           |   |               |
|-----------|---|---------------|
|           | front plate   | actuator base |
| <b>B1</b> | without   | ON-OFF        |
| <b>B2</b> | I <sub>N</sub>  | ON-OFF        |
| <b>B3</b> | I <sub>N</sub>  | ON-OFF        |
| <b>B4</b> | I <sub>N</sub> , characteristic curve, wiring diagram on side | ON-OFF        |

### Rated voltage

- B** AC or ≤ 80 V DC

### Current ratings

- 0.05...125 A for DC
- 0.05...20 A for AC
- higher current ratings upon request

### Approvals (optional)

- V** UL 489

8345 - C 0 1 A - U 3 M1 - D B1 B1 B - 60 A - . ordering example

Remote trip coil available to special order!

## Ordering information for auxiliary contact module

Type number  
X8345

### Module

- S** auxiliary contact module

### Auxiliary contacts

- 01** in all poles
- 02** in pole 1 only
- 04** in pole 2 only

### Auxiliary contact version

- K** auxiliary contacts, tin-plated (symmetrical terminals)

### Auxiliary contact function

- W1** 1 changeover

### Terminal design

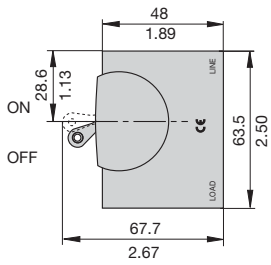
- 02** microswitch with blade terminals  
DIN 46244-A2.8-0.5
- M** mounted to base unit

X8345 - S 01 K W1 02 M ordering example

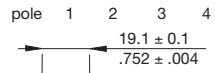
## Dimensions

### Mounting version B/C

Flange mounting rectangular aperture



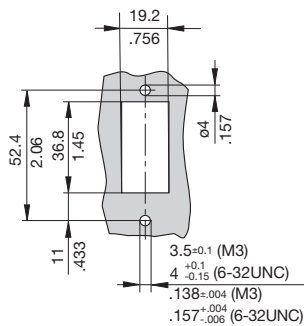
number of poles 1 to 4



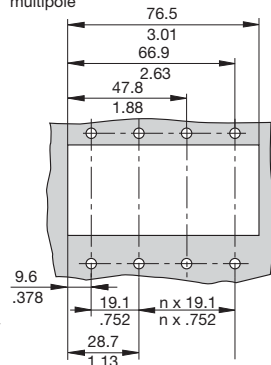
mounting thread M3 or 6-32  
all dimensions referred to the top edge  
mounting depth 4.2 mm/.165 in.  
max. insertion depth 5.5 mm  
max. tightening torque 0.33 Nm

Cut-out dimensions:

1-pole

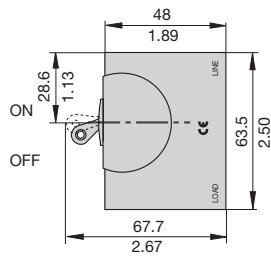


multipole

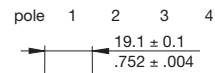


### Mounting version E/F

Flange mounting round aperture



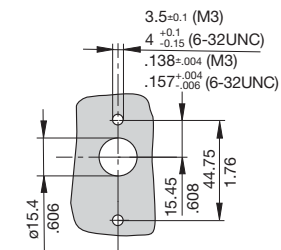
number of poles 1 to 4



mounting thread M3 or 6-32  
all dimensions referred to the top edge  
mounting depth 4.2 mm/.165 in.  
max. insertion depth 5.5 mm  
max. tightening torque 0.33 Nm

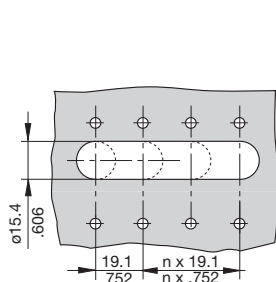
Cut-out dimensions:

1-pole



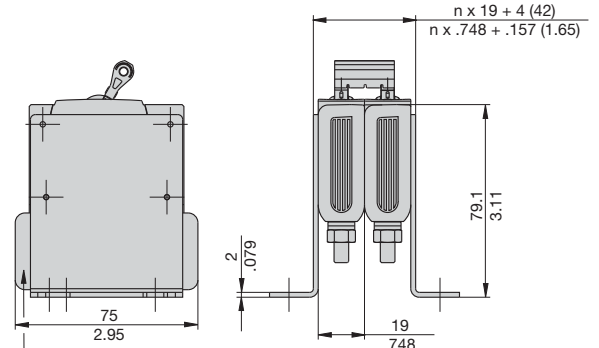
max. panel thickness: 3 mm

4-pole

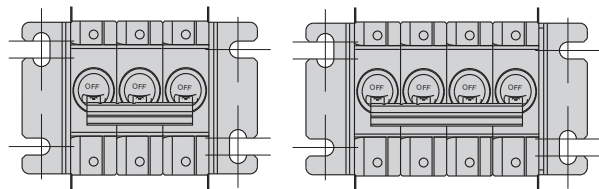
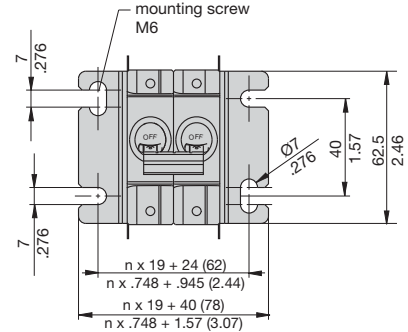


### Mounting version X

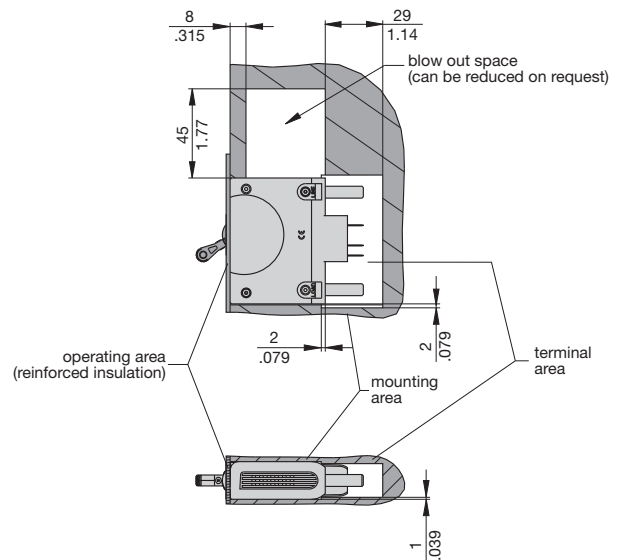
Flange mounting, with rectangular aperture, with 2 mounting brackets



Interphase barrier



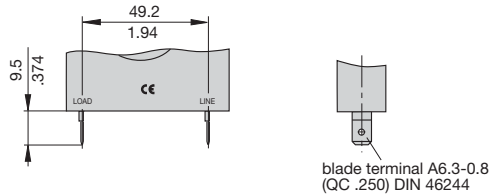
## Installation drawing



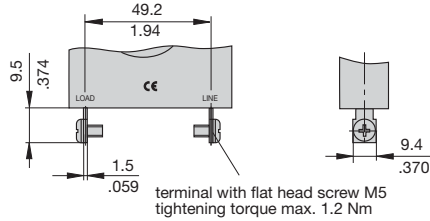
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Terminal design / Dimensions

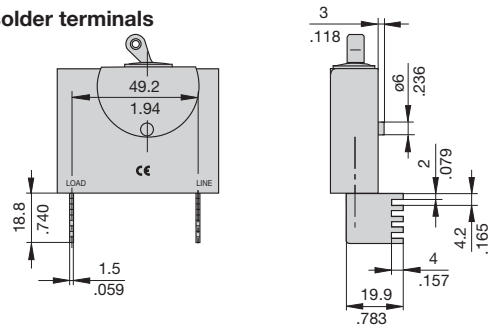
### P - with blade terminals



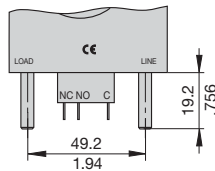
### L - with screw terminals



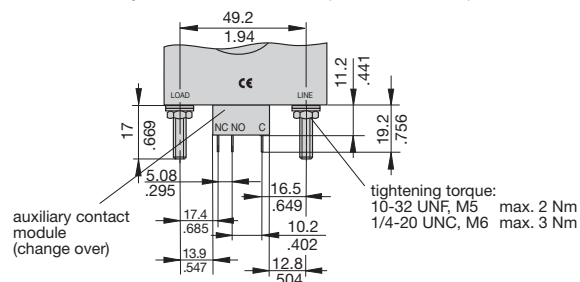
### M - with solder terminals



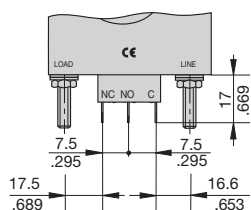
### R - round connectors D = 6 mm (dia .236) (version H) asymmetrical terminals (not for UL 489)



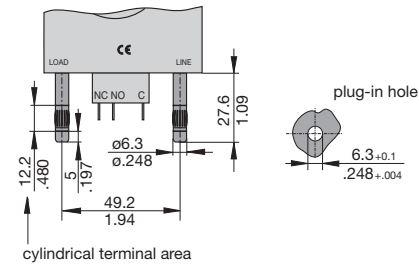
### S/U/T/V - with auxiliary contacts (version H) asymmetrical terminals (not for UL 489)



### auxiliary contacts version K symmetrical terminals



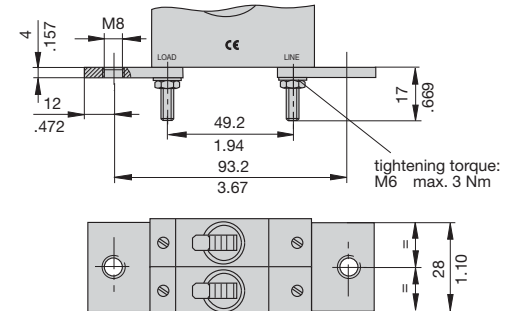
### W - laminated round terminals



## Number of poles / Dimensions

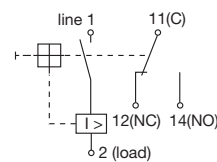
### P 1-pole protected, 2-poles connected in parallel for rating currents from 150 to 180 A

tightening torque:  
M8 max. 6 Nm

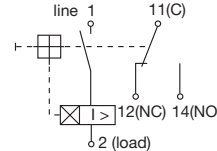


## Internal connection diagrams

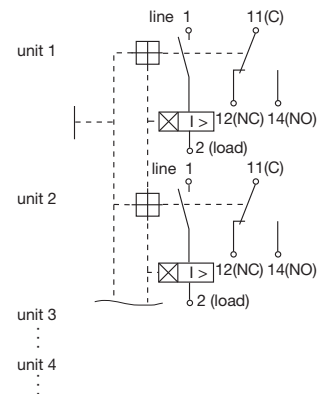
### 1-pole protected magnetically



### 1-pole protected hydraulic-magnetically



### multipole



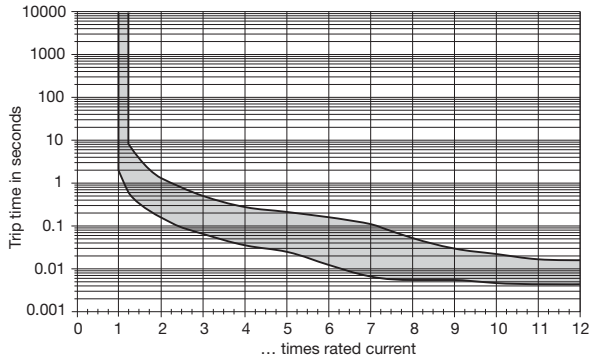
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )



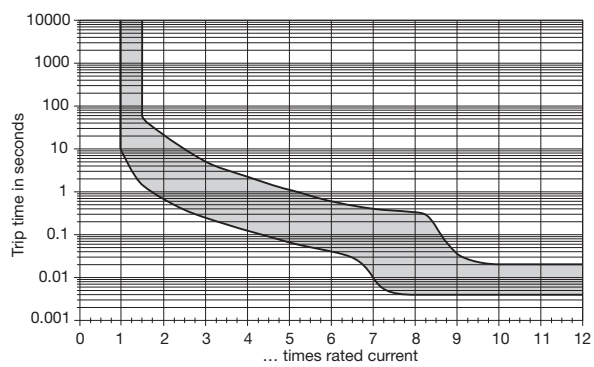
## Typical time/current characteristics at +23 °C / +73.4 °F

(trip time at rated current and all poles symmetrically loaded)

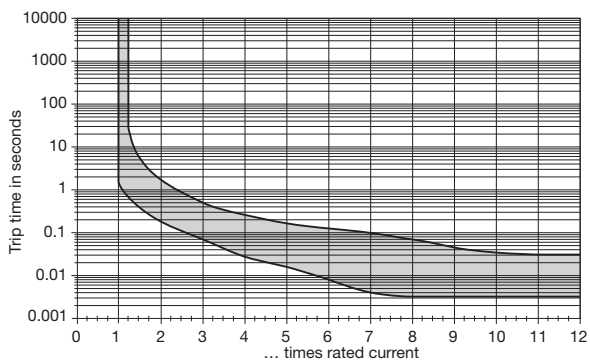
**Curve K1 (short delay) for DC**



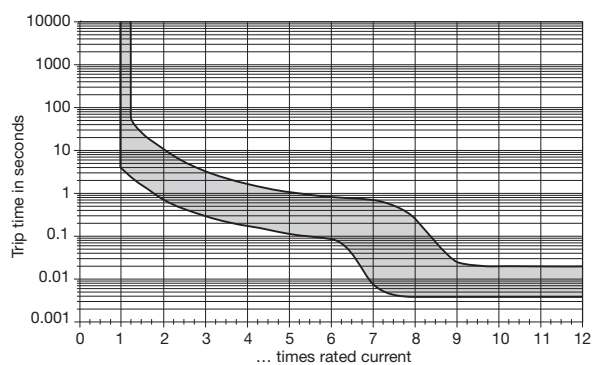
**Curve M0 (medium delay) for AC/DC**



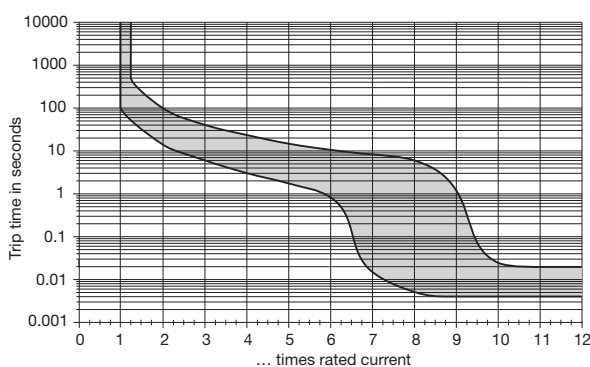
**Curve K2 (short delay) for AC 50/60 Hz**



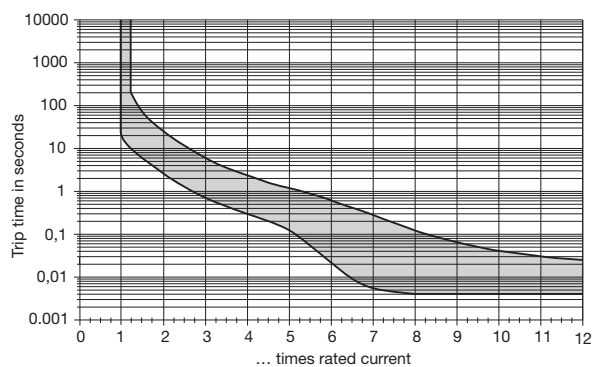
**Curve M1 (medium delay) for DC**



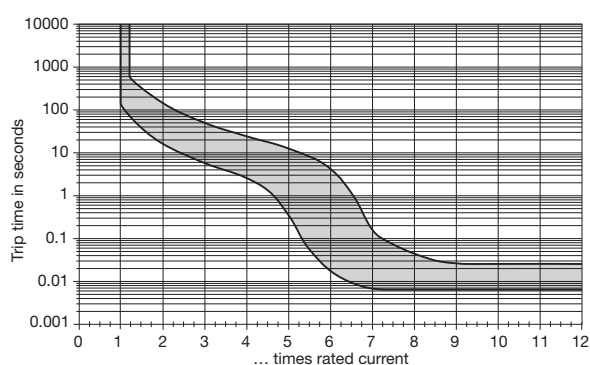
**Curve T1 (long delay) for DC**



**Curve M2 (medium delay) for AC 50/60 Hz**



**Curve T2 (long delay) for AC 50/60 Hz**



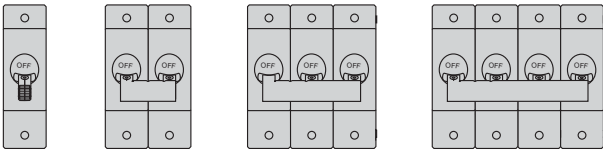
All curves will only be maintained if the escutcheon is mounted on a vertical surface.

**Other characteristic curves to special order ( e. g. pulse delayed, for high inrush currents or capacitive loads).**

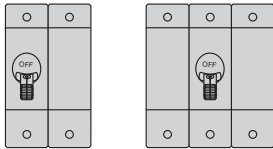
3

## Actuator configuration

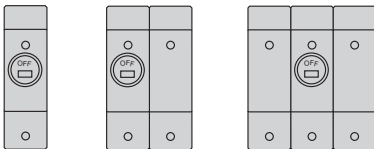
### A 1 toggle per pole, mounting version B/C



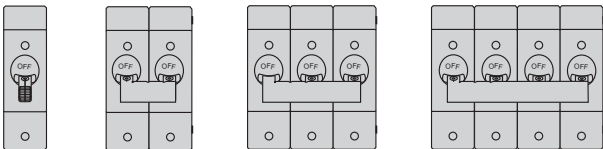
### B reduced number of toggles per unit, mounting version B/C



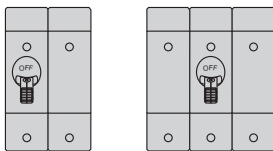
### Z without toggles



### A 1 toggle per pole, mounting version E/F



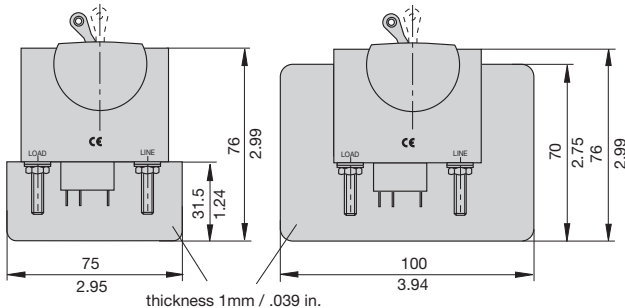
### B reduced number of toggles per unit, mounting version E/F



## Interphase barriers / Dimensions

### 1 - Interphase barrier (small)

### 2 - Interphase barrier (large)



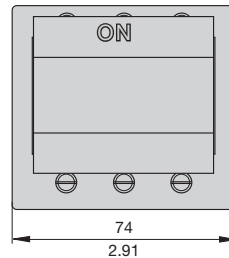
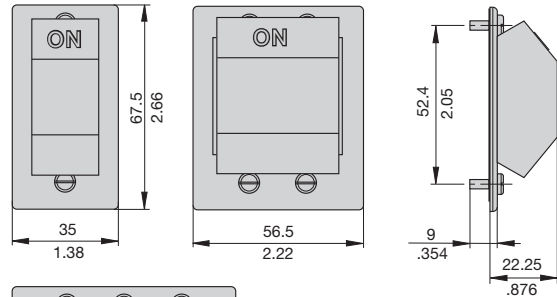
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

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.

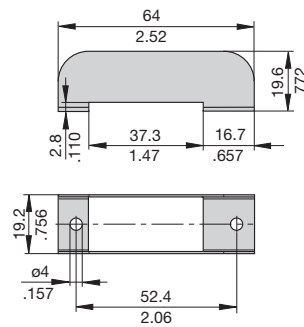
## Accessories

### Splash cover (IP65) for 1-, 2-, 3-pole (only for mounting version B/C)

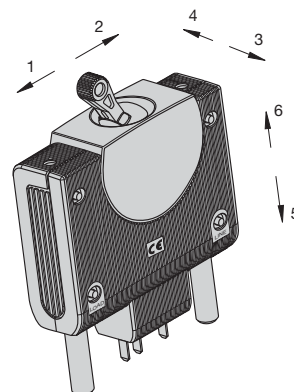
	number of poles	mounting version	actuator configuration
X 222 444 01	1-pole	B	1
X 222 444 02	1-pole	C	1
X 222 444 11	2-pole	B	2
X 222 444 12	2-pole </td <td>C</td> <td>2</td>	C	2
X 222 444 21	3-pole	B	3
X 222 444 22	3-pole	C	3



### Toggle guard (only for mounting version B/C) Y 307 381 01



## Shock directions



## Description

A module which adds remote trip capability to all versions of type 8345. A voltage applied across the coil, by means of an external sensor for example, will cause disconnection of the main switch/circuit breaker mechanism.

## Typical applications

Electrical monitoring of safety systems, remote trip.

## Ordering information

Type No.	
<b>X8345</b>	Module for type 8345
<b>Module</b>	
<b>F</b>	remote trip module
<b>Assembly version</b>	
<b>01</b>	only in pole 1
<b>02</b>	only in pole 2
<b>03</b>	only in pole 3
<b>04</b>	only in pole 4
<b>Remote trip version</b>	
<b>X1</b>	DC
<b>Voltage rating</b>	
<b>12</b>	12 V
<b>24</b>	24 V
<b>48</b>	48 V
<b>Terminal design</b>	
<b>02</b>	blade terminals DIN 4644-A2.8-0.5
<b>M</b>	module mounted to circuit breaker
<b>X8345 - F 01 X1 12 02 M</b>	ordering example

## Voltage ratings and typical internal resistance values

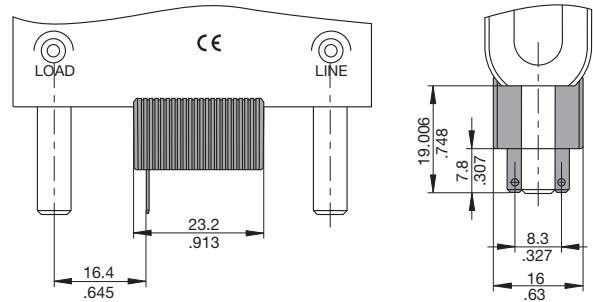
Voltage ratings	Internal resistance ( $\Omega$ )
DC 12 V	3.4
DC 24 V	13.9
DC 48 V	64.3

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

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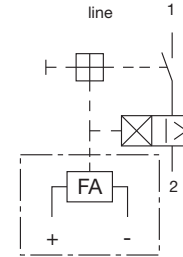
## Dimensions

Additional remote trip module



## Internal connection diagram

1-pole protected hydraulic-magnetically with additional remote trip coil



## Technical data

Voltage ratings	DC 12 V; DC 24 V; DC 48 V
Power consumption	approx. 40 W
Pulse operation	20 ms < $t_{ON}$ < 100 ms / $t_{OFF}$ > 10 sec (Continuous duty possible for multipole devices upon request)
Typical life	10,000 operations at $U_N$
Ambient temperature	-40...+85 °C (-40...+185 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 (EN 60934)
Dielectric strength between main circuit and trip coil circuit	test voltage AC 3,000 V (EN 60934)
Insulation resistance	> 100 M $\Omega$ (DC 500 V)
Vibration	6 g (57-2000 Hz) $\pm$ 0.46 mm (10-57 Hz) shock direction 1/2 4 g (57-2000 Hz) $\pm$ 0.30 mm (10-57 Hz) shock direction 3/4 3 g (57-2000 Hz) $\pm$ 0.23 mm (10-57 Hz) shock direction 5/6 to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	100 g (11 ms) (not when mounted upside down) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab
Mass	approx. 8.5 g (without base unit)

## Description

The X8345-R is an additional module which provides remotely controlled ON and OFF functionality for the E-T-A series 8345 magnetic circuit breaker range. The module actuator, which is motor driven, is factory fitted adjacent to the circuit breaker(s) which it is controlling. The module can be operated by a suitable external changeover switch, momentary switches (one ON, one OFF) or logic system (not part of our product). The status of the actuator will follow the position of the external switch, i.e. if the circuit breaker trips electrically or is operated manually, the actuator will not change.

A single module will control a single pole breaker or multipole circuit breakers up to 3 poles. In the application it has to be ensured that the supply voltage is maintained at all times.

When switching the circuit breaker OFF manually the module has also to be switched off by means of the changeover switch before switching the breaker on again. The same is true for normal switch-on of the breaker.

## Ordering information

### Type number

**X8345** Module for type 8345, 1, 2 and 3 pole

### Module

**R** remote ON/OFF actuation

### Operating voltage

**24** DC 24 V

### Add-on version

**01** mounted on right side

### Mounting method

**00** front panel mounting (standard)

**01** single bracket: module fitted

**02** 2-bracket: module and circuit breaker fitted

### Terminal design

**01** spring loaded screwless terminal 5-pin

### Supply status

**M** module mounted to the base unit

**X8345 - R 24 01 00 01 M** ordering example

Note: Bold-type, blue configurations are standard versions which are presently available.

## Technical data

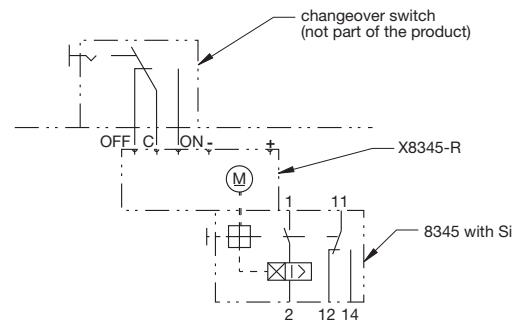
Voltage rating	DC 24 V (16...32 V)
ON duty	50 %
Trip time	< 2 sec
Blocking current	< 1.5 A
Control current	< 3 mA
Typical life	10,000 operations (ON/OFF)
Ambient temperature	-25...70 °C (-13...158 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 (EN 60934)
Dielectric strength pole to module	test voltage AC 1,500 V (EN 60934)
Insulation resistance	> 100 MΩ (DC 500 V)
Vibration	10 g (57-2000 Hz), ± 0,76 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis
Shock	100 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5% salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Mass	approx. 65 g (without base unit)



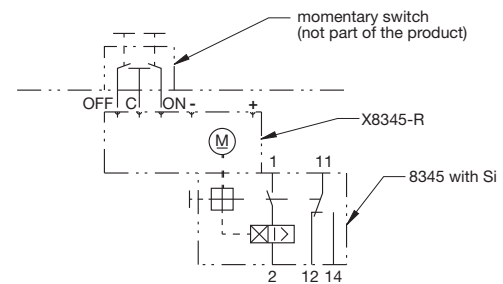
**X8345-R**

## Internal connection diagrams

single pole, hydraulic-magnetic protection, with remote ON/OFF actuation (operated by changeover switch)



single pole, hydraulic-magnetic protection, with remote ON/OFF actuation (actuated by two momentary switches)

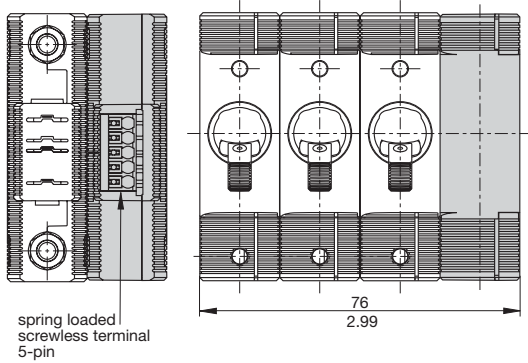
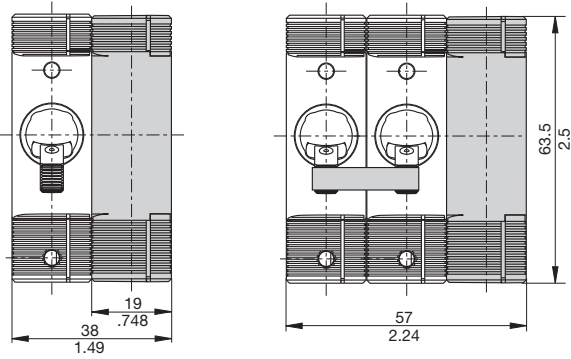


## Typical applications

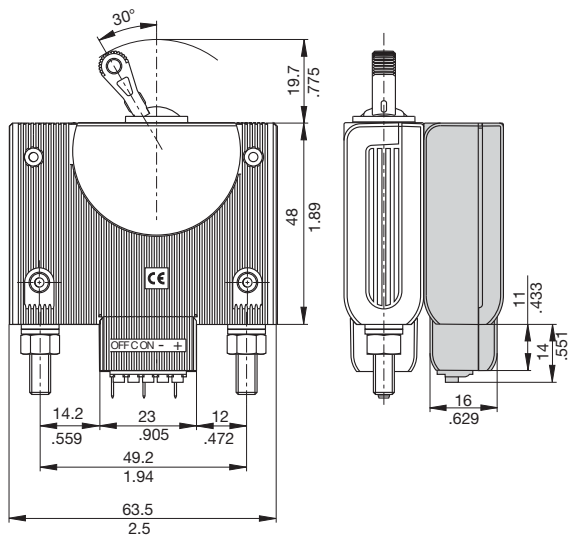
Remote circuit breaker control (ON/OFF) for communication systems, marine installations, automation equipment and similar requirements.

## Dimensions

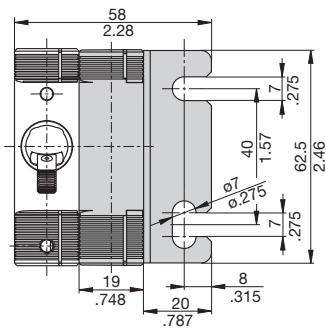
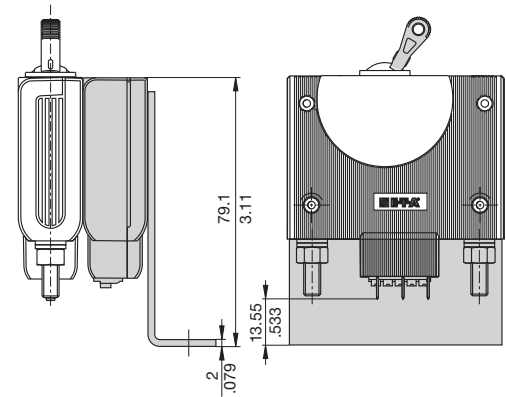
3



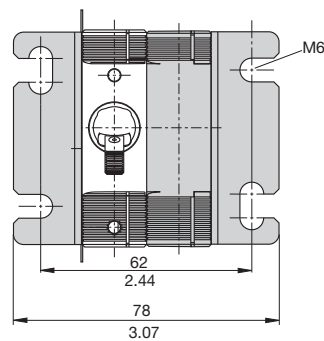
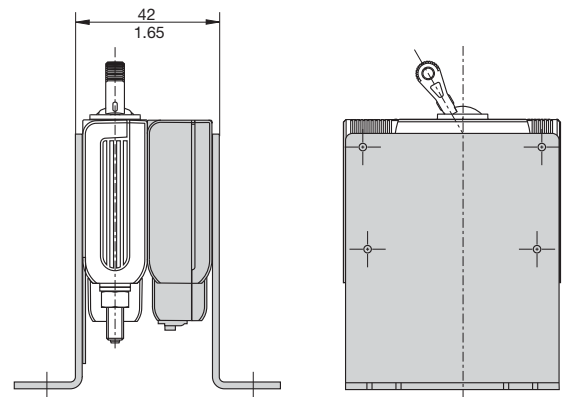
**X8345-R-24-01-00-01-M**



**X8345-R-24-01-01-01-M**



**X8345-R-24-01-02-01-M**



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

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

## Description

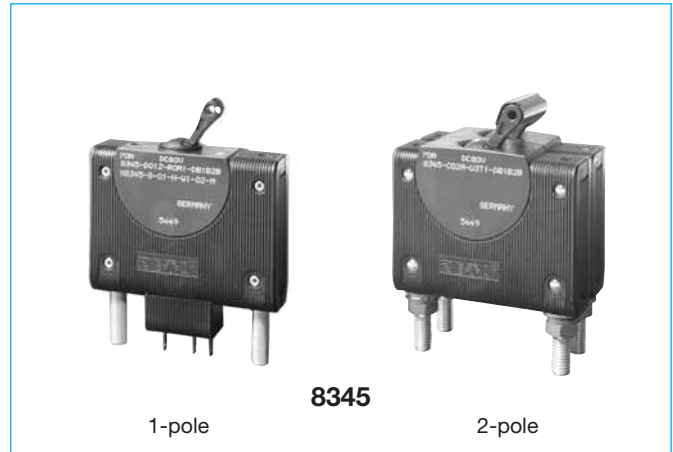
Single and double pole hydraulic-magnetic circuit breakers with trip-free-mechanism and toggle actuation. A choice of switching characteristics ensures suitability for a wide range of applications. Industry standard dimensions and panel mounting. Auxiliary contacts optional. Low temperature sensitivity at rated load. Complies with CBE standard EN 60934 (IEC 60934) S-type HM CBE.

## Typical applications

Railway vehicles.  
In the business fields Communication and Transport: power supplies, switchgear, instrumentation and process control engineering.

## Standard current ratings and typical internal resistance values

Current rating (A)	Trip curves and internal resistance (Ω) per pole	
	K1, M1, T1	F1, F7
0.05	531	275
0.1	58	5
1	1.10	0.578
2	0.295	0.144
3	0.121	0.064
5	0.044	0.025
10	< 0.02	< 0.01
15	< 0.01	< 0.01
20	< 0.01	< 0.01
25	< 0.01	< 0.01
30	< 0.01	< 0.01
40	< 0.01	< 0.01
50	< 0.01	< 0.01
60	< 0.01	-
80	< 0.01	-
100	< 0.01	-
125	< 0.01	-



## Technical data

Voltage rating	DC 110 V ± 25 %
Current rating range	0.05...125 A higher ratings upon request
Auxiliary circuit	AC 240 V 6 A DC 28 V 3 A DC 65 V 1 A DC 80 V 0.5 A
Typical life	5,000 operations at 1 x I <sub>N</sub>
Ambient temperature	-40...+85 °C (-40...+185 °F)
Insulation co-ordination (IEC 60664)	2.5 kV/2 reinforced insulation in operating area
Dielectric strength	test voltage operating area pole to pole main to auxiliary circuit switching to trip circuit
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity (I <sub>cn</sub> )	0.1...125 A: 5,000 A (resistive load) 0.1...100 A: 3,000 A (inductive load) 125 A: 2,000 A (inductive load)
Degree of protection (IEC 60529)	operating area IP40 terminal area IP00
Vibration	upside down: 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz) at 0.9 I <sub>N</sub> directions 1, 2, 3, 4, 5: 10 g at 1 x I <sub>N</sub> with curve F1: 10 g at 0.8 x I <sub>N</sub> in all planes. (57-2000 Hz) ± 0.76 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	directions 1, 2, 3, 4, 5: 100 g (11 ms) at 1 x I <sub>N</sub> , direction 6: 100 g (11 ms) at 0.8 x I <sub>N</sub> , with curve F1: 100 g (11 ms) at 0.8 x I <sub>N</sub> to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5% salt mist, to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH, to IEC 60068-2-78, test Cab
Flammability	Class I1 to NF EN ISO 4589-3 and ISO 4589-1 and -2
Smoke emission visibility	Class F0 to NF X 10-702-2 »smoke chamber«
Mass	approx. 65 g per pole depending on version

## Ordering information

Type No.	8345																											
<b>Mounting</b>	<p><b>B</b> flange mounting, with rectangular aperture with mounting nut 6-32UNC</p> <p><b>C</b> flange mounting, with rectangular aperture with mounting nut M3</p> <p><b>E</b> flange mounting, with round aperture with mounting nut 6-32UNC</p> <p><b>F</b> flange mounting, with round aperture with mounting nut M3</p> <p><b>X</b> flange mounting, with rectangular aperture, with 2 mounting brackets</p>																											
<b>Configuration</b>	<p><b>0</b> without barrier</p> <p><b>1</b> with small barrier</p> <p><b>2</b> with large barrier</p>																											
<b>Number of poles</b>	<p><b>0</b> single pole unprotected</p> <p><b>1</b> single pole protected</p> <p><b>2</b> two pole protected</p>																											
<b>Actuator configuration</b>	<p><b>A</b> all poles with standard toggle</p> <p><b>B</b> reduced number of standard toggles</p> <p><b>Z</b> without actuator</p>																											
<b>Terminal design</b>	<p><b>L</b> screw terminals <math>M5 \leq 50</math> A</p> <p><b>M</b> solder terminals <math>\leq 75</math> A</p> <p><b>P</b> blade terminals <math>\leq 35</math> A</p> <p><b>R</b> round connectors 6 mm</p> <p><b>S</b> stud terminals <math>M5 \leq 60</math> A</p> <p><b>T</b> stud terminals 10-32UNF-3A <math>\leq 60</math> A</p> <p><b>U</b> stud terminals <math>M6 \leq 125</math> A</p> <p><b>V</b> stud terminals 1/4-20UNC-3A <math>\leq 125</math> A</p> <p><b>W</b> laminated round terminals <math>\leq 125</math> A</p>																											
<b>Terminal hardware</b>	<p><b>0</b> without</p> <p><b>3</b> with washer and nut</p> <p><b>6</b> Phillips screws</p>																											
<b>Characteristic curve</b>	<p><b>F1</b> instantaneous trip <math>\leq 50</math> A (tripping current 150 %)</p> <p><b>F7</b> instantaneous trip <math>\leq 50</math> A (tripping current 125 %)</p> <p><b>K1</b> short delay</p> <p><b>M1</b> medium delay</p> <p><b>Q0</b> switch only</p> <p><b>T1</b> long delay</p>																											
<b>Version</b>	<p><b>D</b> standard</p>																											
<b>Colour configuration</b>	<p><b>B1</b> black actuator</p> <p><b>B2</b> white actuator</p> <p><b>B3</b> blue actuator</p>																											
<b>Marking</b>	<table border="1"> <thead> <tr> <th></th> <th>front plate</th> <th>actuator base</th> </tr> </thead> <tbody> <tr> <td><b>A1</b></td> <td>without</td> <td>without</td> </tr> <tr> <td><b>A2</b></td> <td><math>I_N</math></td> <td>without</td> </tr> <tr> <td><b>A3</b></td> <td><math>I_N</math>, characteristic curve</td> <td>without</td> </tr> <tr> <td><b>A4</b></td> <td><math>I_N</math>, characteristic curve, wiring diagram on side</td> <td>without</td> </tr> <tr> <td><b>B1</b></td> <td>without</td> <td>ON-OFF</td> </tr> <tr> <td><b>B2</b></td> <td><math>I_N</math></td> <td>ON-OFF</td> </tr> <tr> <td><b>B3</b></td> <td><math>I_N</math>, characteristic curve</td> <td>ON-OFF</td> </tr> <tr> <td><b>B4</b></td> <td><math>I_N</math>, characteristic curve, wiring diagram on side</td> <td>ON-OFF</td> </tr> </tbody> </table>		front plate	actuator base	<b>A1</b>	without	without	<b>A2</b>	$I_N$	without	<b>A3</b>	$I_N$ , characteristic curve	without	<b>A4</b>	$I_N$ , characteristic curve, wiring diagram on side	without	<b>B1</b>	without	ON-OFF	<b>B2</b>	$I_N$	ON-OFF	<b>B3</b>	$I_N$ , characteristic curve	ON-OFF	<b>B4</b>	$I_N$ , characteristic curve, wiring diagram on side	ON-OFF
	front plate	actuator base																										
<b>A1</b>	without	without																										
<b>A2</b>	$I_N$	without																										
<b>A3</b>	$I_N$ , characteristic curve	without																										
<b>A4</b>	$I_N$ , characteristic curve, wiring diagram on side	without																										
<b>B1</b>	without	ON-OFF																										
<b>B2</b>	$I_N$	ON-OFF																										
<b>B3</b>	$I_N$ , characteristic curve	ON-OFF																										
<b>B4</b>	$I_N$ , characteristic curve, wiring diagram on side	ON-OFF																										
<b>Rated voltage</b>	<p><b>A</b> DC 110 V</p>																											
<b>Current ratings</b>	<p>0.05...125 A</p> <p>higher current ratings upon request</p>																											
8345 - C 0 1 A - U 3 M1 - D B1 A1 A - 60 A	ordering example																											

Remote trip coil available to special order!

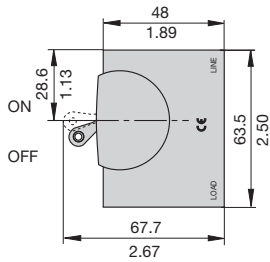
## Ordering information for auxiliary contact module

Type number	X8345
<b>Module</b>	<p><b>S</b> auxiliary contact module</p>
<b>Auxiliary contacts</b>	<p><b>01</b> in all poles</p> <p><b>02</b> in pole 1 only</p> <p><b>04</b> in pole 2 only</p>
<b>Auxiliary contact version</b>	<p><b>H</b> auxiliary contacts standard, gold-flushed</p> <p><b>K</b> auxiliary contacts, tin-plated (symmetrical terminals)</p>
<b>Auxiliary contact function</b>	<p><b>W1</b> 1 changeover</p> <p><b>W2</b> 2 changeover</p>
<b>Terminal design</b>	<p><b>02</b> microswitch with blade terminals DIN 46244-A2.8-0.5</p> <p><b>M</b> mounted to base unit</p>
X8345 - S 01 H W1 02 M	ordering example

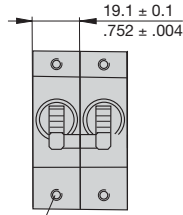
## Dimensions

### Mounting version B/C

Flange mounting rectangular aperture

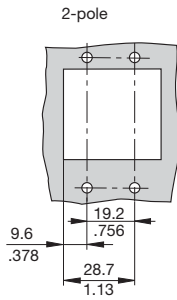
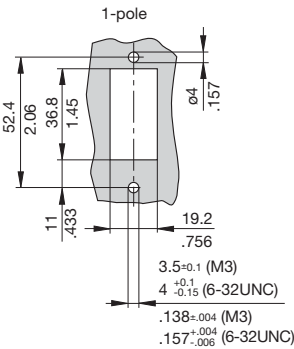


number of poles 1 to 2  
pole 1 2



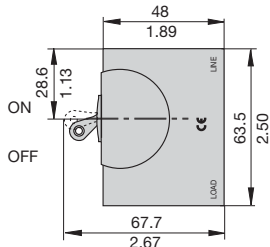
mounting thread M3 or 6-32  
all dimensions referred to the top edge  
mounting depth 4.2 mm/.165 in.  
max. insertion depth 5.5 mm  
max. tightening torque 0.33 Nm

### Cut-out dimensions:

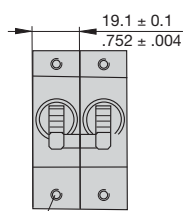


### Mounting version E/F

Flange mounting round aperture

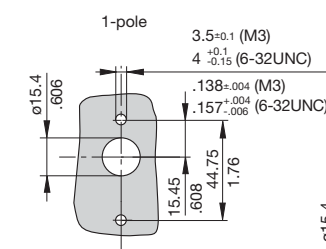


number of poles 1 to 2  
pole 1 2

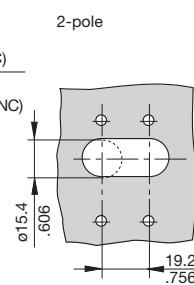


mounting thread M3 or 6-32  
all dimensions referred to the top edge  
mounting depth 4.2 mm/.165 in.  
max. insertion depth 5.5 mm  
max. tightening torque 0.33 Nm

### Cut-out dimensions:

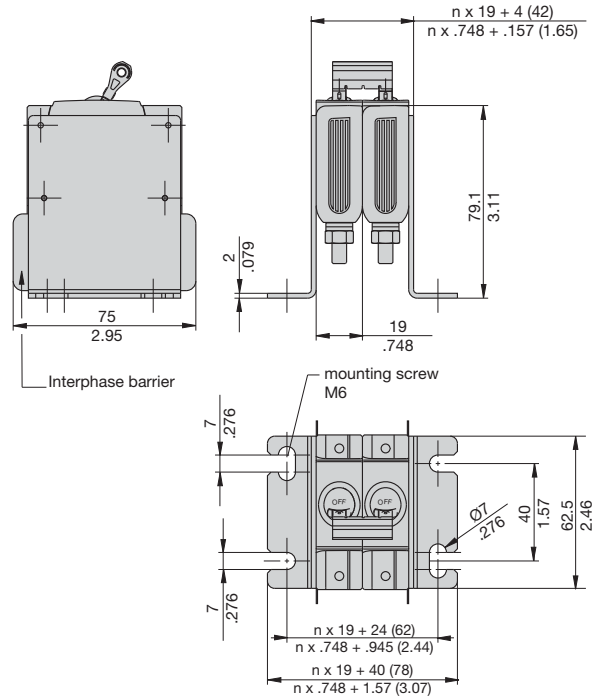


max. panel thickness: 3 mm

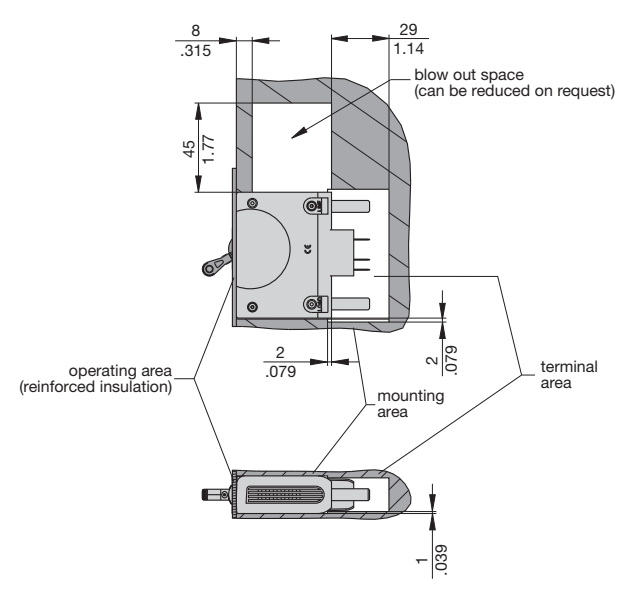


### Mounting version X

Flange mounting, with rectangular aperture, with 2 mounting brackets



## Installation drawing

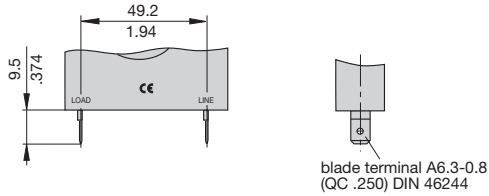


This is a metric design and millimeter dimensions take precedence (mm/inch)

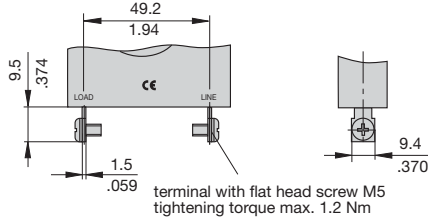


## Terminal design / Dimensions

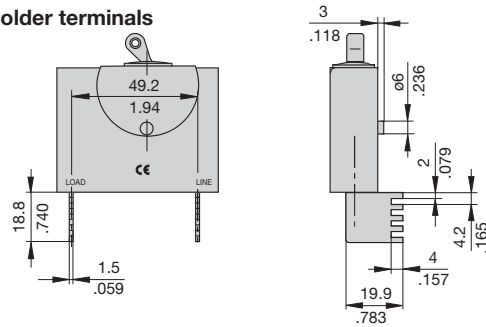
### P - with blade terminals



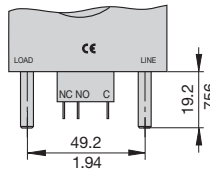
### L - with screw terminals



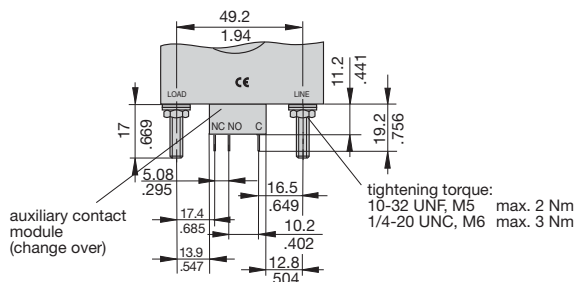
### M - with solder terminals



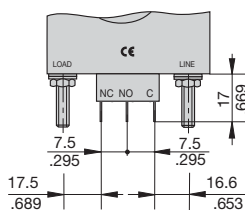
### R - round connectors D = 6 mm (dia .236) (version H) asymmetrical terminals (not for UL 489)



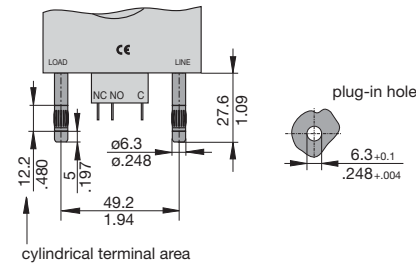
### S/U/T/V - with auxiliary contacts (version H) asymmetrical terminals (not for UL 489)



### auxiliary contacts version K symmetrical terminals

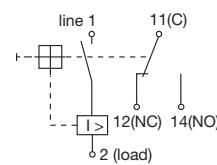


### W - laminated round terminals

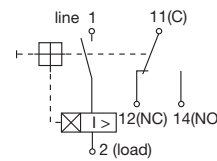


## Internal connection diagrams

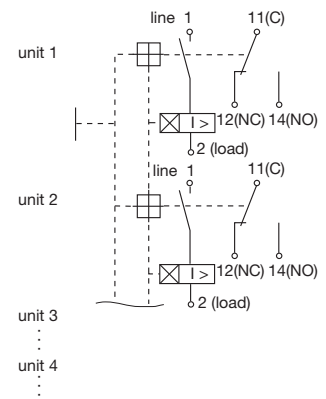
### 1-pole protected magnetically



### 1-pole protected hydraulic-magnetically



### multipole

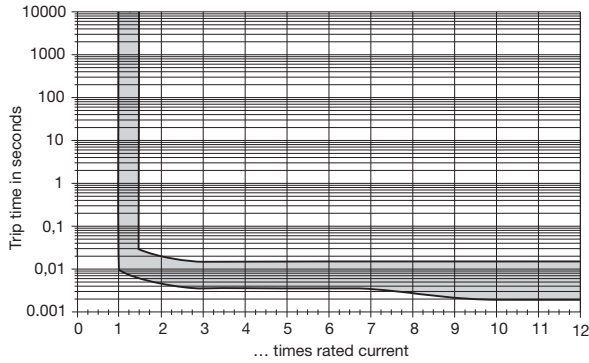


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

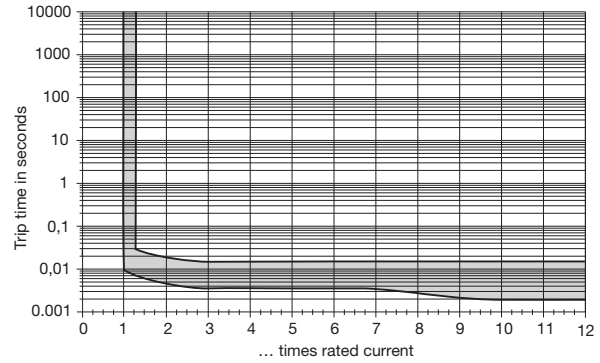
## Typical time/current characteristics at +23 °C / +73.4 °F

(trip time at rated current and all poles symmetrically loaded)

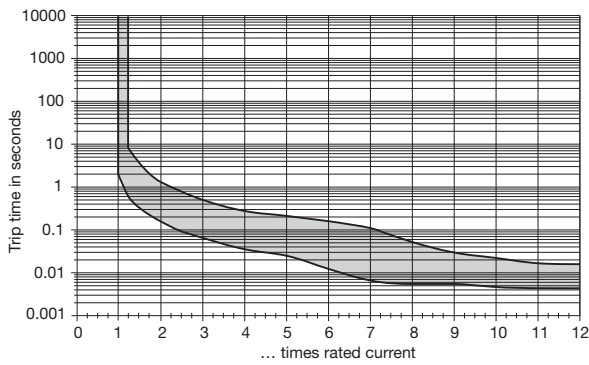
**Curve F1 (instantaneous trip)  $\leq 50$  A**



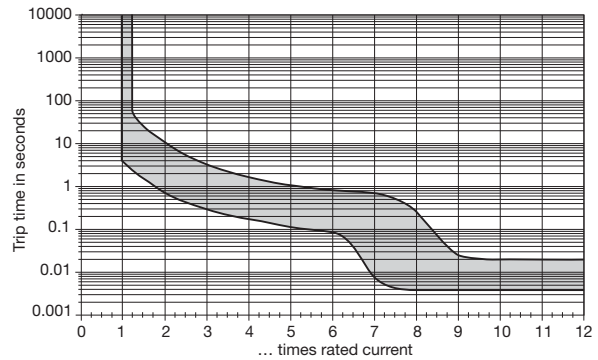
**Curve F7 (instantaneous trip)  $\leq 50$  A**



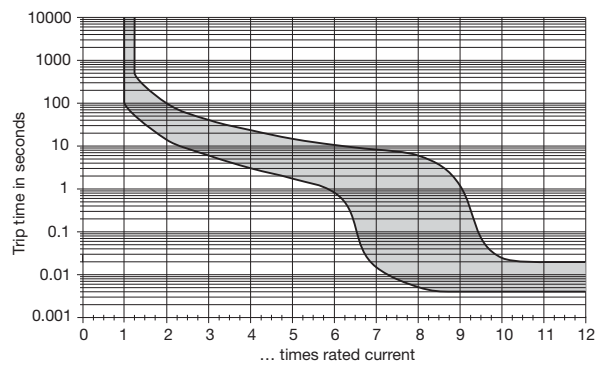
**Curve K1 (short delay)**



**Curve M1 (medium delay)**



**Curve T1 (long delay)**

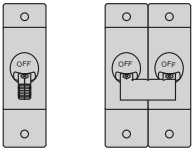


All curves will only be maintained if the escutcheon is mounted on a vertical surface.

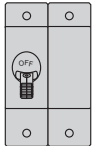
**Other characteristic curves to special order ( e. g. pulse delayed, for high inrush currents or capacitive loads).**

## Actuator configuration

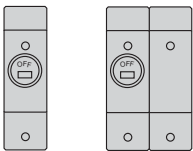
### A 1 toggle per pole, mounting version B/C



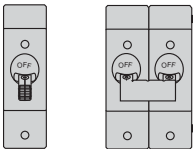
### B reduced number of toggles per unit, mounting version B/C



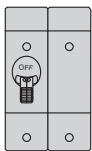
### Z without toggles



### A 1 toggle per pole, mounting version E/F

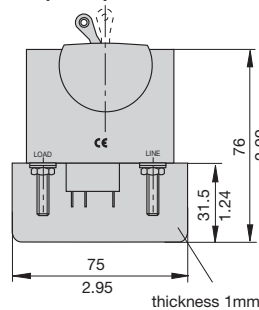


### B reduced number of toggles per unit, mounting version E/F

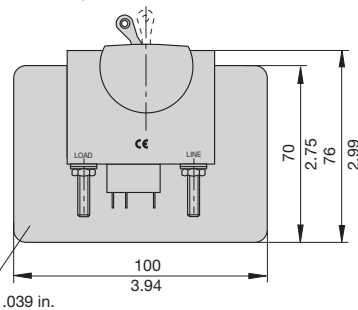


## Interphase barriers / Dimensions

### 1 - Interphase barrier (small)



### 2 - Interphase barrier (large)

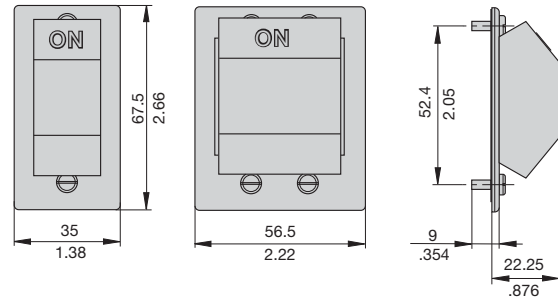


thickness 1mm / .039 in.

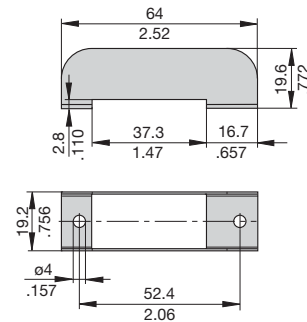
## Accessories

### Splash cover (IP65) for 1-, 2-pole (only for mounting version B/C)

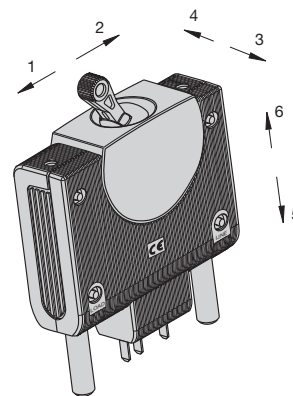
	number of poles	mounting version	actuator configuration
X 222 444 01	1-pole	B	1
X 222 444 02	1-pole	C	1
X 222 444 11	2-pole	B	2
X 222 444 12	2-pole	C	2



### Toggle guard (only for mounting version B/C) Y 307 381 01



## Shock directions



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, 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 <sub>N</sub> 12...125A	Power factor	Interrupting capacity I <sub>N</sub> 7 + 10 A	Power factor
1	AC 240 V	5,000 A	cosφ = 0.7	3,500 A	cosφ = 0.8
2	AC 240 V	8,000 A	cosφ = 0.7	6,000 A	cosφ = 0.7
3	3 AC 415 V	5,000 A	cosφ = 0.7	3,000 A	cosφ = 0.85

### DC voltage

Number of poles	Voltage rating	Interrupting capacity I <sub>N</sub> = 12...125 A	Time constant	Interrupting capacity I <sub>N</sub> = 7 + 10 A	Time constant
1	DC 110 V	3,000 A	13 ms	3,000 A	L/R = 5 ms
1	DC 110 V	5,000 A	5 ms		
2	DC 110 V	5,000 A	13 ms	3,000 A	L/R = 5 ms
2	DC 110 V	10,000 A	≈ 0 ms		

## Standard current ratings and typical internal resistance values

### Curves 01, 02, 04, 05:

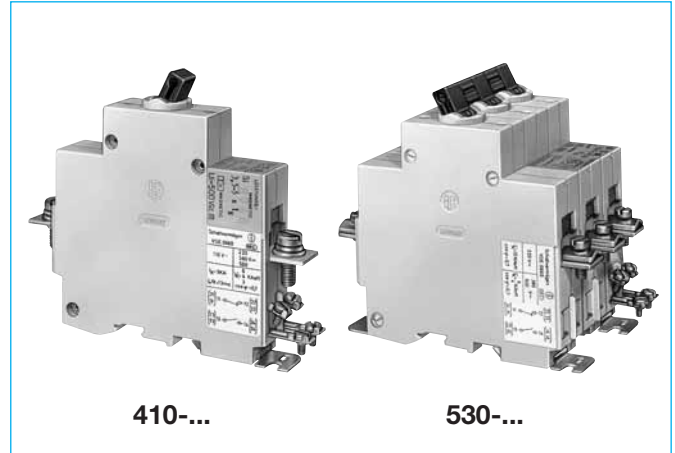
Current rating (A)	Internal resistance (Ω) per pole
10	0.033
16	0.015
20	0.010
25	0.0062
32	0.0039
40	0.0031
50	0.0022
63	≤ 0.002
80	≤ 0.002
90	≤ 0.002
100	≤ 0.002
125	≤ 0.002

### Curves B3, C3:

Current rating (A)	Internal resistance (Ω) per pole
7	0.033
10	0.015
12	0.010
16	0.010
20	0.0062
25	0.0039
32	0.0031
40	0.0022
50	≤ 0.002
63	≤ 0.002
80	≤ 0.002
100	≤ 0.002

## Approvals

Authority	Voltage ratings	Current ratings
UL	AC 277 V	7...125 A (type 520)
UL Canada	AC 277 V	7...125 A (type 520)



## Technical data

Voltage rating	AC 240 V; 3 AC 415 V; DC 110 V	
Current rating range	10...125 A (EN 60947), curves 01/02/04/05 7...100 A (EN 60898), curves B3/C3/01	
Auxiliary circuit	6 A, AC 240 V or DC 28 V 1 A, DC 110 V	
Typical life	10,000 operations at 1 x I <sub>N</sub> 20,000 operations mechanical	
Ambient temperature	-20...+60 °C (-4...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 6 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,300 V pole/pole AC 3,300 V main circuit/aux.circuit AC 2,200 V aux. circuit 11-12/13-14 AC 1,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	curves 02/04/05/B3/C3: 4 g (60-500 Hz), ± 0.30 mm (10-60 Hz) curve 01: 3 g (60-500 Hz), ± 0.23 mm (10-60 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	curves 02, 04, 05, B3, C3: 50 g (11 ms) directions 1, 2, 3, 4, 5 30 g in direction 6 curve 01: 30 g (11 ms) in directions 1, 2, 3, 4, 5 20 g in direction 6 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 520 (2-pole): approx. 580 g 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

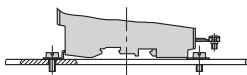
7...125 A

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

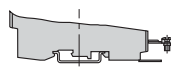
The exact number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

## Mounting methods

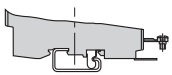
### Surface mounting -1



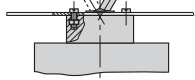
### rail mounting (DIN EN 50 022-35x7,5) -2



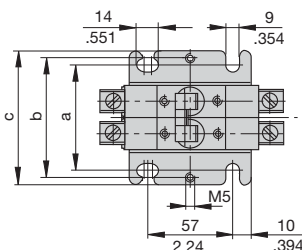
### rail mounting on G profile (DIN EN 50 035-G32) -3



### panel mounting -4

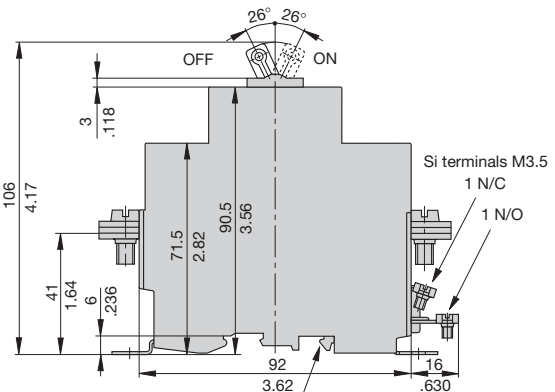


### surface mounting with mounting brackets -5



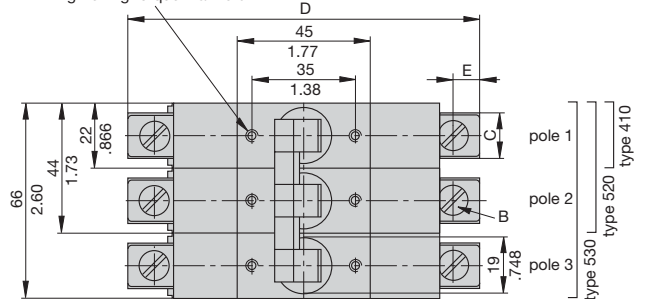
	a		b		c	
	mm	in.	mm	in.	mm	in.
type 410	50	1.97	61.5	2.42	70	2.76
type 520	72	2.84	83.5	3.29	92	3.62
type 530	94	3.70	105.5	4.15	114	4.49

## Dimensions

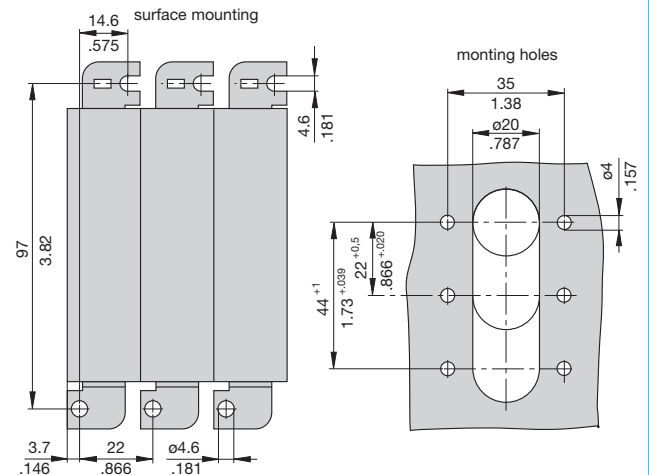


symmetrical rail DIN EN 50022-35x7.5  
G profile rail DIN EN 50035-G32 (not shown)

M3.5 - thread max. 9 mm (.354 in.) deep  
tightening torque max. 0.8 Nm



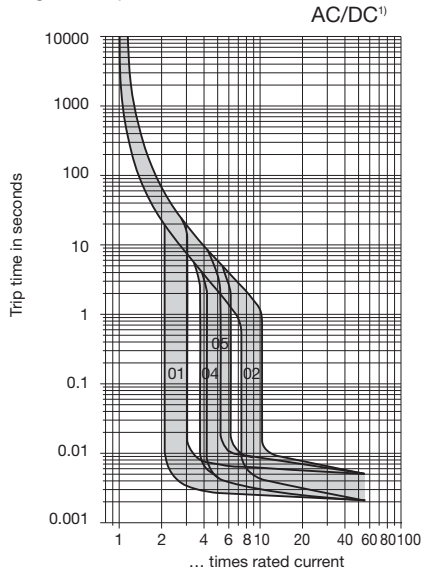
Current rating	Dimensions mm/in.				Terminal	Cross section (see DIN 46288)		Max. tightening torque
	B	C	D	E		with 1 or 2 equal conductors	with 2 different conductors	
≤ 32 A	M5	13 .512	114 4.49	7 .276	pressure plate B5 DIN 46288	2.5 mm <sup>2</sup> to 10 mm <sup>2</sup>	2.5 mm <sup>2</sup> to 10 mm 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



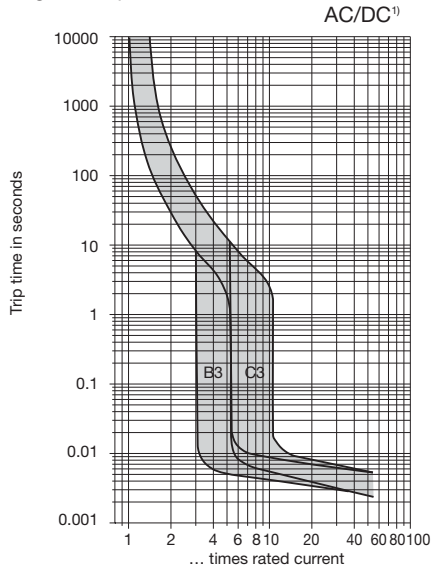
This is a metric design and millimeter dimensions take precedence (mm/inch)

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

Magnetic trip curves 01,02,04,05



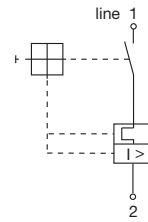
Magnetic trip curves B3,C3



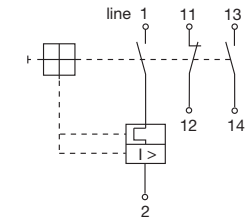
<sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.

## Internal connection diagrams

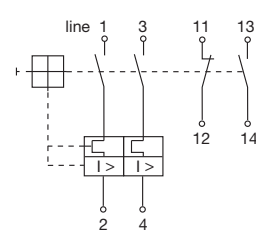
Type 410-K



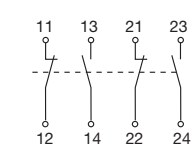
Type 410-K-Si



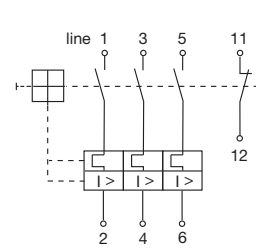
Type 520-K-Si



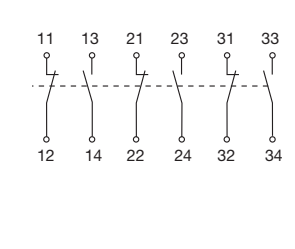
Type 520-K-2Si



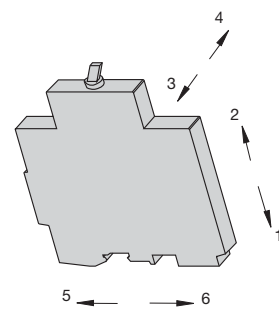
Type 530-K-Si



Type 530-K-3Si

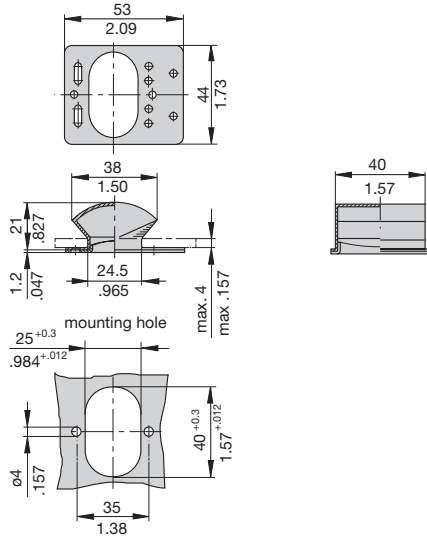


## Shock directions

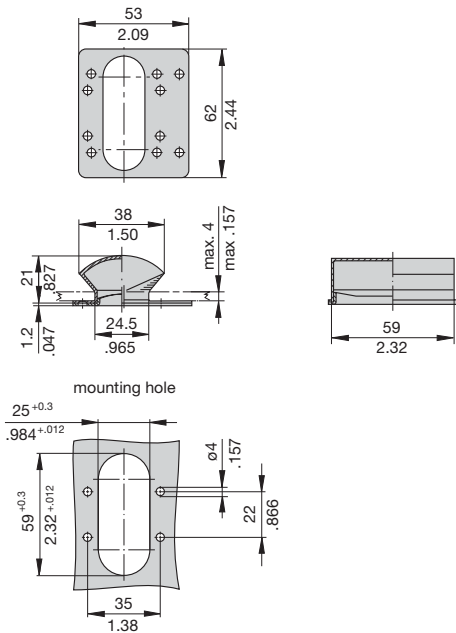


## Accessories

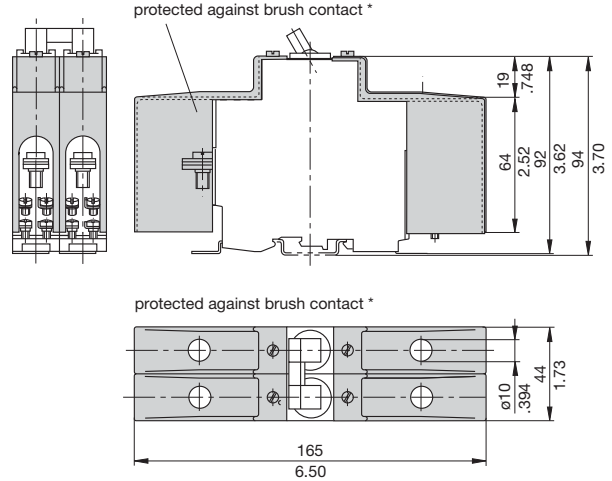
**Splash cover (transparent),  
with fixing plate and screws (IP54)  
for type 410  
X 211 118 01**



**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-...

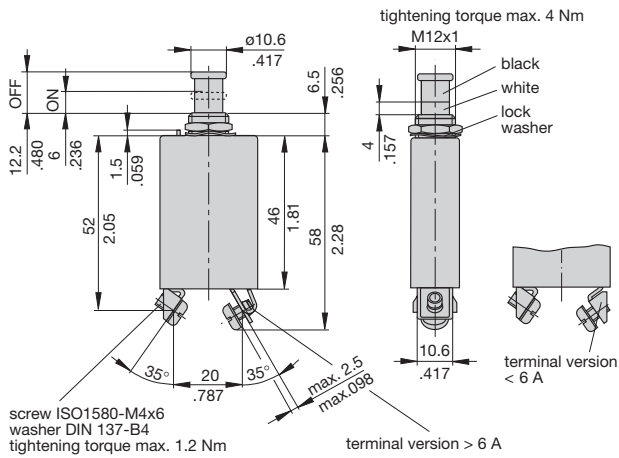
## Technical data

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

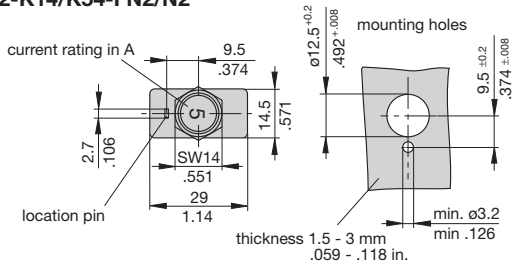


## Dimensions

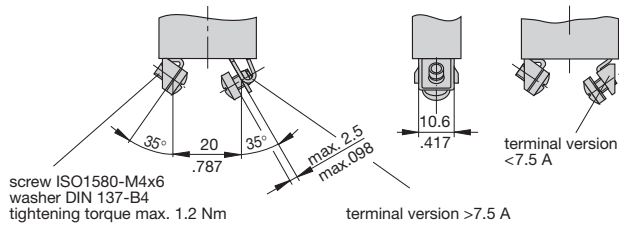
### 412-K54-FN2/N2



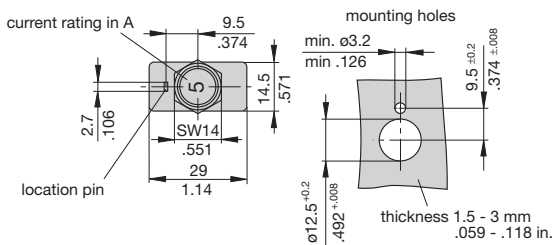
### 412-K14/K54-FN2/N2



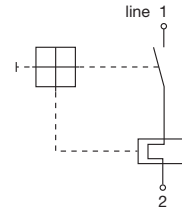
### 412-K14-LN2



### 412-K14/K54-LN2

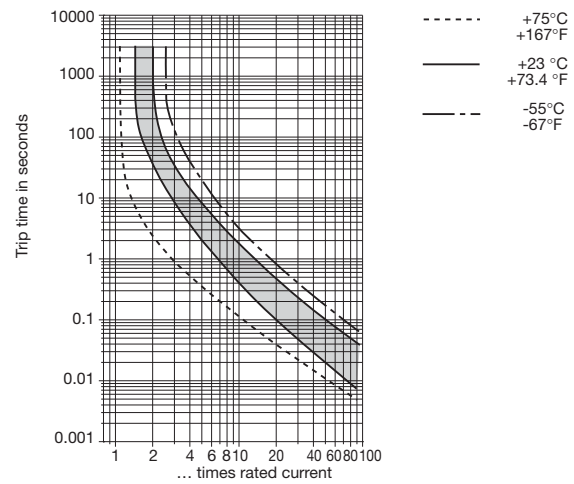


## Internal connection diagram

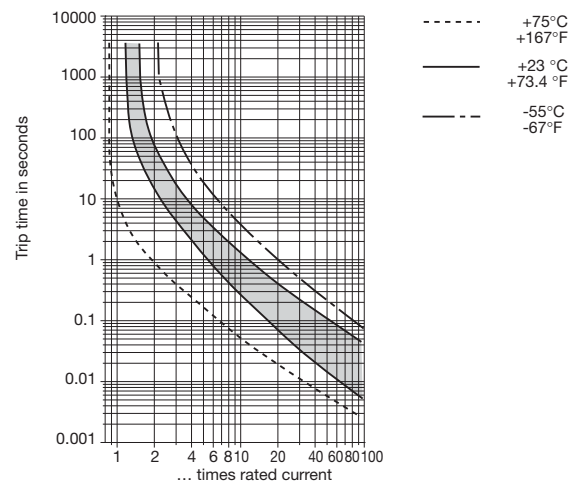


## Typical time/current characteristics

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



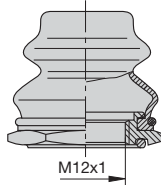
### 412-..LN2/-N2 7.5...35 A



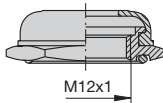
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

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

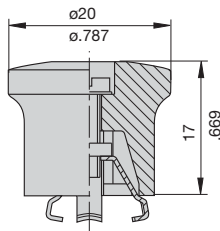
**Splash cover /hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**Splash cover black /hex nut assembly with O ring (IP54)**  
**X 200 802 01** - nickel plated nut M12x1  
**X 200 802 02** - matt black finish nut M12x1



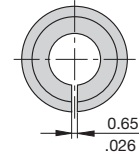
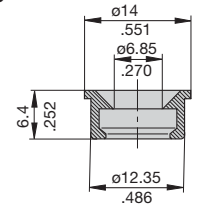
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

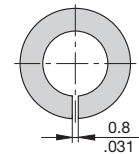
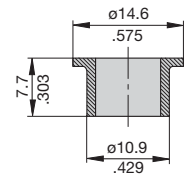
**Identification collar** to be snapped on the push button

**Y 307 004 01** black  
**Y 307 004 02** white  
**Y 307 004 03** red  
**Y 307 004 04** green  
**Y 307 004 05** blue



**Lock out ring** to block the push button in OFF position

**Y 307 005 01** red  
**Y 307 005 02** black



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

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>	
413	threadneck panel mounting
<b>Terminal design</b>	
K14	screw terminals M6 (to aircraft specs.)
K34	reinforced screw terminals M6 (to vehicle specs.)
K54	as K34, but housing sealed
<b>Version</b>	
FN2	vehicle application, nickel-plated
LN2	aircraft application, black finish
N2	general application, nickel-plated
<b>Current ratings</b>	
30...55 A (-FN2)	
30...90 A (-LN2/N2)	
413 - K14 - LN2 - 40 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
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...90 A
QPL Sweden	DC 28 V	30...50 A



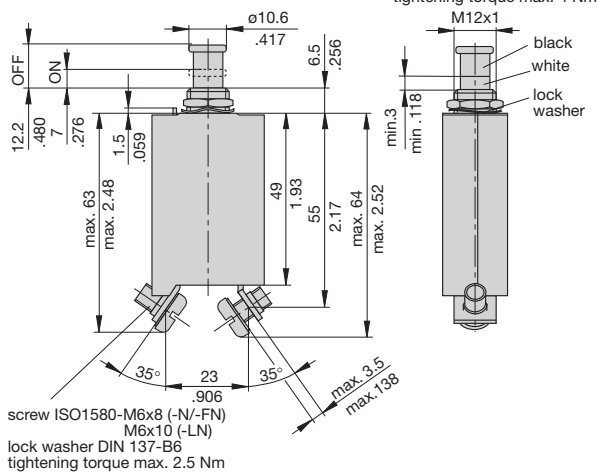
413-...

## Technical data

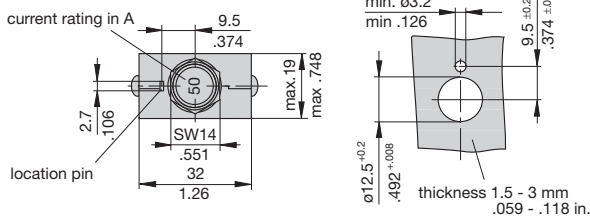
Voltage rating	DC 28 V AC 115 V (400 Hz) upon request	
Current rating range	30...55 A (-FN2) 30...90 A (-LN2/-N2),	
Typical life	2,000 operations at 1 x I <sub>N</sub>	
Ambient temperature	-55...+75 °C (-67...+167 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 1.5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

## Dimensions

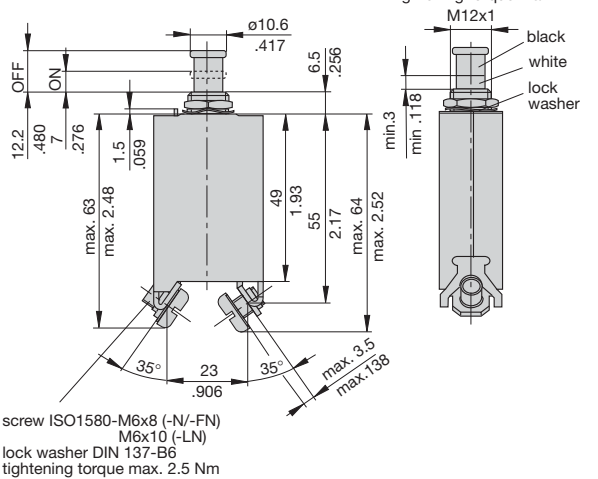
### 413-K14-...



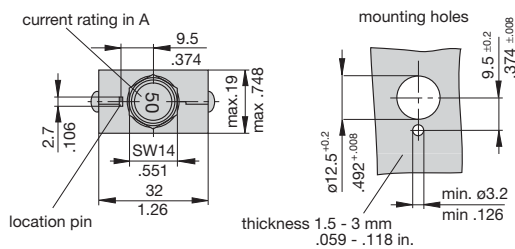
### 413-K14-LN2



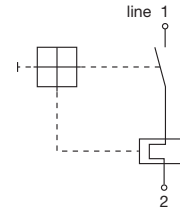
### 413-K34/K54-...



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

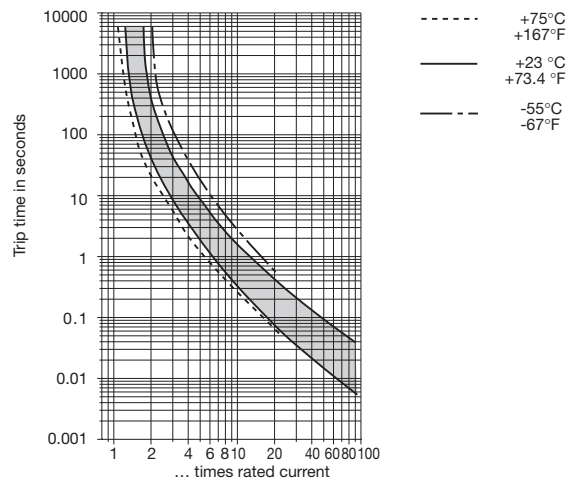


## Internal connection diagram

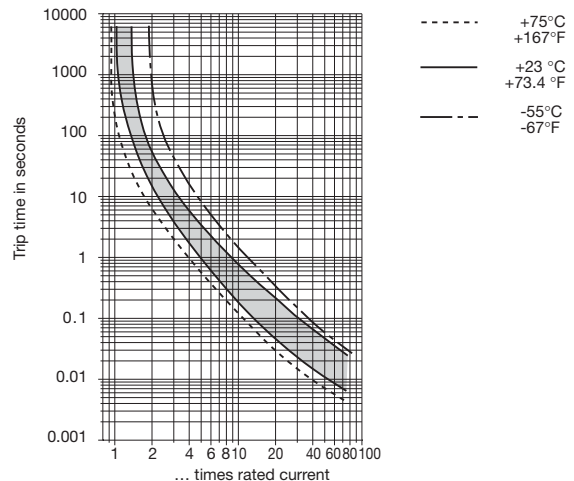


## Typical time/current characteristics

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



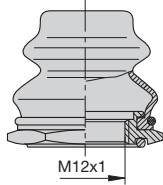
### 413-...-LN2/-N2 30...90 A



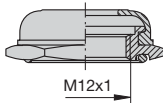
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

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

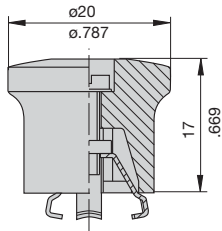
**Splash cover /hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**Splash cover black /hex nut assembly with O ring (IP54)**  
**X 200 802 01** - nickel plated nut M12x1  
**X 200 802 02** - matt black finish nut M12x1



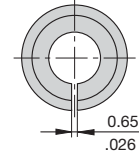
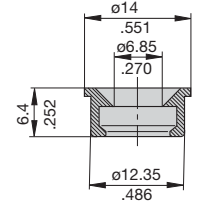
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

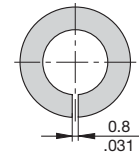
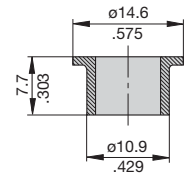
**Identification collar** to be snapped on the push button

**Y 307 004 01** black  
**Y 307 004 02** white  
**Y 307 004 03** red  
**Y 307 004 04** green  
**Y 307 004 05** blue



**Lock out ring** to block the push button in OFF position

**Y 307 005 01** red  
**Y 307 005 02** black



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

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



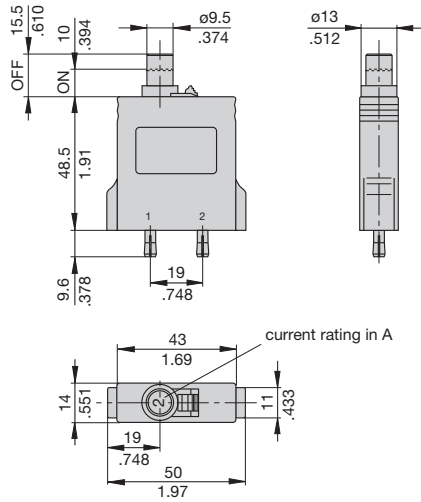
428-...

## Technical data

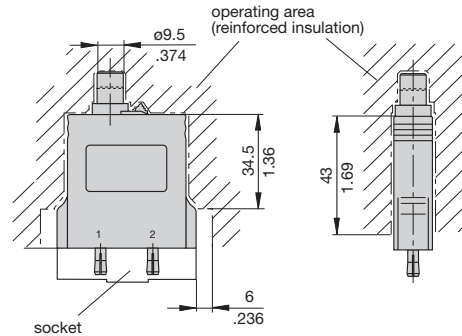
For further details please see chapter: **Technical Information**

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 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 2.5 kV	pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage AC 3,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	0.05...5 A    400 A 5.5...7.5 A    750 A 8...25 A    1,500 A (with back-up fuse NH 40 A to IEC 60269/VDE 0636)	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 60068-2-3, test Ca	
Mass	approx. 50 g	

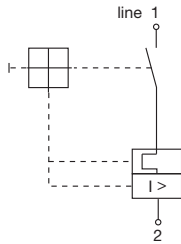
## Dimensions



## Installation drawing



## Internal connection diagram

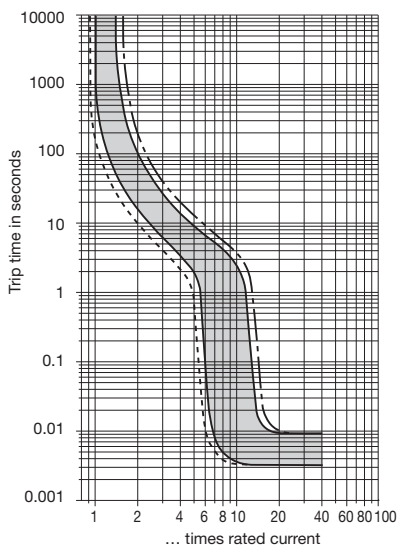


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics

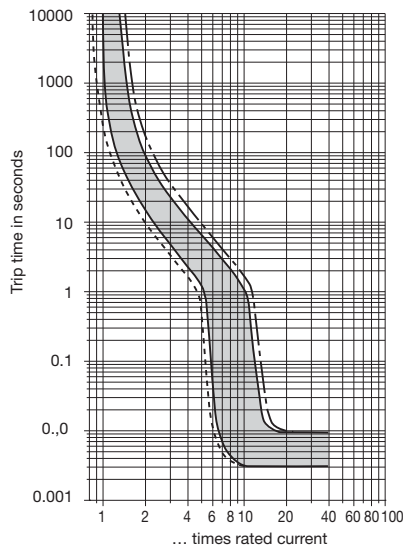
0.05 ... 7 A

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



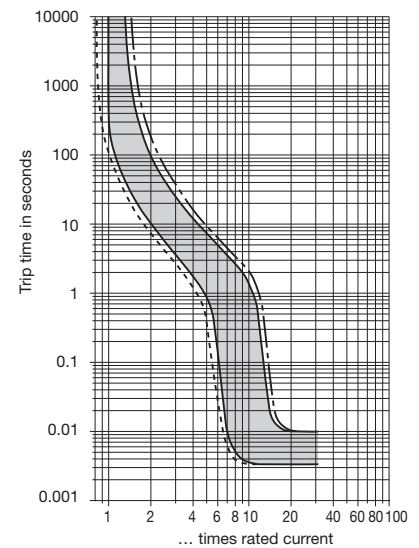
8 ... 16 A

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



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

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

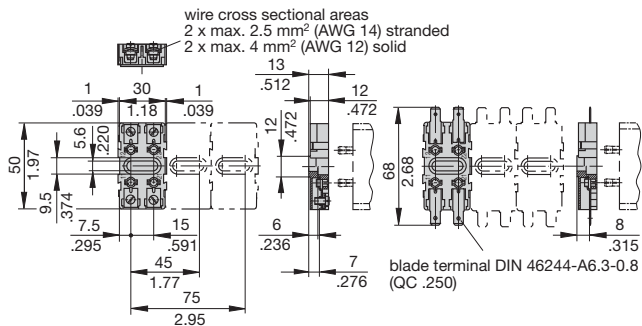


--- +60 °C --- +23 °C --- -30 °C  
 --- +140 °F --- +73.4 °F --- -22 °F

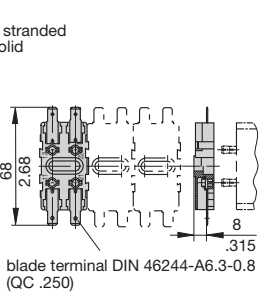
<sup>1)</sup> Magnetic tripping currents are increased by 20% on DC supplies.

## Accessories

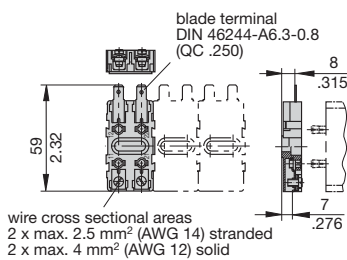
### Sockets 10R-K10 (continuous load up to 20 A)



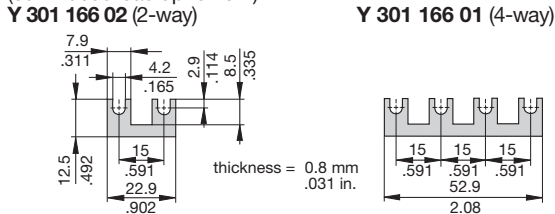
### 10R-P10 (continuous load up to 16 A)



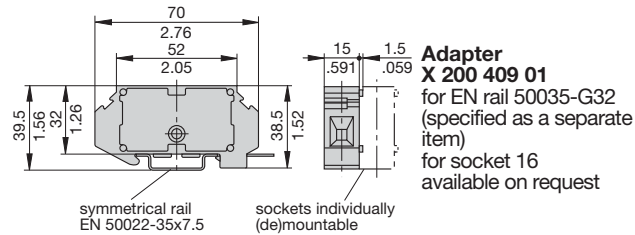
### 10R-A10 (continuous load up to 16 A)



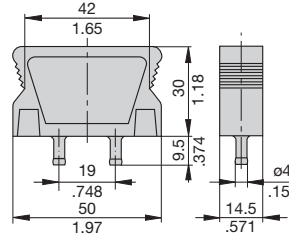
### Bus bars for sockets 10-....: (continuous load up to 20 A)



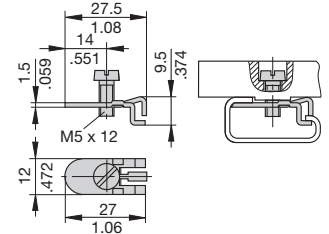
### Socket 16 (continuous load up to 16 A)



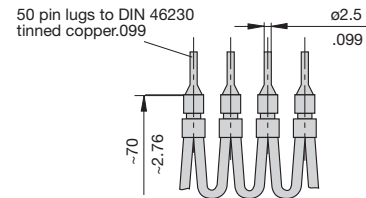
### Blanking plug Y 301 477 01 for sockets 10R-P10/K10/A10



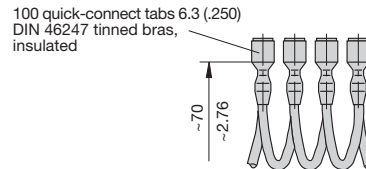
### Terminal for mounting rack X 200 800 01 for socket 10R, 10F on EN rail 50 035-G32



### 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>		
<b>B3</b>	moulded, high environmental protection degree, without operating knob	
<b>B31</b>	moulded, high environmental protection degree, with operating knob	
<b>B35</b>	as B31, but for remote disconnection and re-connection facility	
<b>C3</b>	housing without operating knob, single pole, IP65	
<b>Terminal design</b>		
<b>K12</b>	flat screw terminals M10, for enclosure B3, B31 or B35	
<b>K60</b>	flat screw terminals DIN 46206, sheet 2, form 1, thread M10	
<b>K71</b>	compulsory and only for C3 housing	
<b>Mounting</b>		
<b>1</b>	lugs	
<b>2</b>	compulsory and only for C3 housing	
<b>5</b>	brackets	
<b>Characteristic curve</b>		
<b>06</b>	fast trip	
<b>07</b>	delayed trip	
<b>Auxiliary contacts (blade terminals 6.3x08)</b>		
<b>Si</b>	one each N/O and N/C	
<b>Si01</b>	one N/C (11/12), two N/O (13/14 + 23/24)	
<b>Si2</b>	one N/O (13/14)	
<b>2Si2</b>	two N/O	
<b>Remote trip (optional)</b>		
<b>FA</b>	electrical remote disconnection	
<b>FC</b>	electrical remote disconnection (FA) and re-connection (FE)	
<b>BC-FA</b>	electrical remote disconnection (FA) and manual/remote re-connection not for enclosure B and C	
<b>Coil voltage</b>		
<b>12</b>	DC 12 V	
<b>24</b>	DC 24 V	
	(higher voltage ratings upon request)	
<b>Current ratings</b>		
	40...240 A	
<b>Voltage ratings</b>		
<b>(blank)</b>	≤ DC 110 V	
<b>B</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		



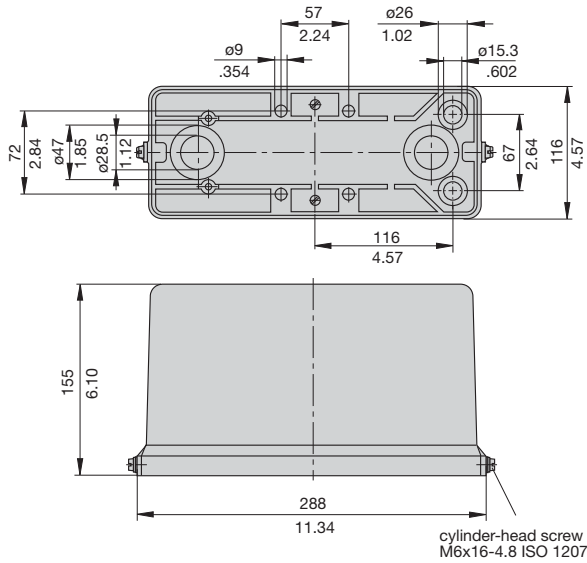
437-...

## Technical data

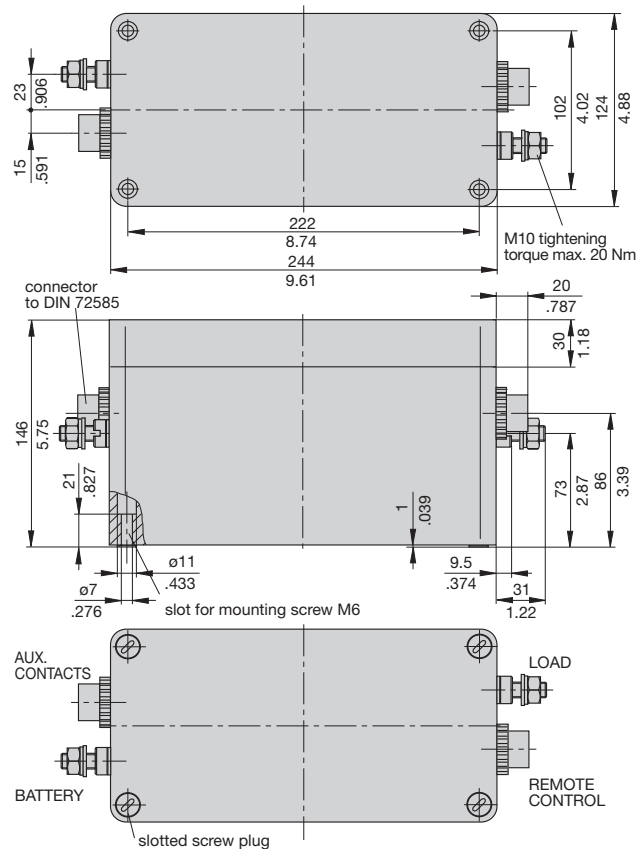
Voltage rating	DC 144 V (higher voltage ratings upon request)	
Current rating range	40...240 A (higher current ratings upon request)	
Auxiliary contact rating	6 A max. at DC 28 V 0.2 A at DC 180 V	
Electrical remote disconnection (-FA)	operating voltage DC 12 V or DC 24 V operating current approx. 18 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	
Electrical remote re-connection (-FC)	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 10,000 operations at 240 A, DC 28 V 20,000 operations mechanical	
Ambient temperature	-40...+60 °C (-40...+140 °F)	
Insulation co-ordination (IEC 60664 and 60664 A)	rated impulse withstand voltage 6 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664 A)	test voltage operating area 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 10,000 A at DC 28 V; L/R = 0 ms 7,500 A at DC 28 V; L/R = 13 ms	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40, terminal area IP00 with enclosure B IP54 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)	to IEC 60068-2-6, test Fc, 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, to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH, to IEC 60068-2-3, test Ca	
Mass	approx. 900 g base unit + approx. 400 g remote disconnection + approx. 100 g remote re-connection + approx. 750 g B housing + approx. 1,000 g C housing	

## Dimensions

### Moulded enclosure IP54 -B3

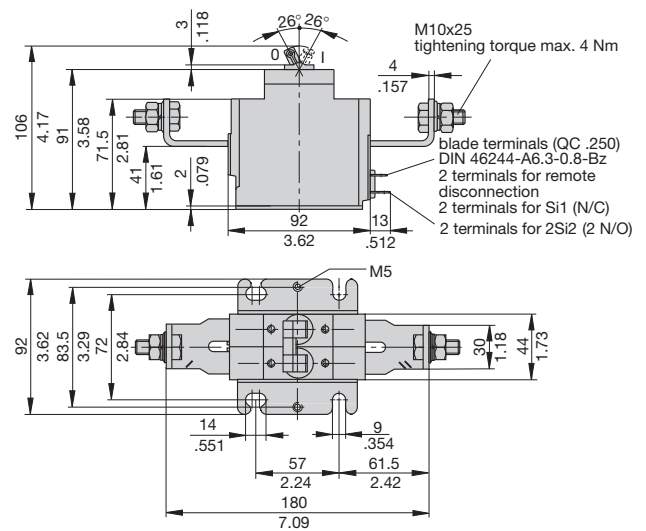


### Moulded enclosure IP65 -C3

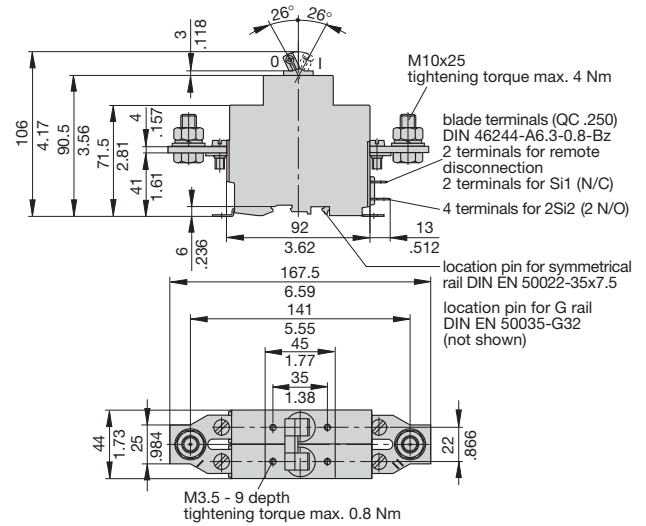


## Dimensions

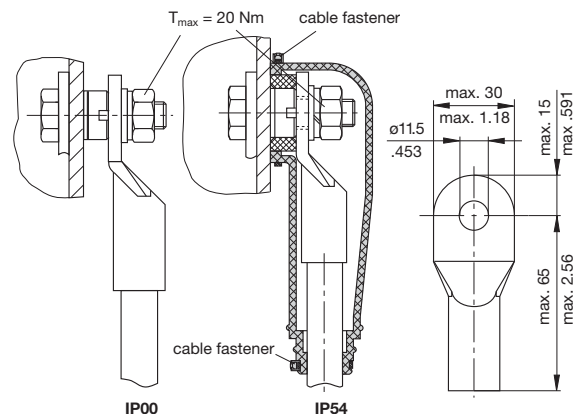
### 437-K12-5-Si-...-FA



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



## Terminals with housing C3

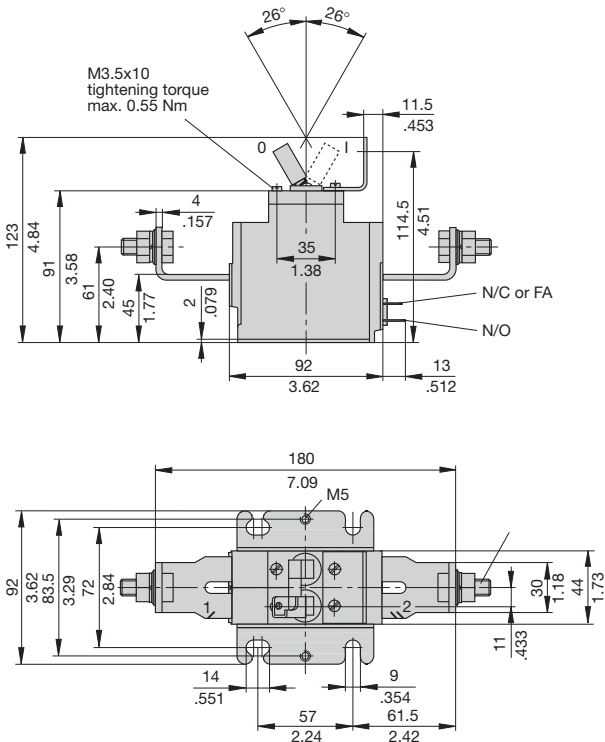


Rubber caps and cable fasteners are supplied with the product.

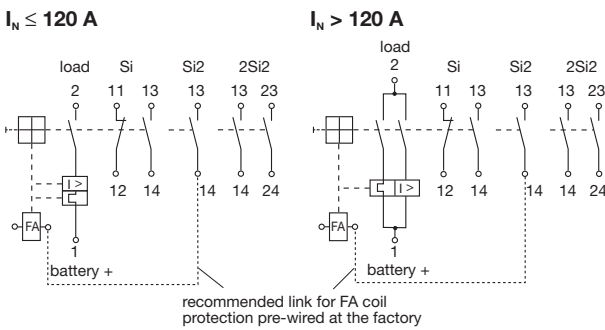
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Dimensions

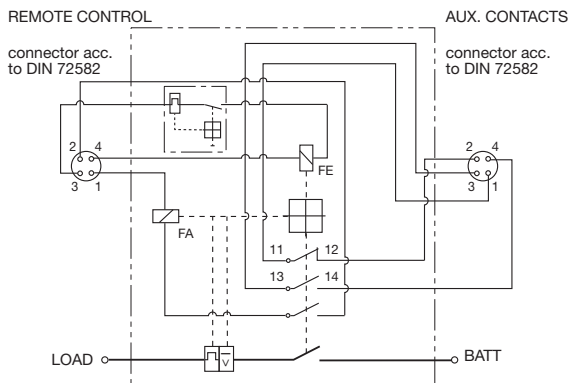
437-K12-...-BC-FA..



## Internal connection diagram



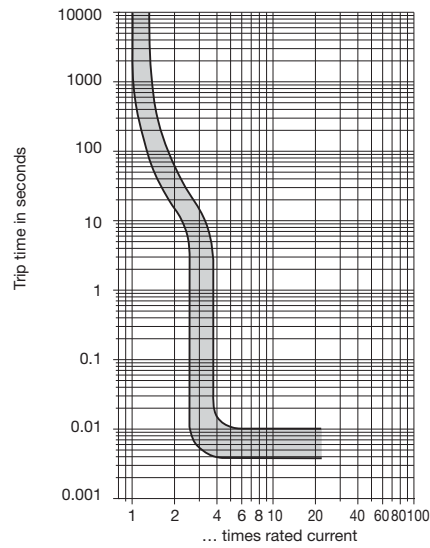
for housing C3



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

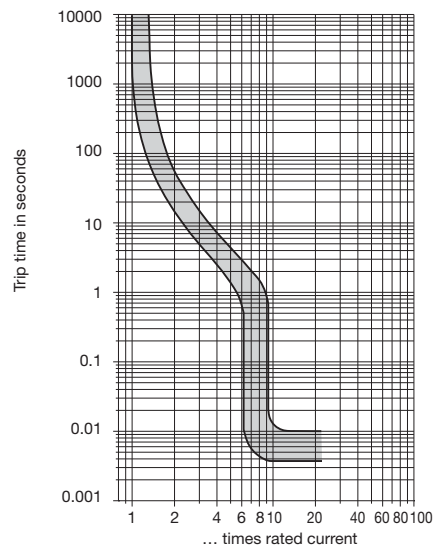
Curve 06 (fast trip)

DC



Curve 07 (delayed trip)

DC



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

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

## Description

Single pole 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.

- 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

### Terminal design, mounting

- K** screw terminals M12, insertion nuts M8
- S** screw terminals M12, insertion nuts 5/16-18

### Manual release

- H** standard

### Version

- N** general application (type 446 only)
- FN** general application (types 447 and 449 only)

### Auxiliary contacts (optional)

- Si** 2 electrically separate auxiliary contacts with screw terminals M3.5 and blade terminals DIN 46244-C-MS-S

### Remote trip (optional for types 447 and 449)

- FA12** DC 12 V coil voltage
- FA24** DC 24 V coil voltage

### Current ratings

- 30...400 A** type 446
- 100...400 A** type 447
- 125...500 A** type 449

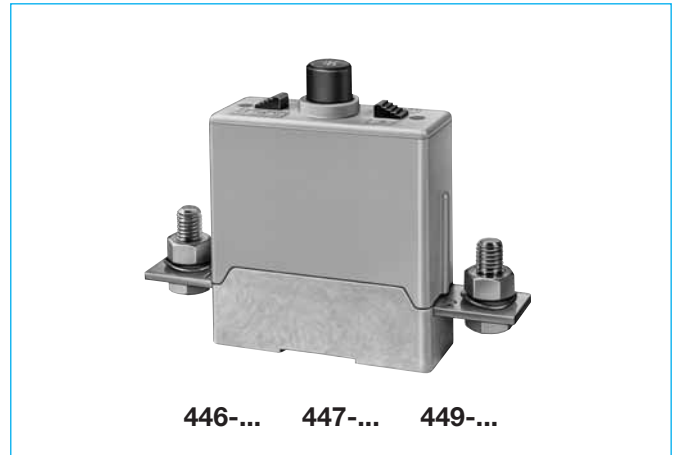
**447 - K - H - FN - ... - ... - 400 A** ordering example

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

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



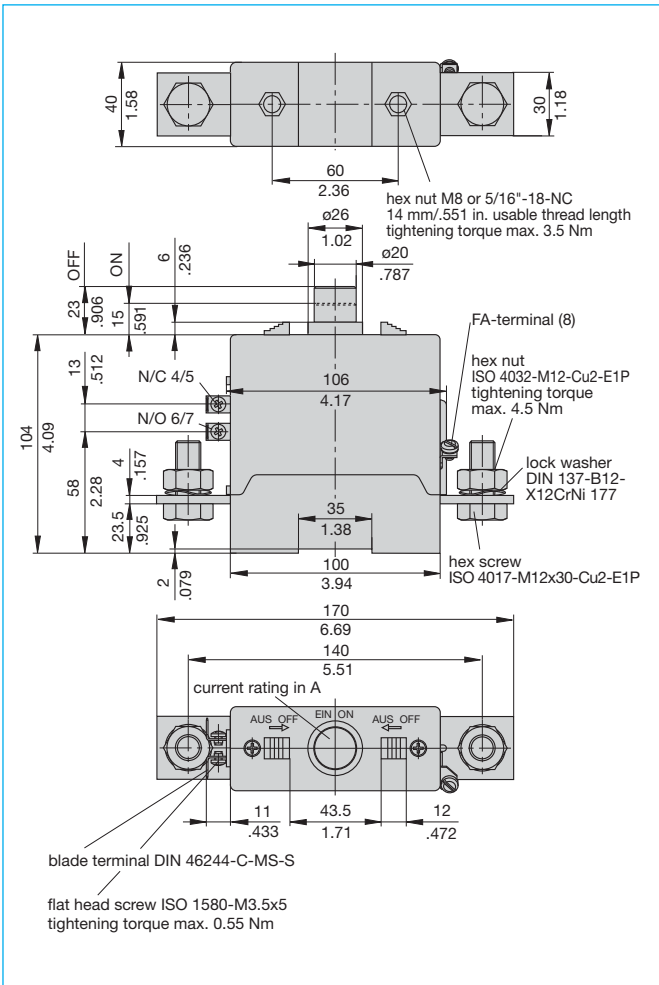
## Technical data

Voltage rating	DC 28 V	
Current rating range	type 446: 30...400 A type 447: 100...400 A type 449: 125...500 A	
Auxiliary circuit	10 A	
Electrical remote disconnection (-FA)	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	
Typical life	1,000 operations at I <sub>N</sub> 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	pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 1,500 V main circuit to auxiliary contacts AC 1,500 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 terminal area IP00	
Vibration	to VG 95210, sheet 19, IEC 60068-2-6, test Fc: without aux. contacts: 10 g (56-500 Hz), ± 0.76 mm (10-55 Hz) with auxiliary contacts: 4 g (56-500 Hz), ± 0.30 mm (10-56 Hz)	
Shock	to VG 95210, sheet 28, IEC 60068-2-27, test Ea: without aux. contacts: 50 g (11 ms) with auxiliary contacts: 20 g (11 ms)	
Corrosion	96 hours at 5 % salt mist to VG 95210, sheet 2, IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7, IEC 60068-2-3, test C	
Mass	approx. 850 g	

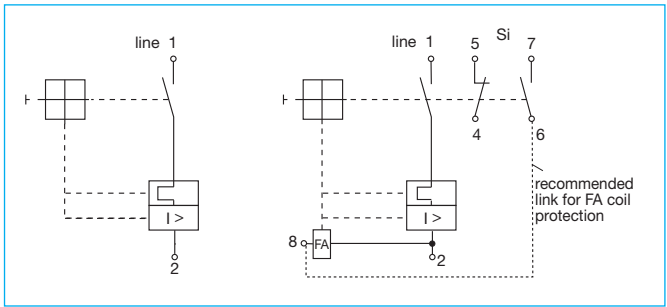
## Approvals

Authority	Voltage ratings	Current ratings
<b>Type 446:</b> UL	DC 28 V	30...400 A
<b>Type 447:</b> UL	DC 28 V	100...400 A
	QPL Sweden	DC 28 V
<b>Type 449:</b> UL	DC 28 V	125...350 A
	VG 95345, part 15	DC 28 V

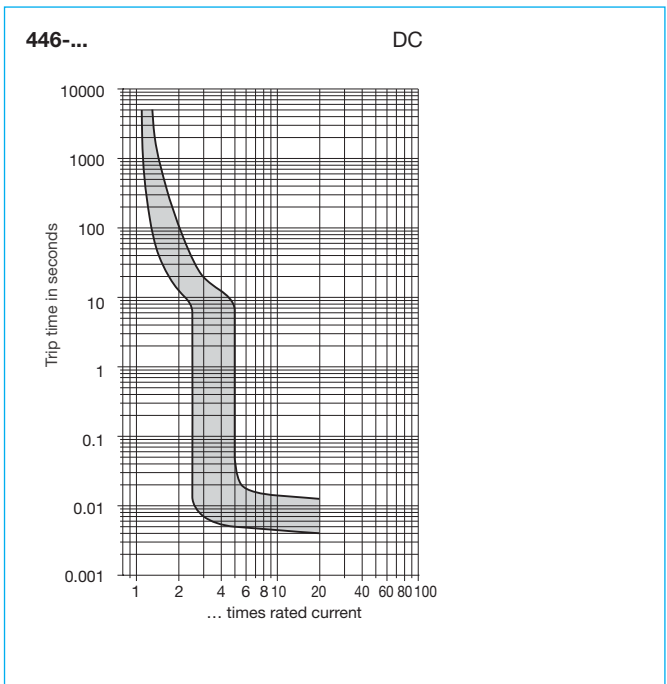
## Dimensions



## Internal connection diagrams



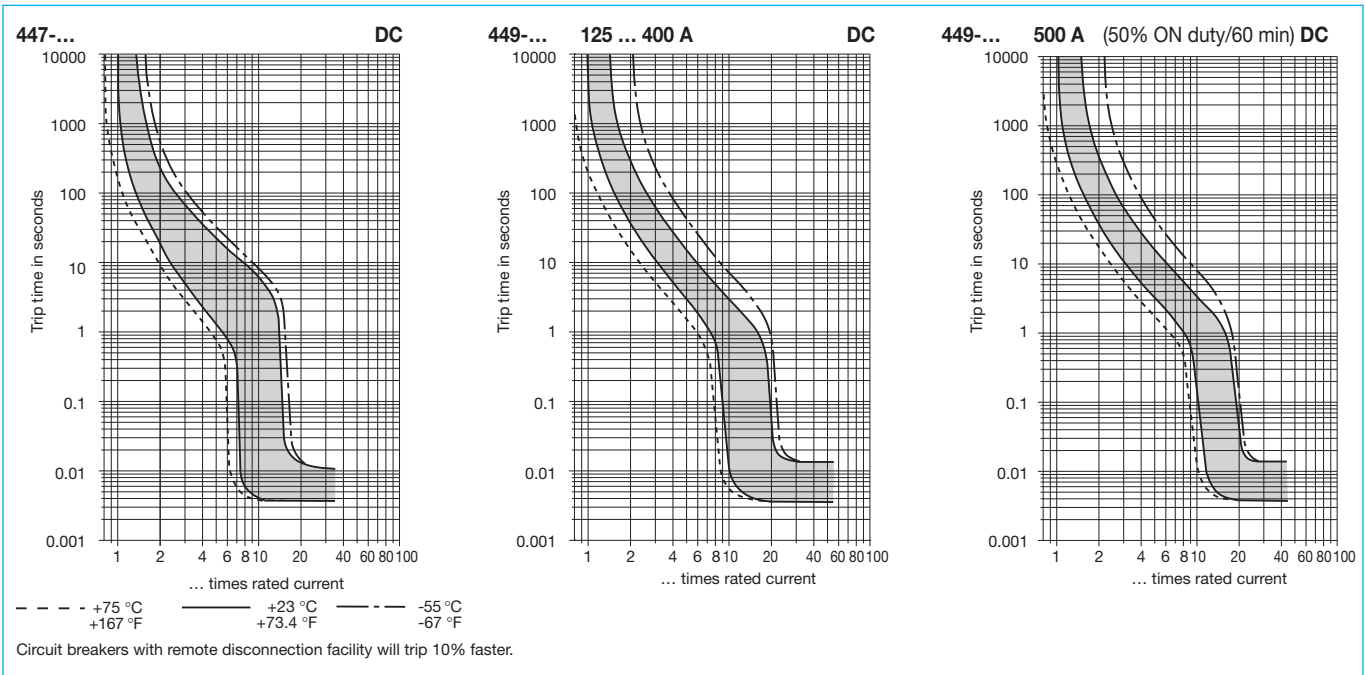
## Typical time/current characteristics at +23 °C/+73.4 °F



4

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

## 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 (connector EN 3155-016M2018 (NC) as S1, but with polarized auxiliary contact (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	90	80	92
60	85	90	100
70	85	100	100
75	90		

## 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)
UL	DC 28 V; DC 72 V	50...125 A

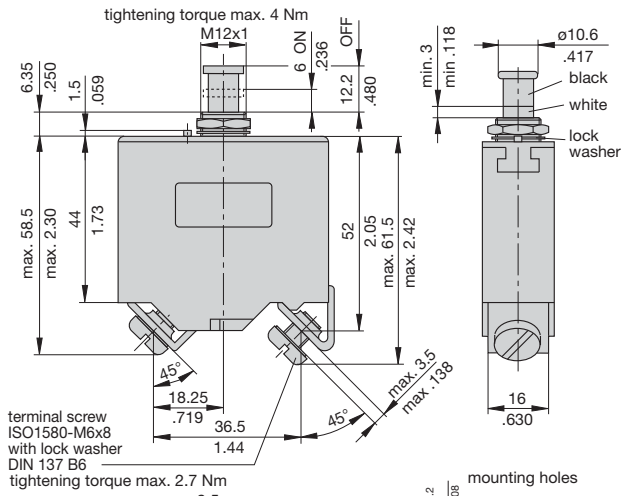


## Technical data

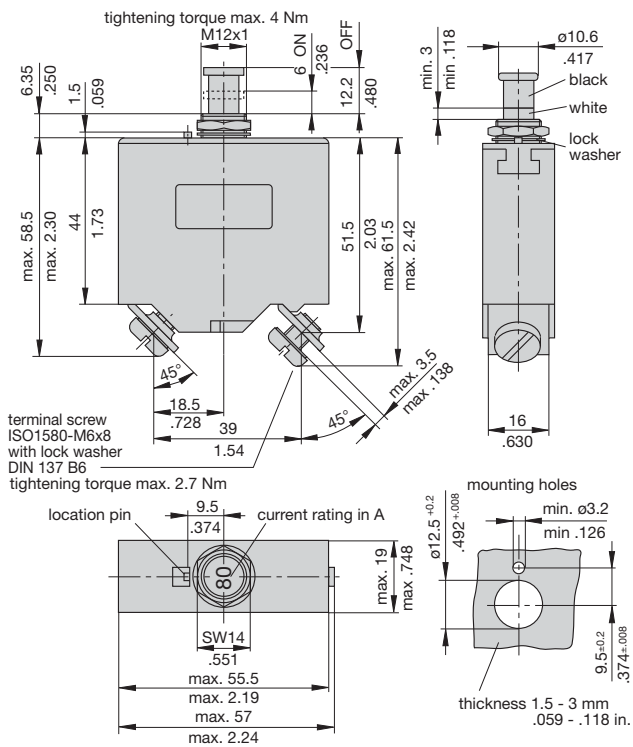
Voltage rating	DC 28 V	
Current rating range	50...100 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	2,500 operations at $I_N$	
Ambient temperature	-55...+75 °C (-67...+167 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 1.5 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664A) operating area	test voltage 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 terminal area IP00	
Vibration	10 g (55-2000 Hz), ± 0.76 mm (10-55 Hz) to VG 95210, sheet 19, IEC 60068-2-6, test Fc	
Shock	50 g (11 ms) to VG 95210, sheet 28, IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to VG 95210, sheet 2, IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7, IEC 60068-2-3, test C	
Explosion	to VG 95210, sheet 10, MIL-STD-202, meth. 109	
Mass	approx. 122 g without auxiliary contact approx. 126 g with auxiliary contact	

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

### 452-K34-FN2 (VG 95345 T17)

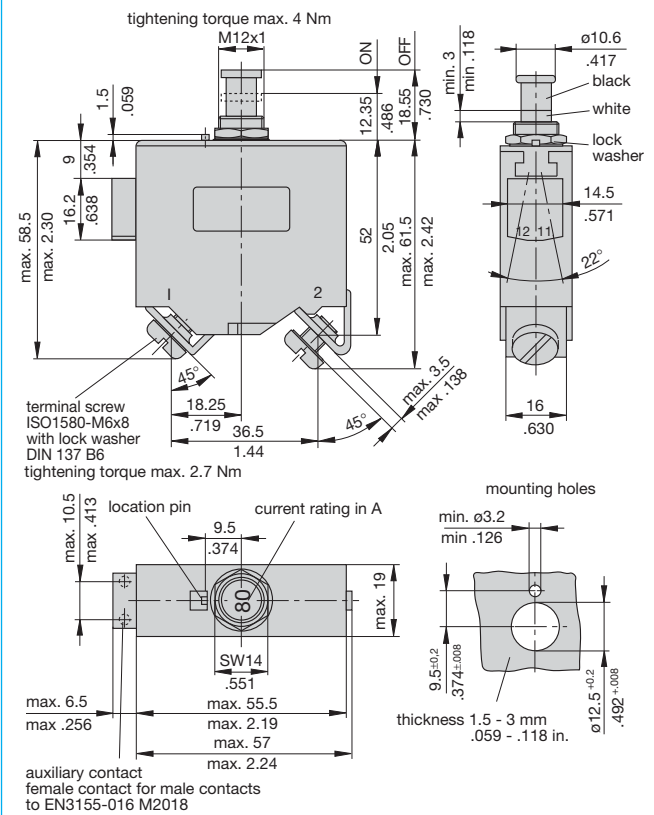


### 452-K14-LN2 (VG 95345 T17)

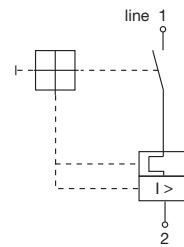


## Dimensions 452-K...-S.

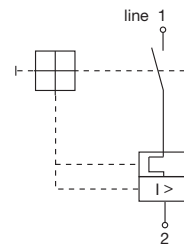
### 452-K34-LN2-S1 (VG 95345 T17) 452-K34-LN2-S5



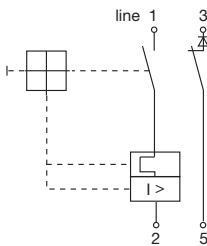
## Internal connection diagram



with auxiliary contact -S1



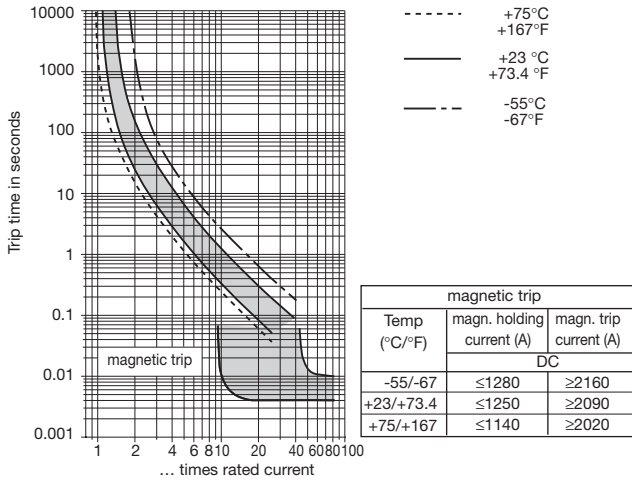
with polarized auxiliary contact -S5



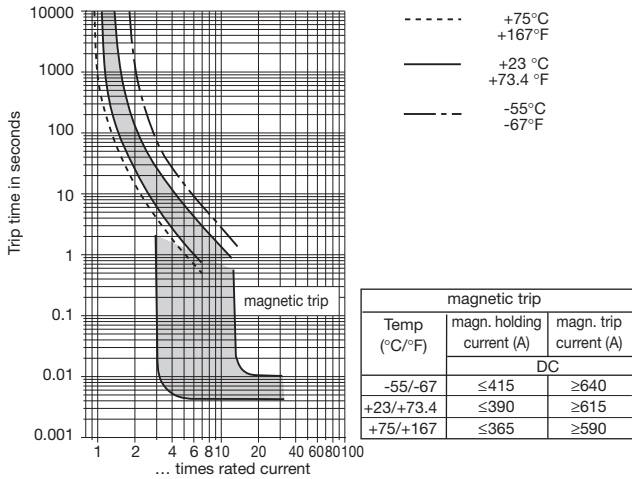
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Typical time/current characteristics

### 452-... (standard delay)



### 452-2-... (fast trip)



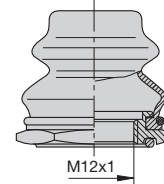
Characteristic curves for AC to special order.

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

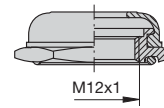
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

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

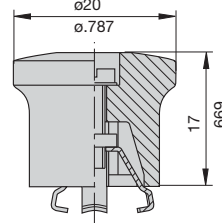
**Splash cover/hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 08** nickel plated nut, transparent cover  
**X 200 801 03** matt black finish nut, black cover



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



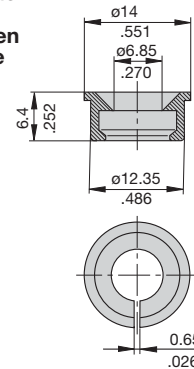
**Actuator extension (black)**  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

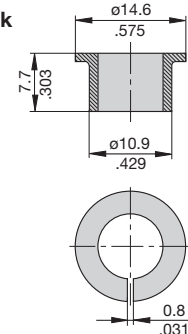
**Identification collar to be snapped on the push button**

**Y 307 004 01** black  
**Y 307 004 02** white  
**Y 307 004 03** red  
**Y 307 004 04** green  
**Y 307 004 05** blue



**Lock out ring to block the push button in OFF position**

**Y 307 005 01** red  
**Y 307 005 02** black





## 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

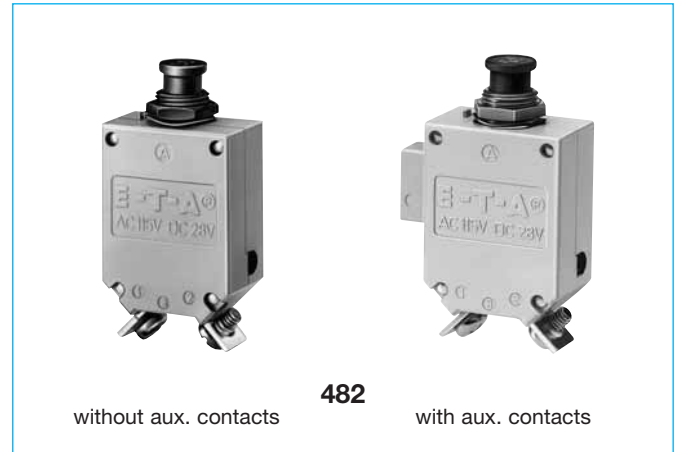
<b>Type No.</b>	482	single pole thermal circuit breaker
<b>Mounting</b>	<b>G</b>	threadneck panel mounting
<b>Threadneck design</b>	<b>1</b>	M 12x1 nickel plated
	<b>2</b>	M 12x1 black
	<b>3</b>	15/32-UN-2A black
	<b>6</b>	M12x1x8 black, without locating pin, push button marking as with 482-G2..
	<b>7</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 35338-137
	<b>3</b>	lock washer 4.3, bulk shipped (MS 35338-137)
	<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>		0.1...50 A

482 - G 1 1 1 - K1 M1 - A 1 S1 . - 10 A ordering example

Previous ordering codes:

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

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



without aux. contacts

482

with aux. contacts

## Technical data

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

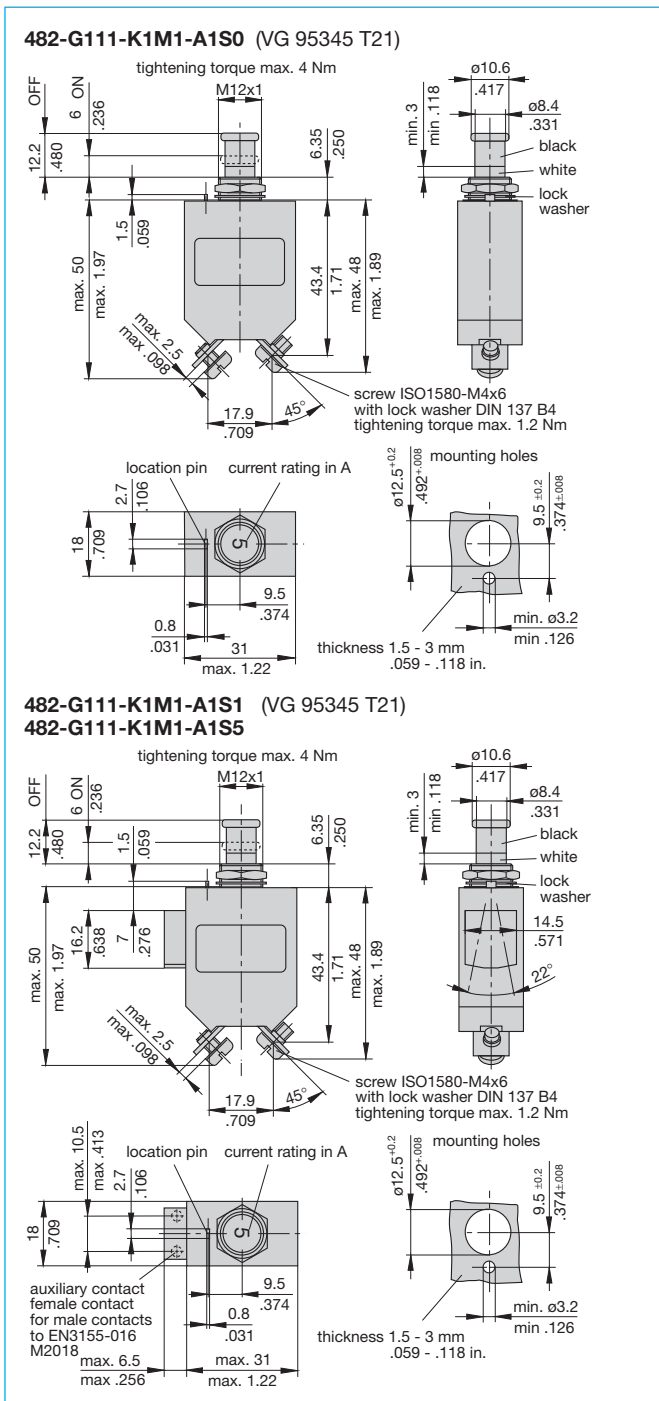
## Approvals

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, CSA	DC 72 V	0.1...50 A
TÜV	DC 72 V	0.1...50 A

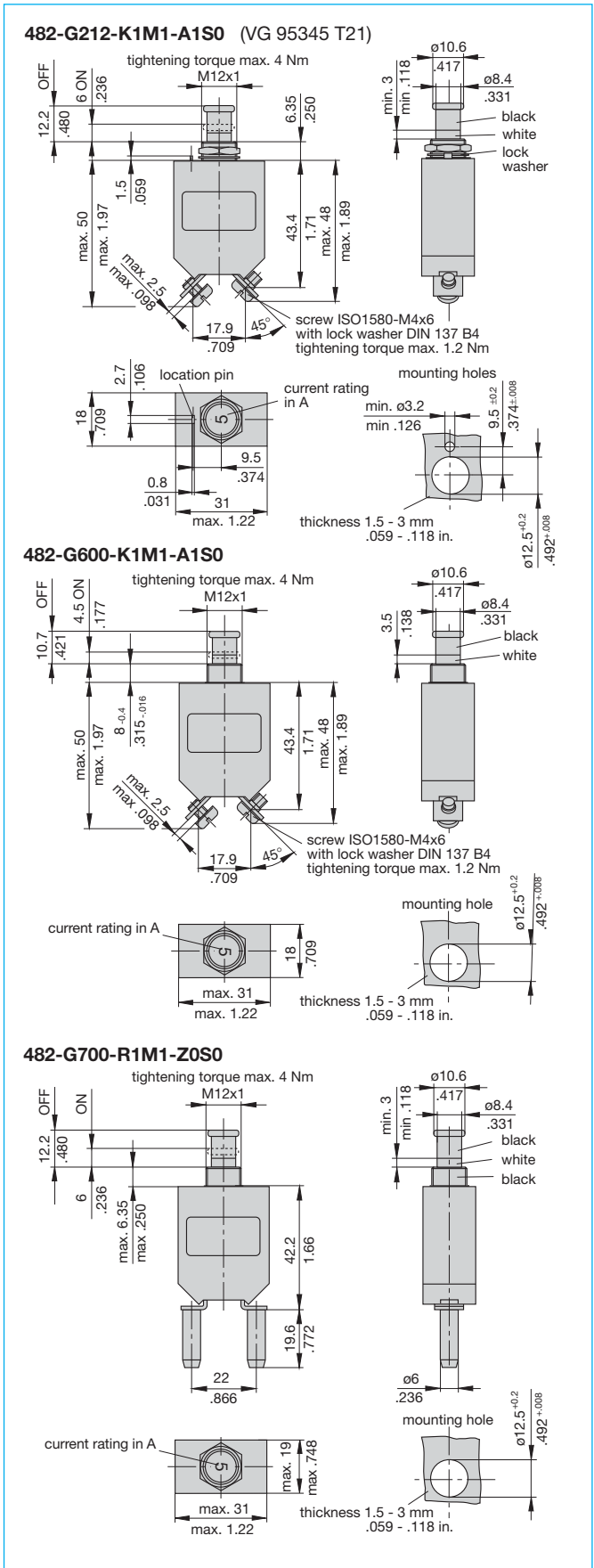
## Standard current ratings and typical volt drop values

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...



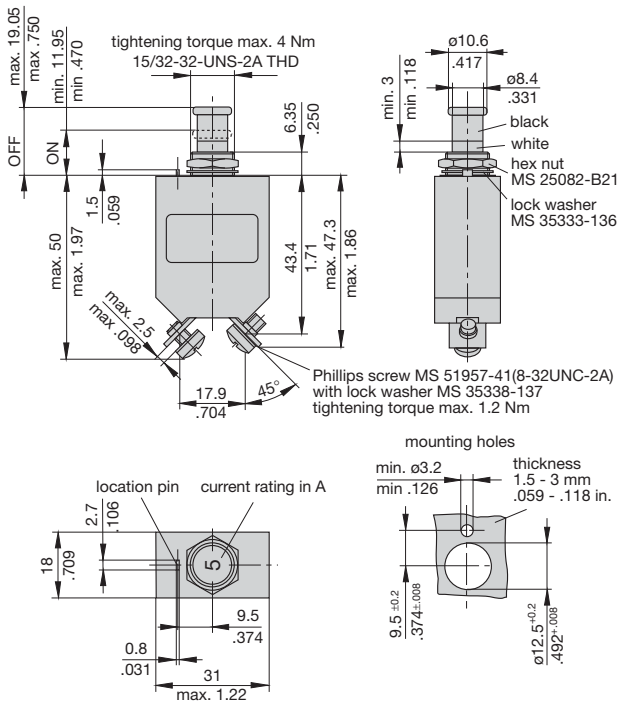
## Dimensions 482-G2../-G6../-G7...



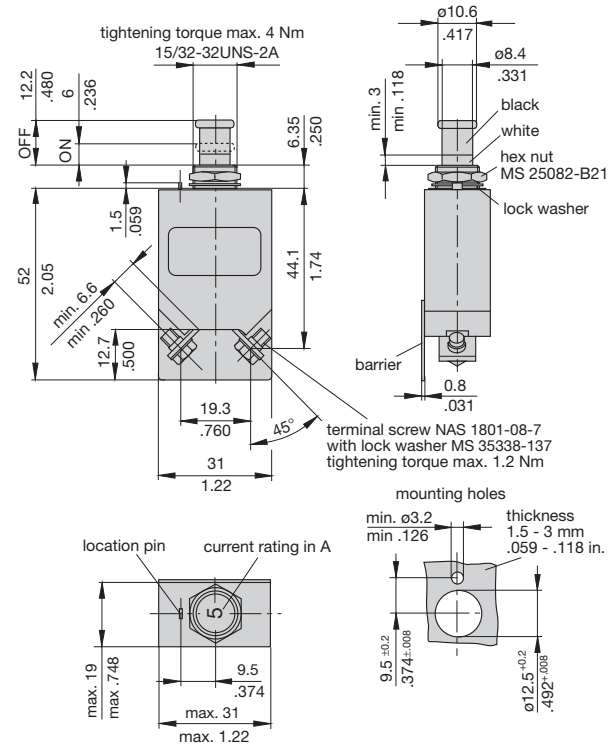
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Dimensions 482-G3...

### 482-G323-J1M1-B2 (MS 25 244)

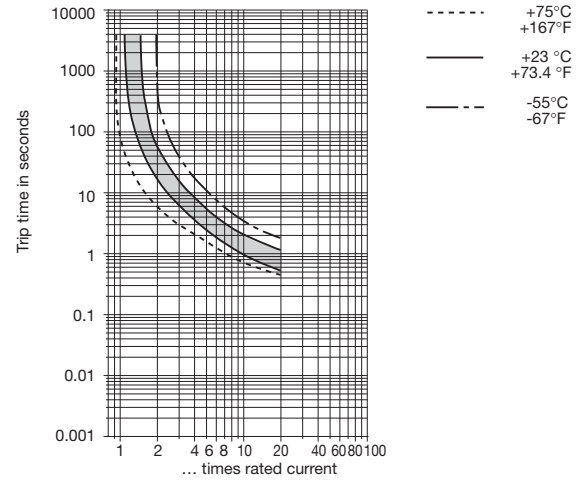


### 482-G323-J2..-E3S0T

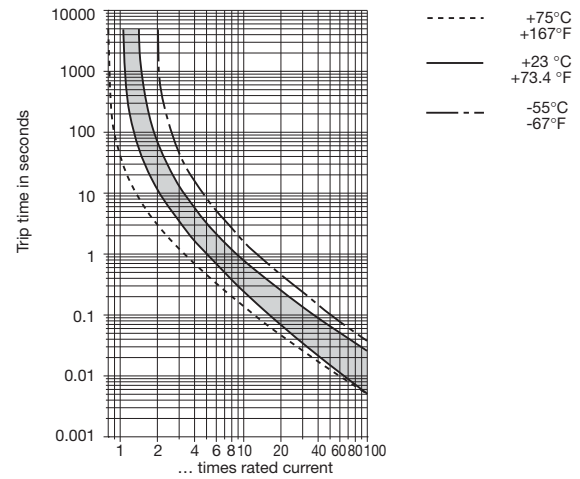


## Typical time/current characteristics

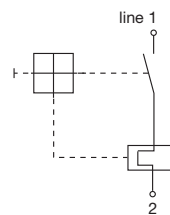
### 0.1...2.5 A



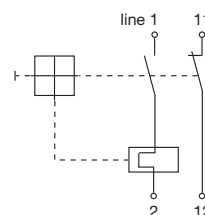
### 3...50 A



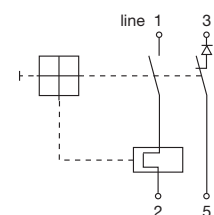
## Internal connection diagrams



### with auxiliary contact



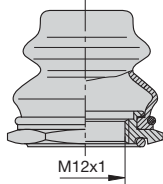
### with polarized auxiliary contact



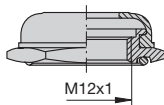
This is a metric design and millimeter dimensions take precedence (mm/inch)

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

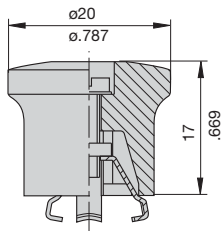
**Splash cover /hex nut assembly with O ring** (IP66 and IP67)  
**X 200 801 08** - nickel plated nut M12x1, transparent cover  
**X 200 801 03** - matt black finish nut M12x1, black cover



**Splash cover black /hex nut assembly with O ring** (IP54)  
**X 200 802 01** - nickel plated nut M12x1  
**X 200 802 02** - matt black finish nut M12x1



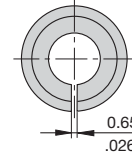
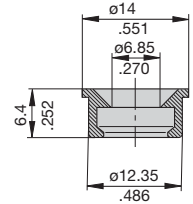
**Actuator extension** (black)  
 to be fitted on the push button  
**X 200 803 01**



## Accessories

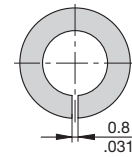
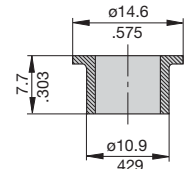
**Identification collar** to be snapped on the push button

**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	AC 250 V, 50/60 Hz DC 75 V	1...25 A 1...35 A



## Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V (higher voltage ratings upon request)	
Current rating range	1...35 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	20,000 operations mechanical or 10,000 operations at I <sub>N</sub> (≤ 25 A) 5,000 operations at I <sub>N</sub> (30 + 35 A)	
Ambient temperature	-55...+125 °C (-67...+257 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 1.5 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area main to aux. circuit	AC 1,500 V AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	AC 115 V (400 Hz): ≤ 4 A      1,000 A 5 A      2,000 A 7.5...35 A      2,500 A DC 28 V: 1...25 A      6,000 A 30 + 35 A      4,000 A	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration (sinusoidal)	15 g (70-2000 Hz), ± 0.76 mm (5-70 Hz) to VG 95210, sheet 19, IEC 60068-2-6, test Fc/ISO 7137	
Vibration (random)	16.4 g rms, 0.2 g <sup>2</sup> /Hz ± 1.5 dB to VG 95210, sheet 29, ISO 7137	
Acceleration	17 g, to ISO 2669	
Shock	75 g (11 ms) to VG 95210, sheet 28, IEC 60068-2-27, test Ea/ISO 7137	
Corrosion	96 hours at 5 % salt mist, severity A 48 hours at 20 % salt mist, severity B to VG 95210, sheet 2, IEC 60068-2-11, test Ka/ISO 7137	
Humidity	240 hours at 95 % RH, to VG 95210, sheet 7, IEC 60068-2-3, test C/ISO 7137	
Explosion	to VG 95210, sheet 10, MIL-STD-202, meth. 109	
Altitude	≤ 25,000 m above sea level	
Mass	max. 29 g with auxiliary contact max. 25 g without auxiliary contact	
<b>Weight reduction through aluminium threadneck: approx. 3 g</b>		

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

<b>Type No.</b>	
483	single pole, with temperature compensation
<b>Mounting</b>	
G	threadneck panel mounting, standard
L	threadneck panel mounting, extended push button
V	threadneck panel mounting, high vibration performance
<b>Threadneck design</b>	
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)
<b>Hardware for threadneck (washers)</b>	
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
<b>Hardware for threadneck (nuts)</b>	
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)
<b>Terminal design (main terminals)</b>	
<b>K</b> screws terminals with metric thread	
1	K14 (M4, MJ4)
<b>J</b> screw terminals with inch thread	
1	J14 (8-32UNC-2B)
2	J17 (8-32UNC-2B)
3	J25 (6-32UNC-2B)
<b>Characteristic curve</b>	
M1	thermal, 1.15-1.38 I <sub>N</sub>
<b>Terminal screws</b>	
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
<b>Terminal washers</b>	
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
<b>Auxiliary contact</b>	
S0	without auxiliary contact
S1	with auxiliary contact (N/C) connector to EN3155-016M2018, size 20
S5	with polarized auxiliary contact (N/C)
<b>Barrier</b>	
Z	without barrier (standard)
<b>Colour of the push button</b>	
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)
<b>Current ratings</b>	
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 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320.

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

Threadneck size 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-V.

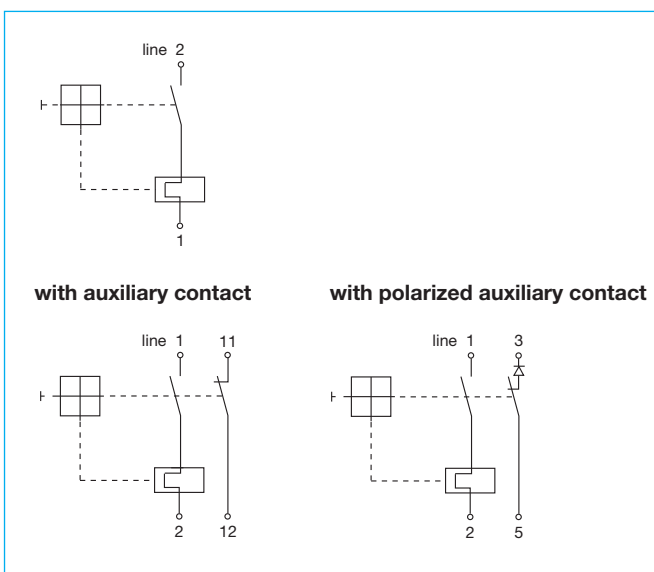
### 483-G533-J3M1-C4S0Z

Threadneck size 7/16-32UNSx6.4 and terminal design -J25 (inch thread 6-32), listed by the German Materialamt der Bundeswehr to VG 95345, part 6.

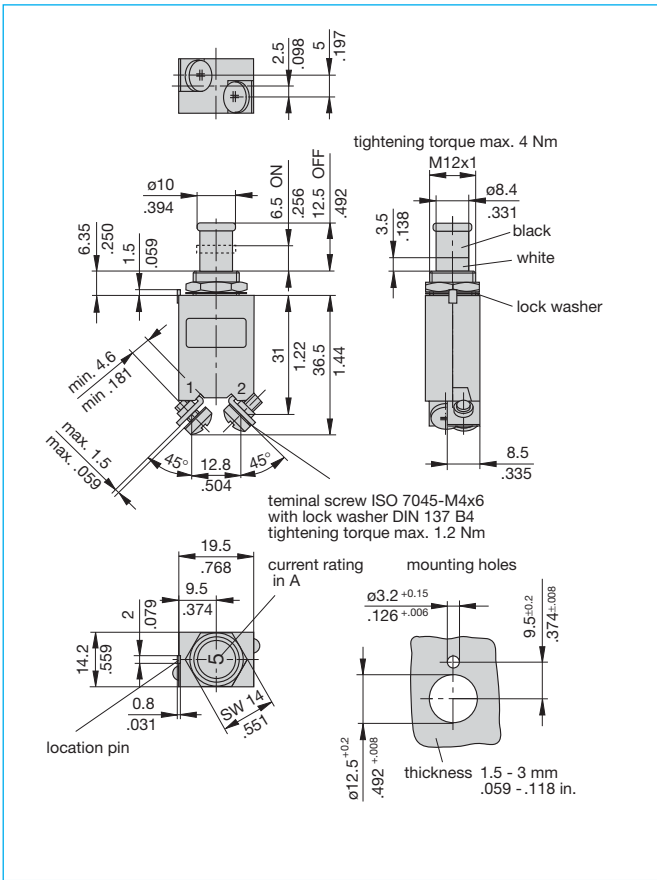
### 483-G814-K1M1-A1S1ZN

Aluminium threadneck M12x1x6.4x8.8 dia.

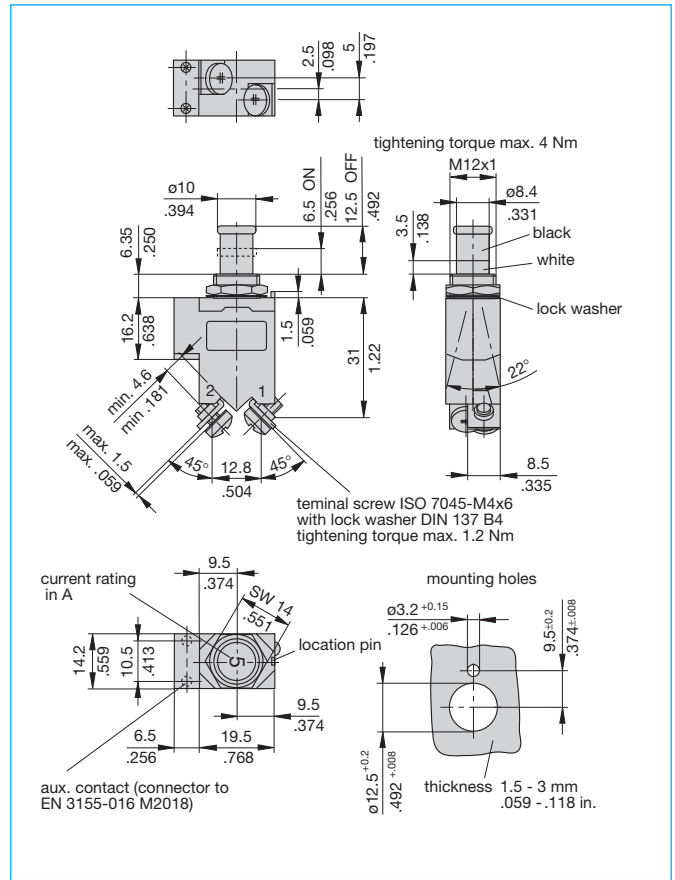
## Internal connection diagrams



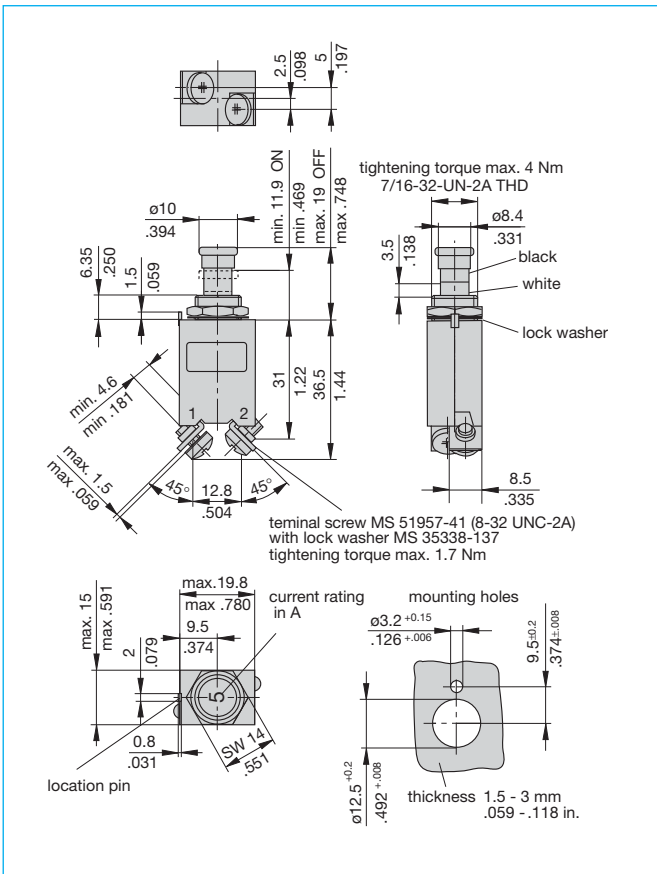
## Dimensions 483-G411-K1M1-A1S0ZN (VG 95345 T06)



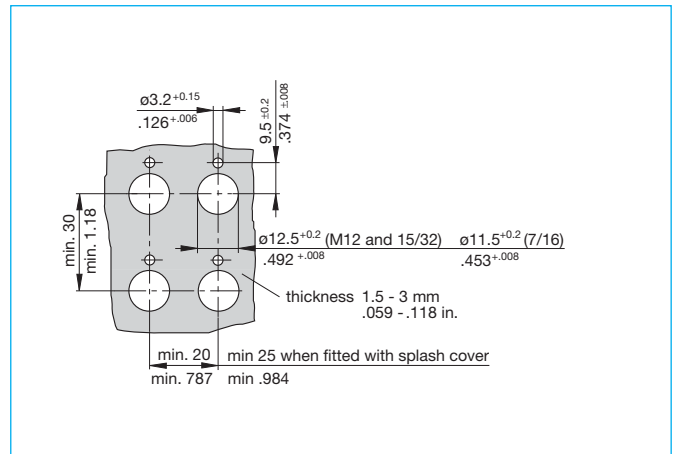
## Dimensions 483-G111-K1M1-A1S1ZN (VG 95345 T06)



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



## Mounting

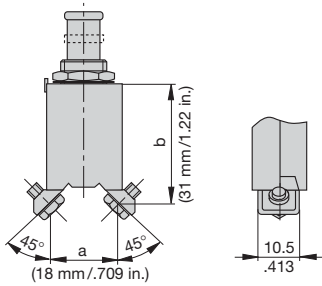


This is a metric design and millimeter dimensions take precedence (mm/inch)

## Other main terminal and threadneck designs

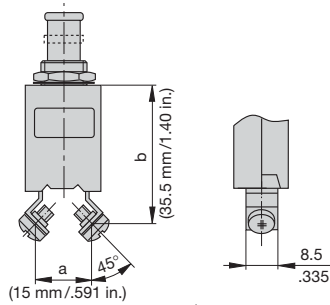
### Terminal design -J2

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)

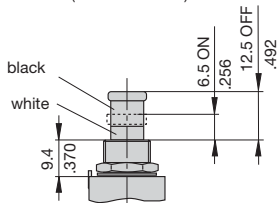


### Terminal design -J3

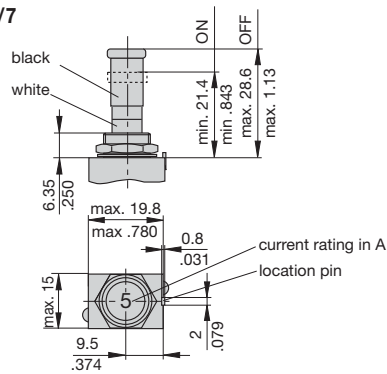
Terminal distances to:  
 MS 26 574 (a, b)



### Mounting -G6



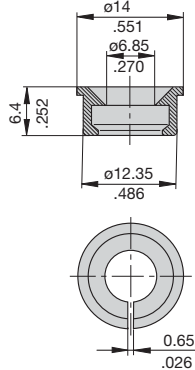
### Mounting -L2/5/7



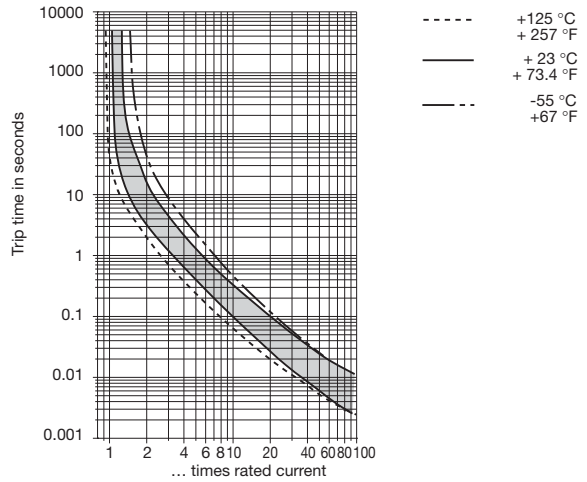
## Accessories

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



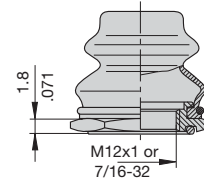
## Typical time/current characteristics



## Accessories

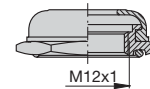
Splash cover/hex nut assembly with O ring (IP66 and IP67)  
 (approved to VG 95345, T23)

- X 200 801 08 nickel plated nut, transparent cover
- X 200 801 03 matt black finish nut, black cover
- X 200 801 09 matt black finish nut 7/16-32, black cover



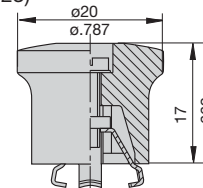
Splash cover/hex nut assembly with O ring (IP54)  
 (approved to VG 95345, T23)

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



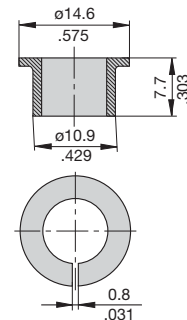
Actuator extension (black) to be fitted on the push button  
 (approved to VG 95345, T23)

- X 200 803 01



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)



## Description

Single pole, miniaturised thermal circuit breaker with trip-free mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). Threadneck panel mounted, temperature-compensated, with optional auxiliary contacts. Fully approved for commercial aircraft and similar requirements.

## Typical applications

Extra low voltage wiring systems on all types of vehicles for land, sea and air.

## Ordering information

### Type No.

4120 single pole, with temperature compensation

### Mounting

**G** threadneck panel mounting

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

### Threadneck design

**1** M12x1x6.3 (aluminium)

**2** 7/16-32 UNx6.3 (aluminium)

### Number of poles

**1** 1-pole, thermally protected

### Hardware for threadneck

**0** without hardware

**1** hex nut M12x1, corrugated washer 12/15, fitted

**2** hex nut M12x1 (aluminium), serrated lock washer 12.1/17.2, fitted

**3** hex nut M12x1 (aluminium), serrated lock washer 12.1/17.2, bulk shipped

**4** hex nut 7/16-32UN (aluminium), serrated lock washer 11.3/14.9, fitted

### Terminal design (main terminals)

**K1** screw terminals with metric thread K14 (M4)

**J1** screw terminals with inch thread J14 (8-32UNC-2B)

**J2** screw terminals with inch thread J17 (8-32UNC-2B)

**J3** screw terminals with inch thread J25 (6-32UNC-2B)

**P1** blade terminals 6.3x0.8, DIN 46244, silver-plated

### Characteristic curve

**M1** thermal, 1.15 - 1.38 I<sub>N</sub>

### Terminal screws

**A** Phillips screw M4x6, fitted

**B** Phillips screw 8-32UNC-2Ax6, fitted

**C** Phillips screw 6-32UNC-2Ax6 (MS 51957-26)

**D** slotted flat head screw M4x6, fitted

**K** hex screw with Phillips head 8-32UNC-3Ax7.6, fitted

**M** hex screw with Phillips head 8-32UNC-3Ax7.6, bulk shipped

**Z** without terminal hardware

### Terminal washers

**0** without lock washer

**1** wave washer B4, fitted

**2** lock washer 4.3, fitted

**4** lock washer 3.7 (MS 35338-136)

**5** lock washer 4.3/9, fitted

**6** lock washer 4.3/9, bulk shipped

### Auxiliary contact

**S0** without auxiliary contact

**S1** with auxiliary contact (connector EN 3155-016M2018) (NC)

**S5** with polarized auxiliary contact (NC)

### Barrier

**Z** without barrier

**U** with barrier (19.5 wide)

### Colour of the push button

**G** green to EN (e. g. 2 1/2)

**N** black to EN (e. g. 2 1/2)

**S** black, with white marking (e. g. 2.5)

**X** black, without marking

### Current ratings

**1...25 A**

4120 - G 1 1 - 1 - K1 M1 - A 1 S0 Z N - 10 A ordering example



4120-...

## Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	1...25 A (0.5 A upon request)	
Auxiliary circuit	1 A, DC 28 V (0.5 A upon request)	
Typical life	20,000 operations mechanical, or 5,000 operations at 1 x I <sub>N</sub>	
Ambient temperature	-55°C ...+125°C (-67...+257 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage	pollution degree 3
	1.5 kV	3
Dielectric strength (IEC 60664 and 60664A)	test voltage	operating area
	AC 1,500 V	AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
	Interrupting capacity I <sub>cn</sub>	AC 115 V (400 Hz):
DC 28 V:		5...25 A 2,000 A
		1...25 A 6,000 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40	
	terminal area IP00	
Vibration (sinusoidal)	10 g (57-2000 Hz), ± 0.76 mm (5-57 Hz) to ISO 7137, EN 2350 para. 5.3.1	
	1...2.5 A: 0.04 g <sup>2</sup> /Hz ± 1.5 dB; 7.3 g eff 3...20 A: 0.06 g <sup>2</sup> /Hz ± 1.5 dB; 9 g eff to ISO 7137, EN 2350 para. 5.3.1	
Acceleration	17 g, to ISO 2669, EN 2350 para. 5.3.3	
Shock	50 g (11 ms), to ISO 7137, EN 2350 para. 5.3.2	
Corrosion	48 hours at 5 % salt mist to ISO 7137, EN 2350 para. 5.4.2	
Humidity	240 hours at 95 % RH, to ISO 7137, EN 2350 para. 5.4.3	
Explosion	to VG 95210, sheet 10	
Altitude	≤ 22,000 m above sea level	
Mass	approx. 20.6 g with terminal screws, without -Si	
	approx. 24.6 g with terminal screws, with -Si	



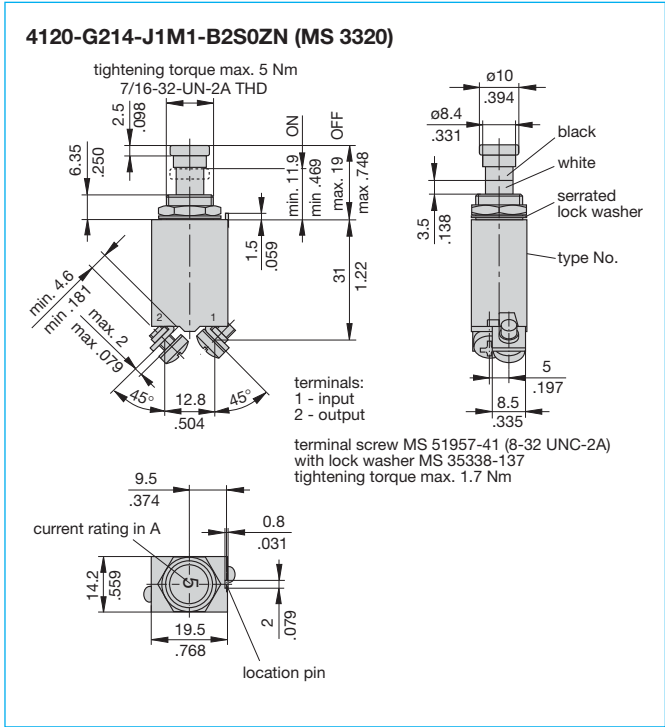
## Standard current ratings and typical volt drop values

Current rating (A)	Volt drop (mV)	Current rating (A)	Volt drop (mV)
1	1100	7.5	250
2	550	10	230
2.5	460	15	200
3	440	20	190
4	380	25	190
5	260		

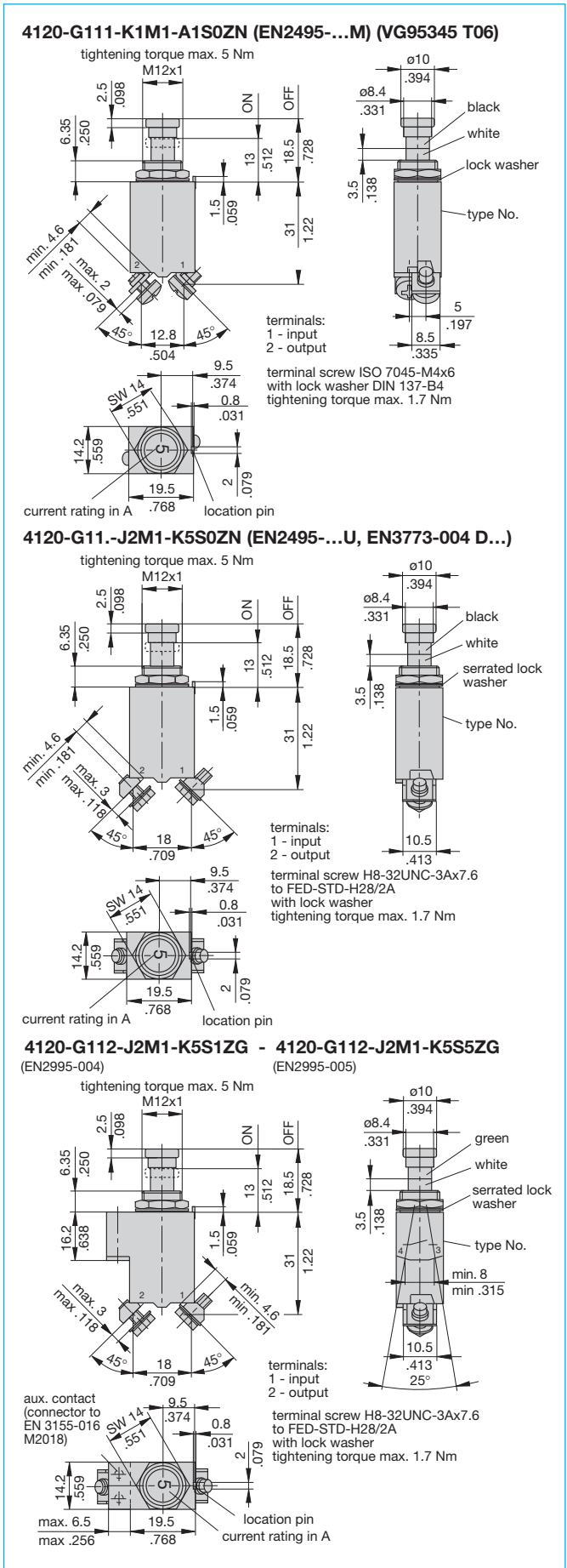
## Approvals (configurations)

Authority	Voltage ratings	Current ratings
EN 2495		
EN 3773		
EN 2995		
MS 3320		
QPL		
VG 95345 T06	DC 28 V; AC 115 V	0.5...20 A
BWB (to VG 95345, part 6)		
UL 1077	DC 50 V	0.5...25 A

## Dimensions 4120-...



## Dimensions 4120-G1..

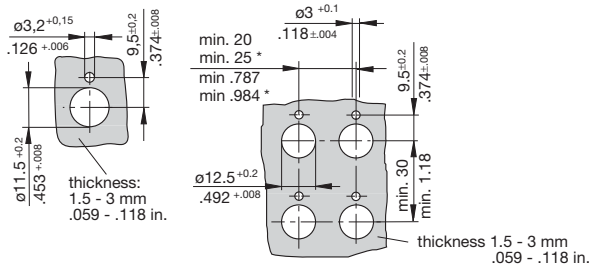


This is a metric design and millimeter dimensions take precedence (mm) inch

## Mounting holes

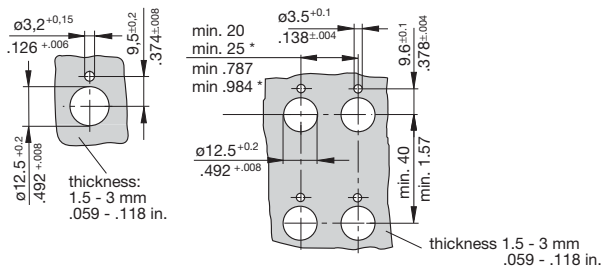
4120-G2...

mounting holes S0



4120-G1...

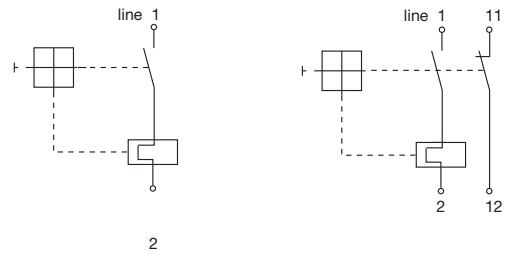
mounting holes S1 or S5



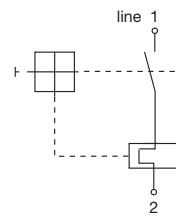
\* min. 25 mm / .984 in. when fitted with splash cover

## Internal connection diagram

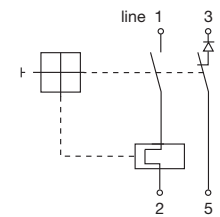
with auxiliary contact  
VG 95345 T06



with auxiliary contact  
EN 2995-004



with polarized auxiliary contact  
EN 2995-005

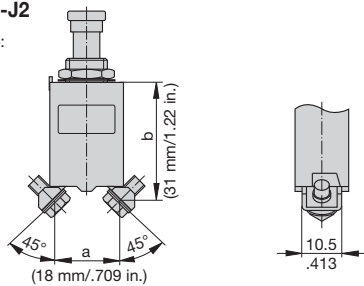


## Other terminal designs

Terminal design -J2

Terminal distances to:

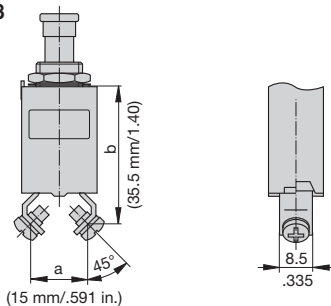
- MS 14 105 (a, b)
- MS 14 153 (a, b)
- MS 22 073 (a)
- MS 22 074 (a)
- MS 25 244 (a)
- MS 25 373 (a, b)



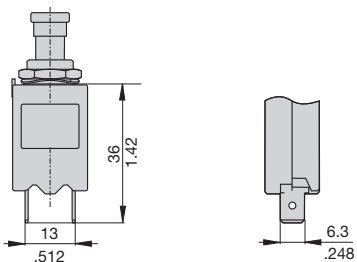
Terminal design -J3

Terminal distances to:

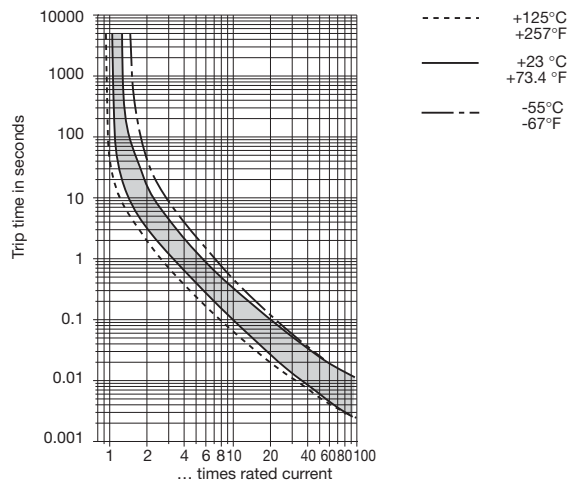
- MS 26 574 (a, b)



Terminal design -P1



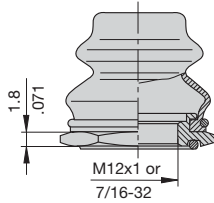
## Typical time/current characteristics



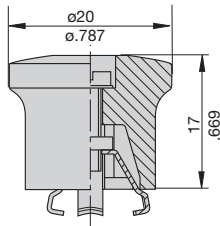
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Accessories (approved to VG 95 345, part 23)

**Splash cover/hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 08** nickel plated nut, transparent cover  
**X 200 801 03** matt black finish nut, black cover  
**X 200 801 09** matt black finish nut 7/16-32, black cover



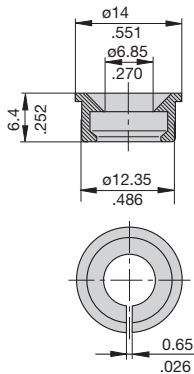
**Actuator extension (black) to be fitted on the push button**  
**X 200 803 01**



## Accessories

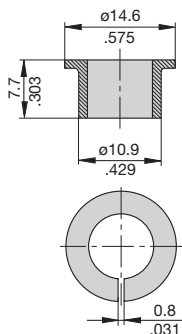
**Identification collar to be snapped on the push button**

**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, thermal circuit breaker with trip-free mechanism, push/pull on/off manual actuation (M-type TO CBE to EN 60934) and temperature compensation. An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US configurations. The robust design makes type 4140 suitable for extremely harsh conditions.

## Typical applications

Land vehicles, aircraft, watercraft, special vehicles.

## Ordering information

### Type No.

**4140** High performance thermal circuit breaker with temperature compensation

### Mounting

**G** threadneck panel mounting

### Threadneck design

**1** M12x0.75x7 alu, blackened, 1 location pin

**3** 7/16-32UNx7 alu, blackened, 1 location pin

### Number of poles

**1** 1-pole, protected

### Hardware for threadneck

**0** without hardware

**2** hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, fitted

**3** hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, supplied separately

**4** hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, fitted

**5** hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, supplied separately

### Terminal design (main terminals)

**J1** screw terminals with inch thread (8-32UNC-2B)

### Characteristic curve

**M1** thermal 1.1-1.45 x I<sub>N</sub>

### Terminal screws

**B** Phillips cylinder head screw 8-32UNC-2Ax6

**K** hex screw with Phillips head 8-32UNC-3Ax7.6, fitted

**M** hex screw with Phillips head 8-32UNC-3Ax7.6, supplied separately

**Z** without accessories

### Terminal washers

**0** without lock washer

**5** lock washer 4.3/9 fitted

**6** lock washer 4.3/9 supplied separately

### Auxiliary contact

**S0** without auxiliary contact

**S1** with aux. contact (N/C) (female contact for male contacts to EN3155-016M2018)

**S5** as S1 but polarized

### Barrier

**T** with barrier

### Colour of the push button

**G** green

**N** black

### Current ratings

**20...50 A**

**4140 - G 1 1 3 - J1 M1 - M 6 S5 T G - 20 A** ordering example



**4140**  
without auxiliary contact      with auxiliary contact

## Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	20...50 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	5,000 operations mechanical and 2,500 operations at I <sub>N</sub>	
Ambient temperature	-55...+125 °C (-67...+257 °F)	
Temperature compensation	-55...+90 °C (-67...+194 °F)	
Insulation co-ordination (IEC 60664)	rated impulse withstand voltage 1.5 kV	pollution degree 3
Dielectric strength	test voltage operating area main to aux. circuit	AC 1,500 V AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	AC 115 V (400 Hz): 1,500 A DC 28 V: 4,000 A	
Degree of protection (IEC 60529)	operating area IP40 terminal area IP00	
Vibration (sinusoidal)	± 0.76 mm (5-80 Hz) 10 g (80-500 Hz), 5 g (500-2000 Hz) to EN 2350 para 5.3.1 and ISO 7137	
Vibration (random)	0.04 g <sup>2</sup> /Hz (40-500 Hz) 5.8 g rms (10-2000 Hz) to ISO 7137	
Acceleration	17 g, to EN 2350, para 5.3.3 and ISO 2669	
Shock	50 g (11 ms), to EN 2350 para 5.3.2 and ISO 7137	
Corrosion	48 hours at 5 % salt mist to EN 2350 para 5.4.2 and ISO 7137	
Humidity	48 hours at 95 % RH, to EN 2350 para 5.4.3 and ISO 7137	
Altitude	≤ 15,000 m above sea level	
Mass	ca. 57 g with accessories and without auxiliary contact ca. 60 g with accessories and with auxiliary contact	

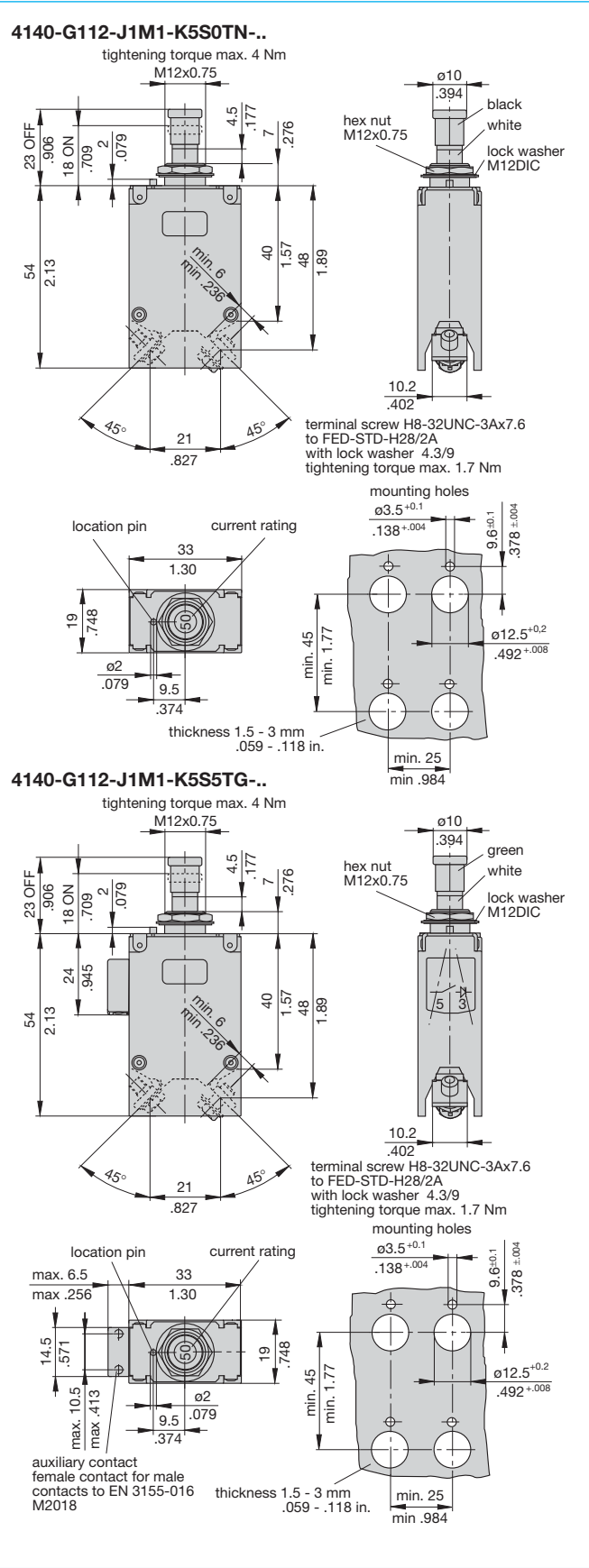
## Standard current ratings and typical volt drop values

Current rating (A)	Volt drop per pole (mV)
20	150
25	150
30	150
35	150
40	120
45	120
50	120

## Approvals

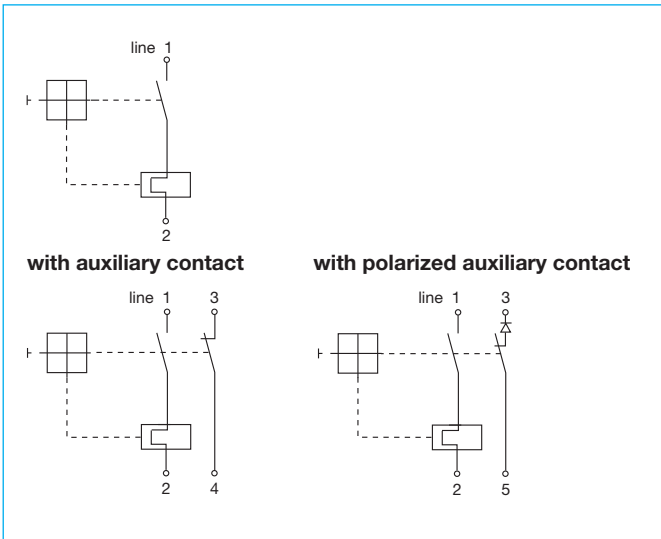
ASNE 0732-005 / prEN 3661-005  
 NSA 931321 / prEN2794-004

## Dimensions

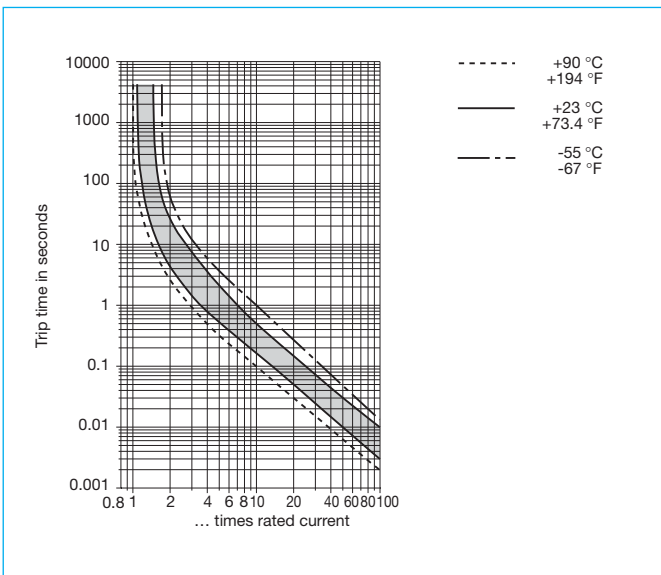


This is a metric design and millimeter dimensions take precedence ( $\frac{mm}{inch}$ )

## Internal connection diagrams



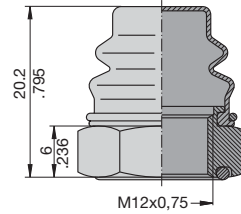
## Typical time/current characteristics



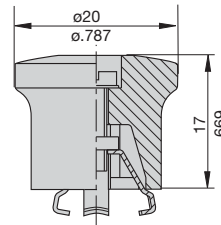
## Accessories

**Splash cover/hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 15** black chromated nut M12x0.75x6, black cover

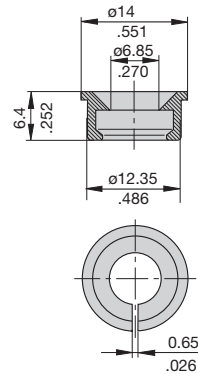
**Splash cover/hex nut assembly with O ring (IP66 and IP67)**  
**X 200 801 16** black chromated nut 7/16-32UNx6, black cover



**Actuator extension (black) to be fitted on the push button**  
**X 200 803 01** (approved to VG 95345, part 23)



**Identification collar to be snapped on the push button**  
**Y 307 004 01** black  
**Y 307 004 02** white  
**Y 307 004 03** red  
**Y 307 004 04** green  
**Y 307 004 05** blue



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

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 remote control circuit breaker (RCCB), temperature compensated, either with or without auxiliary contacts, and featuring a bimetal actuator which trips the circuit breaker mechanism within a specified time under overcurrent conditions. The switching contact latching system is operated by a bi-stable linear motor controlled by electronic circuitry incorporated within the device. Remote control is achieved through the use of a conventional single pole manually operated aircraft style thermal circuit breaker which connects the control input of the RCCB to ground.

With the control circuit breaker (ICU) in the ON position, the RCCB will switch on. When the control circuit breaker is switched off, the RCCB will change to the OFF condition. If power is applied to a previously de-energised RCCB, the device will adopt the same switching status as the control circuit breaker.

If the RCCB trips thermally in the event of a load circuit fault, the electronic circuitry will also cause the control circuit breaker to trip, thereby providing a visual indication through the position of the circuit breaker actuator.

Approved to MIL-PRF-83383.

## Typical applications

Aircraft electrical systems and equipment, and other high performance applications.

## Ordering information

### Type No.

4930 single pole remote control circuit breaker (RCCB)

### Variation

- 01 standard, with auxiliary contacts
- 02 with modified terminal barrier and auxiliary contacts
- 03 standard, without auxiliary contacts
- 04 with modified terminal barrier but without auxiliary contacts

### Current ratings

5...100 A

4930 - 01 - 5 A ordering example

I <sub>N</sub> /A	E-T-A part number	MIL part number	E-T-A part number	MIL part number
5	4930-01-5A	M83383/02-01	4930-03-5A	M83383/01-01
7.5	4930-01-7.5A	M83383/02-02	4930-03-7.5A	M83383/01-02
10	4930-01-10A	M83383/02-03	4930-03-10A	M83383/01-03
15	4930-01-15A	M83383/02-04	4930-03-15A	M83383/01-04
20	4930-01-20A	M83383/02-05	4930-03-20A	M83383/01-05
25	4930-01-25A	M83383/02-06	4930-03-25A	M83383/01-06
35	4930-01-35A	M83383/02-07	4930-03-35A	M83383/01-07
40	4930-01-40A	M83383/02-08	4930-03-40A	M83383/01-08
50	4930-01-50A	M83383/02-09	4930-03-50A	M83383/01-09
60	4930-01-60A	M83383/02-10	4930-03-60A	M83383/01-10
75	4930-01-75A	M83383/02-11	4930-03-75A	M83383/01-11
80	4930-01-80A	M83383/02-12	4930-03-80A	M83383/01-12
100	4930-01-100A	M83383/02-13	4930-03-100A	M83383/01-13

## Approvals

MIL-PRF-83383



4930 (RCCB)

## Technical data (T<sub>A</sub> = 25 °C, U<sub>e</sub> = DC 28 V or AC 115V/400 Hz)

<b>Operating data LINE</b>	(see also MIL-PRF-83383)
Voltage ratings U <sub>e</sub> (operating voltage range)	AC 115 V 400 Hz (AC 104...126 V); DC 28 V (DC 18...36 V)
Current rating range I <sub>N</sub>	5...100 A (see ordering information)
Bias current	typically 2.5 mA at DC 28 V typically 25 mA at AC 115 V
Switching current/ switching period for internal linear motor	typically 3.4 A / 28 ms at DC typically 2.8 A / 17 ms at AC
Optical indication ON/OFF	status indicator (near terminal A1)
<b>Load circuit LOAD</b>	
Current rating range I <sub>N</sub>	5...100 A (see ordering information)
Interrupting capacity	DC 28 V: 6,000 A AC 115 V 400 Hz: 3,600 A
Voltage drop at I <sub>N</sub>	see table 1 (standard current ratings and typical voltage drop values)
Overload disconnection	see table 2 (typical time/current characteristics)
Trip limits	see table 2
<b>Control circuit ICU</b>	
ICU	Indicator/Control Unit thermal circuit breaker 0.5 A
Trigger current for ICU ("TRIP FREE"-mode) / duration	approx. 3.2 A / 5 s max
Control voltage U <sub>ICU</sub> RCCB "OFF" (ICU open)	<b>Limits:</b> U <sub>ICU</sub> > typ. 2 V (> 1.5 V between -54...+71 °C / -65...+160 °F)
RCCB "ON" (ICU closed)	U <sub>ICU</sub> < typ. 0.6 V (< 0.2 V between -54...+71 °C / -65...+160 °F)
Control current I <sub>ICU</sub>	typically 0.4 mA
Additional control units	one relay contact or one ON/OFF switch is applicable (see application note ICU)
ON/OFF-cycling time (e. g. additional relay contact in ICU circuit)	ON > 80 ms / OFF > 80 ms
<b>Signal output AUX</b>	
Auxiliary contacts	change over contacts S1 - S2 is open, when RCCB main contact is open
Voltage ratings	DC 28 V, AC 115 V (400 Hz)
Current ratings	resistive load: 3 A / inductive load 1.5 A lamp load: 0.5 A



## Technical data ( $T_A = 25\text{ }^\circ\text{C}$ , $U_e = \text{DC } 28\text{ V}$ or $\text{AC } 115\text{V}/400\text{ Hz}$ )

### General data

Typical life endurance	50,000 operations at $I_N$ (inductive or resistive)
Ambient temperature	-54...+71 $^\circ\text{C}$ (-65...+160 $^\circ\text{F}$ )
Dielectric strength (IEC 60664 and 60664A)	test voltage between main terminals AC 1,500 V main terminal to mounting area AC 1,500 V
Insulation resistance	> 100 $\text{M}\Omega$ (DC 500 V)
Vibration (sinusoidal)	10 g (55-2000 Hz), $\pm 0.76\text{ mm}$ (10-55 Hz) to MIL-STD 202, method 204, condition C
Vibration (random)	10-2000 Hz 0.15 $\text{g}^2/\text{Hz}$ , rms value 13.5 g; 5 h/axis loaded with 0.9 $I_N$
Shock	25 g (11 ms, half sinusoidal) to MIL-STD 202, method 213, condition J ISO 7137 (RTCA/DO-160 C, part 7)
Corrosion	48 hours at 5 % salt mist to MIL-STD 202, method 101, condition B ISO 7137 (RTCA/DO-160 C, part 14, category S)
Humidity	240 hours at 95 % RH to MIL-STD 202, method 106/ISO 7137 (RTCA/DO-160 C, part 6, category B)
Sand and dust	to MIL-STD 202, method 110, test condition A
Fungus	to MIL-STD 810 D, method 508.3, 28 days
Altitude	$\leq 15,000\text{ m}$ above sea level
EMI requirements	to MIL-STD 461, class 1 D
Mass	5...25 A approx. 315 g 35...100 A approx. 319 g
Dimensions	max. 82.55 x 31.9 x 108.2 mm (max. 3.25 x 1.256 x 4.26 inch)
Terminals, connections	see table 3

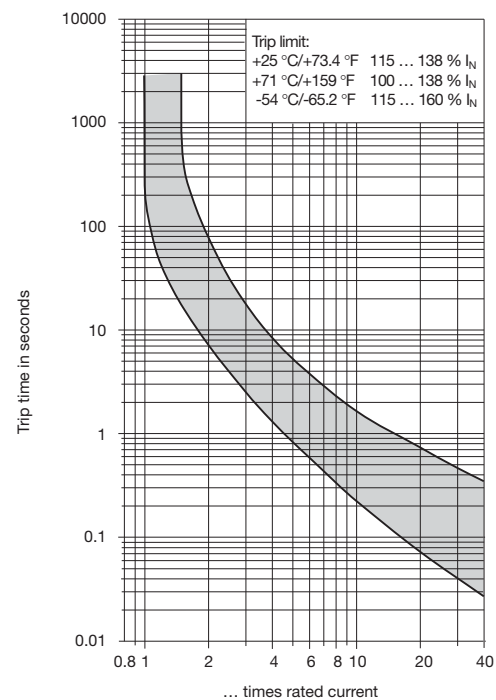
### Table 1

Standard current ratings and typical voltage drop values

Current ratings (A)	Voltage drop at rated current (mV)	Current ratings (A)	Voltage drop at rated current (mV)
5	450	40	225
7.5	360	50	225
10	347	60	225
15	225	75	225
20	225	80	225
25	225	100	225
35	225		

### Table 2

Typical time/current characteristics



### Table 3

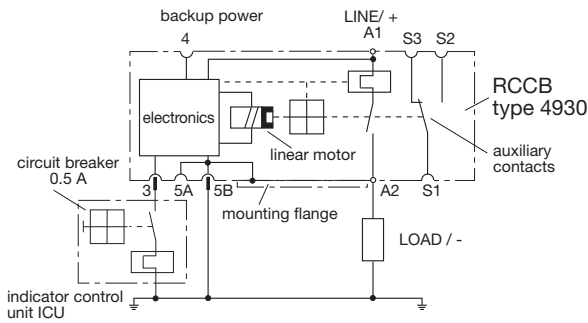
Terminals, connections

Current rating (A)	5...25	35...100
Thread A	0.190-32 UNF-2A	0.250-28 UNF-2A
Mounting torque	2 Nm	4.1 Nm
B (mm/in.)	12.7/.500	15.5/.610
C (mm/in.)	12.7/.500	15.5/.610
Nut	AN315-3R	AN315-4R
Lock washer	MS 35338-43	MS 35338-44
Flat washer	NAS 1149F0322P	NAS 1149F0463P

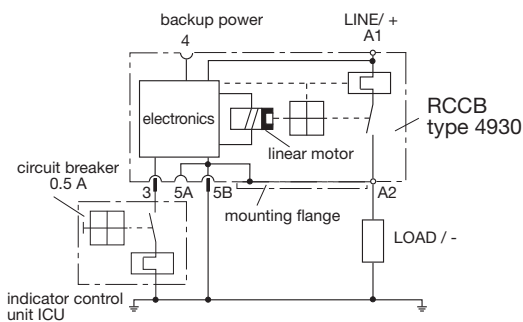


## Internal Connection diagrams

### Type 4930-01/ -02 (with auxiliary contacts)

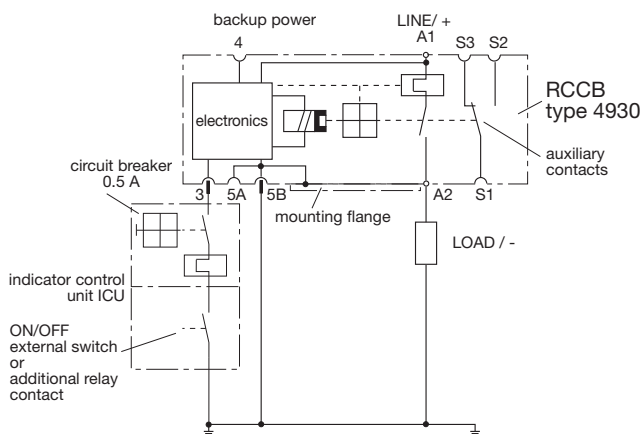


### Type 4930-03/ -04 (without auxiliary contacts)



## Application note (ICU)

### Type 4930-01/ -02 (with auxiliary contacts)



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## Description

Three pole, aircraft style thermal circuit breaker with trip-free mechanism and push/pull on/off manual actuation. An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US configurations. Temperature compensated, with optional auxiliary contacts. The robust design is well suited to extremely harsh conditions. In the event of an overload in one, two or three phases all three poles will be disconnected.

## Typical applications

Land vehicles, aircraft, watercraft, special vehicles.

## Ordering information

<b>Type No.</b>	5140	High performance thermal circuit breaker with temperature compensation
<b>Mounting</b>	<b>G</b>	threadneck panel mounting
<b>Threadneck design</b>	<b>1</b>	M12x0.75x7 alu, blackened, 1 location pin
	<b>2</b>	M12x0.75x7 alu, blackened, 2 location pins
	<b>3</b>	7/16-32UNx7 alu, blackened, 1 location pin
	<b>4</b>	7/16-32UNx7 alu, blackened, 2 location pins
<b>Number of poles</b>	<b>3</b>	3-pole, protected
<b>Hardware for threadneck</b>	<b>0</b>	without hardware
	<b>2</b>	hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, mounted
	<b>3</b>	hex nut M12x0.75, alu, serrated lock-washer 12.1/17.2, bulk
	<b>4</b>	hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, mounted
	<b>5</b>	hex nut 7/16-32UN, alu, toothed lock-washer 11.3/14.9, bulk
<b>Terminal design (main terminals)</b>	<b>J1</b>	screw terminals with inch thread (8-32UNC-2B)
	<b>J2</b>	screw terminals with inch thread (8-32UNC-2B) on one side, busbar terminals on other side, with hole bent at 60 °
	<b>J3</b>	screw terminals with inch thread (8-32UNC-2B) on one side, busbar terminals on other side, with hole bent at 40 °
<b>Characteristic curve</b>	<b>M1</b>	thermal 1.1-1.45 I <sub>N</sub>
<b>Terminal screws</b>	<b>B</b>	Phillips cylinder head screw 8-32UNC-2Ax6
	<b>K</b>	hex screw with Phillips head 8-32UNC-3Ax7.6, mounted
	<b>M</b>	hex screw with Phillips head 8-32UNC-3Ax7.6, bulk
	<b>Z</b>	without accessories
<b>Terminal washers</b>	<b>0</b>	without lock washer
	<b>5</b>	lock washer 4.3/9 mounted
	<b>6</b>	lock washer 4.3/9 bulk
<b>Auxiliary contact</b>	<b>S0</b>	without auxiliary contact
	<b>S1</b>	with aux. contact (N/C) (female contact for male contacts to EN3155-016M2018)
	<b>S5</b>	as S1 but polarized
<b>Barrier</b>	<b>T</b>	with barrier
<b>Colour of the push button</b>	<b>G</b>	green
	<b>N</b>	black
<b>Current ratings</b>		20...50 A
<b>5140 - G 1 3 3 - J1 M1 - M 6 S5 T G - 20 A ordering example</b>		



## Technical data

Voltage rating	3 AC 200 V (400 Hz); DC 28 V	
Current rating range	20...50 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	5,000 operations mechanical and 2,500 operations at I <sub>N</sub>	
Ambient temperature	-55...+125 °C (-67...+257 °F)	
Temperature compensation	-55...+90 °C (-67...+194 °F)	
Insulation co-ordination (IEC 60664)	rated impulse withstand voltage 1.5 kV	pollution degree 3
Dielectric strength	test voltage operating area pole/pole main to aux. circuit	AC 1,500 V AC 1,500 V AC 1,500 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I <sub>cn</sub>	2,000 A	
Degree of protection (IEC 60529)	operating area IP40 terminal area IP00	
Vibration (sinusoidal)	± 0.76 mm (5-80 Hz) 10 g (80-500 Hz), 5 g (500-2000 Hz) to EN 2350 Abschn. 5.3.1 and ISO 7137	
Vibration (random)	0.04 g <sup>2</sup> /Hz (40-500 Hz) 5.8 g rms (10-2000 Hz) to ISO 7137	
Acceleration	17 g, to EN 2350, para 5.3.3 and ISO 2669	
Shock	50 g (11 ms), to EN 2350 para 5.3.2 and ISO 7137	
Corrosion	48 hours at 5 % salt mist to EN 2350 para 5.4.2 and ISO 7137	
Humidity	48 hours at 95 % RH, to EN 2350 para 5.4.3 and ISO 7137	
Altitude	≤ 15,000 m above sea level	
Mass	ca. 144 g	with accessories and without auxiliary contact
	ca. 150 g	with accessories and with auxiliary contact

## Standard current ratings and typical volt drop values

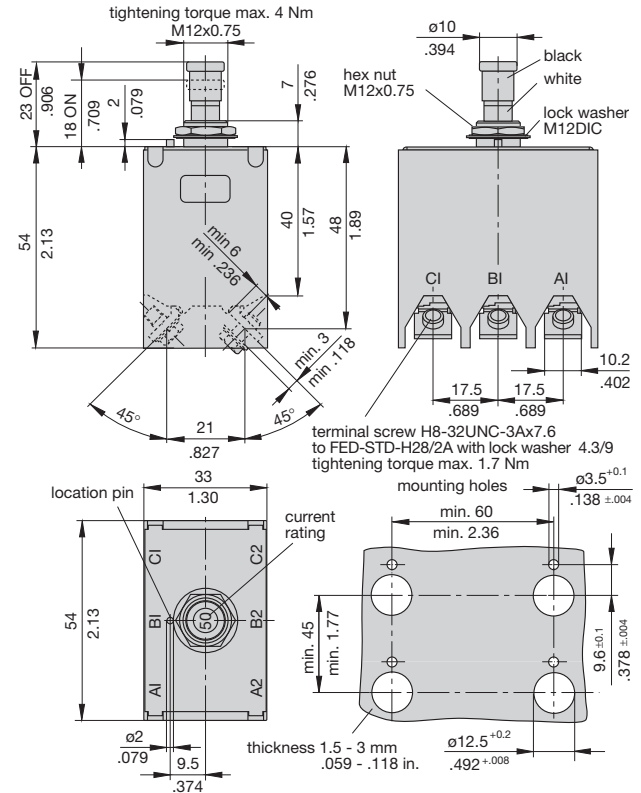
Current rating (A)	Volt drop per pole (mV)
20	150
25	150
30	150
35	150
40	120
45	120
50	120

## Approvals

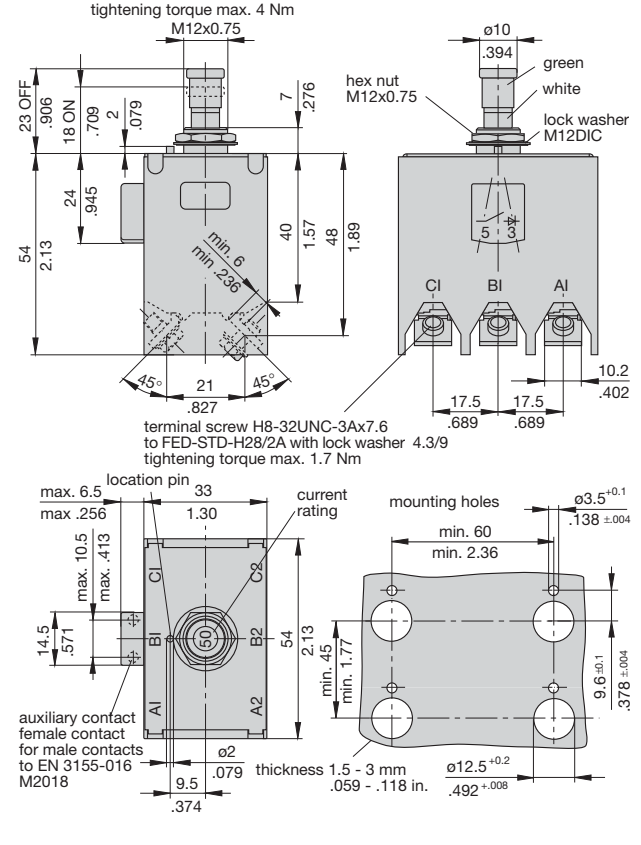
ASNE 0459  
 NSA 931323 / prEN2665-004  
 ASNE 0733-005 / prEN 3662-005  
 ASNE 0733-006 / prEN 3662-006

## Dimensions

### 5140-G132-J1M1-K5S0TN (NSA 931 323; prEN 2665-004)



### 5140-G132-J1M1-K5S5TG (ASNE 0733-005; prEN 3662-005)

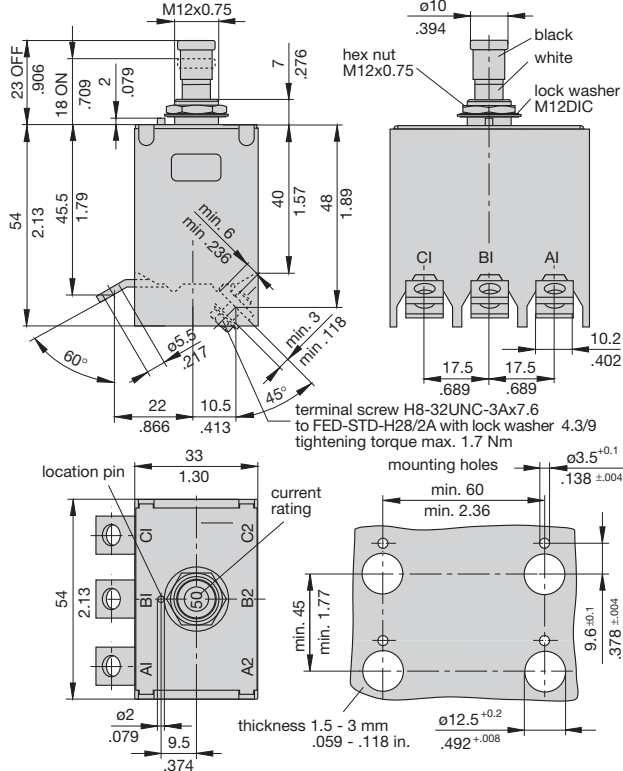


This is a metric design and millimeter dimensions take precedence (mm)  
 inch

## Dimensions

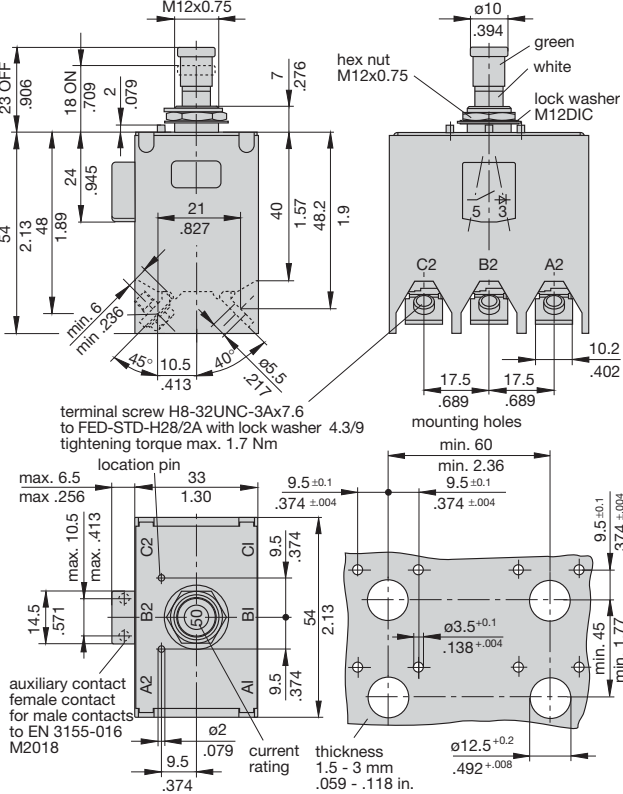
### 5140-G132-J2M1-K5S0TN (ASNE 0459)

tightening torque max. 4 Nm



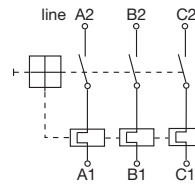
### 5140-G232-J3M1-K5S5TG (ASNE 0733-006; prEN 3662-006)

tightening torque max. 4 Nm

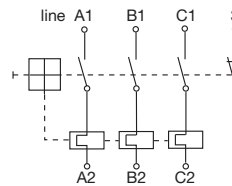


## Internal connection diagrams

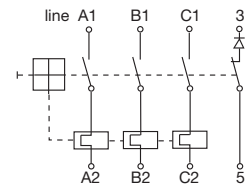
### without auxiliary contact



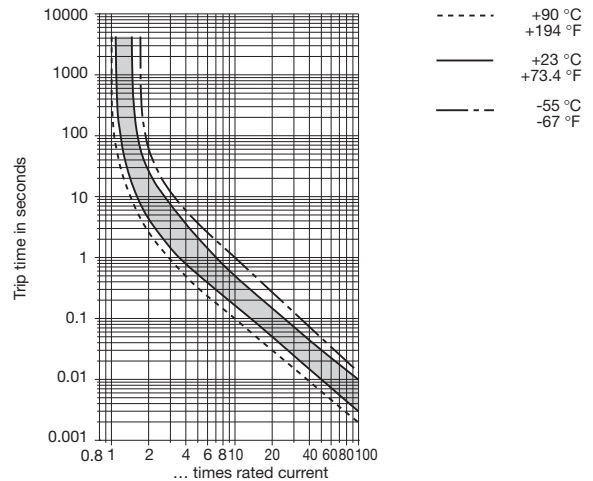
### with auxiliary contact



### with polarized auxiliary contact



## Typical time/current characteristics

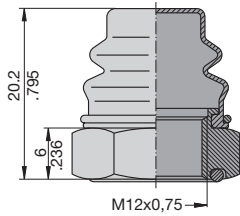


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

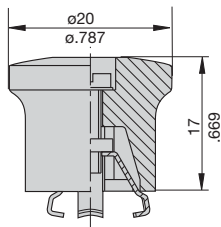
## Accessories

**Splash cover/hex nut assembly with O ring** (IP66 and IP67)  
**X 200 801 15** black chromated nut M12x0.75x6, black cover

**Splash cover/hex nut assembly with O ring** (IP66 and IP67)  
**X 200 801 16** black chromated nut 7/16-32UNx6, black cover

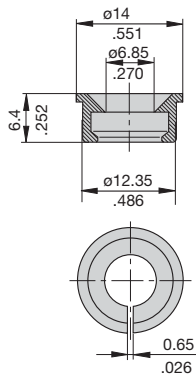


**Actuator extension** (black) to be fitted on the push button  
**X 200 803 01** (approved to VG 95345, part 23)



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

- Y 307 004 01** black
- Y 307 004 02** white
- Y 307 004 03** red
- Y 307 004 04** green
- Y 307 004 05** blue



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

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

Three pole, miniaturised, aircraft style thermal circuit breaker with tease-free, trip-free, snap action mechanism and push/pull on/off manual actuation (M-type TO CBE to EN 60934). An indicator band on the push button clearly shows the tripped/off position. Threadneck panel mounted, available in metric and US (AS 14154) configurations. Advanced two-chamber design minimises contact contamination to provide fail-safe operation. Temperature compensated with optional auxiliary contacts, and fully approved for use on a wide range of aircraft and equipment. For single pole version see type 483.

## Typical applications

Aircraft systems and equipment (fixed wing and helicopters); other extra low voltage wiring applications; defence equipment; communications systems.

## Standard current ratings and typical volt drop values

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

## Approvals

Approvals:

LN 29887

VG 95345, part 11

prEN 2996

AS 14154

QPL



583-...  
without auxiliary contact      with auxiliary contact

## Technical data

Voltage rating	3 AC 200 V (400 Hz); DC 28 V	
Current rating range	1...30 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	20,000 operations mechanical 10,000 operations at $I_N$ ( $\leq 25$ A) 4,000 operations at $I_N$ (30 A)	
Ambient temperature	-55...+125 °C (-67...+257 °F) $\leq 15$ A -55...+90 °C (-67...+194 °F) $> 15$ A	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 1.5 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area pole/pole main to aux. circuit	AC 1,500 V AC 1,500 V AC 1,500 V
Insulation resistance	$> 100$ M $\Omega$ (DC 500 V)	
Interrupting capacity $I_{cn}$	3 AC 200 V (400 Hz): $\leq 4$ A      1,000 A 5 A      2,000 A 7.5...25 A      2,500 A 30 A      1,500 A DC 28 V: 1...25 A      6,000 A 30 A      4,000 A	
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00	
Vibration (sinusoidal)	10 g (57-2000 Hz), $\pm 0.76$ mm (5-57 Hz) to VG 95210, sheet 19, 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, to VG 95210, sheet 29, IEC 60068-2-6, test Fc, ISO 7137	
Acceleration	17 g, to ISO 2669	
Shock	50 g (11 ms), to VG 95210, sheet 28, IEC 60068-2-27, test Ea, ISO 7137	
Corrosion	96 hours at 5 % salt mist 48 hours at 20 % salt mist to VG 95210, sheet 2, IEC 60068-2-11, test Ka, ISO 7137	
Humidity	240 hours at 95 % RH, to VG 95210, sheet 7, IEC 60068-2-3, test C/ISO 7137	
Explosion	to VG 95210, sheet 10, MIL-STD-202, meth. 109	
Altitude	$\leq 25,000$ m above sea level	
Mass	max. 67 g with auxiliary contact max. 63 g without auxiliary contact	
<b>Mass reduction through aluminium threadneck approx. 3 g</b>		



## Ordering information

<b>Type No.</b>	
<b>583</b>	three pole, with temperature compensation
<b>Mounting</b>	
<b>G</b>	threadneck panel mounting
<b>Threadneck design</b>	
<b>1</b>	M12x1x6.4x8.8 dia. with mounting plate (aux. contact version)
<b>2</b>	15/32-32UNx6.4x7.8 dia. (only without aux. contact)
<b>3</b>	MJ12x1x6.4x8.8 dia. (only without aux. contact)
<b>4</b>	M12x1x6.4x8.8 dia. (only without aux. contact)
<b>5</b>	7/16-32UNx6.4x7.8 (only without aux. contact)
<b>6</b>	M12x1x9.4x8.8 dia. (without aux. contact)
<b>7</b>	7/16-32 UNx6.4x7.8 dia. with mounting plate (aux.contact version)
<b>8</b>	M12x1x6.4x8.8 with mounting plate, aluminium threadneck
<b>9</b>	M12x1x6.4x8.8, aluminium threadneck
<b>Hardware for threadneck (washers)</b>	
<b>0</b>	without hardware
<b>1</b>	corrugated washer 12/15, fitted
<b>2</b>	serrated lock washer 12.1/17.2, fitted
<b>3</b>	serrated lock washer 11.3/14.9, fitted
<b>4</b>	serrated lock washer 12/15, fitted
<b>Hardware for threadneck (nuts)</b>	
<b>0</b>	without hardware
<b>1</b>	hex nut M12x1
<b>2</b>	hex nut 15/32-32UN
<b>3</b>	hex nut 7/16-32UN
<b>5</b>	hex nut MJ12x1 (only with threadneck design 3)
<b>Terminal design (main terminals)</b>	
<b>K</b>	screw terminals with metric thread
<b>1</b>	K14 (M4, MJ4)
<b>J</b>	screw terminals with inch thread
<b>1</b>	J14 (8-32UNC-2B)
<b>2</b>	J17 (8-32UNC-2B)
<b>3</b>	J25 (6-32UNC-2B)
<b>Characteristic curve</b>	
<b>M1</b>	thermal, 1.15-1.38 I <sub>N</sub>
<b>Terminal screws</b>	
<b>A</b>	Phillips screw M4x6
<b>B</b>	Phillips screw 8-32UNC-2Ax6 (MS 51957-41)
<b>C</b>	Phillips screw 6-32UNC-2Ax6 (MS 51957-41)
<b>D</b>	slotted flat head screw M4x6
<b>E</b>	hex screw with Phillips head 8-32UNC-3Ax9.5
<b>K</b>	hex screw with Phillips head 8-32UNC-3Ax7.6
<b>L</b>	Phillips screw MJ4x6
<b>Z</b>	without accessories
<b>Terminal washers</b>	
<b>0</b>	without lock washer
<b>1</b>	lock washer B4
<b>2</b>	lock washer 4.3 (MS 35338-137)
<b>3</b>	lock washer B4 and washer 4.4/9.5
<b>4</b>	lock washer 3.7 (MS 35338-136)
<b>5</b>	lock washer 4.3/9
<b>Auxiliary contact</b>	
<b>S0</b>	without auxiliary contact
<b>S1</b>	with auxiliary contact (N/C) (connector to EN 3155-016M2018, size 20)
<b>S5</b>	with polarized auxiliary contact (N/C)
<b>Barrier</b>	
<b>T</b>	barrier 25.5 mm wide, 37.7 mm long (-S0 only)
<b>U</b>	barrier 19.5 mm wide, 37.7 mm long
<b>V</b>	barrier 25.5 mm wide, 37.7 mm long, colour marking between the terminals (-S0 only)
<b>X</b>	barrier 19.5 mm wide, 34.1 mm long
<b>Colour of the push button</b>	
	(blank) black (standard) (e.g. 7.5)
<b>A</b>	green (e.g. 7.5)
<b>G</b>	green to EN (e.g. 7 1/2)
<b>N</b>	black to EN (e.g. 7 1/2)
<b>Current ratings</b>	
	1...30 A
<b>583 - G 4 1 1 - K 1 M1 - A 1 S0 T . - 5 A</b>	ordering example

## Ordering information for approved devices

### 583-G411-K1M1-A1S0TN (583-96-TC-K14)

Metric threadneck M12x1 and terminal design -K14 (M4x6), listed by the German Materialamt der Bundeswehr to VG 95345 T11.

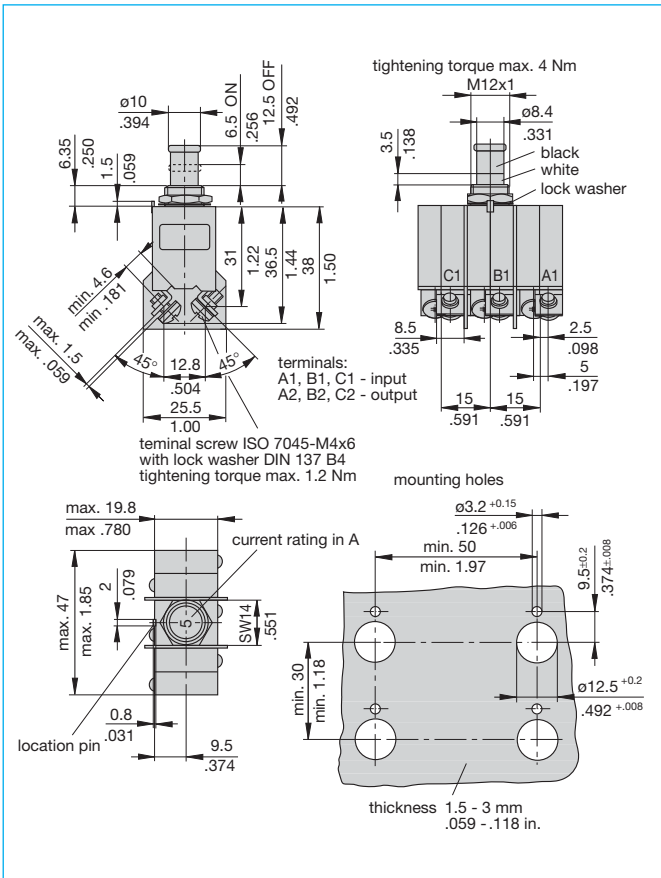
### 583-G111-K1M1-A1S1UN

Metric threadneck M12x1 and terminal design -K14 (M4x6) with auxiliary contact -Si, listed by the German Materialamt der Bundeswehr to VG 95345 T11.

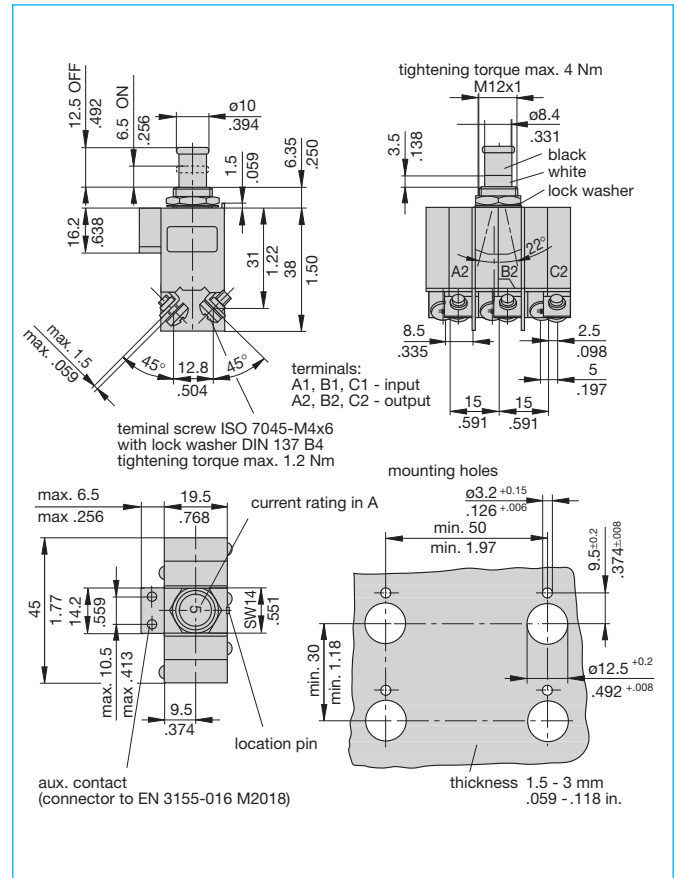
### 583-G533-J1M1-B2S0XN (AS 14154)

Threadneck size 7/16-32UNx6.4 and terminal design -J14 (inch thread 8-32), approved to AS 14154.

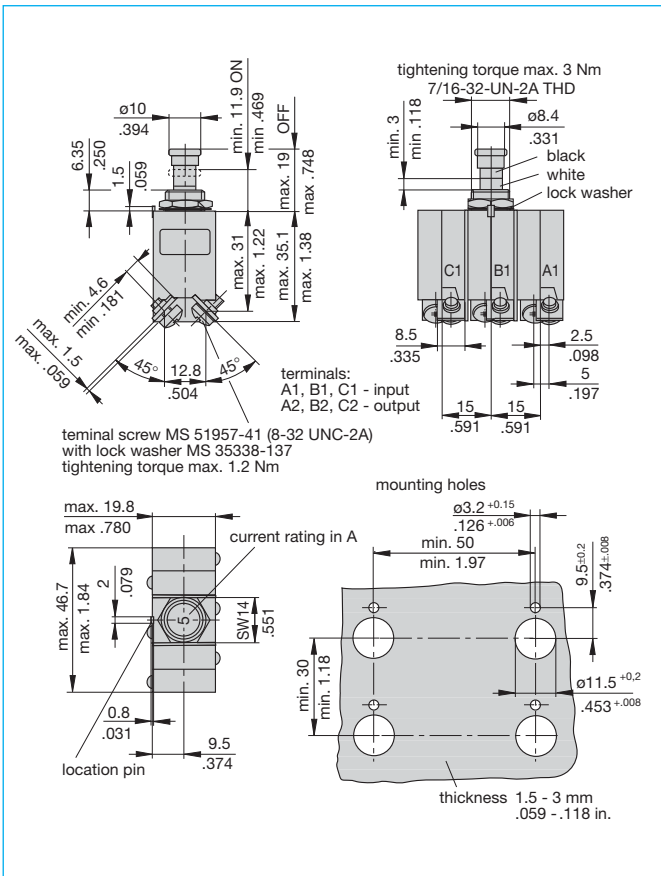
## Dimensions 583-G411-K1M1-A1S0TN (VG 95345 T11)



## Dimensions 583-G111-K1M1-A1S1UN (VG 95345 T11)



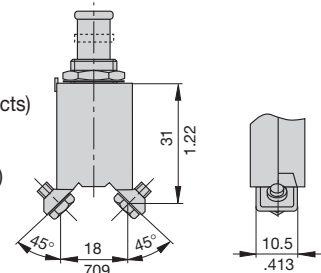
## Dimensions 583-G533-J1M1-B2S0XN (AS14154)



## Other main terminal and threadneck designs

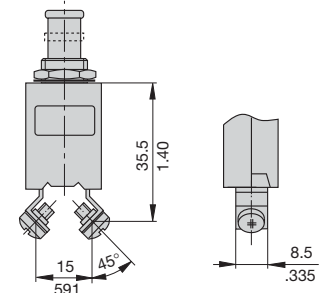
### terminal design -J2

- recommended barrier:  
-T or -X  
for -S0  
(without auxiliary contacts)  
-U or -X  
for -S1 or -S5  
(with auxiliary contacts)

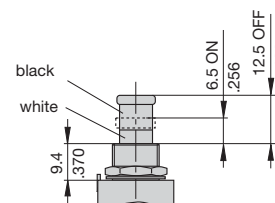


### terminal design -J3

- recommended barrier:  
-T for -S0  
(without auxiliary contacts)  
-U for -S1 or -S5  
(with auxiliary contacts)

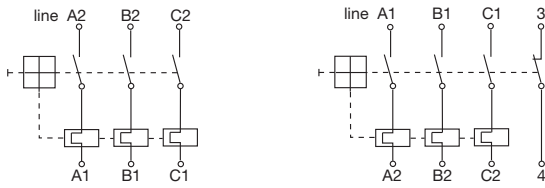


### mounting -G6

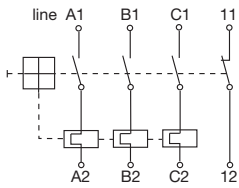


## Internal connection diagrams

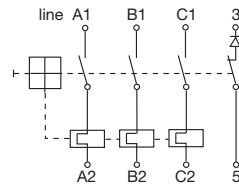
with auxiliary contact  
EN 2996-004



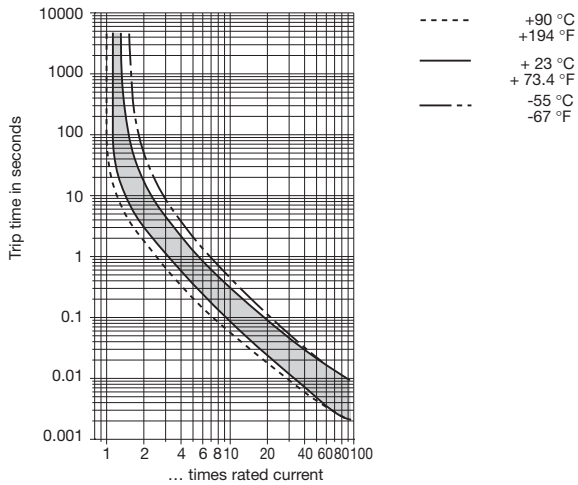
with auxiliary contact  
VG 95345 T11



with polarized auxiliary contact  
EN 2996-005

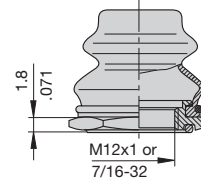


## Typical time/current characteristics

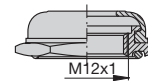


## Accessories

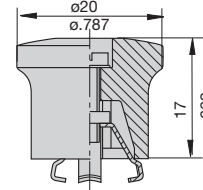
- Splash cover/hex nut assembly with O ring (IP66 and IP67)**  
(approved to VG 95345, part 23)  
**X 200 801 08** nickel plated nut, transparent cover  
**X 200 801 03** matt black finish nut, black cover  
**X 200 801 09** matt black finish nut 7/16-32, black cover



- Splash cover black/hex nut assembly with O ring (IP54)**  
only for threadneck nut M12 (to VG 95345, sheet 23)  
**X 200 802 01** nickel plated nut  
**X 200 802 02** matt black finish nut

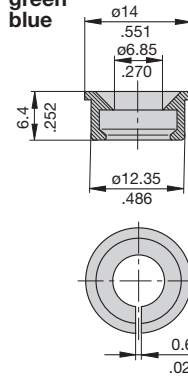


- Actuator extension (black)** to be fitted on the push button  
(approved to VG 95345, T23)  
**X 200 803 01**



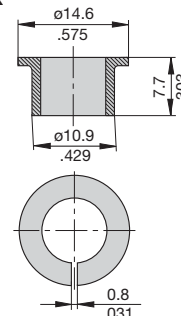
- Identification collar** to be snapped on the push button

- Y 307 004 01** black  
**Y 307 004 02** white  
**Y 307 004 03** red  
**Y 307 004 04** green  
**Y 307 004 05** blue



- Lock out ring** to block the push button in OFF position

- Y 307 005 01** red  
**Y 307 005 02** black



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, two and three pole isolators to EN 60947 / IEC 60947 with toggle actuation. Designed for rail, panel or surface mounting. Options include auxiliary contacts and remote electrical disconnection. For circuit breaker versions see types 410, 520, 530.

## Typical applications

Control systems, industrial equipment.

## Ordering information

### Type No.

911	single pole switch
912	double pole switch
913	three pole switch

### Terminal design

<b>K</b>	main terminal up to 32 A: pressure plate B5-DIN 46288 up to 63 A: pressure plate B6-DIN 46288 up to 125 A: terminal screws DIN 46206, sheet 2, form 1, thread M6
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### Mounting

<b>1</b>	surface mounting
<b>2</b>	rail or panel mounting (rail DIN EN 50022-35x7.5)
<b>3</b>	rail or panel mounting (rail DIN EN 50035-G32)
<b>4</b>	panel mounting only
<b>5</b>	mounting brackets – surface mounting

### Auxiliary contacts (terminals M3.5 or blade terminals (-FA))

<b>Si</b>	one each N/O and N/C (not for 911-FA)
<b>Si1</b>	one N/C (11,12) (not for 911-FA)
<b>Si2</b>	one N/O (13,14)
<b>2Si</b>	two each N/O and N/C – types 912, 913 only (not for 912-FA)
<b>3Si</b>	three each N/O and N/C – type 913 only (not for 913-FA)

### Remote trip (optional)

<b>FA 12</b>	remote disconnection, for DC 12 V
<b>FA 24</b>	remote disconnection, for DC 24 V

### Current ratings

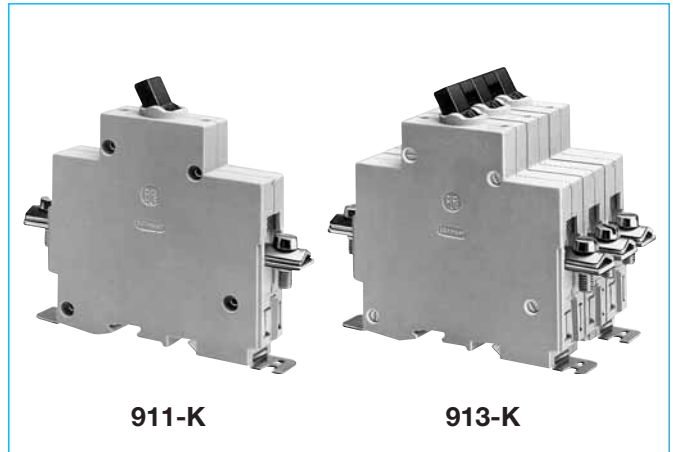
32, 63, 125 A

911 - K - 1 - Si - ... - 63 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

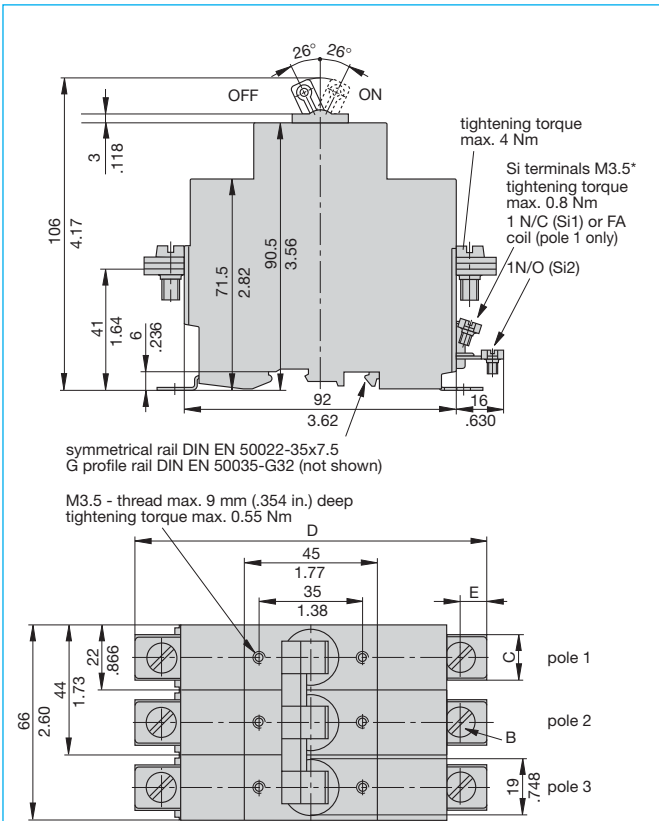
Current rating (A)	Internal resistance (Ω)
32	≤ 0.002 per pole
63	≤ 0.002 per pole
125	≤ 0.002 per pole



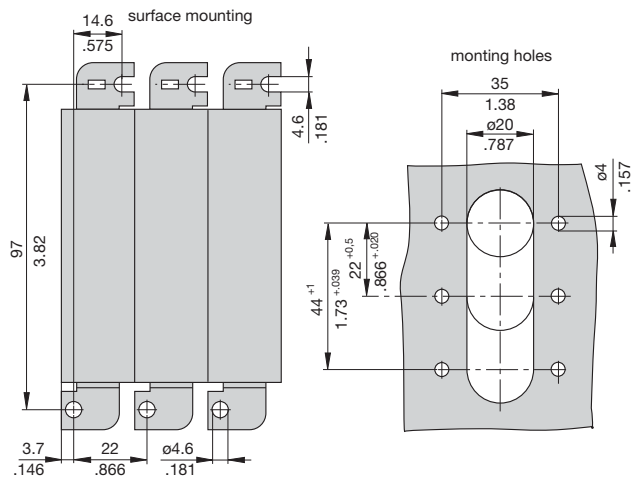
## Technical data

Voltage rating	AC 240 V; 3 AC 415 A; 3 AC 500 V; DC 110 V
Current rating range	32 A, 63 A, 125 A
Auxiliary contact rating	6 A at AC 240 V or DC 28 V; 1 A at DC 110 V
Electrical remote disconnection (FA)	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 msec
Typical life	10,000 operations at I <sub>N</sub> 20,000 operations mechanical
Ambient temperature	-40...+75 °C (-40...+167 °F)
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 6 kV pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area AC 3,300 V pole/pole AC 3,300 V main to aux. circuit AC 2,200 V aux. circuit 11-12 to 13-14 AC 1,000 V
Insulation resistance	> 100 MΩ (DC 500 V)
Short-circuit protection	back up fuse max. 125 A
Degree of protection (IEC 60529/DIN 40050)	operating area IP40 terminal area IP00
Vibration	5 g (57-200 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 60068-2-3, test Ca
Mass	approx. 220 g single pole approx. 440 g double pole approx. 660 g three pole

## Dimensions

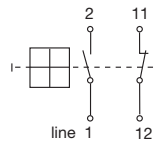


Current rating	Dimensions mm/in.				Terminal	Cross section (see DIN 46288)		Max. tightening torque
	B	C	D	E		with 1 or 2 equal conductors	with 2 different conductors	
≤ 32 A	M5 13 .512	114 4.49	7 .276	pressure plate B5 DIN 46288	2.5 mm <sup>2</sup> to 10 mm <sup>2</sup>	2.5 mm <sup>2</sup> to 10 mm 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

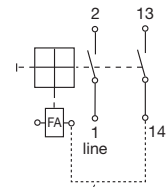


## Internal connection diagrams

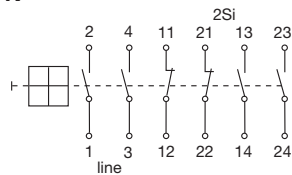
911



911-...-FA

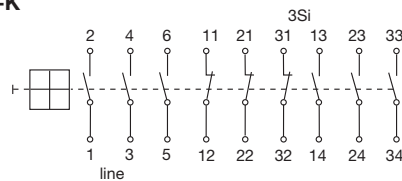


912-K



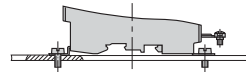
recommended link for FA coil protection pre-wired at the factory

913-K

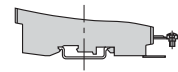


## Mounting method

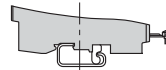
Surface mounting  
suffix: -1



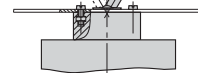
Rail mounting  
(EN 50022-35x7.5)  
suffix: -2



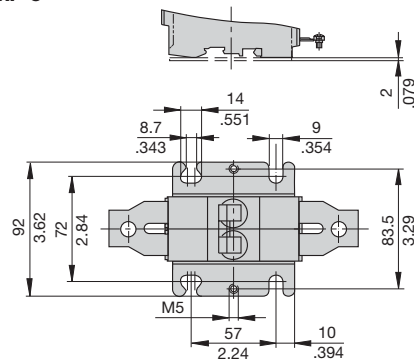
Rail mounting  
(EN 50035-G32)  
suffix: -3



Panel mounting  
suffix: -4



Mounting brackets - surface mounting  
suffix: -5

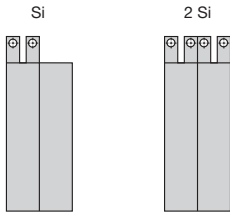


Covers, labels, sealing screws etc. can be fitted on the front of the housing.

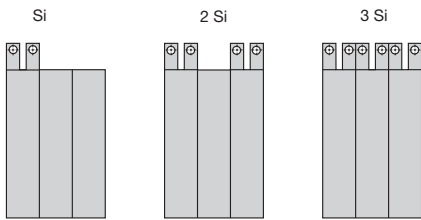
This is a metric design and millimeter dimensions take precedence (mm/inch)

## Auxiliary contact arrangement with multipole switches

### double pole devices



### three pole devices

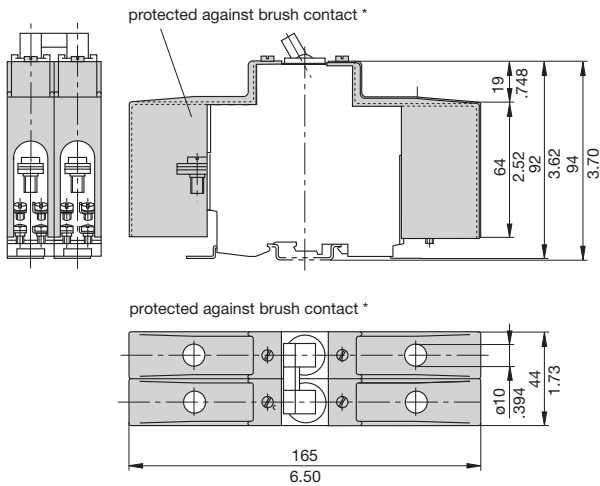


## Accessories

### Terminal insulation cover

X 211 705 01

(1 set = 2 pcs per pole)



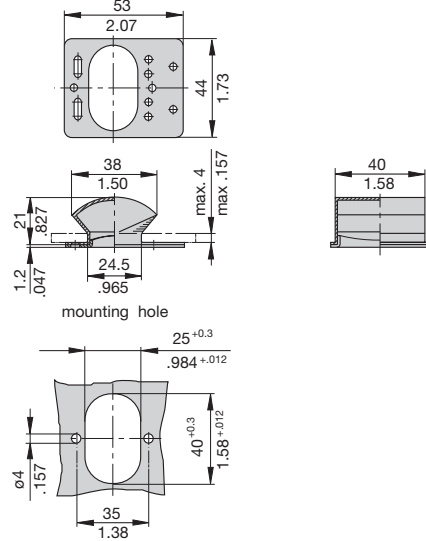
\* to DIN 57106T100/VDE 0106 T100

## Accessories

### For series 911 ≤ 125 A

Water splash cover translucent with fixing plate and screws (IP54)

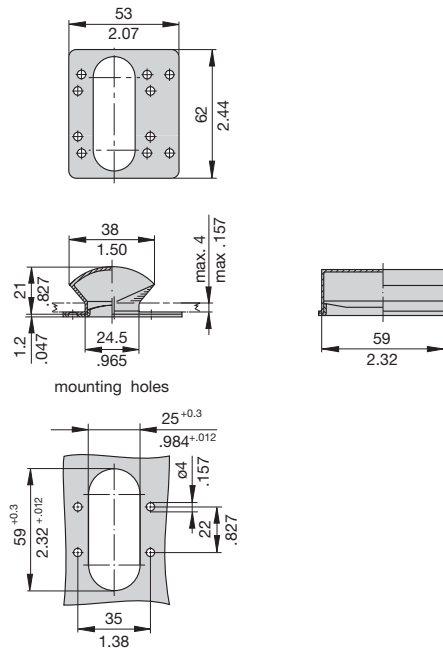
X 211 118 01



### For series 911 - 240 A and 912

Water splash cover translucent with fixing plate and screws (IP54)

X 211 119 01



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 or two pole isolation switches to IEC 60947/EN 60947 with toggle actuation. Options include auxiliary contacts, a moulded flame retardant enclosure for added environmental protection (with or without rotary action external operating knob), and remote operation - disconnection only, or disconnection and re-connection. A version for use in hazardous areas (e.g. petroleum and chemical tankers) is available to special order.

## Typical applications

Vehicles of all types (including tankers), boats, battery powered systems.

## Ordering information

### Type No.

921 single pole switch  
922 double pole switch

### Enclosure design (optional)

**B3** without external operating knob, for use only with single pole devices  
**B31** with external operating knob, for use only with single pole devices  
**B32** without external operating knob, for use only with double pole devices  
**B33** with external operating knob, for use with double pole devices  
**B34** with external operating knob, for use only with double pole devices with remote-re-connection facility  
**B35** with external operating knob, for use only with single pole devices with remote-re-connection facility  
**C3** without external operating knob, 1-pole, IP65  
**C32** without external operating knob, 2-pole, IP65

### Terminal design

**K12** for single pole version, enclosures B3, B31, B35  
**K60** for single pole version  
**K61** for double pole version  
**K62** for double pole version  
**K71** compulsory and only for C3 housing  
**K72** for double pole version, enclosures B32, B33, B34  
**K76** compulsory and only for C32 housing

### Mounting

**2** compulsory and only for C3 and C32 housing  
**5** mounting brackets - surface mounting

### Auxiliary contacts (blade terminals 6.3x0.8)

**Si2** one N/O  
**Si01** one N/C, two N/O  
**2Si2** two N/O  
**Si10** one each N/O and N/C

### Remote operation

**FA** remote disconnection  
**FC** electrical remote disconnection (FA) and re-connection (FE)  
**BC-FA** electrical remote disconnection and manual remote re-connection (not for enclosure -B.. or -C..)

### Coil voltage

**12** AC/DC 12 V  
**24** AC/DC 24 V

### Current ratings

**240 A** type 921  
**120 A** type 922

921 - ... - K60 - 5 - Si2 - FA 24 - 240 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.



**921**  
single pole

**922**  
double pole

## Technical data

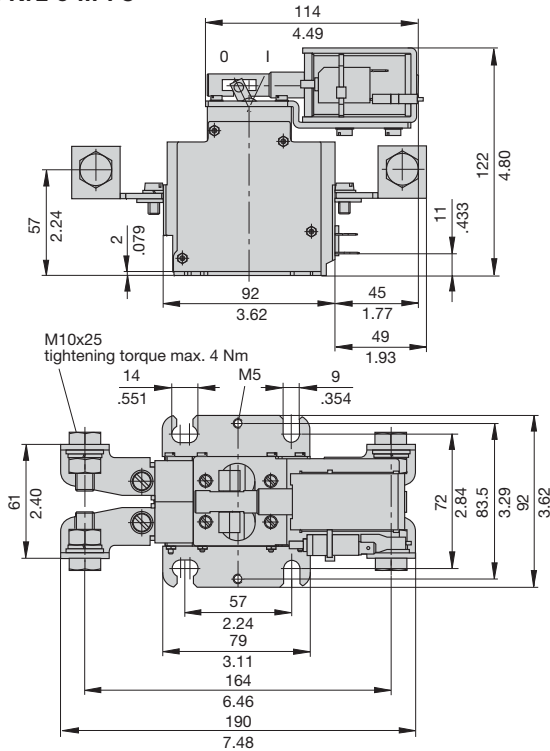
Voltage rating	DC 12 V; DC 24 V	
Current rating range	240 A type 921, single pole 120 A type 922, double pole	
Auxiliary contact rating	6 A at DC 24 V 1 A at DC 110 V	
Electrical remote disconnection (-FA):	operating voltage DC 12 V or DC 24 V operating current approx. 18 A or approx. 12 A max. pulse time 10 ms < t <sub>ON</sub> < 20 ms / t <sub>OFF</sub> > 10 s switching time < 20 ms	
Electrical remote re-connection (-FE):	operating voltage DC 12 V or DC 24 V operating current approx. 30 A or approx. 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	10,000 operations at I <sub>N</sub> 20,000 operations mechanical	
Ambient temperature	-40...+75 °C (-40...+167 °F)	
Insulation co-ordination (IEC 60664 and 60664A)	rated impulse withstand voltage 6 kV	pollution degree 3
Dielectric strength (IEC 60664 and 60664A)	test voltage operating area pole/pole main to aux. circuit aux. circuits 11-12 to 13-14	AC 3,300 V AC 3,300 V AC 2,200 V AC 1,000 V
Insulation resistance	> 100 MΩ (DC 500 V)	
Switching capacity	Type 921 2,500A for 1s at +23°C 600A for 1min at +23°C 600A for 2min at -23°C 600A for 90s at 0°C	Type 922 1,500A for 1s at +23°C 600A for 30s at +23°C 600A for 1min at -23°C 600A for 45s at 0°C
Degree of protection (IEC 529/DIN 40050)	operating area IP40 terminal area IP00 IP54 with enclosure -B.. IP65 with enclosure -C..	
Vibration	5 g (57-200 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms), to IEC 60068-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 60068-2-11, test Ka	
Humidity	240 hours at 95 % RH, to IEC 60068-2-3, test Ca	
Mass	approx. 900 g base unit + approx. 400 g remote disconnection + approx. 100 g remote re-connection + approx. 750 g B housing + approx. 1,000 g C housing	



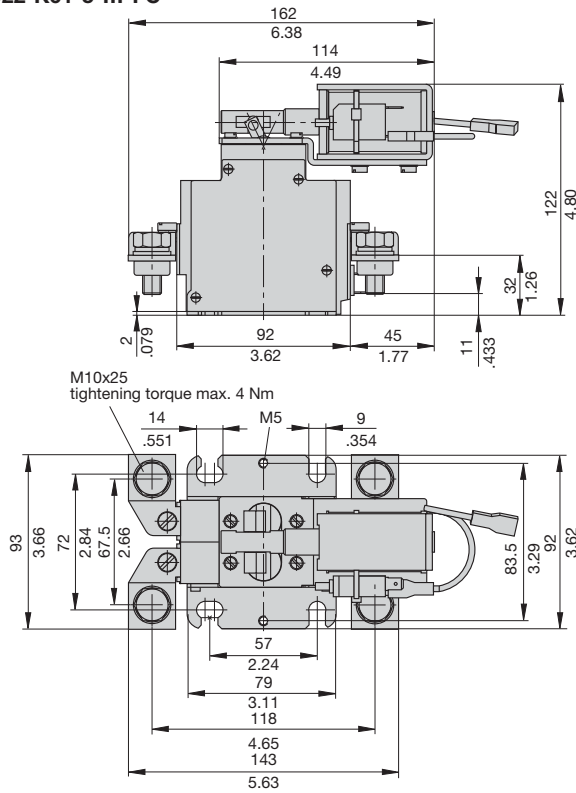


## Dimensions types 922

922-K72-5-...-FC

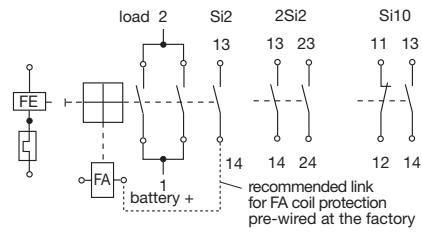


922-K61-5-...-FC

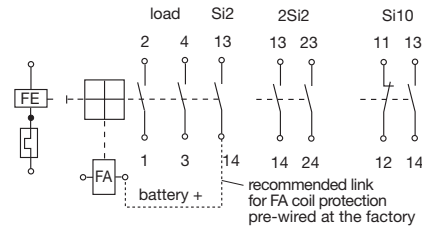


## Internal connection diagrams

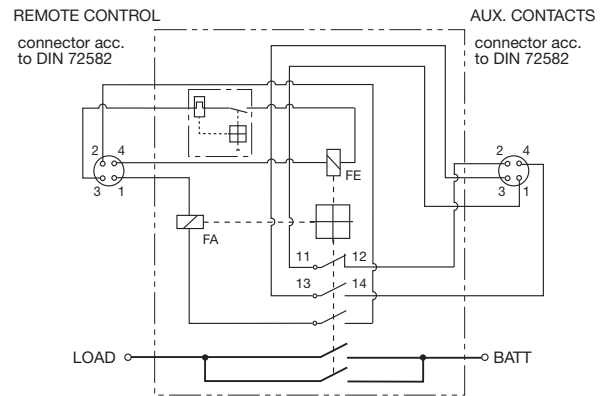
921



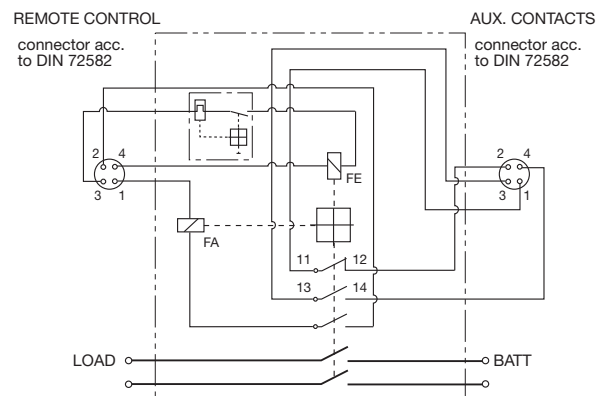
922



921-C3-...

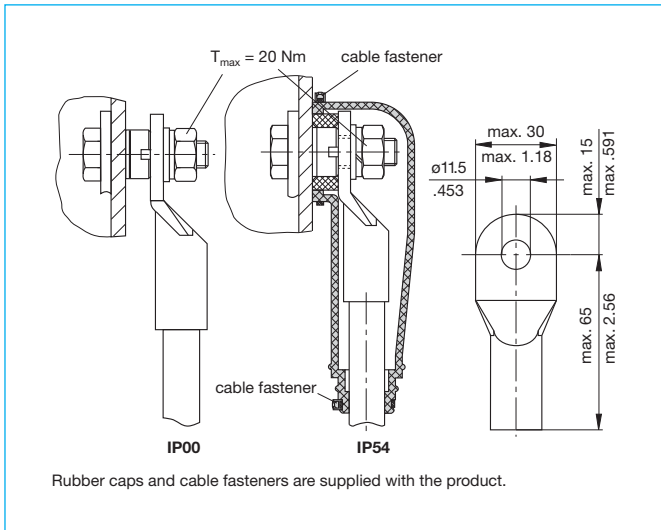


922-C32-...

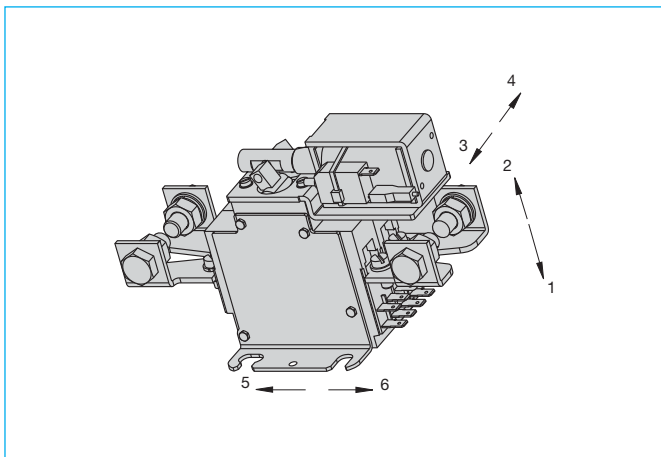


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Terminals with housing C3.



## Shock directions



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

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## Description

Single pole, miniaturised aircraft simulator switch with extremely fast magnetic trip time. Blade, screw and wire wrap terminals. Aircraft style threadneck and push/pull button with white trip indicator ring. Current rating marked on the push button according to customer's request by adhesive labels or marking inserts.

## Typical applications

Simulators.

## Ordering information

### Type No.

**9510** switch with magnetic instantaneous trip for flight simulators

### Mounting method and style

**G** threadneck mounting with standard push button

**L** threadneck mounting with long push button

### Threadneck design

**1** M12x1x6.3

**2** 7/16-32UNx6.3

### Number of poles

**1** single pole

### Accessories for threadneck

**0** without accessories

**1** hex nut M12x1, aluminium, lock washer  $\phi 12 / \phi 15$  (crinkle) fitted

**2** hex nut M12x1, aluminium, serrated lock washer  $\phi 12.1 / \phi 17.2$ , fitted

**3** hex nut 7/16-32UN, aluminium, toothed washer  $\phi 11.3 / \phi 14.9$ , fitted (MS 3533-141)

**9** front plate with mounting thread 6-32UNC-2B for threadneck 7/16-32 UN, threaded sleeve 7/16-32 UN

### Terminal configuration

**J** screw terminals with inch thread

**1** 6-32UNC-2B, silver plated bent 45° inwards

**3** 6-32UNC-2B, silver plated, with socket, bent 45° inwards

**P** blade terminals

**1** A6.3x0.8 DIN 46244, silver plated

**W** wire wrap terminal

**4** pin size 1.2x1.2 EN 60352-1, gold plated, with socket

**Z** 0 without terminals

### Rated voltage

**F0** DC 24 V

**F1** DC 28 V

**F2** DC 48 V

**F4** DC 12 V

### Accessories (terminal screws)

**B** Phillips screw 6-32UNC-2Ax4.8 fitted (MS 51957-25)

**Z** without accessories

### Accessories (terminal washers)

**0** without accessories

**2** 3.6 split washer fitted (MS 35338-136)

### Internal circuit

**R2** with logic diode, contacts gold plated

### Colour of the push button

**S** black

**G** green

**A** green, for marking insert

**B** black, for marking insert

**0** without marking

**1** hot-stamped marking, can be read when locating pin is above

**2** hot-stamped marking, can be read when locating pin is at the bottom

**9** without marking insert

### Current ratings

**0.5...150 A**

9510 - G 1 1 1 - J 1 F1 - B 0 R 2 S 0 - 10 A ordering example



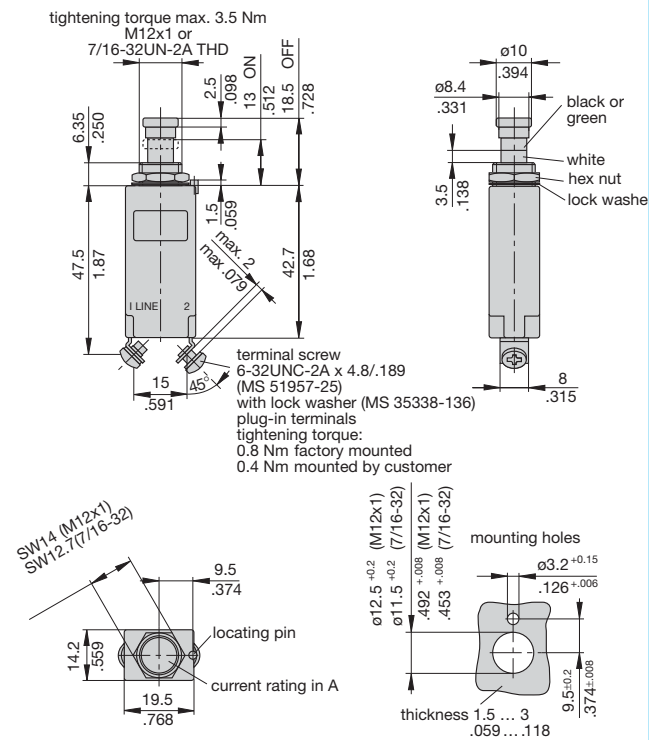
9510-...

## Technical data

Voltage rating	DC 12 V	DC 24 V	DC 28 V	DC 48 V
Trip current	< 450 mA	< 160 mA	< 200 mA	< 340 mA
Trip time	< 25 ms	< 25 ms	< 25 ms	< 20 ms
Min. switching voltage	at +23 °C/+73.4 °F		DC 25 V	
	at +60 °C/+140 °F		DC 28 V	
Internal resistance	157 $\Omega$			
Typical life	10,000 operations at DC 24, 28 or 48 V			
Temperature range	-30...+60 °C (-22...+140 °F)			
Insulation resistance	> 100 M $\Omega$ (DC 500 V)			
Degree of protection (IEC 60529)	operating area IP40 terminal area IP00			
Vibration (sinusoidal)	3 g (57-500 Hz), $\pm$ 0.23 mm (10-57 Hz) to DIN IEC 60068-2-6, test Fc 10 cycles/frequency axis			
Shock	5 g (11 ms), to DIN IEC 60068-2-27, test Ea			
Humidity	240 hours at 95 % RH, 40 °C to DIN IEC 60068-2-3, test Ca			
Mass	23 g without hardware 26 g with hardware			

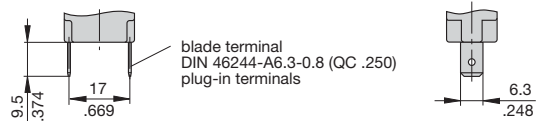
## Dimensions

### 9510-G...-J1...-B2....

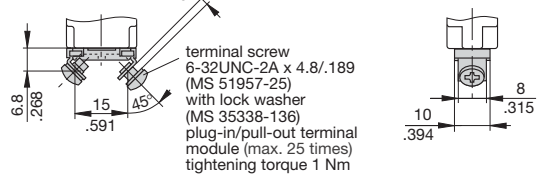


## Other main terminal designs

### -P1...



### -J3...

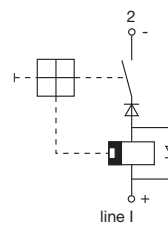


### -W4...



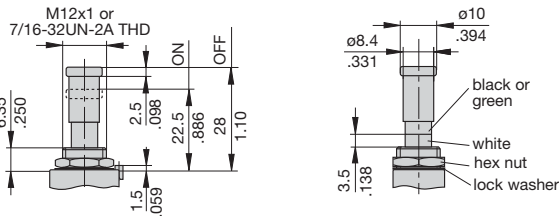
## Internal connection diagram

### internal circuit R 2

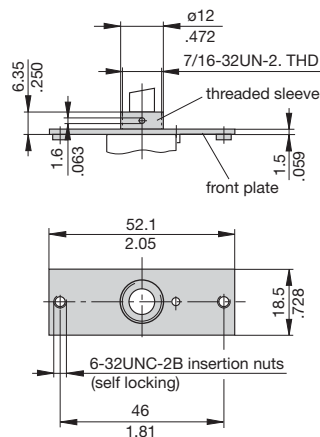


## Other threadneck designs

### -L...



### -G219 -L219



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

## Accessories

### Label (black) for push/pull button (S0 or G0)

Part number	Rated current (A)
Y 307 082 01	0.5
Y 307 082 02	1/2
Y 307 082 03	1
Y 307 082 04	1.5
Y 307 082 05	1 1/2
Y 307 082 06	2
Y 307 082 07	3
Y 307 082 08	5
Y 307 082 09	7.5
Y 307 082 10	7 1/2
Y 307 082 11	10
Y 307 082 12	15
Y 307 082 13	20
Y 307 082 14	25
Y 307 082 15	30
Y 307 082 16	35
Y 307 082 17	6
Y 307 082 18	40
Y 307 082 19	50
Y 307 082 20	60
Y 307 082 21	70
Y 307 082 22	75
Y 307 082 23	80
Y 307 082 24	90
Y 307 082 25	100
Y 307 082 26	120
Y 307 082 27	125
Y 307 082 28	150
Y 307 082 29	2.5
Y 307 082 30	2 1/2
Y 307 082 31	7

#### Plug-in screw terminal,

bent at 45° inwards (2 pcs needed per unit)

**Y 307 187 02** terminal silver plated

**Y 304 508 02** Phillips screw 6-32 UNC-2Ax4.8 (MS 51957-25)

**Y 304 509 01** split washer (MS 35338-36)

#### Plug-in blade terminal (2 pcs needed per unit)

**Y 307 202 02** P10 terminal silver plated

#### Plug-in/pull-out screw terminals with socket,

bent at 45° inwards

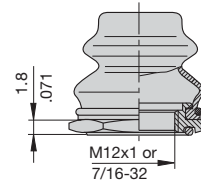
**X 222 173 11** terminals silver plated

#### Plug-in/pull-out wire wrap terminals with socket

**X 222 174 12** terminals gold plated

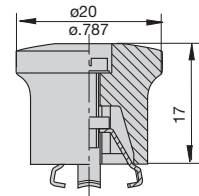
#### Splash cover/hex nut assembly with O ring (IP66 and IP67) (approved to VG 95345, part 23)

- X 200 801 03** matt black finish nut M12x1.8, black cover
- X 200 801 08** nickel plated nut M12x1.8, transparent cover
- X 200 801 09** matt black finish nut 7/16-32x1.8, black cover
- X 200 801 10** matt black finish nut 7/16-32x1.8, transparent cover



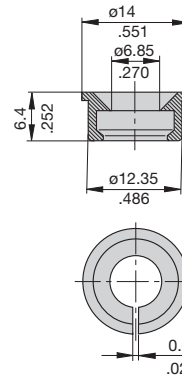
#### Actuator extension (black) to be fitted on the push button (approved to VG 95345, T23)

**X 200 803 01**



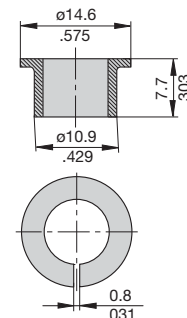
#### Identification collar to be snapped on the push button

- Y 307 004 01** black
- Y 307 004 02** white
- Y 307 004 03** red
- Y 307 004 04** green
- Y 307 004 05** blue



#### Lock out ring to block the push button in OFF position

- Y 307 005 01** red
- Y 307 005 02** black



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

## Accessories

**Hex nut M12x1**  
Y 300 116 04

**Hex nut 7/16-32**  
Y 304 506 03

**Lock washer Ø12 / Ø15**  
Y 300 118 03

**Serrated lock washer Ø12.1 / Ø17.2**  
Y 302 911 01

**Toothed washer Ø11.3 / Ø14.9 (MS 35333-141)**  
Y 304 507 01

**Front plate with mounting thread 6-32UNC-2B  
for threadneck 7/16-32UN**  
Y 301 516 21

**Threaded sleeve**  
Y 307 281 02

**Extracting tool of marking insert**  
Y 307 301 01

### Marking inserts (push button configuration A or B)

hot stamped black	green	current rating (A)
Y 307 280 01	Y 307 280 02	without
X 222 175 01	X 222 176 01	0.5
X 222 175 02	X 222 176 02	1/2
X 222 175 03	X 222 176 03	1
X 222 175 04	X 222 176 04	1.5
X 222 175 05	X 222 176 05	1 1/2
X 222 175 06	X 222 176 06	2
X 222 175 07	X 222 176 07	3
X 222 175 08	X 222 176 08	5
X 222 175 09	X 222 176 09	7.5
X 222 175 10	X 222 176 10	7 1/2
X 222 175 11	X 222 176 11	10
X 222 175 12	X 222 176 12	15
X 222 175 13	X 222 176 13	20
X 222 175 14	X 222 176 14	25
X 222 175 15	X 222 176 15	30
X 222 175 16	X 222 176 16	35
X 222 175 17	X 222 176 17	6
X 222 175 18	X 222 176 18	40
X 222 175 19	X 222 176 19	50
X 222 175 20	X 222 176 20	60
X 222 175 21	X 222 176 21	70
X 222 175 22	X 222 176 22	75
X 222 175 23	X 222 176 23	80
X 222 175 24	X 222 176 24	90
X 222 175 25	X 222 176 25	100
X 222 175 26	X 222 176 26	120
X 222 175 27	X 222 176 27	125
X 222 175 28	X 222 176 28	150
X 222 175 29	X 222 176 29	2.5
X 222 175 30	X 222 176 30	2 1/2
X 222 175 31	X 222 176 31	7

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

## Description

The battery master switch E-1032-... allows remotely controlled connection and disconnection of the battery. In the event of reverse connection the battery will be disconnected from the vehicle electrical system.

## Typical applications

Commercial vehicles

## Ordering information

<b>Type No.</b>	
E-1032	
<b>Version</b>	
NA1	single pole
NA2	double pole
<b>Enclosure</b>	
C	with moulded enclosure IP65
<b>Isolation switch</b>	
921	single pole switch
922	double pole switch
<b>Voltage rating</b>	
DC 24 V	
DC 12 V	
<b>Variant No.</b>	
e.g. special versions, mounting plate. Designation determined by manufacturer	
E-1032 - NA1 - C 921 - DC 24 V - ... ordering example	



**E-1032**

## Technical data

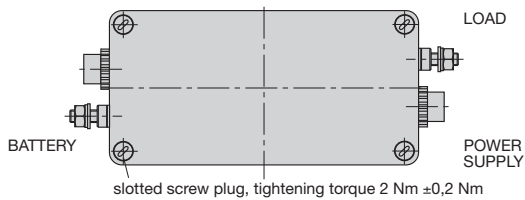
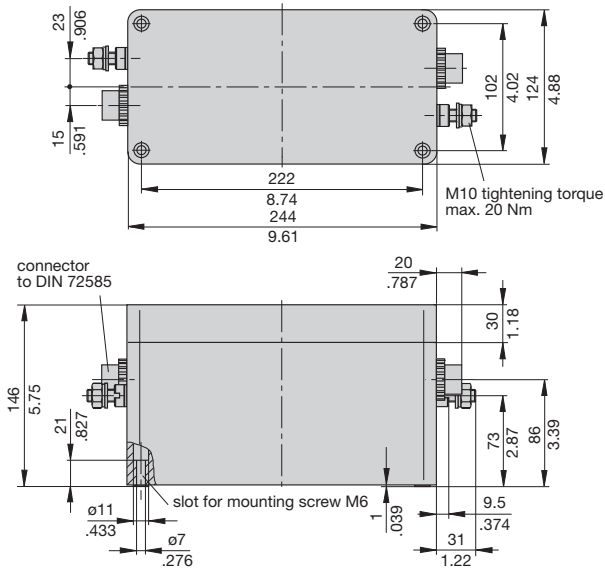
Voltage rating	DC 24 V	DC 12 V
Voltage rang	ON 18 - 32 V	9 - 16 V
	OFF 15 - 32 V	8.5 - 16 V
The switching function is no longer ensured when the voltage falls below the minimum values. The switch will not change its position when the voltage falls down to 0 V (automatic locking).		
Current ratings	240 A single pole 120 A double pole	
Overload capacity	2,500 A for 1 s at 23 °C, single pole 1,500 A for 1 s at 23 °C, double pole	
Current consumption of the electronics	≤ 15 mA (with the control circuit connected)	
Switching current at U <sub>N</sub>	DC 24 V:	DC 12 V:
	ON approx. 15A/100 ms OFF approx. 12A/100 ms	approx. 20A/100 ms approx. 10A/100 ms
Control circuit	4 - 6 mA ON	
Control switch (accessory)	with coding resistance DC 24 V: 1 kΩ DC 12 V: 330 Ω without coding resistance to ADR for external actuation	
Temperature range	-40...+75 °C (-40...+167 °F)	
Reverse polarity protection	If polarized incorrectly, the Master Switch will switch off immediately, disconnecting the entire vehicle electrical system. After approx. 30 s the circuit breaker of the ON coil will trip.	
Resettability	When the Battery Master Switch is mechanically switched off, it will be reset immediately by the electronics.	
Typical life	10,000 operations at I <sub>N</sub> 20,000 operations, mechanical	
Degree of protection IEC 60529/DIN40050)	housing IP65 terminal studs with rubber cap IP54	
Vibration	5 g (57-200 Hz), ± 0.38 mm (10-57 Hz) to IEC 60068-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) direction 1, 2, 3, 4 15 g (11 ms) direction 5, 6 to IEC 60068-2-27, test Ea	
Corrosion	96 h at 5 % salt mist, to IEC 60068-2-11, test Ka	
Humidity	240 h at 95 % RH, to IEC 60068-2-78, test Cab	
Terminals		
Main terminals	blade terminals with cable lugs for M10 terminal studs	
Control cable	connector to DIN 72585	

## Technical data

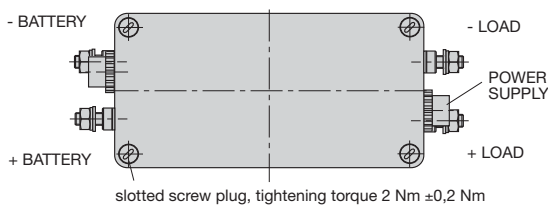
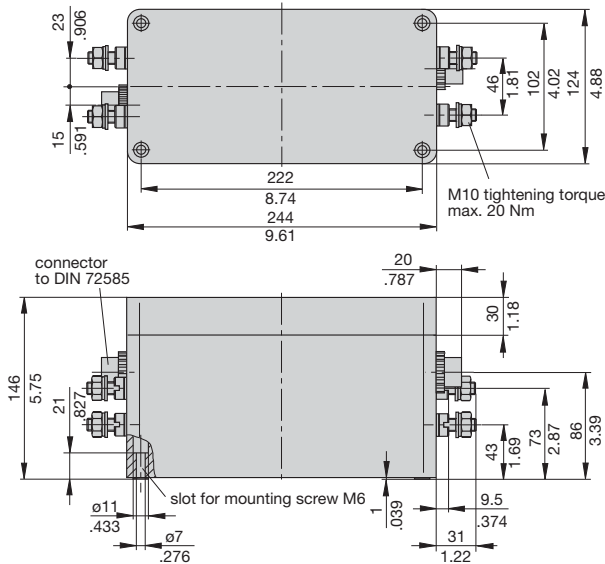
Auxiliary contact for auxiliary relay	max. 6 A (circuit not protected)
Mass	single pole: approx. 3,500 g with enclosure, double pole: approx. 3,700 g with enclosure,

## Dimensions

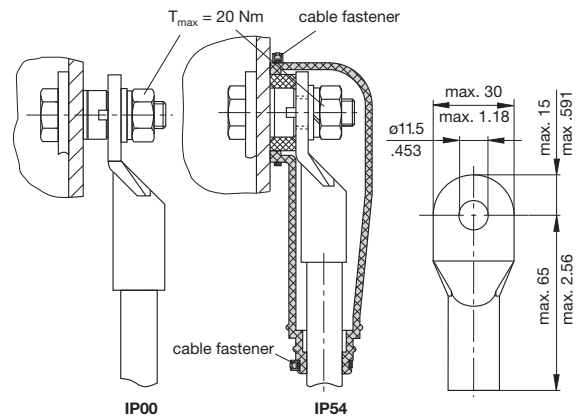
### E-1032-NA1-... 1 pole



### E-1032-NA2-... 2 pole

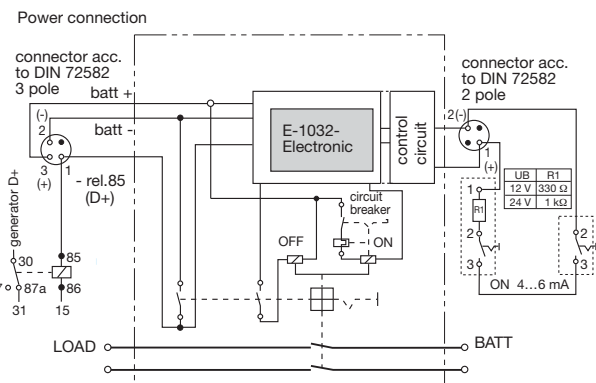


## Rubber cap

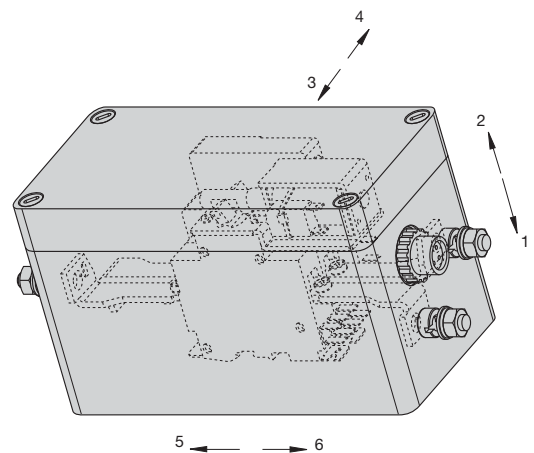


Rubber caps and cable fasteners are supplied with the product.

## Internal connection diagrams



## Shock directions



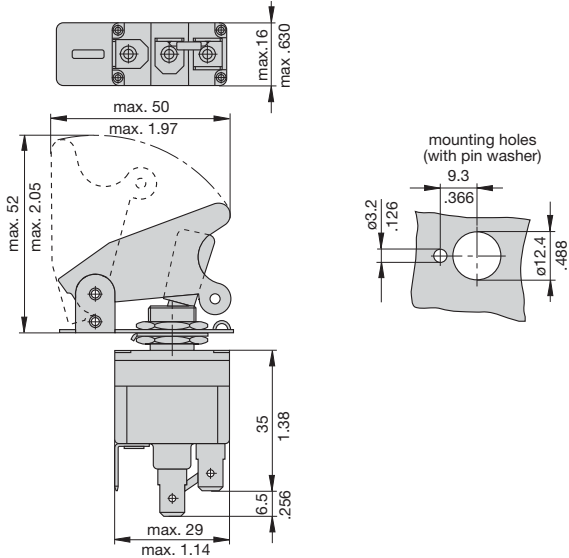
Please follow the instructions for installation

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

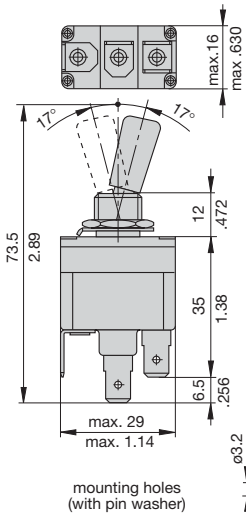


## Accessories

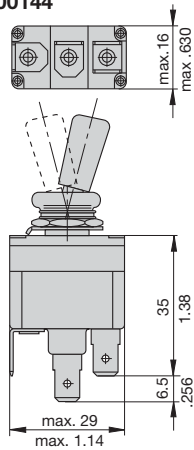
### ADR switch with safety cover OZ223Z000141 12 V OZ223Z000142 24 V



### ADR switch without rubber boot OZ223Z000143



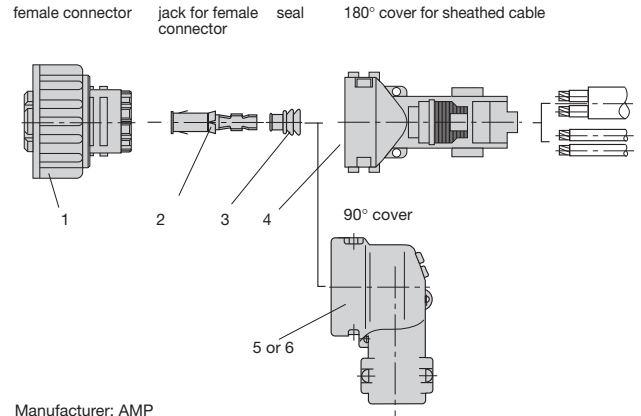
### ADR switch with rubber boot (IP54 in operating area) OZ223Z000144



### Standard connector set OZ112Z000179, comprising:

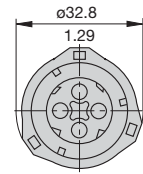
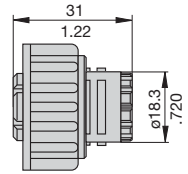
(AMP-parts) suitable for single/double pole Battery Master Switch E-1032-..., DC 12 V and DC 24 V

Quantity	Designation	Ref. No.
1	female connector, 3-pole	X 221 378 01
1	female connector, 2-pole	X 221 378 02
5+1 replacem.	jack for female connector	Y 306 501 01
5+1 replacem.	seal	Y 306 502 01
2	90 ° cover corrugated conduit NW 10	Y 306 499 01

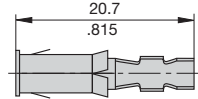


Manufacturer: AMP

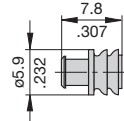
- Female connector SW  
X 221 378 02 2-way  
X 221 378 01 3-way  
X 221 378 03 4-way



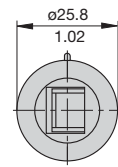
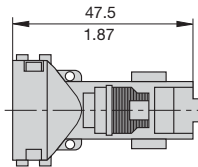
- Jack for female connector  
Y 306 501 01



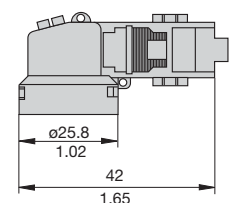
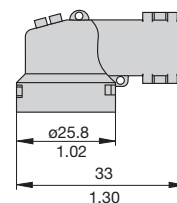
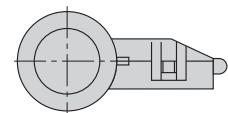
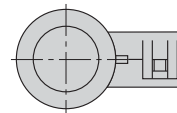
- Seal  
Y 306 502 01



- 180° cover for sheathed cable  
Y 306 500 01



- 90° cover for corrugated conduit NW10  
Y 306 499 01



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 circuit breaker type 437 or single/two pole isolation switches types 921/922 featuring an additional electronic function module which limits the duration of the supply to the remote disconnect and reconnect coils, avoiding damage in the event of unusual operating circumstances. Available with undervoltage monitoring option to protect batteries from the effects of deep discharge, status output for undervoltage, auto reset feature.

## Typical applications

Battery and cable protection for all types of vehicle (including electric), battery powered systems.

## Ordering information

### Type No.

**E-1073** control unit for types 921/922 and 437 with remote control

### Voltage rating

**0** DC 12 V

**1** DC 24 V

### Control mode

**1** ON/OFF control input

**00** without additional function

**02** with undervoltage protection and status output

**12** with autoreset, undervoltage protection and status output (921/922 only)

**2** ON and OFF buttons

**33** with control current supply and ON/OFF test input

### Circuit Breaker/Isolation Switch

**437** single pole circuit breaker (2-pole upon request)

**921** single pole battery isolation switch

**922** double pole battery isolation switch

### Enclosure design (optional)

blank = without housing

**B3** moulded housing, for use with single pole devices

**B32** moulded housing, for use with double pole device

**B34** moulded housing, external operating knob, for use with double pole devices (not with auto reset)

**B35** moulded housing, external operating knob, for use with single pole devices (not with auto reset)

### Terminal design

**K12** flat screw terminals angled 90°, for single pole version

**K60** straight flat screw terminals, for single pole version, without housing

**K72** flat screw terminals angled 90°, for double pole version

### Characteristic curve (type 437 only)

**06** fast magnetic trip

**07** delayed magnetic trip (standard)

### Auxiliary contacts

**Si01** one N/C, two N/O (one N/C, one N/O with autoreset option)

### Current ratings

**437:** 40, 50, 63, 80, 100, 120, 160, 200, 240A

**921:** 240 A

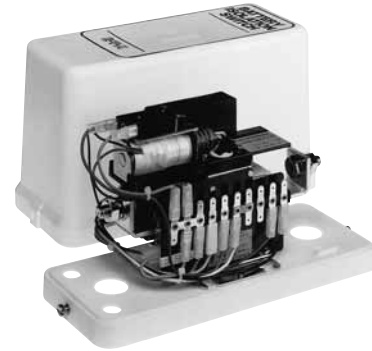
**922:** 120 A

**E-1073 - 1 1 02 - 437 - B3 - K12 - 07 - Si01 - 240 A** ordering example

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

## Technical data of switch or circuit breaker

see types 437, 921 or 922



**E-1073-437**

## Technical data – Electronic module

Voltage rating	DC 12 V	DC 24 V
Voltage rating range	ON 10.3 - 16 V	18 - 32 V
	OFF 9 - 16 V	16 - 32 V
Correct switching performance is not guaranteed if the voltage falls below the minimum value.		
Temperature range electronic control unit	-40...+80 °C (-40...+176 °F)	
Operating current	ON approx. 30 A	approx. 15 A
	OFF approx. 10 A	approx. 20 A
Excitation time	ON typically 100 ms	
	OFF typically 20 ms	
Switching frequency	0.1 Hz max.	
Power consumption of electronic control unit	typically < 1 mA (when switched off or button operated)	
Control inputs	E-1073-.1.: »E/A« (ON/OFF), »U-AUS« (undervoltage protection OFF), »A-W« (auto reset)	
	E-1073-.2.: »T-EIN« (button ON), »T-AUS« (button OFF)	
voltage	ON (high)	max. 32 V
	OFF (low)	> 8 V
power consumption	DC 12 V:	typically 1 mA
	DC 24 V:	typically 5 mA
EMC	according to DIN 40839/ISO 7637	
Reverse polarity protection	If polarized incorrectly, the Battery Isolation Switch will operate immediately. The circuit breaker will trip after a few seconds.	
Undervoltage protection switching thresholds	optional with E-1073-.1..	
	DC 12 V:	11.0 V ± 0.2 V
hysteresis	DC 24 V:	22.8 V ± 0.2 V
	typically 0.5 V	
trip time	typically 40 sec	
Undervoltage status output transistor output current load	»UST«, optional with E-1073-.1..	
	minus switching corresponding to 2 W lamp load, short-circuit proof	
Automatic reset »A-W«, (optional with E-1073-.1.., with series 921/922 only)	Reset after mechanical disconnection is provided by the integral electronic control after approx. 100 ms.	
Control current supply »+US2«, with E-1073-.2.. for T-EIN/T-AUS	May be connected to 20 control inputs. Noise-voltage proof, short-circuit proof	
Terminals	control terminals	blade terminals 6.3x0.8 mm
	Mass, with circuit breaker or isolation switch	approx. 2,000 g without enclosure
		approx. 2,500 g with enclosure

## Features

- Multiple functions in one unit
  - High performance circuit breaker providing battery and cable protection from overloads and short-circuits.
  - Master switch for ON/OFF operation
  - Electrical remote control
  - Undervoltage protection with status output
  - Auxiliary contacts (e.g. for generator disconnection)
  - Active reverse polarity protection of the entire vehicle electrical system
- Current ratings to 240 A (higher voltage ratings to special order)
- Closed-circuit current consumption < 1 mA

## Technical description

E-T-A circuit breaker/battery isolation switches combined with electronic control unit E-1073 will meet a wide range of requirements.

### Circuit breaker/battery isolation switches

The main switching contacts will open the plus, the minus or both poles according to model and application.

- **Series E-1073-....437**  
Single pole thermal-magnetic circuit breaker for current ratings up to 240 A, to protect the vehicle electrical system from overloads and short circuits.
- **Series E-1073-....921**  
Single pole battery isolation switch for current ratings up to 240 A.
- **Series E-1073-....922**  
Double pole battery isolation switch for current ratings up to 120 A.

### Electronic control unit

An electronic control unit enables the basic on/off function and two additional functions. The system voltage is connected across terminals +UB/-UB to provide the supply to the control unit and a feed is taken from +US1 for the remotely sited operating switch(es). The quiescent current drain is typically less than 1 mA, with a short duration excursion during excitation of the ON/OFF coils.

### Basic function

#### Switch ON/OFF

Operation of the ON control switch will energise the switch-on coil for approximately 100 ms causing the main switching contacts to latch closed. Operation of the OFF control switch will cause the disconnect coil to trigger the release of the switching mechanism within approximately 20 ms. Both coil circuits are current limited to prevent damage through overheating.

### Manual operation

An optional external operating knob is available to provide manual control in addition to electrical ON/OFF operation.

### Reverse polarity protection

In the event of reverse polarity connection, the electronic control unit will immediately operate the battery switch to isolate the entire electrical system. The circuit breaker will trip after a short delay to protect the operating coils and must be re-set once the fault has been corrected.

## Control functions

### Type 1 E-1073-.1.. with ON/OFF switch

#### ON/OFF control switch input (»E/A«)

The battery isolation switch can be operated on or off by an external control switch to plus.

#### Undervoltage protection (optional)

This optional feature protects the battery from deep discharge should electrical loads be left on.

The battery is automatically disconnected whenever the voltage falls below a critical value for more than 40 s. The unit is reset by operation of the control switch. Sustained undervoltage after reconnection causes the unit to disconnect again after approx. 40 s.

#### Overriding the undervoltage protection (»U-AUS«)

Undervoltage protection may be overridden if required by connecting control output »U-AUS« to plus terminal or terminal 15.

#### Undervoltage status output (»UST«)

Undervoltage is signalled immediately via the minus-switching, short-circuit proof transistor output (2 W lamp load).

#### Auto reset (»A-W«), optional with series 921 and 922

Immediate reset after unwanted mechanical disconnection (e.g. upon excessive vibration) is provided by the integral electronic control.

### Type 2 E-1073-.2.. with ON/OFF button

#### ON/OFF control inputs (»T-ON/T-OFF«)

ON/OFF function is provided by two external switches with a central control function, i.e. several systems can be operated simultaneously.

#### Additional control current supply (»+US2«)

If several circuit breakers/battery isolation switches are operated in parallel, switches can be supplied with control current from any of the electronic control units available. This power source is short-circuit proof, protected from noise voltages and will operate for 20 inputs.

#### Additional control input »ON/OFF Test« (»E/A«)

This control input can be used for maintenance purposes. The battery isolation switch is switched on when plus voltage is applied, and switched off when plus voltage is removed.

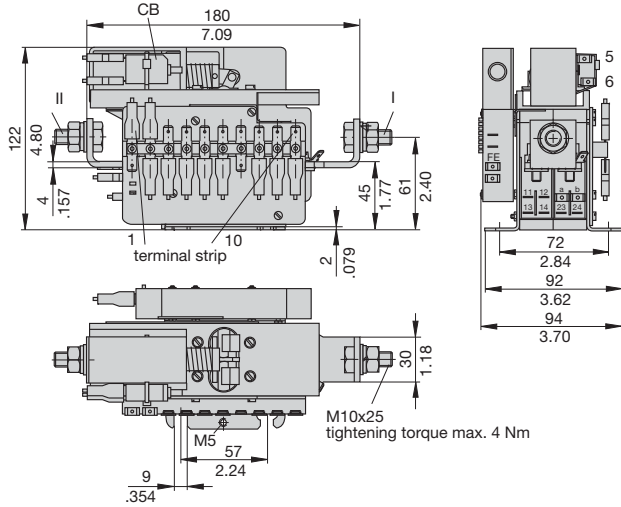
## Note

The circuit breaker should be in the OFF condition when connecting or replacing the battery.

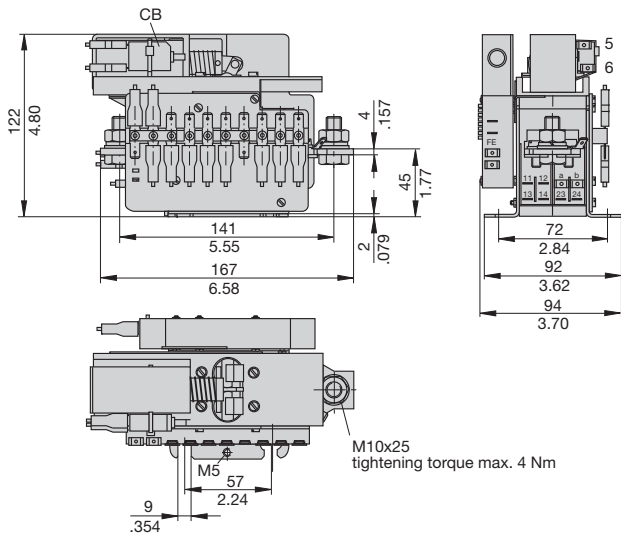
**Observe instructions for installation!**

## Dimensions

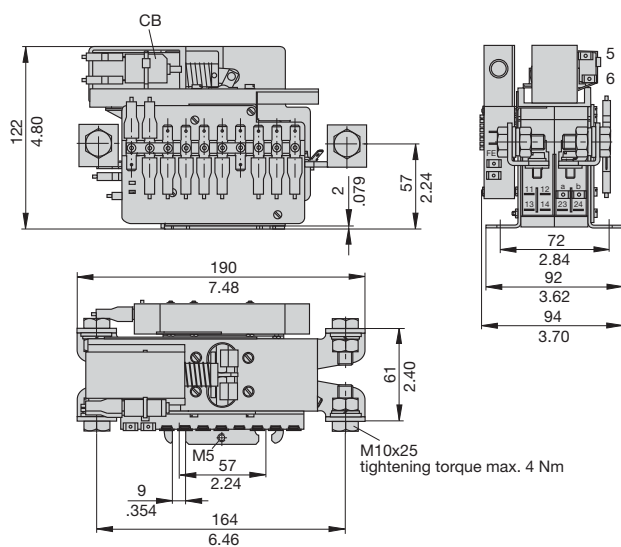
### E-1073-...-437/-921-...-K12-...



### E-1073-...-437/-921-...-K60-...

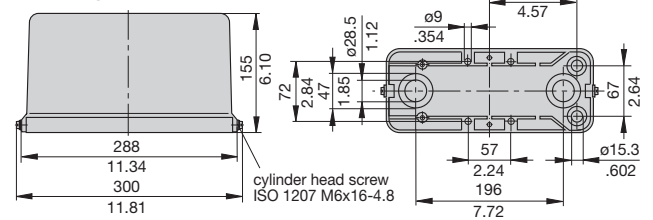


### E-1073-...-922-...-K72-...

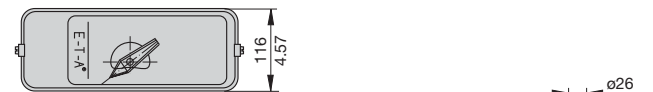


## Dimensions – Enclosures

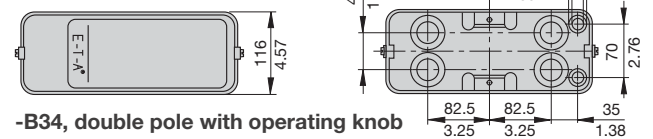
### -B3, single pole



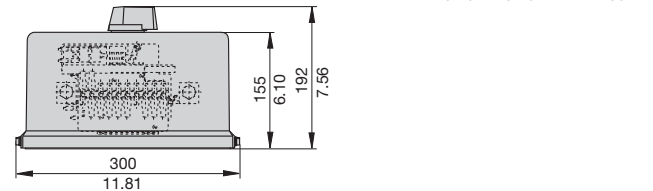
### -B35, single pole with operating knob



### -B32, double pole

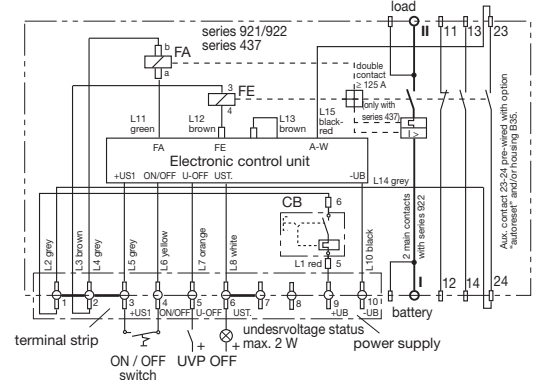


### -B34, double pole with operating knob

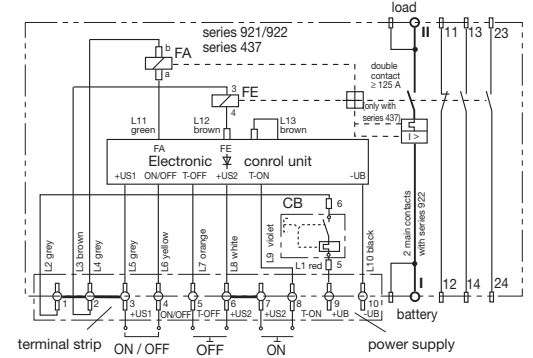


## Connection diagrams

### E-1073-1...-437/-921/-922 control function ON/OFF switch



### E-1073-2...-437/-921/-922 control function ON/OFF button



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

## Typical applications

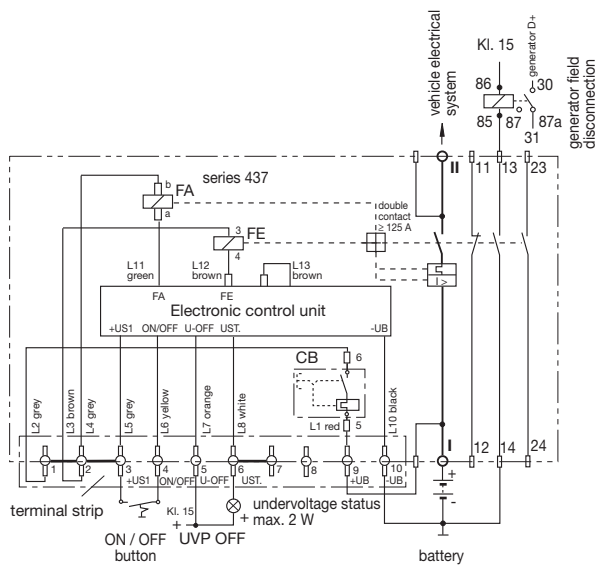
### For road vehicles, e.g. buses and coaches

Series E-1073-1102-437-B3-K12-07-Si01-240 A

In this application, the E-T-A combined battery switch/circuit breaker has several functions:

- High performance circuit breaker rated at 240 A, providing battery and cable protection from overloads and short circuits.
- Isolation switch, for ON/OFF operation (e.g. for main system disconnection).
- Remote control via external, low-current circuit.
- Undervoltage protection from battery deep discharge should electrical loads be left on.
- Early under voltage signalisation via a warning lamp (undervoltage status output), located as required.
- Undervoltage operation can be overridden if required.
- Auxiliary contact to disconnect the generator field.
- Reverse polarity protection through immediate disconnection of the entire vehicle electrical system if the battery is incorrectly connected.

These functions allow the number of components and cables required to be reduced, with significant space and weight saving benefits.



### For rail vehicles, e.g. underground carriages

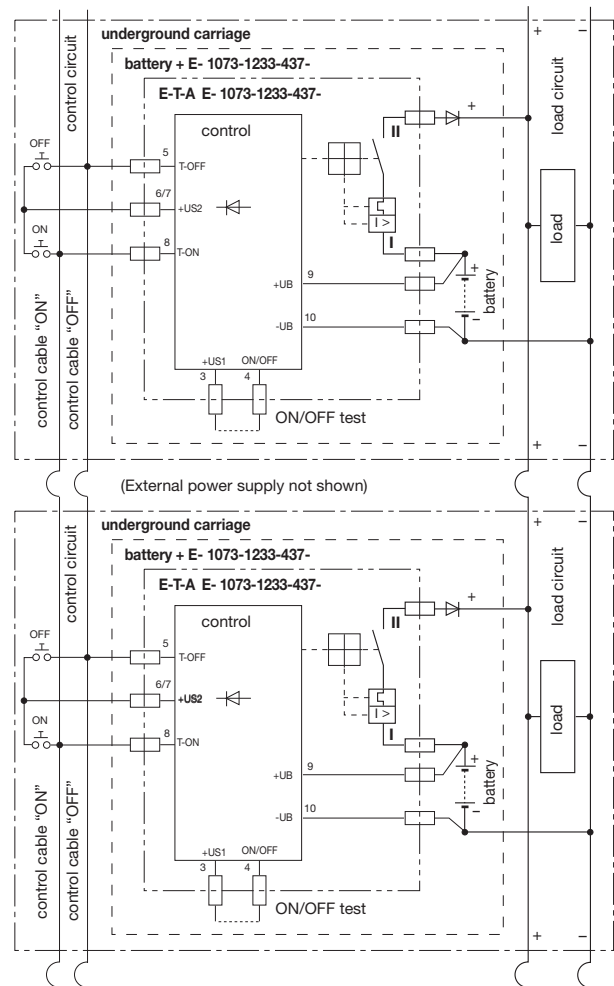
Series E-1073-1233-437-K60-06-Si01-200 A

In this application, the E-T-A combined battery switch/circuit breaker has two functions:

- High performance circuit breaker providing battery and cable protection from overloads and short circuits.
- Isolation switch between battery and loads.

In this application, an ON/OFF remote control switch can be provided in both the first and last carriages. This will enable all batteries to be disconnected from the power distribution system by the operation of one control, irrespective of its location. In the same way, all batteries can be re-connected by the operation of a single control switch.

This is extremely helpful during coupling/de-coupling of carriages for example. In addition the E/A test input permits the operation of individual battery switch/circuit breakers during maintenance.



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

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

Monostable power relay for single pole disconnection with a variety of versions available. Due to the possible combinations of the different configurations as well as due to different modes of mounting the power relay D1 is suitable for many applications.

### Typical applications

Commercial vehicles, agricultural engines, watercraft, construction vehicles, motor homes and industrial trucks.



**PR60**

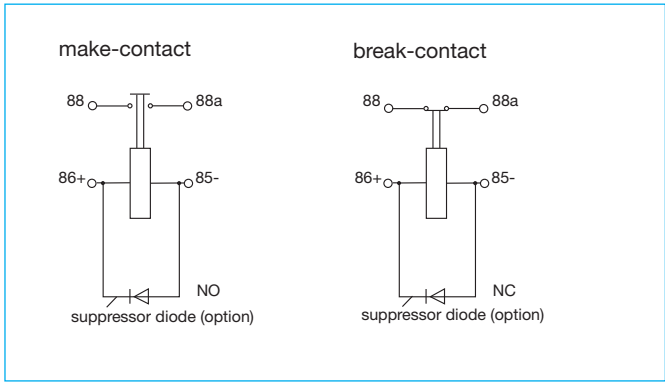
### Technical data

Current rating	100 A, 200 A, 300 A
Coil data	
Rated voltage	DC 12 V                      DC 24 V                      DC 48 V
Operating voltage	9...16 V                      18...32 V                      36...54 V
Max. starting voltage (entire temperature range)	9 V                      14 V                      36 V
Isolating voltage	≤ 2 V                      ≤ 4 V                      ≤ 8 V
Coil current	1 A                      0,4 A                      0,2 A
Coil power	approx. 10 W / 7 W upon request                      approx. 10 W                      approx. 10 W
Ambient temperature	-40 °C...+85 °C
Protection class	
interior	IP67 (0.2 bar: 1 min) to IEC 529 and IP6K9K to DIN 40050 part 9 and IEC 529
terminals	IP00 to IEC 529
Vibration	5 g (50-2000 Hz)
Shock	10 g (11 msec)
Resistance to	oil, fuel, hydraulic fluids
Housing	galvanized steel, tin-plated or lacquered optional
Mounting method	side mount, optionally large or small foot mount
Options	special version with suppressor diode and/or blow magnet
Terminal thread	100 A: M8 200 A: M8 or M10 300 A: M10
Mounting position	any
Switching element	contacts AgSnO
Min. insulation resistance	100 MΩ
Insulation resistance after load	50 MΩ
High voltage resistance	1,050 V for 1 min
Max. initial contact voltage drop	150 mV
Contact voltage drop after endurance	175 mV
ON duty	100 %
Overload	100 A: 800 A for 1 s, 200 A for 20 s 200 A: 1 600 A for 1 s, 400 A for 20 s 300 A: 2 400 A for 1 s, 600 A for 20 s
Typical life	
rated load Ω	75,000 cycles (at DC 28 V)
mechanically	1,500,000 cycles
Starting time incl. bounce duration	max. 40 ms
Bounce duration	max. 5 ms
Release time	max. 20 ms (without suppressor diode)
Cable cross section at rated load	100 A: min. 50 mm <sup>2</sup> 200 A: min. 70 mm <sup>2</sup> 300 A: min. 95 mm <sup>2</sup>
Mass	approx. 810 g (side mount, small foot mount) approx. 935 g (large foot mount)

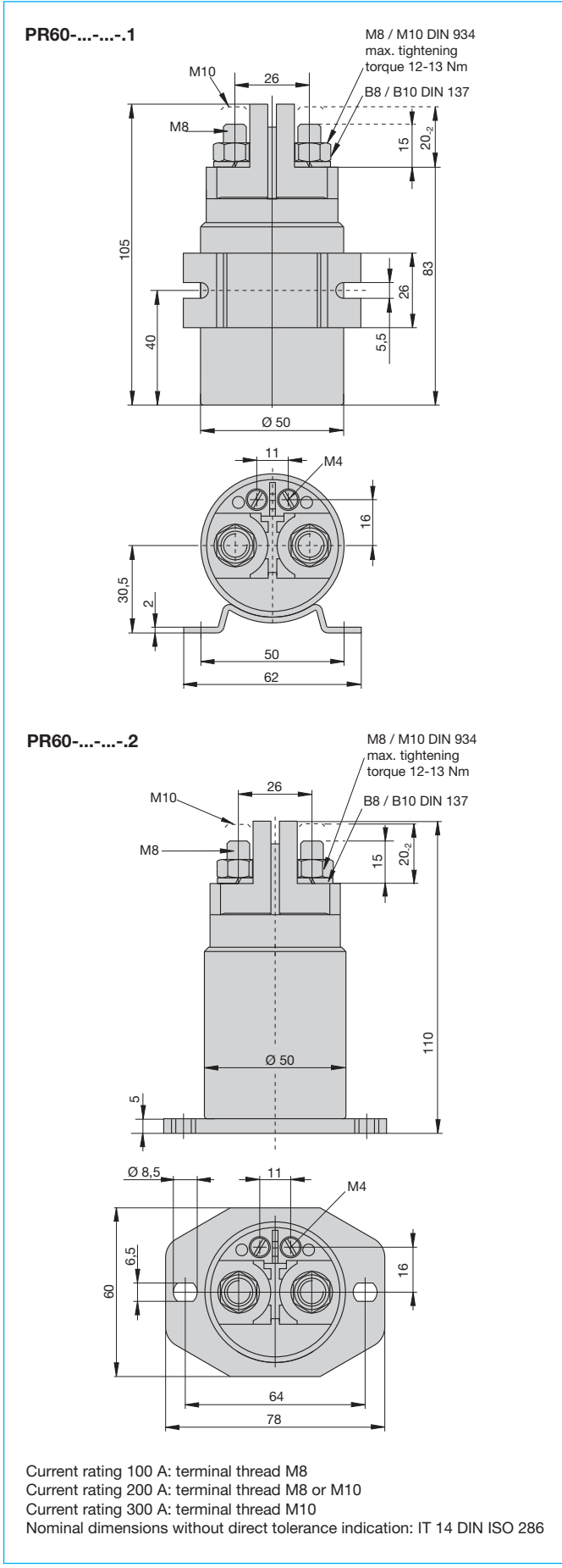
**Ordering information**

Type no.									
PR60									
<b>Contact type</b>									
1	make contact								
2	break contact								
<b>Coil resistance</b>									
1	12 V								
2	24 V								
3	48 V								
<b>Current rating</b>									
1	100 A								
2	200 A								
3	300 A (only for make contacts)								
<b>Design of main terminals</b>									
1	M8 (for current ratings 100 A and 200 A)								
2	M10 (for current ratings 200 A and 300 A)								
<b>Contact design</b>									
2	AgSnO (standard)								
<b>Options</b>									
0	without								
2	suppressor diode								
3	blow magnet, recommended for voltages ≥ 40 V								
4	suppressor diode and blow magnet								
other suppressor circuits of coil terminals upon request									
<b>Housing</b>									
1	galvanised steel (standard)								
2	tin-plated								
3	lacquered (upon request)								
<b>Mounting method</b>									
1	side mount (standard)								
2	small foot mount								
3	large foot mount								
PR60 - 1 2 2-2 2 0-1 1	ordering example								

**Schematic diagram**

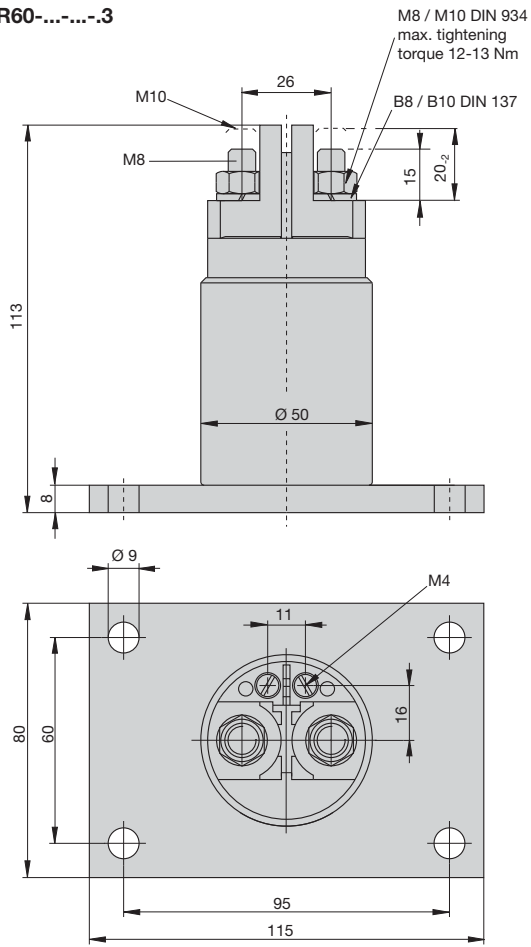


**Dimensions**



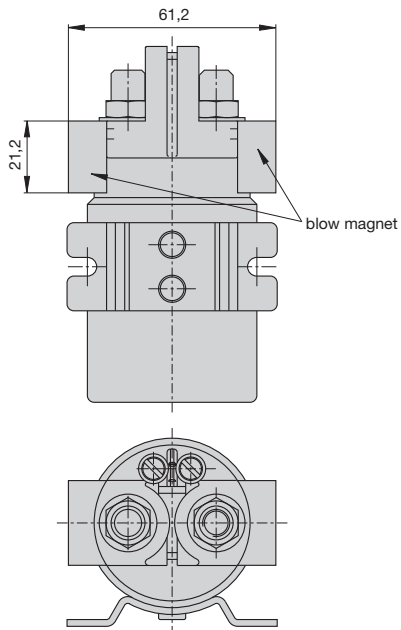
**Dimensions**

**PR60-...-...-3**



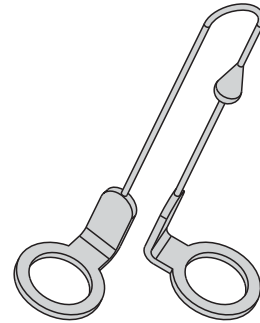
Current rating 100 A: terminal thread M8  
 Current rating 200 A: terminal thread M8 or M10  
 Current rating 300 A: terminal thread M10  
 Nominal dimensions without direct tolerance indication: IT 14 DIN ISO 286

**PR60-...-...-3-.. with blow magnet**



**Accessories**

**Suppressor diode  
 X 223 02 901**



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



## Description

The electronic circuit breaker ESS1 is designed to ensure selective disconnection of individual loads in industrial systems which are powered by a DC 24 V switch mode power supply. Selectivity means that the ESS1 responds faster to overload or short circuit conditions than the power supply.

The ESS1 has four major tasks:

- In the event of an overload or short circuit in a load circuit, even the shortest break-down of the output voltage of the power supply to values below 18 V must be prevented under all circumstances.**

Otherwise all other components fed by the power supply will respond unpredictably to the voltage dip. Result: reset, re-start, standstill of components or whole system. The voltage dip is caused by the characteristic overcurrent behaviour of the power supply (straight characteristic curve, fold-back curve, hiccup mode etc.).

- Selective protection/disconnection must be ensured even at worst-case overload conditions.**

Long feed lines prevent the occurrence of a significant short circuit current (see table 1).

- The current limited switch-on of loads with high input capacitance must be ensured without increase of rated current adjustment.**

Electronic DC 24 V components contain big input capacitors for suppression or back-up of voltage dips.

- Fault indication**

## Features

- Electronic circuit breaker for protecting system components (sensors, actuators, field bus couplers, control units etc.) which are powered by a DC 24 V switch mode power supply.
- Connection of all load types (resistive, inductive, capacitive).
- Alternative current ratings (3 A or 6 A) can be selected by means of the switch on the device.
- Overload- and short-circuit proof switching output with active limitation of inrush and short-circuit currents.
- Overload-dependent trip characteristics ("thermal-magnetic circuit breaker style", but much narrower trip curve tolerances).
- Power Mosfet switching output, high side switch.
- Additional disconnection by electromechanical switch in the event of overload.
- RED actuator button: reset or manual trip.
- Visual status indication:  
GREEN LED: O.K. signal  
YELLOW LEDs (40, 60, 80, 100 % of rated current): load current indication  
RED LED (110 %): flashing or lighted after tripping
- Fault indication through auxiliary contact (N/C, break contact).
- Integral thermal circuit breaker (with VDE, UL, CSA approval) serving as a fail-safe element in the load circuit and providing reverse polarity protection.
- Option: control input



ESS1-.../SVS1-...

## Technical data ( $T_{\text{ambient}} = 25 \text{ }^\circ\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

### Operating data

Operating voltage $U_S$	DC 24 V (DC 18...32 V)
Current rating $I_N$	3 A or 6 A (selected by means of a switch)
Current consumption $I_0$ (load output non-conductive)	typically 13 mA
OK signal	GREEN LED lighted when operating voltage is applied
Reverse polarity protection $U_S$	integral with the device -> internal fail-safe-element tripped (see »Reset« on connection side), LEDs are unlit
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication)

### Load circuit

Load output	Power-MOSFET switching output (high side switch)
Max. data of load (100 % ON duty)	DC 24 V / 5 A (resistive, inductive, capacitive, lamp load)
Voltage drop at $I_N$	typically 220 mV / 3 A typically 440 mV / 6 A
Overload disconnection	typically $1.1 \times I_N$
Trip times	see time/current characteristic curve: $t_{v1}: I_{\text{load}} > 1.05...2 \times I_N$ typ. 5 s, LED RED (110 %) flashing until disconnection occurs $t_{v2}: I_{\text{load}} > 2 \times I_N$ typ. 5 s...100 ms, LED RED (110 %) lighting after disconnection, fault indication F closed
Short-circuit current $I_K$	active current limitation max. $2 \times I_N$ (6 A or 12 A)
Trip time $t_K$ (at $I_K$ )	typically 100 ms
Temperature disconnection:	internal temperature monitoring with physical isolation, LED RED (110 %) lighting after disconnection, fault indication F
Load current indication	4 YELLOW LEDs (40, 60, 80, 100 %) or 1 RED LED (110 %) signalling utilization of the set current rating in % (e. g. higher than 40 %)
Starting delay $t_{\text{start}}$	typically 1 s upon application of $U_S$ after each switch-on
Free-wheeling circuit	integral bi-directional transil diode; external free-wheeling diode recommended for inductive loads
Disconnection of load circuit	single pole (switch contact) - by manual operation of the RED button - upon electronic fault disconnection (overload, short-circuit)

## Technical data ( $T_{\text{ambient}} = 25\text{ }^{\circ}\text{C}$ , operating voltage $U_S = \text{DC } 24\text{ V}$ )

Several load outputs must not be connected in parallel

### Control circuit (option)

Control input EC/EO - **to customer requirement:** possibly physically isolated via opto coupler/ control voltage  $U_S$ / control current  $I_S$  / switching frequency  $f_{\text{max}}$  / control signal ( $U_S = \gg 1 < <$ )  
Switching times  $t_{\text{on}}$  /  $t_{\text{off}}$ / leakage current/ protection

### Fault indication

Fault indication F potential-free auxiliary contact (SC-S0), break contact (N/C), DC 30 V / max. 1 A

Status of fault indication Contact closed in the event of power failure or when the switch (RED button) has tripped upon:  
- overload/short-circuit in the load circuit (RED LED lights). The fault indicated by that LED is stored until the RED operating button is reset.  
- manual disconnection of the device

Signal delay typically 150 ms

Reverse polarity of  $U_S$  internal fail-safe element will trip

### General data

Ambient temperature  $0...40\text{ }^{\circ}\text{C}$  (without condensation, see EN 60204-1)

Storage temperature  $-20...+70\text{ }^{\circ}\text{C}$

Blade terminals 6.3 mm to DIN 46244-A6.3-0.8 for E-T-A Power distribution system SVS1-xx-...

Backup fuse for ESS1 not required because of the integral redundant fail-safe element (thermal E-T-A circuit breaker)

Housing material aluminium

Mounting of housing Plug-in for distribution system SVS1 for symmetric rail mounting

Vibration 3 g, test to IEC 60068-2-6 test Fc

Degree of protection Housing: IP20 DIN 40050/IEC 529  
Terminals: IP00 DIN 40050/IEC 529

EMC Emission: EN 50081-1  
Susceptibility: EN 61000-6-2

Dimensions (W x H x D) 17.5 x 100 x 55 mm

Mass approx. 80 g

## Ordering information

### Type No.

ESS1 Electronic Circuit Breaker for DC 24 V applications

#### Version

0 standard

#### Control input

0 without control input

1 with control input 8.5 V...30 V (option)

#### Signal output

0 without auxiliary contact

1 with auxiliary contact (N/O)

#### Input voltage

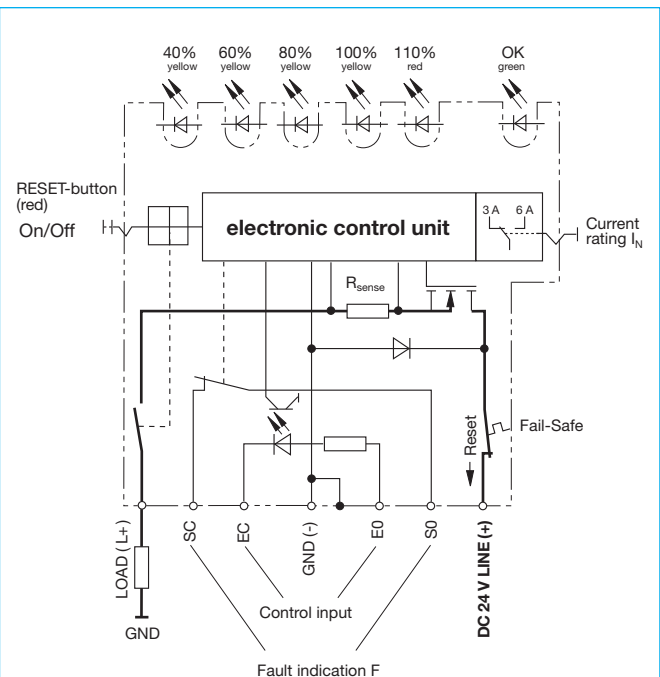
DC 24 V voltage rating DC 24 V (18...32 V)

#### Current rating

3 A/6 A adjustable (by slide switch)

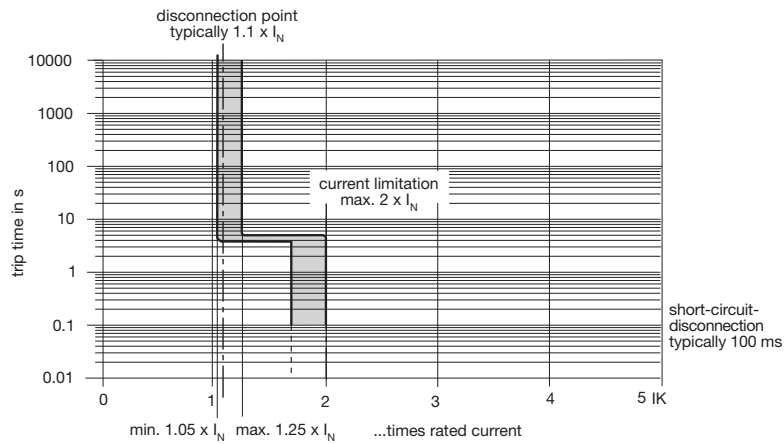
ESS1 - 0 0 1 - DC 24 V - 3 A/6 A ordering example

## Basic circuit diagram



Shown on the switched-off and de-energised condition. The red reset button is in the tripped (OFF) position, the auxiliary contacts of the fault indication (SC-S0) are closed.

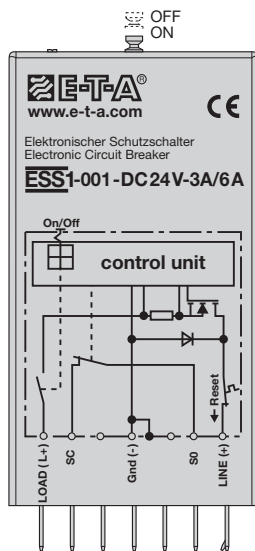
## Time/Current characteristic curve ( $T_A = 25\text{ }^\circ\text{C}$ )



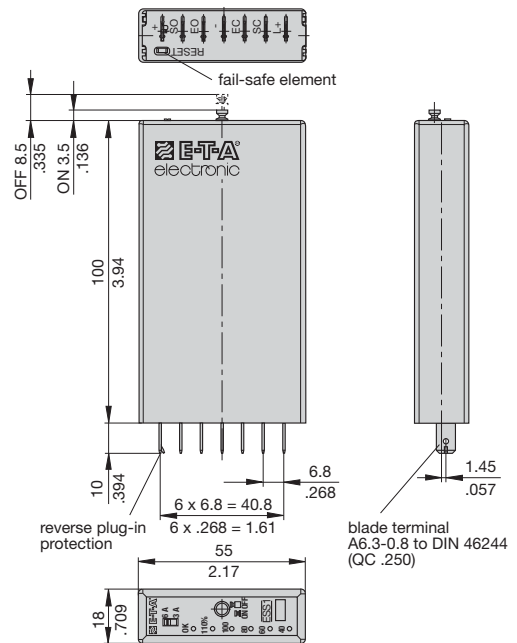
Explanation of the characteristic curve:

- The trip time is typically 5 s in the range between  $1.05 \times I_N$  and  $2 \times I_N$ .
- Electronic current limitation starts at  $2 \times I_N$  which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload until disconnection will not exceed two times the current rating.
- Without the current limitation activated at  $2 \times I_N$  a much higher overload current would flow in the event of an overload or short circuit.
- Trip time after activation of current limitation is between 5 s and 100 ms (short circuit).

## Terminal wiring diagram



## Dimensions



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

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.

## Matrix of the ESS1 switching conditions

Operating mode (unit without Control input)	Trouble-free operation	Overload: $I_{load} = 1.1...2 \times I_N$	Short-circuit: $I_{load} > 2 \times I_N$	temperature disconnection ( $> 150\text{ }^\circ\text{C} /$ $302\text{ }^\circ\text{F}$ ) *	internal- failure **)
Load output	<b>ON</b> = <i>conductive</i>	<b>OFF</b> = <i>non-conductive</i>	<b>OFF</b> = <i>non-conductive</i>	<b>OFF</b> = <i>non-cond.</i>	
Load circuit 1-pole discon. (through switching contact)	no	yes, after approx. 5 s	yes, after approx. 5 s...100 ms	yes, after approx. 60 ms	
<b>Indication</b>					
GREEN LED O. K.-signal	lighted	lighted	lighted	lighted	not lighted
RED LED ( $I > 110\%$ von $I_N$ )	not lighted	LED flashes for approx. 5 sec, LED flashes momentarily, lighted after tripping	LED flashes for approx. 5 sec, LED flashes momentarily, lighted after tripping	LED flashes momentarily, lighted after tripping	
YELLOW LEDs Load current indication ( $> 40, 60,$ $80, 100\%$ von $I_N$ )	0...4 LEDs lighted, dependent on load current	none of the LEDs lighted after tripping	none of the LEDs lighted after tripping	none of the LEDs lighted after tripping	
Fault indication F aux. contact	open	closed	closed	closed	
RED actuator/ reset button	ON	tripped	tripped	tripped	

- With manual operation (RED button pulled):  
fault indication F, RED LED also lighted.

\* Upon response of the internal temperature control (chip  
temperature of power semiconductors is  $+150\text{ }^\circ\text{C} / +302\text{ }^\circ\text{F}$  for a  
short period of time) the load current is disconnected. The circuit  
breaker trips and the red LED ( $I > 110\%$ ) is lighted.

If the ESS1 is to be switched off again, a short cooling down  
period must be taken into account due to the temperature  
hysteresis of the semiconductor chip. The cooling down period  
will be approx. 5 sec dependent on the energy absorption  
(behaviour similar to thermal circuit breaker).

\*\*) Electronic control unit defective  
- internal fail-safe element has tripped (see »reset«  
on terminal side of the ESS1).

**Table 1: Electronic Circuit Breaker ESS1 for DC 24 V**

### Reliable trip of ESS1 with different cable lengths and cross sections

Specific conductivity of copper $\rho_0 =$	0.0178 (Ohm x mm <sup>2</sup> ) / m		
$U_S = \text{DC } 19.2\text{ V}$ (= 80 % v. 24 V)	voltage drop of ESS1 and tolerance of trip point (typically $1.1 \times I_N = 1.05...1.25 \times I_N$ ) have been taken into account.		
ESS1-selected rating $I_N$ (in A) →	<b>3</b>	<b>6</b>	→ <b>ESS1 trips after typically 5 s</b>
trip current $I_{ab} = \text{max. } 1.25 \times I_N$ (in A) →	3.75	7.5	
$R_{max}$ in Ohm = $(U_S / I_{ab}) - 0.050$ →	<b>5.07</b>	<b>2.51</b>	

### The ESS1 reliably trips from 0 Ohm to max. circuitry resistance $R_{max}$

Cable cross section A in mm <sup>2</sup> →	0.14	0.25	0.34	0.5	0.75	1	1.5
cable length L in meter (= single length) ↓	cable resistance in Ohm = $(R_0 \times 2 \times L) / A$						
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

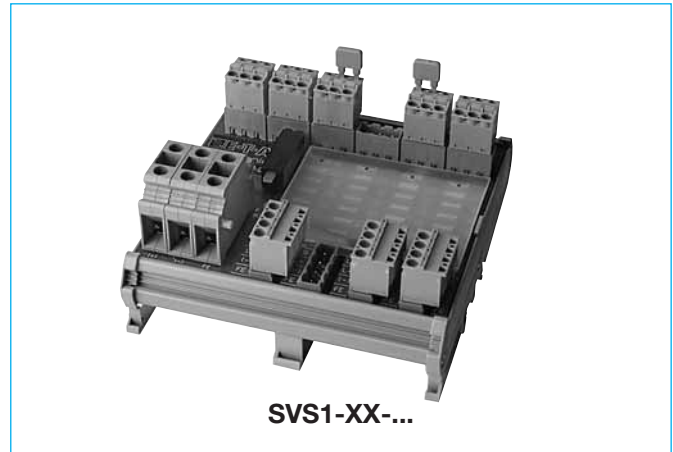
<b>Example 1:</b>	max. length at 1.5 mm <sup>2</sup> and 3 A	<b>214 m</b> →
<b>Example 2:</b>	max. length at 1.5 mm <sup>2</sup> and 6 A	<b>106 m</b> →
<b>Example 3:</b>	mixed wiring: (Control cabinet – sensor/actuator level)	$R_1 = 40\text{ m in } 1.5\text{ mm}^2$ and $R_2 = 5\text{ m in } 0.25\text{ mm}^2$ : $R_1 = 0.95\text{ Ohm}$ , $R_2 = 0.71\text{ Ohm}$ <b>Total (<math>R_1 + R_2</math>) = 1.66 Ohm</b>

## Description

The E-T-A power distribution system SVS1 is designed to accommodate the electronic circuit breaker series ESSx. It distributes the current supplied by a switch mode power supply up to 40 A to 4, 8, 12 or 16 channels. Mains connection is via screw terminals. The individual circuit breakers can be plugged in. Loads are connected via cage clamp screwless terminals. The power distribution includes integral wiring of the signalisation of the individual channels which can be combined to group signals A and B. The SVS1 can be snapped onto a DIN symmetrical rail.

## Features

- Power distribution system for short-circuit limited DC 24 V applications up to max. 40 A continuous load
- Three screw terminals (max. 10 mm<sup>2</sup>/AWG 8) for:
  - DC 24 V (+) (green)
  - DC 24 V (-) (green)
  - FE (functional earth) (green)
 for connecting the switched-mode power supply
- Modular design ESS1-positions:
  - SVS1-16-...: 16 channels - SVS1-12-...: 12 channels
  - SVS1-08-...: 8 channels - SVS1-04-...: 4 channels
- Load outputs (L) per channel (complete with screwless spring-loaded terminals, wiring 4 x max. 2.5 mm<sup>2</sup> (AWG 14)/ without connector sleeve):
  - (LB) group output (+) internally bridged across all channels (for special applications)
  - (L+) load output (+), per channel
  - (-) DC 24 V (-)
  - (FE) functional earth
- Signal output (S) per channel (complete with screwless spring-loaded terminals, wiring 3 x max. 2.5 mm<sup>2</sup> (AWG 14)/ without connector sleeve):
  - (S0) single output
  - (SA) signal group A
  - (SB) signal group B
- 2 Group signal outputs (output or further connection) (complete with screwless spring-loaded terminals, wiring 3 x max. 2.5 mm<sup>2</sup> (AWG 14)/ without connector sleeve):
  - (SAS) signal group A --> group signal
  - (SBS) signal group B --> group signal
  - (SCS) common return wire for groups A/B (protected by a 1 Amp. E-T-A Circuit Breaker F/SCS)
- Option: control input (E) - not used -



SVS1-XX-...

## Ordering information

### Type

- SVS1** Power distribution system
- Short-circuit limited DC 24 V applications
  - Max. 40 A continuous load
  - 3 screw terminals max. 10 mm<sup>2</sup> (AWG 8) for
    - DC 24 V (+) /DC 24 V (-) / functional earth FE

### Version, number of channels (K)

- 04** 4 channels (K1...K4)
- 08** 8 channels (K1...K8)
- 12** 12 channels (K1...K12)
- 16** 16 channels (K1...K16)

### Load outputs (L) per channel

- L2** load (+), load (-) (on request)
- L3** load (+), load (-), FE (on request)
- L4** 4 load outputs per channel
  - (LB) group output (+) internally bridged across all channels
  - (L+) load output (+), per channel
  - (-) DC 24 V (-)
  - (FE) functional earth

### Signal outputs (S)

- S0** without signal outputs (option)
- S1** - with signal output (S) per channel:
  - (S0) single output
  - (SA) signal group A
  - (SB) signal group B
- with group signal outputs:
  - (SAS) signal group A group signal
  - (SBS) signal-group B group signal
  - (SCS) common return wire for groups A/B

### Control input (E)

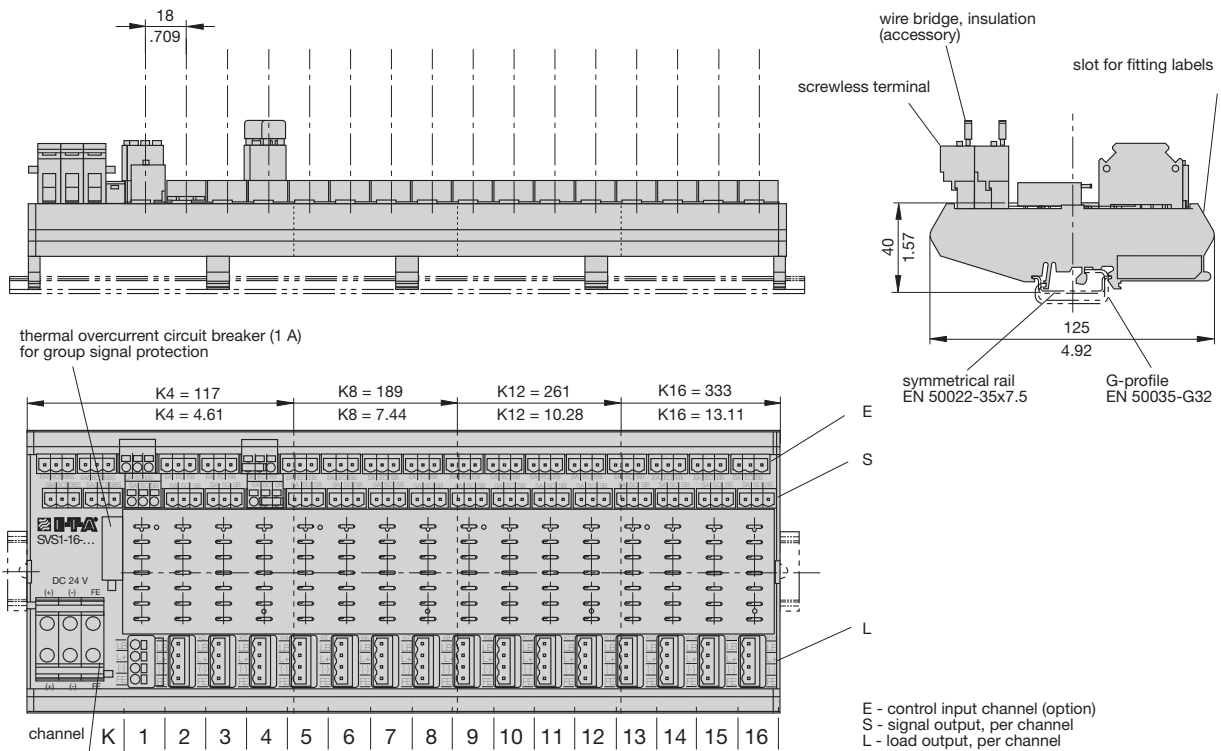
- E0** without control input
- E1** with control input (E) per channel (option)

### Fitting variants

- C0** not fitted
- C1** complete with screwless spring-loaded terminals max. 2.5 mm<sup>2</sup> (AWG 14) without connector sleeve

SVS1 - 16 - L4 - S1 - E0 - C1 ordering example

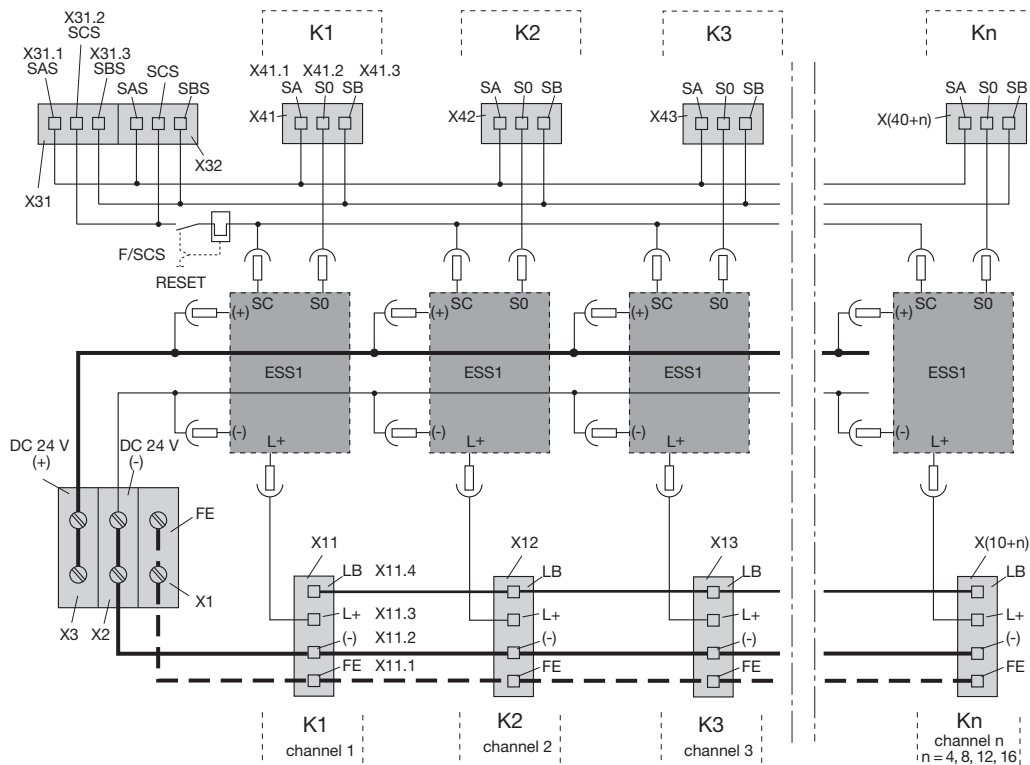
## Dimensions SVS1-16



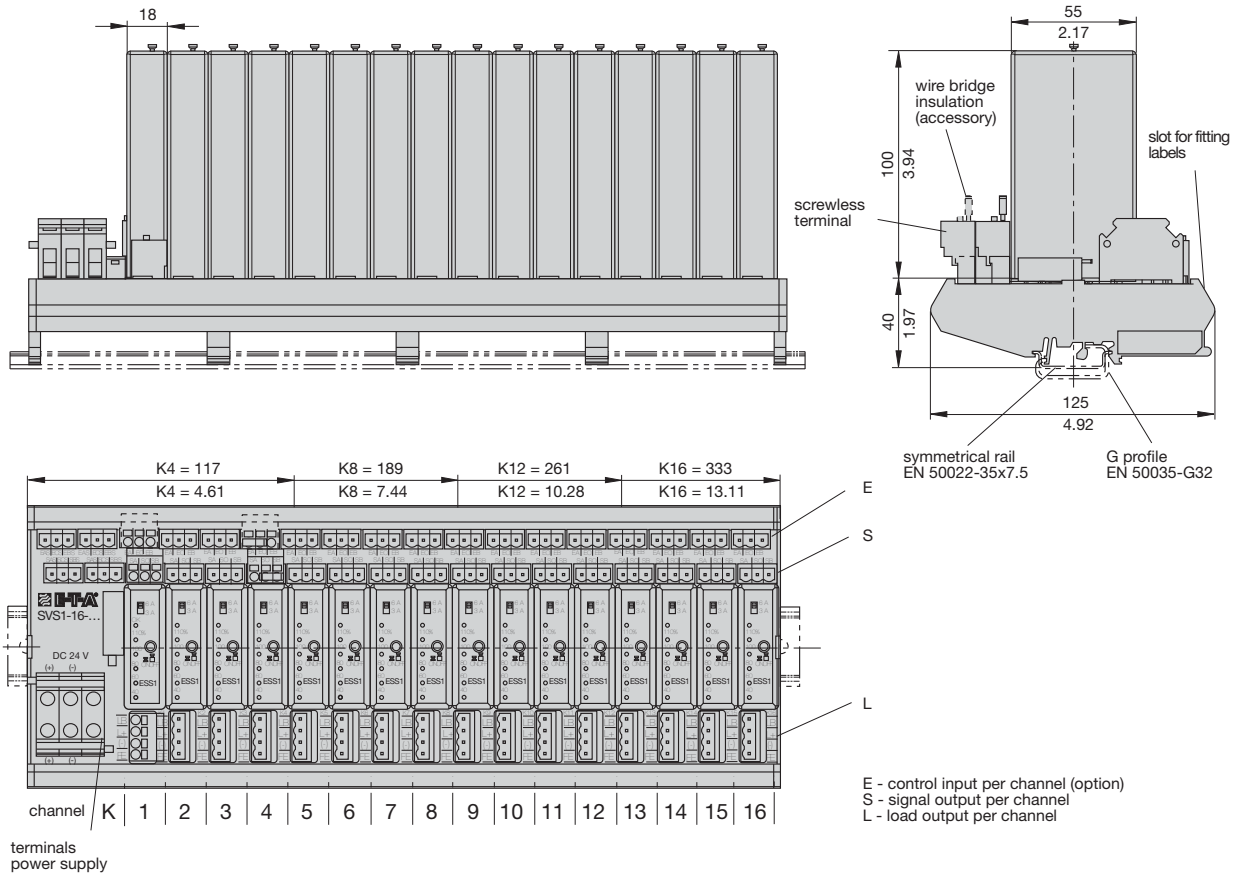
terminals  
power supply

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

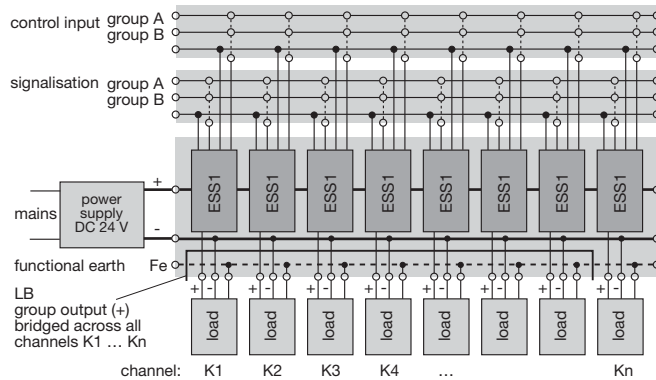
## Connection diagram SVS1-(n)



## Dimensions SVS1-16, fitted with ESS1



## Schematic diagram SVS1-(n)



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

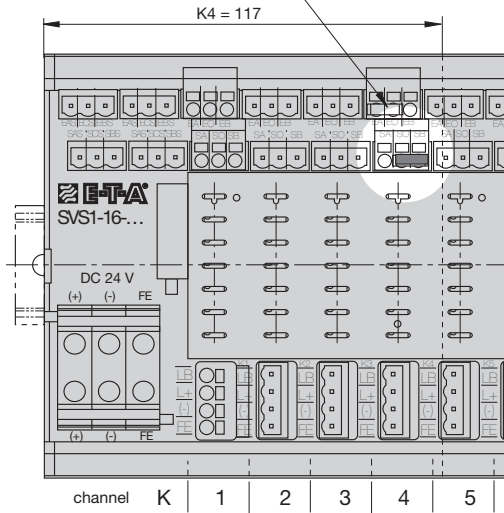
## Example of signal group

Signal output of channel K4:

Insulated wire bridge (accessory) placed:  
[S0] Π [SB]

This means that [S0] of K4 has been assigned to the group signal of signal group B [SBS].

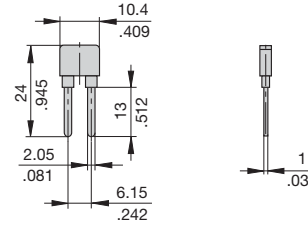
[S0] single output  
[SB] signal group B  
[SA] signal group A



## Accessories

### Insulated wire bridge Y 303 881 08

- Group connection of signal outputs (S0) - (SA) or (S0) - (SB)
- Group connection of control inputs (option)



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

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

Electronic circuit breaker type ESS20-0.. is designed to ensure **selective** disconnection of individual loads in systems which are powered by a DC 24 V switch-mode power supply.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through **selective** disconnection the ESS20-0.. responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by a combination of active current limitation and well-proven circuit breaker technology including physical isolation. The ESS20-0.. limits the highest possible current to 1.8 or 1.5 times the selected rated current of the circuit breaker. Thus it is possible to switch on capacitive loads of up to 20,000 µF lamp loads, but they are disconnected only in the event of an overload or short circuit.

For optimal adjustment to the application conditions the current rating of the ESS20-0.. can be selected in fixed values from 0.5 A...10 A and in adjustable variants 1 A/2 A or 3 A/6 A. Failure and status indication are provided by a bicolour LED and an integral signal contact.

The ESS20-0.. features a width of only 12.5 mm and can be plugged into the E-T-A power distribution socket Module 17plus and SVS02/SVS04 (for ESS20-003) ensuring ease of installation and saving space in control cabinets.

## Features

- Selective load protection with physical isolation in the event of a fault.
- All types of loads can be connected (small DC motors etc. on request).
- Active current limitation (1.8 or 1.5 times rated current  $I_N = 8$  A or 10 A) for safe connection of capacitive loads up to 20,000 µF and on overload/short circuit.
- Electronic trip characteristic.
- Reliable overload disconnection with  $1.1 \times I_N$  plus, even with long load lines or small cable cross sections (see table 2).
- Selectable current ratings (fixed values 0.5 A...10 A or two steps: 1 A/2 A or 3 A/6 A).
- Manual ON/OFF button (push-push actuation).
- Clear status and failure indication.
- Width per unit only 12.5 mm.
- Plug-in mounting utilising power distribution system Module 17plus or SVS02/SVS04 (for ESS20-003), see product group 7.

## Approvals

Authority	Voltage rating	Current ratings
UL 1077	DC 24 V	0.5...10 A

**Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.**



ESS20-0..

## Technical data ( $T_{\text{ambient}} = 25^\circ\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

### Operating data

Operating voltage $U_S$	DC 24 V (18...32 V)
Current rating $I_N$	fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A switchable: 1 A/2 A or 3 A/6 A
Power consumption	typically 13 mA
Trip current (bimetal)	typically 0.3 A (only in the event of a failure, before physical isolation)
Status indication by means of	<b>bicolour LED:</b> GREEN: unit is ON, power-MOSFET is switched on ORANGE: in the event of overload or short circuit until physical isolation LED not lighted: push button in OFF position <b>potential-free signal contact</b> (change-over contact) <b>OFF-position of push button</b>

Reverse polarity protection of $U_S$	internal bimetal (fail-safe element) trips, push button moves into OFF position
--------------------------------------	---

### Load circuit

Load output	Power-MOSFET switching output (high side switch)
Max. data of load with side-by-side mounting	see table 1
Voltage drop at $I_N$	see table 1
Overload disconnection	typically $1.1 \times I_N$ (1.05...1.35 $\times I_N$ )
Short-circuit current $I_K$	typically $1.8 \times I_N$ / active current limitation
Trip time	see time/current characteristics
for physical isolation	typically 5 sec at $I_{\text{load}} > 1.1 \times I_N$
for electronic disconnection	typically 5 sec...100 ms at $I_{\text{load}} > 1.8 \times I_N$ or $1.5 \times I_N$

Temperature disconnection	internal temperature monitoring with physical isolation
---------------------------	---

Low voltage monitoring load output	ON at $U_S > 16 \text{ V}$ OFF at $U_S < 8 \text{ V}$
------------------------------------	--

Starting delay $t_{\text{start}}$	typically 0.3 sec after every switch-on and after applying $U_S$
-----------------------------------	--

Disconnection of load circuit	single pole (switch contact) - by push-push actuation of the blue push button - upon electronic fault disconnection (overload, short circuit) - with reverse polarity
-------------------------------	--

Free-wheeling circuit	external free-wheeling diode recommended with inductive load
-----------------------	--

Several load outputs must not be connected in parallel.

## Technical data (T<sub>ambient</sub> = 25 °C, operating voltage U<sub>S</sub> = DC 24 V)

### Fault indication, signal output

Fault indications	potential-free auxiliary contact change-over (SC-SO / SC-SI) simultaneously with physical isolation max. DC 30 V / 0.5 A, min. 10 V / 10 mA
Signal output ESS20-001 (single signalisation N/O)	blue push button in ON position: signal contact SC-SI is closed blue push button in OFF position: signal contact SC-SI is open
Signal output ESS20-003 (group signalisation N/C)	blue push button in ON position: signal contact SC-SO is closed (SC-SI is open) blue push button in OFF position: signal contact SC-SO is open (SC-SI is closed)
Visual indication	LED lighted in ORANGE (until physical isolation)

### General data

Backup fuse for ESS20-0..	not required because of the integral redundant fail-safe element (thermal E-T-A circuit breaker) push button in OFF position when fail-safe element has tripped.
Blade terminals	6.3 mm to DIN 46244-A6.3-0.8
Housing material	plastics material
Mounting of housing	plug-in mounting utilising power distribution system Module 17plus or SVS02
Ambient temperature	0...+50 °C (without condensation, see EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP30 DIN 40050 terminals: IP00 DIN 40050
EMC (EMC directive, CE logo)	emission: EN 50081-1 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 pollution degree 2 re-inforced insulation in operating area
Dielectric strength	(see dimensions) operating area test voltage AC 1000 V installation area test voltage AC 500 V load circuit-signal contact test voltage AC 500 V
Insulation resistance (OFF condition)	> 100 MΩ (DC 500 V) [LINE (+) – LOAD (+)]
Approvals	UL 1077, File E67320 Supplementary Protectors for use in Electrical Equipment CE logo
Dimensions (W x H x D)	12.5 x 105 x 60 mm
Mass	approx. 65 g

**Table 1: voltage drop, current limitation, max. load current**

current rating I <sub>N</sub>	typically voltage drop U <sub>ON</sub> at I <sub>N</sub>	active current limitation (typically)	max. load current at 100 % ON duty	
			T <sub>U</sub> = 40 °C	T <sub>U</sub> = 50 °C
0.5 A	100 mV	1.8 x I <sub>N</sub>	0.5 A	0.5 A
1 A	140 mV	1.8 x I <sub>N</sub>	1 A	1 A
2 A	180 mV	1.8 x I <sub>N</sub>	2 A	2 A
3 A	140 mV	1.8 x I <sub>N</sub>	3 A	3 A
4 A	190 mV	1.8 x I <sub>N</sub>	4 A	4 A
6 A	280 mV	1.8 x I <sub>N</sub>	6 A	5 A
8 A	220 mV	1.5 x I <sub>N</sub>	8 A	7 A
10 A	280 mV	1.5 x I <sub>N</sub>	10 A	9 A
1 A/2 A	140 mV/280 mV	1.8 x I <sub>N</sub>	1 A/2 A	1 A/2 A
3 A/6 A	140 mV/280 mV	1.8 x I <sub>N</sub>	3 A/6 A	3 A/5 A

Attention: when mounted side-by-side without convection the ESS20-0.. should not carry more than 80 % of its rated load with 100 % ON duty because of the integral thermal circuit breaker.

## Ordering information

### Type No.

**ESS20** Electronic Circuit Breaker with current limitation (e.g. typically 1.8 times rated current or 1.5 x I<sub>N</sub>, see table 1)

### Version

**0** with physical isolation in the event of a failure

### Control input

**0** without control input

### Signal output

- 1** signal contact N/O (single signalisation)
- 2** signal contact N/C (single signalisation)
- 3** signal contact changeover (group signalisation)

### Operating voltage

**DC 24 V** rated voltage DC 24 V

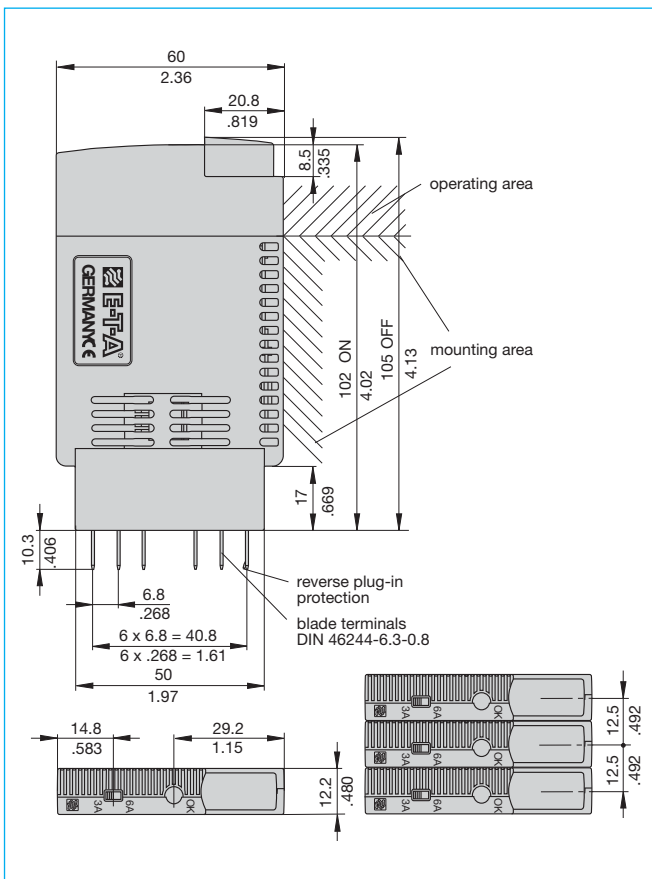
### Current rating

- 0.5 A**
- 1 A**
- 2 A**
- 3 A**
- 4 A**
- 6 A**
- 8 A**
- 10 A**
- 1 A/2 A** (selectable)
- 3 A/6 A** (selectable)

**ESS20 - 0 0 3 - DC 24 V - 3 A/6 A** ordering example (recommended type)

**Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.**

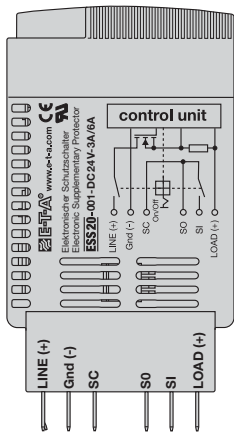
## Dimensions



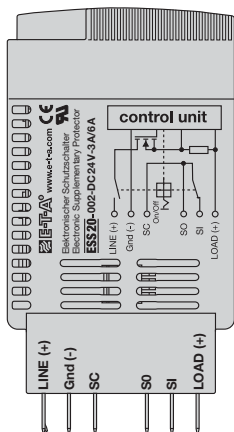
This is a metric design and millimeter dimensions take precedence (  $\frac{\text{mm}}{\text{inch}}$  )

## Terminal wiring diagrams (e. g. adjustable 3 A/6 A)

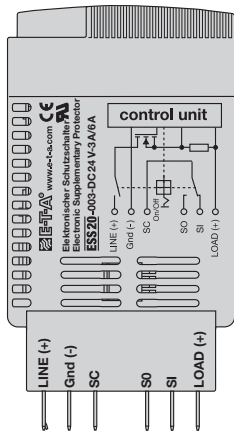
ESS20-001-...



ESS20-002-...

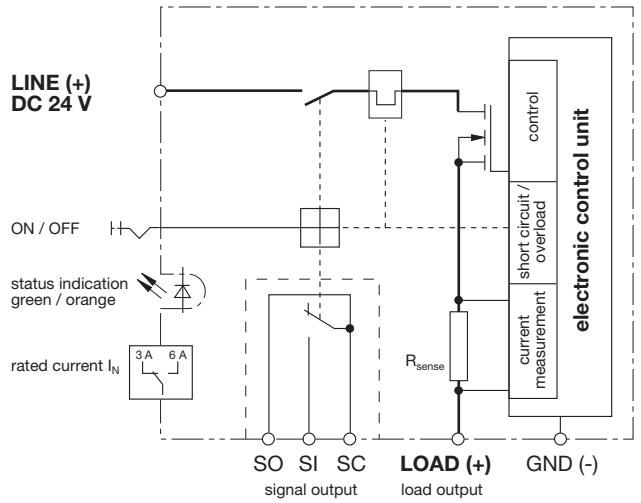


ESS20-003- ...

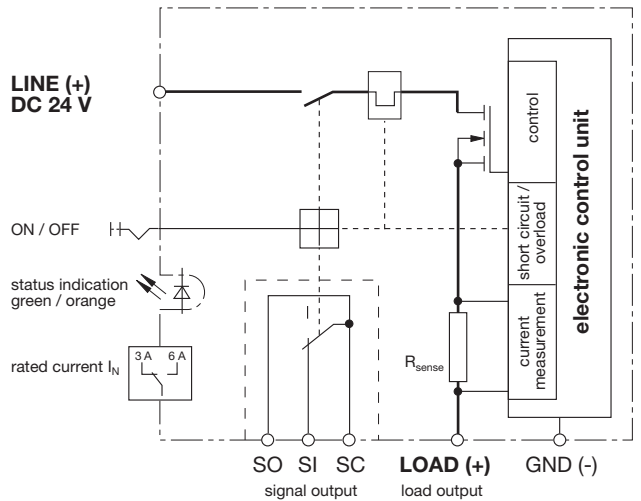


## Basic circuit diagrams (e. g. adjustable 3 A/6 A)

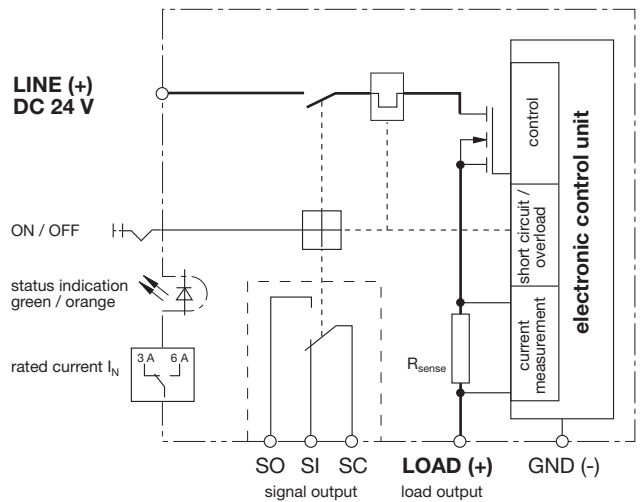
ESS20-001-... (single signalisation N/O)



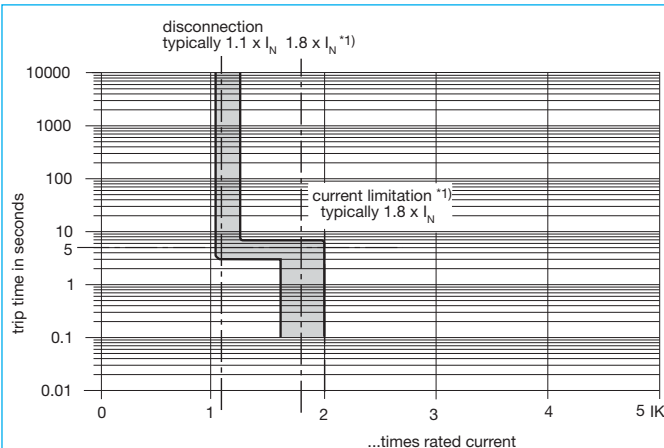
ESS20-002-... (single signalisation N/C)



ESS20-003- ... (group signalisation with change over)



## Time/Current characteristic curve ( $T_A = 25\text{ }^\circ\text{C}$ )



\*1) current limitation typically  $1.8 \times I_N$  times rated current at  $I_N = 0.5\text{ A} \dots 6\text{ A}$   
 current limitation typically  $1.5 \times I_N$  times rated current at  $I_N = 8\text{ A} \dots 10\text{ A}$

- The trip time is typically 5 s in the range between  $1.1$  and  $1.8 \times I_N^{*1}$ .
- Electronic current limitation starts at typically  $1.8 \times I_N^{*1}$  which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload until disconnection will not exceed  $1.8 \times I_N^{*1}$  times the current rating. Trip time is between 100 ms (short circuit current  $I_K$ ) and 5 sec (at overload with high line attenuation).
- Without the current limitation activated at typically  $1.8 \times I_N^{*1}$  a considerably higher overload current would flow in the event of an overload or short circuit.
- After detection of an overload or short circuit the LED changes colour from GREEN to ORANGE. The LED will no longer be lighted after the circuit breaker has tripped.
- Resetting the circuit breaker is not possible before the integral bimetal has cooled down (approx. 10 sec).

Table 2: Reliable trip of ESS20

### Reliable trip of ESS20 with different cable lengths and cross sections

Resistivity of copper $\rho_0 =$	0.0178 (Ohm x mm <sup>2</sup> ) / m		
$U_S = \text{DC } 19.2\text{ V}$ (= 80 % v. 24 V)	voltage drop of ESS20 and tolerance of trip point (typically $1.1 \times I_N = 1.05 \dots 1.35 \times I_N$ ) have been taken into account.		
ESS20-selected rating $I_N$ (in A) →	<b>3</b>	<b>6</b>	→ <b>ESS20 trips after 3...5 s</b>
e. g. trip current $I_{ab} = 1.25 \times I_N$ (in A) →	3.75	7.5	
$R_{\text{max}}$ in Ohm = $(U_S / I_{ab}) - 0.050$ →	<b>5.07</b>	<b>2.51</b>	

### The ESS20 reliably trips from 0 Ohm to max. circuitry resistance $R_{\text{max}}$

Cable cross section A in mm <sup>2</sup> →	0.14	0.25	0.34	0.5	0.75	1	1.5
cable length L in meter (= single length) ↓	cable resistance in Ohm = $(R_0 \times 2 \times L) / A$						
	↓	↓	↓	↓	↓	↓	↓
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

- Example 1:** max. length at 1.5 mm<sup>2</sup> and 3 A → **214 m**
- Example 2:** max. length at 1.5 mm<sup>2</sup> and 6 A → **106 m**
- Example 3:** mixed wiring: R1 = 40 m in 1.5 mm<sup>2</sup> and R2 = 5 m in 0.25 mm<sup>2</sup>:  
 (Control cabinet – sensor/actuator level) R1 = 0.95 Ohm, R2 = 0.71 Ohm **Total (R1 + R2) = 1.66 Ohm**

## Accessories for ESS20-0..

### Description

Module 17plus is a power distribution system for use with electronic circuit breaker ESS20-0..

Each module accommodates two breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.

The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected.

Electrical connections are by means of spring-loaded terminals. The reference potential for the ESS20-0.. (Gnd pin 11) is also looped through and connected to the terminals at the sides.

The integral make contact of the ESS20-001 (SC-SI) can be tapped at terminal 12 of the relevant channel (individual signalisation).

The integral make contact of the ESS20-002 (SC-SI) can be tapped at terminal 12 of the relevant channel (individual signalisation).

The ESS20-003 has an integral signal contact (change-over contact). The contact SC-SO is used for group fault signalisation. For this purpose the contacts for signalisation are connected in series in the Module 17plus and are connected to the terminal blocks via two terminals (13,14). It is possible with a test probe to contact the series connection in each module and detect possible interruptions.

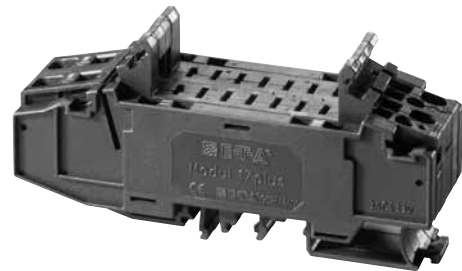
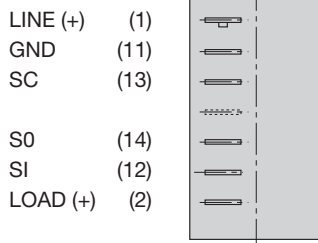
All internal wirings for the ground potential and the group signal are established by the modular mounting of the individual Modules 17plus. Meets the requirements of UL60950.

### Ordering information

17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

### Pin configuration, fitted with ESS20-0..

#### ESS20-0.. Module 17 plus

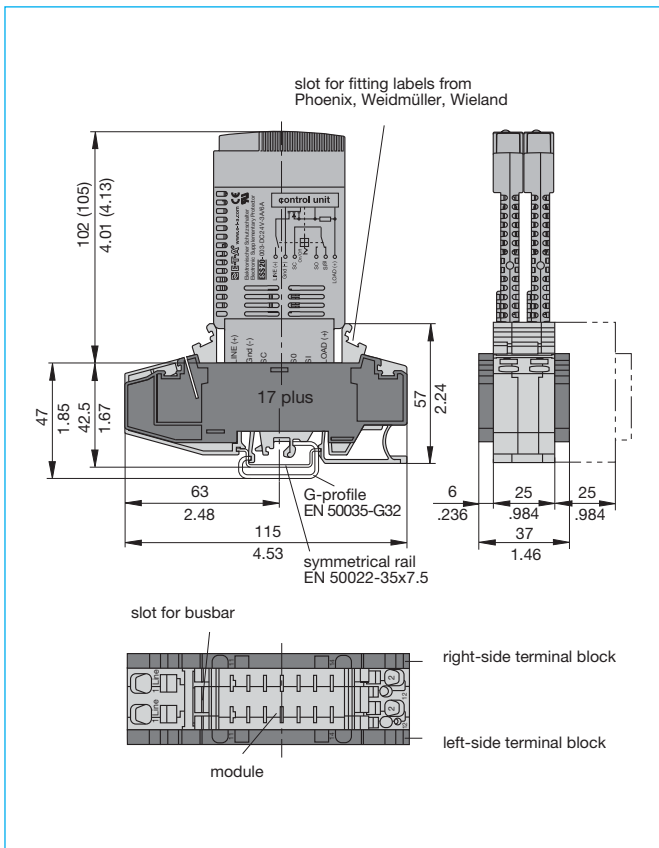


17plus

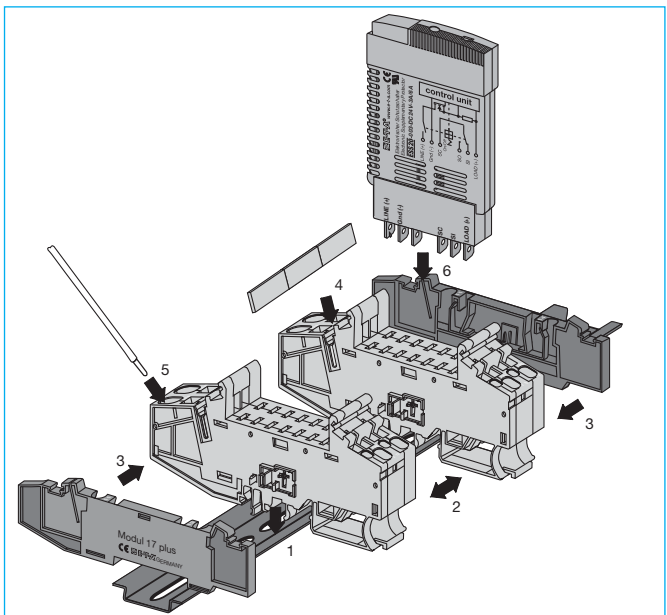
### Technical data

Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
LINE feed (1)	spring-loaded terminals for 1.5-10 mm <sup>2</sup> (AWG 10), SD 2 (0.8x4.0)
LOAD output (2)	spring-loaded terminals for 0.25-4 mm <sup>2</sup> (AWG 12), SD 1 (0.6x3.5)
Reference potential Gnd/ group signal terminals (11 or 13, 14):	spring-loaded terminals for 0.25-2.5 mm <sup>2</sup> (AWG 14), SD 1 (0.6x3.5)
individual signal terminal (12)	spring-loaded terminal for 0.25-1.5 mm <sup>2</sup> (AWG 16), SD 0 (0.4x2.5)
Test probe for testing the group signal for line interruption: ≤ 2 mm ø	
Voltage rating (without ESS20-0..):	AC 433 V; DC 65 V
Current rating (without ESS20-0..)	
LINE feed (1)	50 A
LOAD output (2)	25 A
Reference potential Gnd (11)	10 A
Individual signal (12)	1 A (with ESS20-0..: 0.5 A)
Group signal /(13-14)	1 A (with ESS20-0..: 0.5 A)
Internal resistance values (without ESS20-0..)	
LINE-LOAD (1-2)	≤ 5 mΩ
Group signal (13-14) per module	≤ 8 mΩ per pole + 5 mΩ for each additional module
Busbar for power distribution	
insulated busbar (blue or red):	I <sub>max</sub> 32 A
non-insulated busbar:	I <sub>max</sub> 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	
Dielectric strength of Module 17plus (without ESS20-0..)	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V
Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

## Dimensions

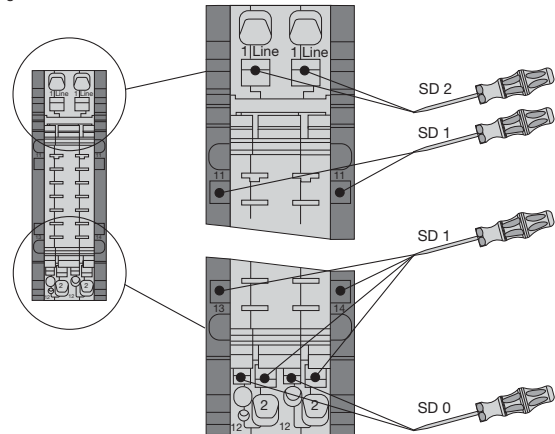


## Installation example



Installation:

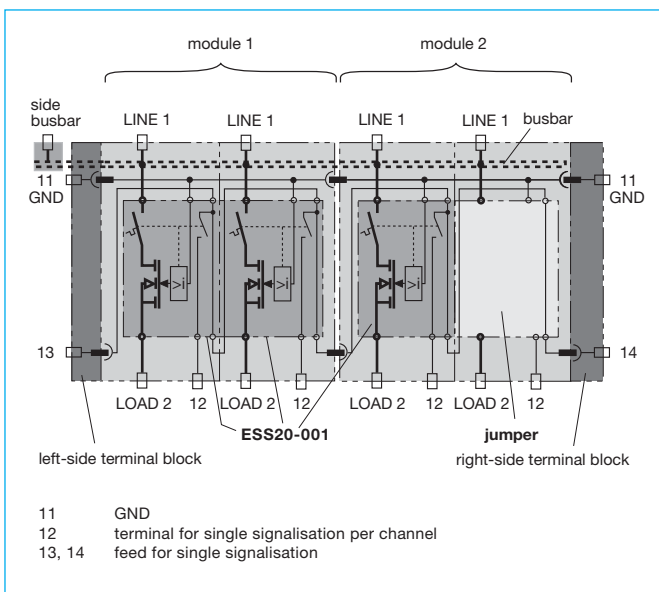
- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in ESS20-0..



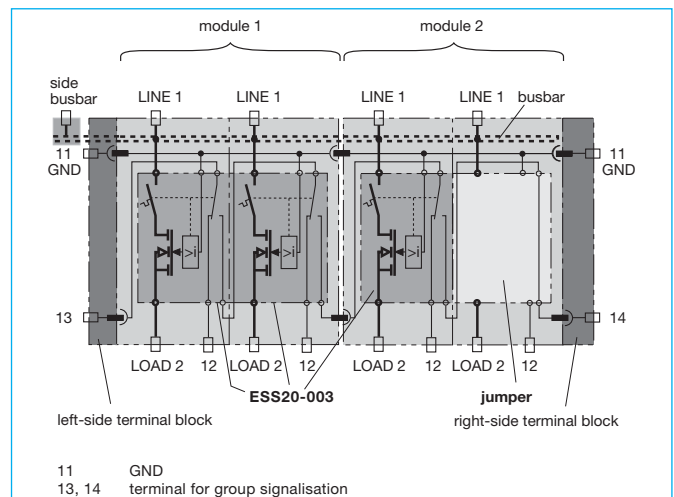
Connection and disconnection of cables with screw driver

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

## Connection diagram for ESS20-001



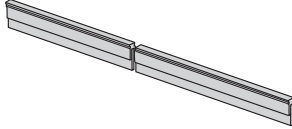
## Connection diagram for ESS20-003



## Accessories

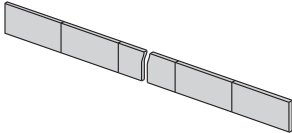
### Busbar 32 A

- X 222 005 01 blue insulation, 500 mm/19.68 in.
- X 222 005 02 red insulation, 500 mm/19.68 in.
- X 222 005 03 grey insulation, 500 mm/19.68 in.



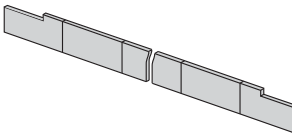
### Busbar 50 A

- Y 307 016 01 non-insulated, 500 mm/19.68 in.



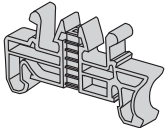
### Busbar 50 A

- Y 307 016 11 non-insulated, 500 mm/19.68 in.



### End bracket

- X 222 004 01



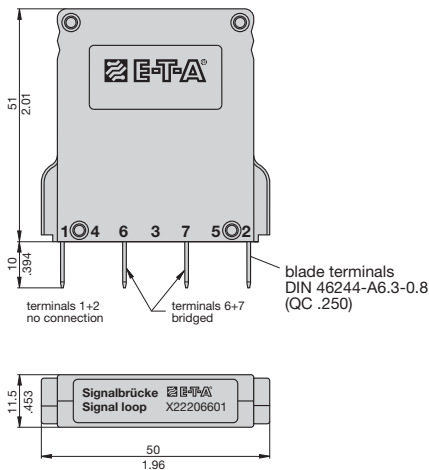
### Screw terminal for busbar

- X 211 156 01 non insulated



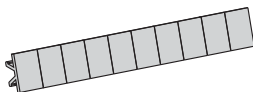
### Jumper

- X 222 066 01



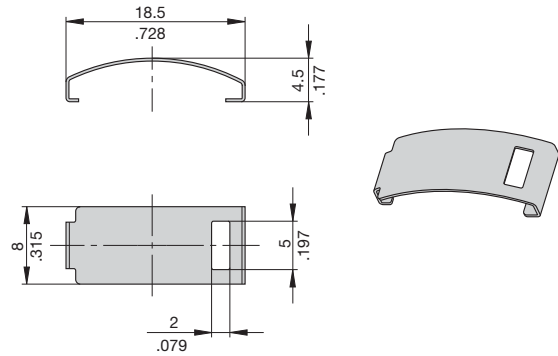
### Labels

- marking area 6 x 10 mm
- (packing unit 10 pcs = 1 strip)
- part. no. Y 307 942 61



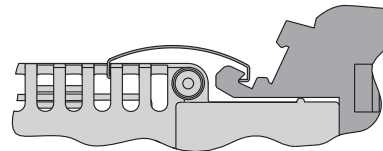
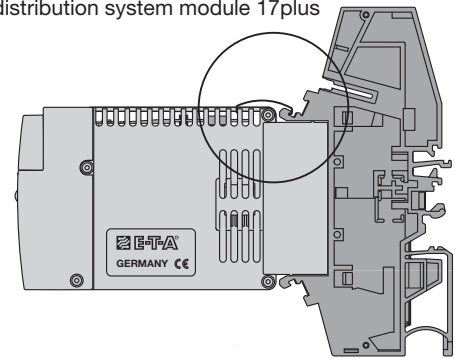
## Accessories for ESS20-0..

### Retaining clip Y 307 754 01

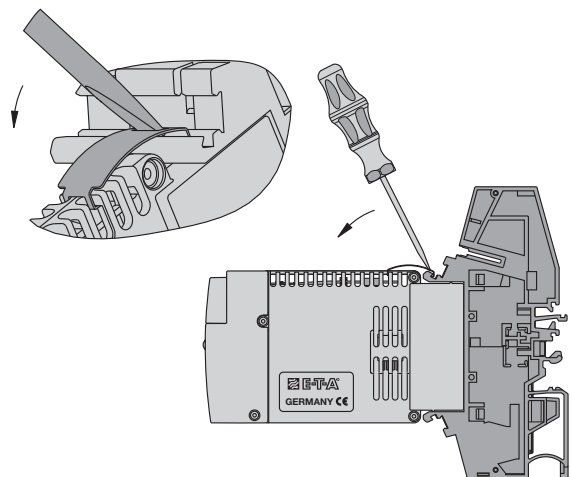


## Mounting of retaining clip

ESS20 with retaining clip Y 307 754 01  
for power distribution system module 17plus



Removal of retaining clip Y 307 754 01

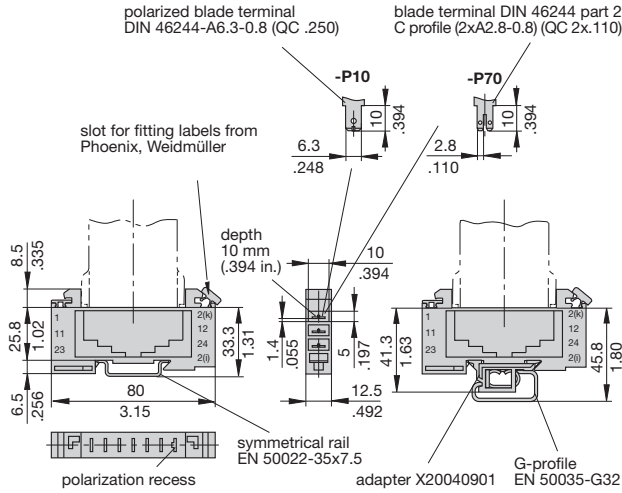


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

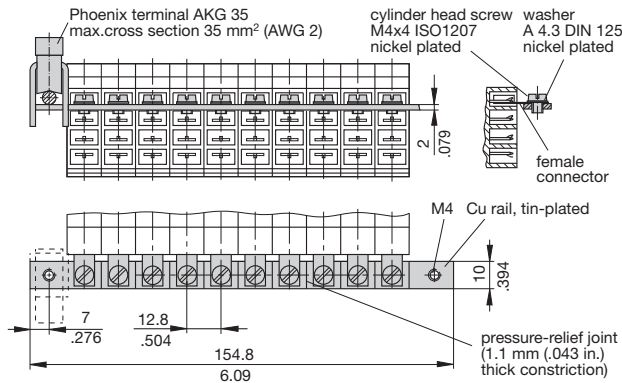
**Accessories for ESS20-0..**

**Single mounting sockets**  
(up to 16 A max. load)  
**17-P10-Si**  
**17-P70-Si**

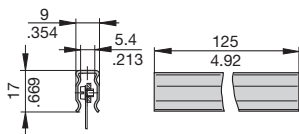
(with adapter)  
**17-P10-Si-20025**  
**17-P70-Si-20025**



**Busbar (10-way)** (supplied as a complete package)  
**for type 17 socket**  
(for max. 100 A continuous load,  
more positions available on request)  
**X 211 157 01** with terminal  
**X 211 157 02** without terminal



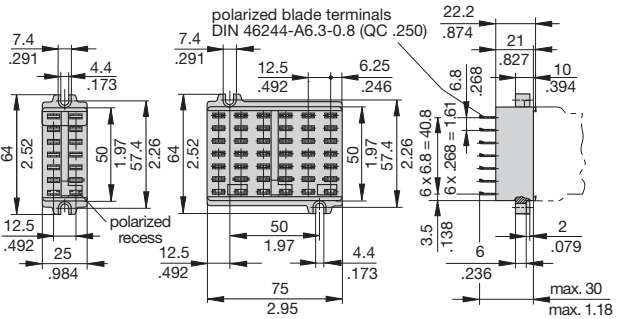
**Insulating sleeving for busbar (10-way)**  
**Y 303 824 01**



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

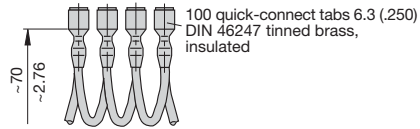
**2-way mounting socket**  
**23-P10-Si**  
(retaining clip Y 300 581 03 available on request)

**6-way mounting socket**  
**63-P10-Si**



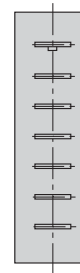
**Connector bus links -P10**

- X 210 588 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)



**Pin selection, fitted with ESS20-0..**

ESS20-0..	17-P10-Si
LINE (+)	[2(k)]
GND	[12]
SC	[24]
S0	[2(l)]
SI	[23]
LOAD (+)	[11]
	[1]



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



## Description

The special device ESS20-1.. is a further extension of the product line "electronic circuit breakers". Type ESS20-1.. has a width of only 12.5 mm and selectively protects all DC 24 V loads through a combination of active electronic current limitation and well-proven circuit breaker technology including physical isolation and manual actuation. The ESS20-1.. can be plugged into the E-T-A power distribution socket Module 17plus, ensuring ease of installation and a significant reduction of wiring time.

DC 24 V switch-mode power supplies (10 A...40 A), which are widely used in automation industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads.

The ESS20-1.. helps to overcome this problem as it responds to the overload condition faster than the switch-mode power supply. The highest possible overcurrent is limited to 1.8 or 1.5 times rated current. Thus it is possible to switch on capacitive loads up to **20.000 µF** but they are disconnected only in the event of an overload or short circuit. For optimal adjustment to the application conditions the current rating of the ESS20-1.. can be selected in fixed values from 0.5 A...10 A and in switchable variants 1 A/2 A or 3 A/6 A. Failure and status indication are provided by a bicolour LED and an integral short-circuit proof signal output.

**Upon detection of overload or short circuit in the load circuit the MOSFET of the load output will be blocked and current flow in the load circuit will be interrupted. MOSFET and load circuit may be reset by means of the electronic reset input or manually by actuating the push-button (PUSH-PUSH operation). The load circuit may also be physically isolated during start-up of the equipment, e. g. for measuring purposes.**

## Features

- Selective load protection, electronic trip curve
- Active current limitation (1.8 or 1.5 times rated current  $I_N = 8$  A or 10 A) with connection of capacitive loads up to 20,000 µF and at overload/short circuit.
- Reliable overload disconnection with  $1.1 \times I_N$  plus, even with long load lines or small cable cross sections (see table 2).
- Selectable current ratings (fixed values 0.5 A...10 A or two steps: 1 A/2 A or 3 A/6 A).
- Manual ON/OFF button (push-push actuation) with physical isolation
- Clear status and failure indication through LED and signal output
- Electronic reset input
- Integral fail-safe element
- Width per unit only 12.5 mm
- Plug-in mounting utilising power distribution system Module 17 plus

## Approvals

Authority	Voltage rating	Current ratings
UL 1077	DC 24 V	0.5...10 A

**Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.**



ESS20-1..

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

### Operating data

Operating voltage $U_S$	DC 24 V (18...32 V)
Current rating $I_N$	fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A switchable: 1 A/2 A or 3 A/6 A
Closed circuit current $I_0$	typically 22 mA
Status indication by means of	<ul style="list-style-type: none"> <li>• bicolour LED: <ul style="list-style-type: none"> <li>GREEN: unit is ON, load circuit/power-MOSFET is switched on, signal output on, supplying +DC 24 V</li> <li>ORANGE: in the event of overload or short circuit until electronic disconnection</li> <li>RED: unit switched off electronically, load circuit/power MOSFET off, status output blocked, undervoltage (<math>U_S &lt; 8\text{ V}</math>), after switch-on until end of switch-on delay.</li> <li>OFF: switched off manually with push-button, unit off load</li> </ul> </li> <li>• signal output SF: <ul style="list-style-type: none"> <li>- 1 signalisation per channel</li> <li>- load "ON" SF = +DC 24 V</li> <li>- load "OFF" SF = 0 V</li> </ul> </li> <li>• ON/OFF position of push button</li> </ul>

### Load circuit

Load output	power MOSFET switching output (plus switching)
Max. data of load with side-by-side mounting	see table 1
Voltage drop $U_{ON}$ at $I_N$	see table 1
Disconnection at overload	typically $1.1 \times I_N$ (1.05...1.35 $\times I_N$ )
Short circuit current $I_K$	typically $1.8 \times I_N$ / active current limitation see table 1
Trip time	see time/current characteristics
for physical isolation	typically 3 s at $I_{load} > 1.1 \times I_N$
for electronic disconnection	typically 3 s...100 ms at $I_{load} > 1.8 \times I_N$ or $1.5 \times I_N$
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring of load output	with hysteresis, no reset necessary "OFF" at $U_S < 8\text{ V}$ "ON" at $U_S > 16\text{ V}$
Starting delay $t_{start}$	typically 0.5 sec after every switch-on and after applying $U_S$
Physical isolation	single pole (switch contact) of load circuit - by push-push actuation of the blue push button

## Technical Data ( $T_U = 25\text{ °C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

Free-wheeling circuit	external free-wheeling diode recommended with inductive load
Several load outputs	must not be connected in parallel
<b>Signal output SF</b>	
Signal output SF	plus-switching signal output per unit, applies $U_S$ to terminal 12 of module 17plus Ratings: DC 24 V / max. 0.5 A (short-circuit proof)
Signal output SF ON	signal output has +24 V level if - the load output has continuity (ON condition of load)
Signal output SF OFF	signal output has 0 V level if - the load output is electronically blocked (fault condition or switch-on delay) - the blue push button is in OFF position - no operating voltage $U_S$ is connected. The signal output is connected to ground via a pull-down resistor (10 kOhm).

### Reset input

Reset input RE (terminal 13 or 14 of module 17plus Caution: unused slots have to be fitted with jumpers)	The electronically blocked ESS20-1.. may e.g. be reset via an external momentary switch due to the falling edge of a short +DC 24 V impulse. The reset signal will be fed in terminal 13 or 14 of the module 17plus and is internally pre-wired. The reset simultaneously affects all blocked ESS20-1.. channels of the power distribution system, all switched on ESS20-1.. channels remain unaffected.
---	--

Reset input level:	
voltage high	max. +DC 32 V > DC 8 V...DC 32 V
voltage low	< DC 3 V...0 V
current consumption	at +DC 24 V typically 2.6 mA
min. pulse length	10 ms

### General data

Fail-safe element	back-up fuse for ESS21 not required as it has an integral redundant fail-safe element (thermal E-T-A circuit breaker); push button in OFF position with tripped fail-safe element
Blade terminals	6.3 mm to DIN 46244-A6.3-0.8
Housing material	plastics
Mounting	plug-in type for E-T-A power distribution socket Module 17plus
Ambient temperature	0...+50 °C (without moisture condensation, cf. EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Protection class	housing: IP30 DIN 40050, terminals: IP00 DIN 40050
EMC requirements (EMC directive, CE logo)	emitted interference: EN 50081-1 immunity: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 re-inforced insulation in operating area
Dielectric strength operating area	(see dimensions) test voltage AC 1,000 V
Dielectric strength installation area	test voltage AC 500 V
Insulation resistance (OFF condition of push button)	> 100 MΩ (DC 500 V) between [LINE (+) - LOAD (+)]
Approvals	UL 1077, File E67320 Supplementary Protectors for use in Electrical Equipment CE logo
Dimensions (B x H x T)	12.5 x 105 x 60 mm
Mass	65 g

Table 1: voltage drop, current limitation, max. load current

current rating $I_N$	typically voltage drop $U_{ON}$ at $I_N$	active current limitation (typically)	max. load current at 100 % ON duty	
			$T_U = 40\text{ °C}$	$T_U = 50\text{ °C}$
0.5 A	100 mV	$1.8 \times I_N$	0.5 A	0.5 A
1 A	140 mV	$1.8 \times I_N$	1 A	1 A
2 A	180 mV	$1.8 \times I_N$	2 A	2 A
3 A	140 mV	$1.8 \times I_N$	3 A	3 A
4 A	190 mV	$1.8 \times I_N$	4 A	4 A
6 A	280 mV	$1.8 \times I_N$	6 A	5 A
8 A	220 mV	$1.5 \times I_N$	8 A	7 A
10 A	280 mV	$1.5 \times I_N$	10 A	9 A
1 A/2 A	140 mV/280 mV	$1.8 \times I_N$	1 A/2 A	1 A/2 A
3 A/6 A	140 mV/280 mV	$1.8 \times I_N$	3 A/6 A	3 A/5 A

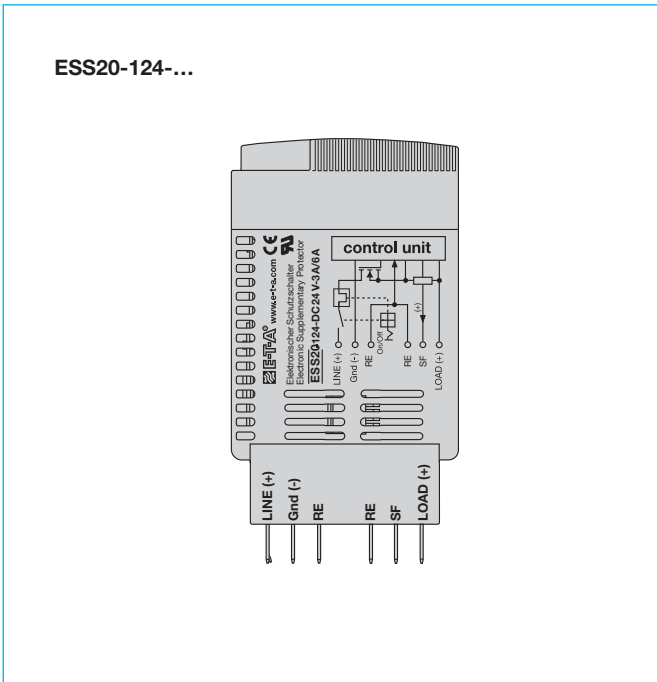
Attention: when mounted side-by-side without convection the ESS20-1.. should not carry more than 80 % of its rated load with 100 % ON duty because of the integral thermal circuit breaker.

## Ordering information

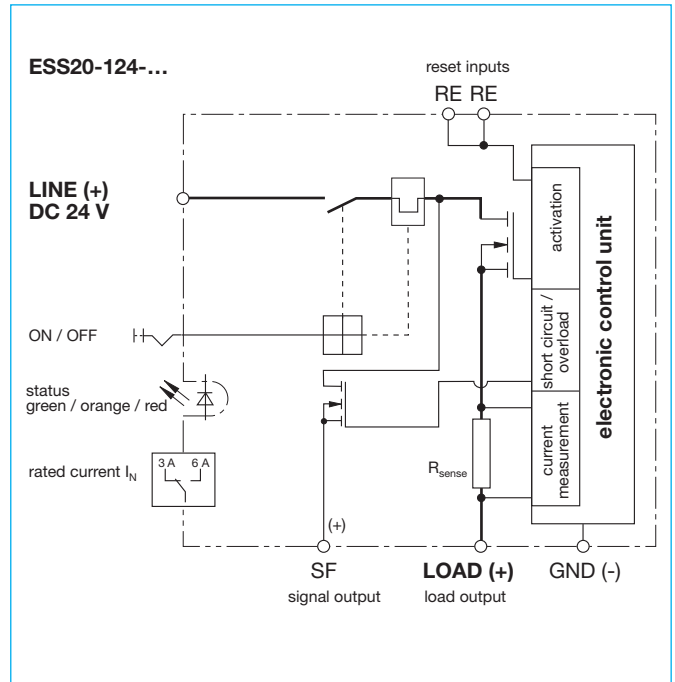
Type	Electronic Circuit Breaker with current limitation (e.g. typically $1.8 \times I_N$ or $1.5 \times I_N$ , see table 1)
Version	1 without physical isolation in the event of a failure
Control input	2 with reset input RE
Signal output	4 status output SF (single signalisation, plus switching)
Operating voltage	DC 24 V rated voltage DC 24 V
Current rating	0.5 A 1 A 2 A 3 A 4 A 6 A 8 A 10 A 1 A/2 A (selectable) 3 A/6 A (selectable)
ESS20 - 1 2 4 - DC 24 V - 3 A/6 A	ordering example (recommended type)

Attention: the user has to make sure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESS20 used.

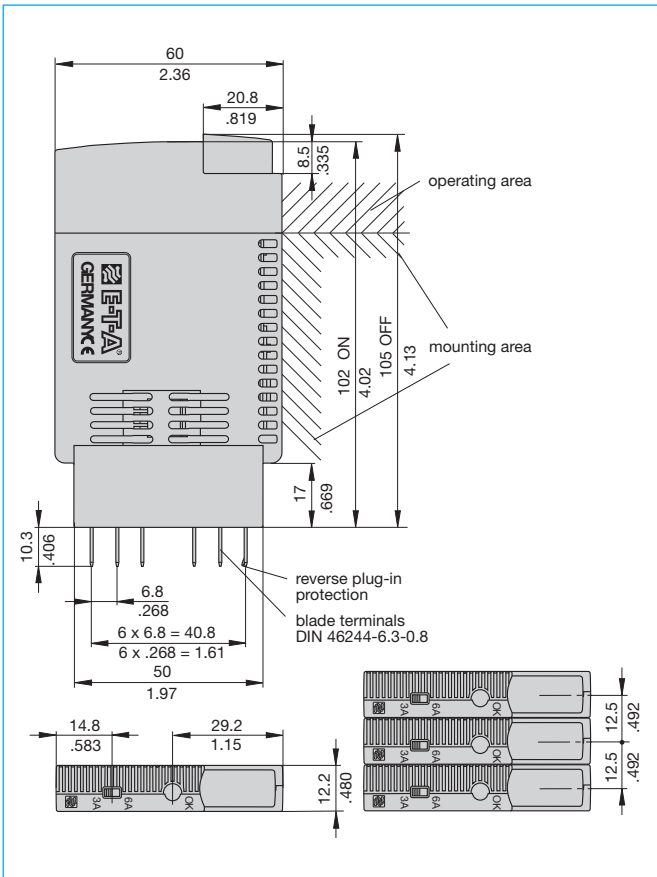
## Terminal wiring diagram ESS20-124 (e. g. switchable 3 A/6 A)



## Basic circuit diagram ESS20-124 (e. g. switchable 3 A/6 A)



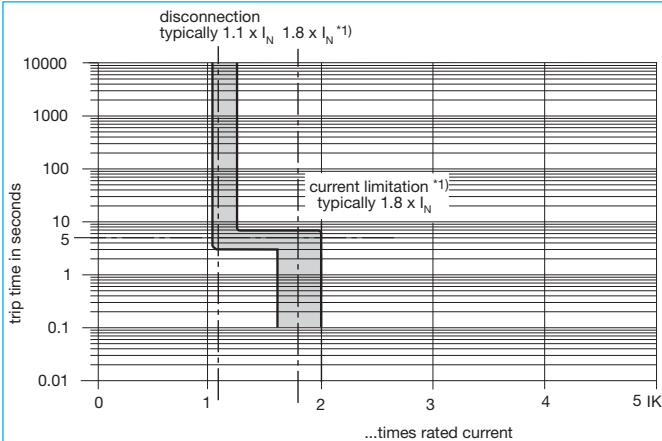
## Dimensions



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

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.

## Time/Current characteristic curve ( $T_A = 25\text{ }^\circ\text{C}$ )



- The trip time is typically 3 s in the range between 3 s.
- Electronic current limitation starts at  $1.8 \times I_N^{*1}$  which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload until disconnection will not exceed  $1.8^{*1}$  times the current rating. Trip time depends on extent of overcurrent. In the event of an overload of  $1.8 \times I_N^{*1}$  plus the trip time will be up to 3 s, in the event of a short circuit it will be 100 ms.
- Without current limitation to typically  $1.8 \times I_N^{*1}$  a much higher overcurrent would occur in the event of overload or short circuit.

$^{*1}$ current limitation typically  $1.8 \times I_N$  times rated current at  $I_N = 0.5\text{ A} \dots 6\text{ A}$   
 current limitation typically  $1.5 \times I_N$  times rated current at  $I_N = 8\text{ A} \dots 10\text{ A}$

**Table 2: Reliable trip of ESS20**

### Reliable trip of ESS20 with different cable lengths and cross sections

Resistivity of copper $\rho_0 =$	0.0178 (Ohm x mm <sup>2</sup> ) / m		
$U_S = \text{DC } 19.2\text{ V}$ (= 80 % v. 24 V)	voltage drop of ESS20 and tolerance of trip point (typically $1.1 \times I_N = 1.05 \dots 1.35 \times I_N$ ) have been taken into account.		
ESS20-selected rating $I_N$ (in A) →	<b>3</b>	<b>6</b>	→ <b>ESS20 trips after 3 s</b>
e. g. trip current $I_{ab} = 1.25 \times I_N$ (in A) →	3.75	7.5	
$R_{\text{max}}$ in Ohm = $(U_S / I_{ab}) - 0.050$ →	<b>5.07</b>	<b>2.51</b>	

### The ESS20 reliably trips from 0 Ohm to max. circuitry resistance $R_{\text{max}}$

Cable cross section A in mm <sup>2</sup> →	0.14	0.25	0.34	0.5	0.75	1	1.5
cable length L in meter (= single length) ↓	cable resistance in Ohm = $(R_0 \times 2 \times L) / A$						
	↓	↓	↓	↓	↓	↓	↓
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

- Example 1:** max. length at 1.5 mm<sup>2</sup> and 3 A → **214 m**
- Example 2:** max. length at 1.5 mm<sup>2</sup> and 6 A → **106 m**
- Example 3:** mixed wiring: R1 = 40 m in 1.5 mm<sup>2</sup> and R2 = 5 m in 0.25 mm<sup>2</sup>:  
 (Control cabinet – sensor/actuator level) R1 = 0.95 Ohm, R2 = 0.71 Ohm **Total (R1 + R2) = 1.66 Ohm**

## Accessories for ESS20-1..

### Description

Module 17plus is a power distribution system for use with electronic circuit breaker ESS20-1..

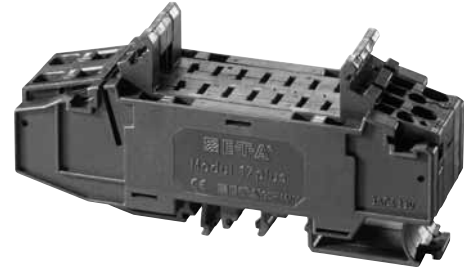
Each module accommodates two breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.

The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected.

Electrical connections are by means of spring-loaded terminals. The reference potential for the ESS20-1.. (GND pin 11) is also looped through and connected to the terminals at the sides.

The integral signal output SF of the ESS20-124 may be picked off at terminal 12 of the corresponding channel (single signalisation). The reset input RE may be connected via terminal 13 or 14.

Meets the requirements of UL60950.



17plus

### Ordering information

17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

### Pin configuration, fitted with ESS20-1..

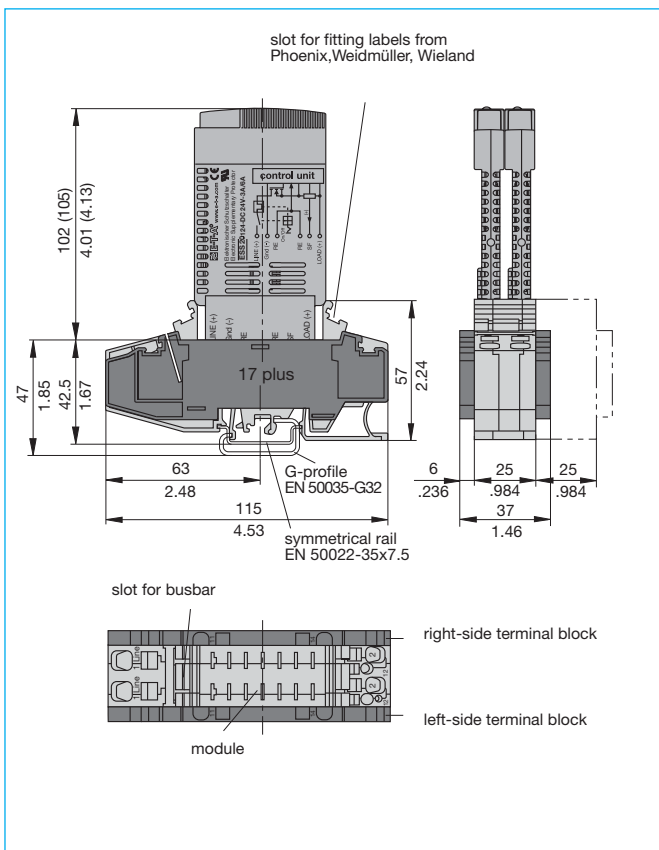
#### ESS20-124 Module 17 plus

LINE (+)	(1)		operating voltage PLUS, DC 24 V
GND	(11)		operating voltage MINUS
RE	(13)		reset input RE
RE	(14)		reset input RE
SF	(12)		signal output SF
LOAD (+)	(2)		protected load output

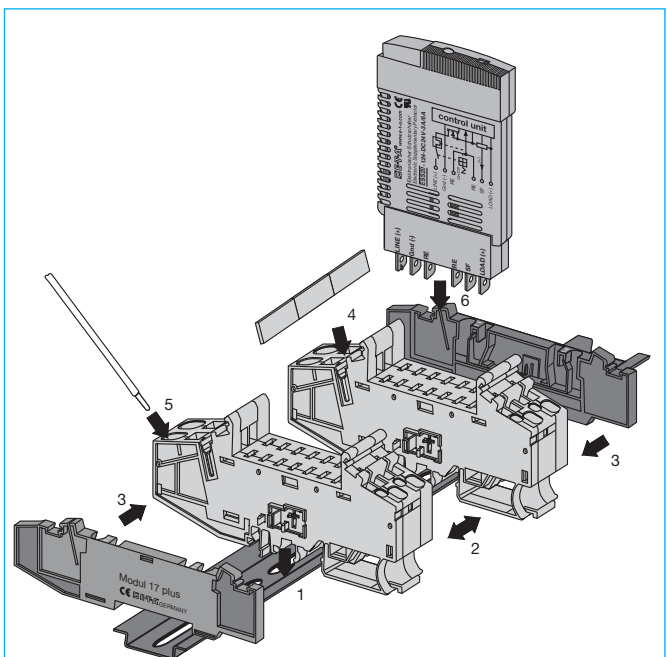
### Technical data

Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
LINE feed (1)	spring-loaded terminals for 1.5-10 mm <sup>2</sup> (AWG 10), SD 2 (0.8x4.0)
LOAD output (2)	spring-loaded terminals for 0.25-4 mm <sup>2</sup> (AWG 12), SD 1 (0.6x3.5)
Reference potential GND/ group signal terminals (11 or 13, 14):	spring-loaded terminals for 0.25-2.5 mm <sup>2</sup> (AWG 14), SD 1 (0.6x3.5)
individual signal terminal (12)	spring-loaded terminal for 0.25-1.5 mm <sup>2</sup> (AWG 16), SD 0 (0.4x2.5)
Test probe for testing the group signal for line interruption: ≤ 2 mm ø	
Voltage rating (without ESS20-1..):	AC 433 V; DC 65 V
Current rating (without ESS20-1..)	
LINE feed (1)	50 A
LOAD output (2)	25 A
Reference potential GND (11)	10 A
Individual signal (12)	1 A (with ESS20-1..: 0.5 A)
Group signal /(13-14)	1 A (with ESS20-1..: 0.5 A)
Internal resistance values (without ESS20-1..)	
LINE-LOAD (1-2)	≤ 5 mΩ
Group signal (13-14) per module	≤ 8 mΩ per pole + 5 mΩ for each additional module
Busbar for power distribution	
insulated busbar (blue or red):	I <sub>max</sub> 32 A
non-insulated busbar:	I <sub>max</sub> 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	
Dielectric strength of Module 17plus (without ESS20-1..)	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V
Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

## Dimensions

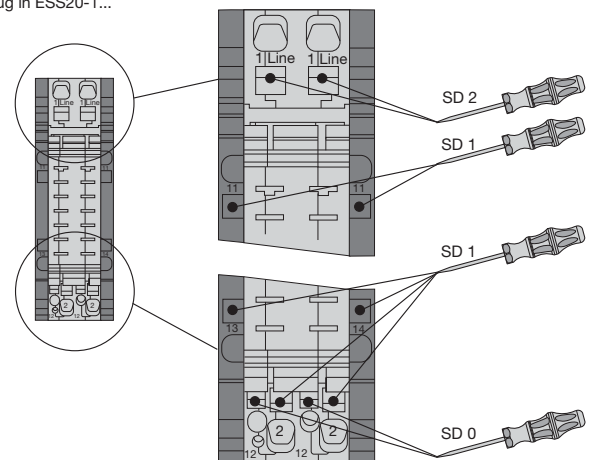


## Installation example



Installation:

- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in ESS20-1...

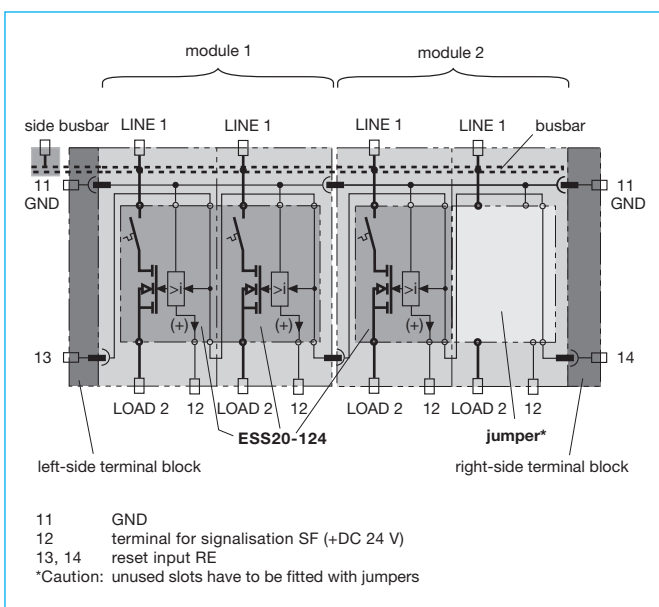


Connection and disconnection of cables with screw driver

5

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

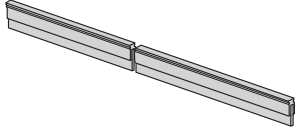
## Connection diagram pour ESS20-124



**Accessories**

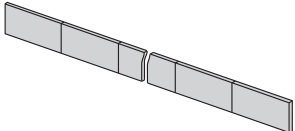
**Busbar 32 A**

- X 222 005 01 blue insulation, 500 mm/19.68 in.
- X 222 005 02 red insulation, 500 mm/19.68 in.
- X 222 005 03 grey insulation, 500 mm/19.68 in.



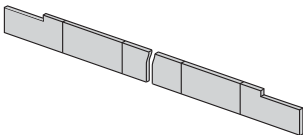
**Busbar 50 A**

- Y 307 016 01 non-insulated, 500 mm/19.68 in.



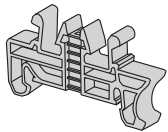
**Busbar 50 A**

- Y 307 016 11 non-insulated, 500 mm/19.68 in.



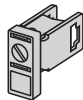
**End bracket**

- X 222 004 01



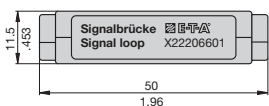
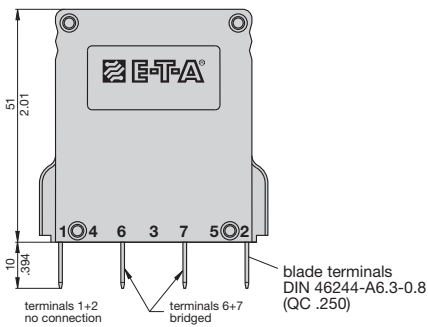
**Screw terminal for busbar**

- X 211 156 01 non insulated



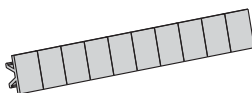
**Jumper**

- X 222 066 01



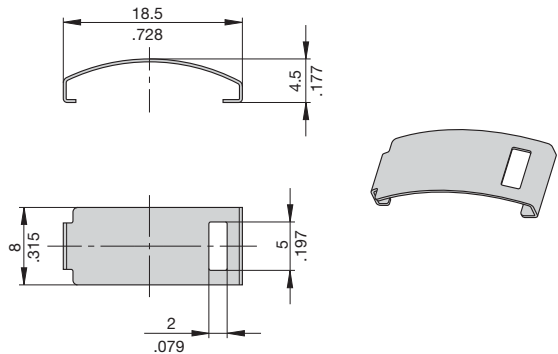
**Labels**

marking area 6 x 10 mm  
(packing unit 10 pcs = 1 strip)  
**part. no. Y 307 942 61**



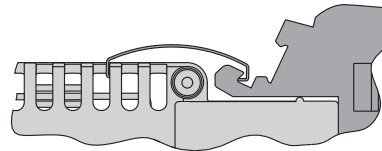
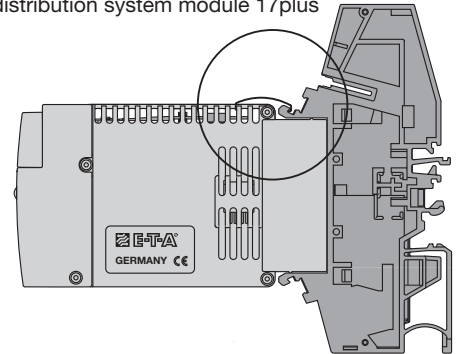
**Accessories for ESS20-1..**

**Retaining clip Y 307 754 01**

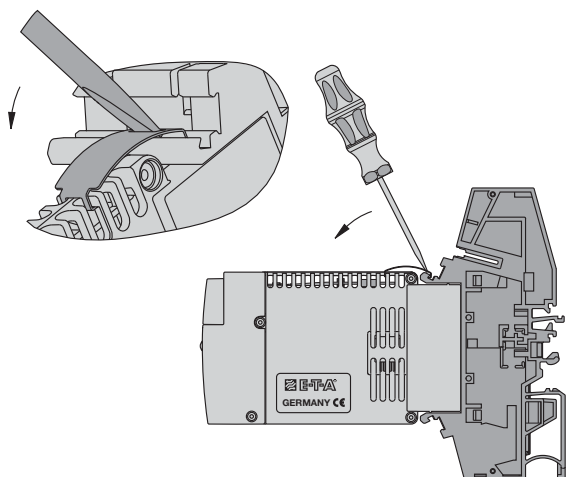


**Accessories for ESS20-1..**

ESS20 with retaining clip Y 307 754 01 for power distribution system module 17plus



Removal of retaining clip Y 307 754 01



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

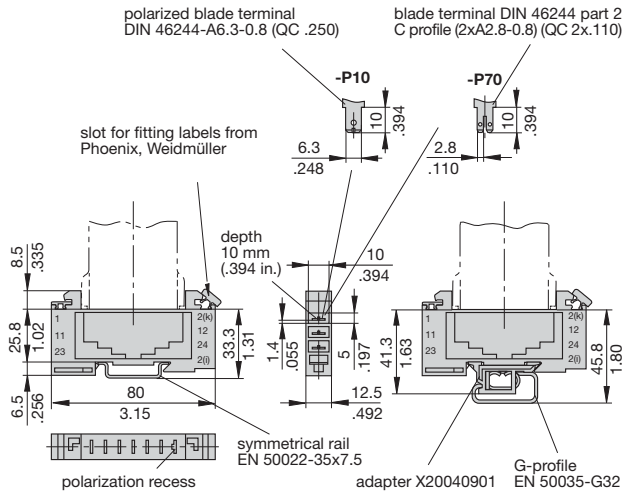
## Accessories for ESS20-1..

### Single mounting sockets

(up to 16 A max. load)  
**17-P10-Si**  
**17-P70-Si**

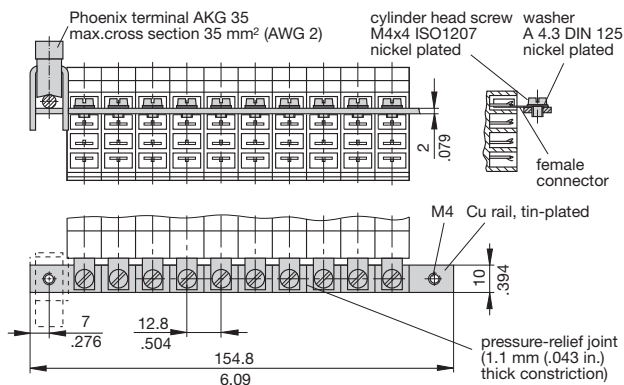
(with adapter)

**17-P10-Si-20025**  
**17-P70-Si-20025**

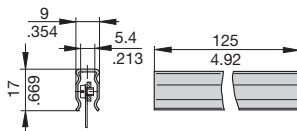


### Busbar (10-way) (supplied as a complete package) for type 17 socket

(for max. 100 A continuous load),  
 more positions available on request  
**X 211 157 01** with terminal  
**X 211 157 02** without terminal



### Insulating sleeving for busbar (10-way) Y 303 824 01



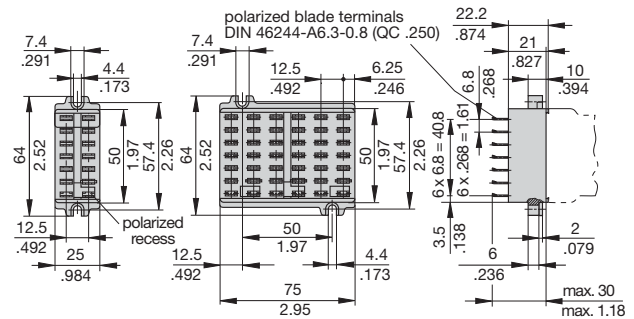
### 2-way mounting socket

**23-P10-Si**

(retaining clip Y 300 581 03 available on request)

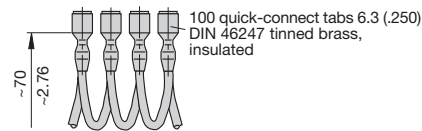
### 6-way mounting socket

**63-P10-Si**



### Connector bus links -P10

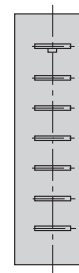
**X 210 588 01/ 1.5 mm²**, (AWG 16), brown (up to 13 A max. load)  
**X 210 588 02/ 2.5 mm²**, (AWG 14), black (up to 20 A max. load)  
**X 210 588 03/ 2.5 mm²**, (AWG 14), red (up to 20 A max. load)  
**X 210 588 04/ 2.5 mm²**, (AWG 14), blue (up to 20 A max. load)



## Pin selection, fitted with ESS20-124

### ESS20-124 17-P10-Si

LINE (+)	[2(k)]
GND	[12]
RE	[24]
RE	[2(0)]
SF	[11]
LOAD (+)	[1]



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

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## Description

Electronic circuit protector type ESX10 is designed to ensure **selective** disconnection of DC 24 V load systems.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through **selective** disconnection the ESX10 responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by active current limitation. The ESX10 limits the highest possible current to values between 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on **capacitive loads of up to 20,000 µF** lamp loads, but they are disconnected only in the event of an overload or short circuit.

For optimal alignment with the characteristics of the application the current rating of the ESX10 can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact.

The ESX10, with a width of only 12.5 mm, can be plugged into the E-T-A power distribution socket Module 17plus ensuring ease of installation and saving space in control cabinets.

**Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The MOSFET and the load circuit may be re-activated via the remote electronic reset input or manually by means of the ON/OFF button. When starting up the system, the load circuit may also be manually disconnected.**

## Features

- Selective load protection, electronic trip characteristics.
- Active current limitation for safe connection of capacitive loads up to 20,000 µF and on overload/short circuit.
- Current ratings 0.5 A...12 A.
- Reliable overload disconnection with  $1.1 \times I_N$  plus, even with long load lines or small cable cross sections (see table 3).
- Manual ON/OFF button (S1).
- Control input IN+ for remote ON/OFF signal (option).
- Clear status and failure indication through LED, status output SF or Si contact F.
- Electronic reset input RE (option).
- Integral fail-safe element.
- Width per unit only 12.5 mm.
- Plug-in mounting utilising power distribution system Module 17plus or SVSxx optionally (see product group 7)

## Approvals

Authority	Voltage rating	Current ratings
UL 2367	DC 24 V	0.5...12 A

### Attention:

- The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10 used.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10.



ESX10

## Technical data (T<sub>ambient</sub> = 25 °C, operating voltage U<sub>S</sub> = DC 24 V)

### Operating data

Operating voltage U <sub>S</sub>	DC 24 V (18...32 V)
Current rating I <sub>N</sub>	fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A
Closed current I <sub>0</sub>	ON condition: typically 20...30 mA depending on signal output
Status indication by means of	<ul style="list-style-type: none"> <li>• <b>multicolour LED:</b> <ul style="list-style-type: none"> <li>GREEN: unit is ON, power-MOSFET is switched on                             <ul style="list-style-type: none"> <li>- status output SF ON, supplies + DC 24 V</li> </ul> </li> <li>ORANGE: in the event of overload or short circuit until electronic disconnection</li> <li>RED:                             <ul style="list-style-type: none"> <li>- unit electronically disconnected</li> <li>- load circuit/Power-MOSFET OFF</li> </ul> </li> <li>OFF:                             <ul style="list-style-type: none"> <li>- manually switched off (S1 = OFF) or device is dead</li> <li>- undervoltage (U<sub>S</sub> &lt; 8 V)</li> <li>- after switch-on till the end of the delay period</li> </ul> </li> </ul> </li> <li>• status output SF (option)</li> <li>• potential-free signal contact F (option)</li> <li>• ON/OFF/ condition of switch S1</li> </ul>

### Load circuit

Load output	Power-MOSFET switching output (high side switch)
Overload disconnection	typically $1.1 \times I_N$ ( $1.05...1.35 \times I_N$ )
Short-circuit current I <sub>K</sub>	active current limitation (see table 1)
Trip time for electronic disconnection	see time/current characteristics typically 3 s at I <sub>Load</sub> > $1.1 \times I_N$ typically 3 s...100 ms at I <sub>Load</sub> > $1.8 \times I_N$ (or $1.5 \times I_N/1.3 \times I_N$ )
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring load output	with hysteresis, no reset necessary load "OFF" at U <sub>S</sub> < 8 V
Starting delay t <sub>start</sub>	typically 0.5 sec after every switch-on and after applying U <sub>S</sub>
Disconnection of load circuit	electronic disconnection
Free-wheeling circuit	external free-wheeling diode recommended with inductive load
Several load outputs must not be connected in parallel	

## Technical data ( $T_{\text{ambient}} = 25^{\circ}\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

Status output SF	ESX10-104/-106/-124/-127
Electrical data	plus-switching signal output, connects $U_S$ to terminal 12 of module 17plus nominal data: DC 24 V / max. 0.2 A (short circuit proof) status output is internally connected to GND with a 10 kOhm resistor
Status OUT	ESX10-104/-106/-124 (signal status OUT), at $U_S = +24 \text{ V}$ $+24 \text{ V} = \text{S1 is ON}$ , load output connected through $0 \text{ V} = \text{S1 is ON}$ , load output blocked and/or switch S1 is OFF
Status $\overline{\text{OUT}}$	ESX10-127 (signal status OUT inverted), at $U_S = +24 \text{ V}$ $+24 \text{ V} = \text{S1 is ON}$ , load output blocked, red LED lighted $0 \text{ V} = \text{S1 is ON}$ , load output connected through and / or switch S1 is in OFF position
OFF condition	0 V level at status output when: <ul style="list-style-type: none"> <li>switch S1 is in ON position, but device is still in switch-on delay</li> <li>switch S1 is OFF, or control signal OFF, device is switched off</li> <li>no operating voltage <math>U_S</math></li> </ul>
Signal output F	ESX10-101/-102/-103/-105/-106/-115/-125
Electrical data	potential-free signal contact max. DC 30 V/0.5 A, min. 10 V/10 mA
ON condition LED green	voltage $U_S$ applied, switch S1 is in ON position no overload, no short circuit
OFF condition LED off	<ul style="list-style-type: none"> <li>device switched off (switch S1 is in OFF position)</li> <li>no voltage <math>U_S</math> applied</li> </ul>
Fault condition LED orange	overload condition $> 1.1 \times I_N$ up to electronic disconnection
Fault condition LED red	electronic disconnection upon overload or short circuit device switched off with control signal (switch S1 is in ON position)
ESX10-101	single signal, make contact contact SC/SO-SI open
ESX10-102	single signal, break contact contact SC/SO-SI closed
ESX10-103	group signal change-over contact contact SC-SO open, SC-SI closed
ESX10-105/-106/-115/-125	group signal, make contact contact SC-SO open
Fault	signal output fault conditions: <ul style="list-style-type: none"> <li>no operating voltage <math>U_S</math></li> <li>ON/OFF switch S1 is in OFF position</li> <li>red LED lighted (electronic disconnection)</li> </ul>

**Table 1: voltage drop, current limitation, max. load current**

current rating $I_N$	typically voltage drop $U_{\text{ON}}$ at $I_N$	active current limitation (typically)	max. load current at 100 % ON duty	
			$T_U = 40^{\circ}\text{C}$	$T_U = 50^{\circ}\text{C}$
0.5 A	70 mV	$1.8 \times I_N$	0.5 A	0.5 A
1 A	80 mV	$1.8 \times I_N$	1 A	1 A
2 A	130 mV	$1.8 \times I_N$	2 A	2 A
3 A	80 mV	$1.8 \times I_N$	3 A	3 A
4 A	100 mV	$1.8 \times I_N$	4 A	4 A
6 A	130 mV	$1.8 \times I_N$	6 A	5 A
8 A	120 mV	$1.5 \times I_N$	8 A	7 A
10 A	150 mV	$1.5 \times I_N$	10 A	9 A
12 A	180 mV	$1.3 \times I_N$	12 A	10.8 A

Attention: when mounted side-by-side without convection the ESX10-0.. should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.

## Technical data ( $T_{\text{ambient}} = 25^{\circ}\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

Reset input RE	ESX10-124/-125/-127
Electrical data	voltage: max. +DC 32 V high $> \text{DC } 8 \text{ V} \leq \text{DC } 32 \text{ V}$ low $\leq \text{DC } 3 \text{ V} > 0 \text{ V}$ power consumption typically 2.6 mA (+DC 24 V) min. pulse duration typically 10 ms
Reset signal RE (= terminal 13,14 or 12 of Module 17plus)	The electronically blocked ESX10-124/-127 may remotely be reset via an external momentary switch due to the falling edge of a +24 V pulse. The reset signal will be fed in terminal 13, 14 or 12 of Module 17plus and is internally pre-wired. The reset simultaneously affects all blocked ESX10-124/-127 channels of the power distribution system, all switched on ESX10-124/-127 channels remain unaffected. With type ESX10-125 the reset only affects the device concerned. By connecting the individual terminals 12 of the Module 17plus a joint reset signal for all ESX10-125 may be generated.
Caution: unused slots have to be fitted with jumpers	
Control input IN+	ESX10-115
Electrical data	see reset input RE
Control signal IN+	+24V level (HIGH): device will be switched on by a remote ON/OFF signal 0 V level (LOW): device will be switched off by a remote ON/OFF signal
Switch S1 ON/OFF	unit can only be switched on with S1 if a HIGH level is applied to IN+
General data	
Fail-safe element:	backup fuse for ESX10 <u>not required</u> because of the integral redundant fail-safe element
Blade terminals	6.3 mm to DIN 46244-A6.3-0.8
Housing	moulded
Mounting	plug-in mounting utilising power distribution system Module 17plus or SVSxx
Ambient temperature	0...+50 °C (without condensation, see EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP30 DIN 40050 terminals: IP00 DIN 40050
EMC (EMC directive, CE logo)	emission: EN 61000-6-3 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 pollution degree 2 re-inforced insulation in operating area
dielectric strength	max. DC 32 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Approvals	UL 2367, File E306740 Solid State Overcurrent Protectors CE logo
Dimensions (W x H x D)	12.5 x 70 x 60 mm
Mass	approx. 40 g

## Ordering information

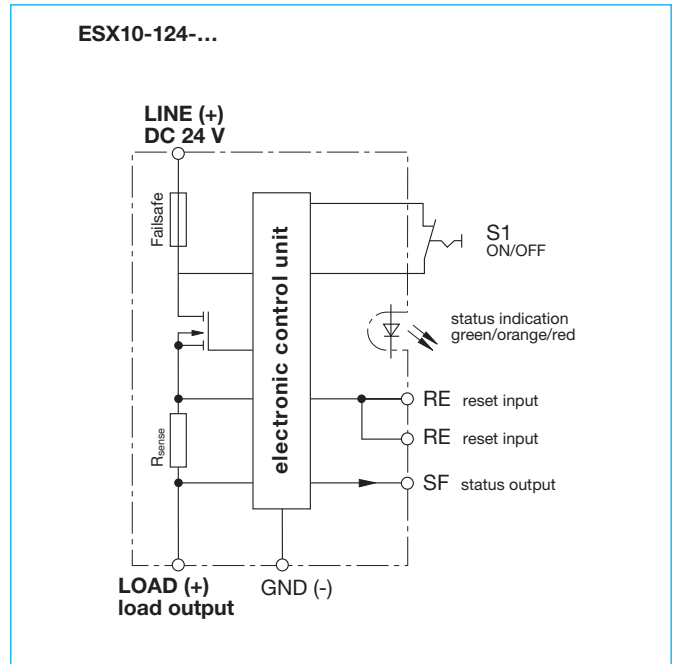
<b>Type No.</b>	
<b>ESX10</b>	Electronic Circuit Protector for DC 24 V applications
<b>Version</b>	
<b>1</b>	standard, without physical isolation in the event of a failure
<b>Signal input</b>	
<b>0</b>	without signal input
<b>1</b>	with control input IN+, only ESX10-115
<b>2</b>	with reset input RE, only ESX10-124, ESX10-125, ESX10-127
<b>Signal outputs</b>	
<b>0</b>	without, only ESX10-100
<b>1</b>	signal output F (single signal, N/O), only ESX10-101
<b>2</b>	signal output F (single signal, N/C), only ESX10-102
<b>3</b>	signal output F (group signal, change-over), only ESX10-103
<b>4</b>	status output SF (+24 V = OK), only ESX10-104, ESX10-124
<b>5</b>	signal output F (group signal, N/O), ESX10-105, ESX10-115, ESX10-125
<b>6</b>	signal output F (group signal, N/O), status output SF +24 V = OK, only ESX10-106
<b>7</b>	status output inverted, 0 V = OK, only ESX10-127
<b>Operating voltage</b>	
<b>DC 24 V</b>	rated voltage DC 24 V
<b>Current rating</b>	
<b>0,5 A</b>	
<b>1 A</b>	
<b>2 A</b>	
<b>3 A</b>	
<b>4 A</b>	
<b>6 A</b>	
<b>8 A</b>	
<b>10 A</b>	
<b>12 A</b>	
<b>ESX10 - 1 0 5 - DC 24 V - 6 A</b> ordering example	

Description of ESX10 signal inputs and outputs (wiring diagrams) see next page.

**Please note:**

- The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10 used.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10.

## Schematic diagram ESX10-124



## Terminal wiring diagram ESX10-124

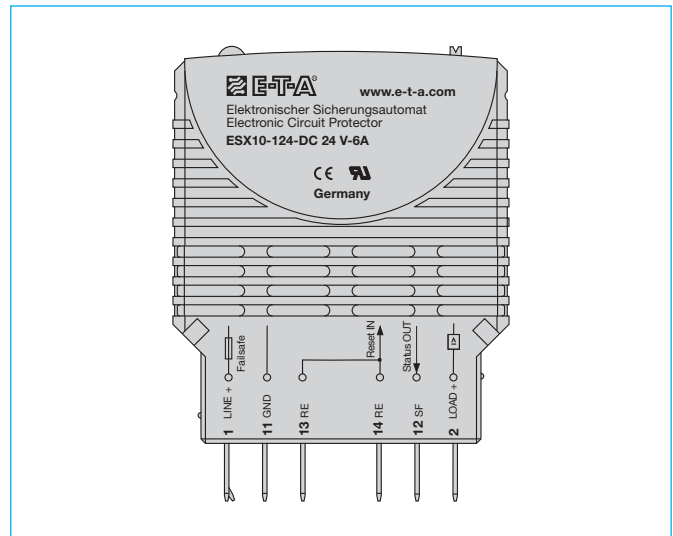


Table 2: ESX10 - product version

version	signal input		signal output					status output SF	
	control input ON/OFF +24 V Control IN+	reset input +24 V RE	single signal N/O	single signal N/C	group signal N/O	group signal change-over	status OUT +24 V = OK	status OUT 0 V = OK	
ESX10 -...									
-100									
-101			x						
-102				x					
-103						x			
-104							x		
-105					x				
-106					x			x	
-115	x				x				
-124		x						x	
-125		x			x				
-127		x						x	

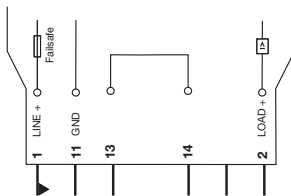
## ESX10 Signal inputs / outputs (wiring diagram)

### ESX10 signal inputs / outputs (wiring diagrams)

Signal contacts are shown in the OFF or fault condition.

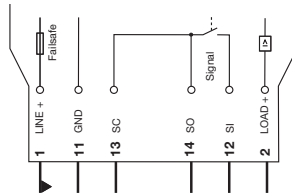
#### ESX10-100

without signal input/output



#### ESX10-101

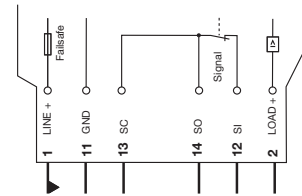
without signal input  
with signal output F (single signal, N/O)



operating condition: SC/SO-SI closed  
fault condition: SC/SO-SI open

#### ESX10-102

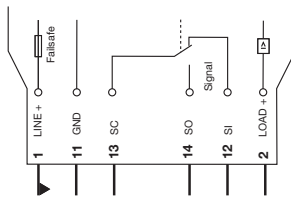
without signal input  
with signal output F (single signal, N/C)



operating condition: SC/SO-SI open  
fault condition: SC/SO-SI closed

#### ESX10-103

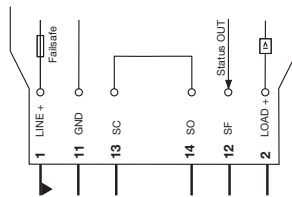
without signal input  
with signal output F (group signal, change-over)



operating condition: SC/SO closed, SC-SI open  
fault condition: SC/SO open, SC-SI closed

#### ESX10-104

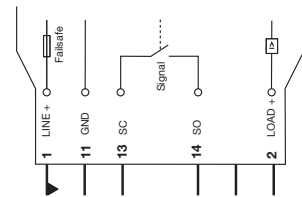
without signal input  
with status output SF (+24V = load output ON)



operating condition: SF +24V = OK  
fault condition: SF 0V

#### ESX10-105

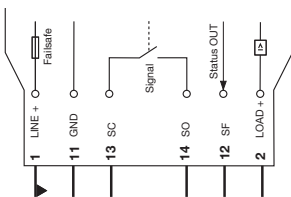
without signal input  
with signal output F (group signal, N/O)



operating condition: SC-SO closed  
fault condition: SC-SO open

#### ESX10-106

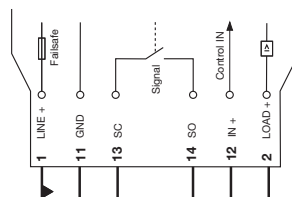
without signal input  
with signal output F (group signal, N/O)  
with status output SF (+24V = load output ON)



operating condition: SC-SO closed  
fault condition: SC-SO open

#### ESX10-115-...

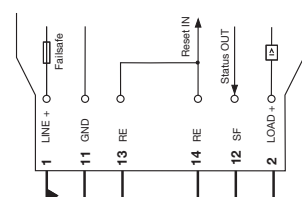
with control input IN+ (+DC 24V)  
with signal output F (group signal, N/O)



operating condition: SC-SO closed  
fault condition: SC-SO open

#### ESX10-124-...

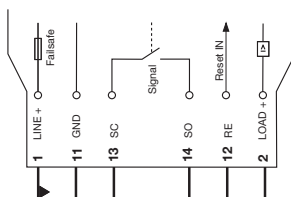
with reset input RE (+DC 24V↓)  
with status output SF (+24V = load output ON)



operating condition: SF +24V = OK  
fault condition: SF 0V

#### ESX10-125-...

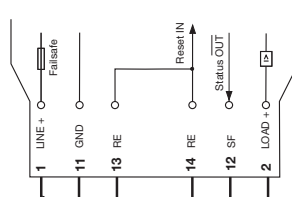
with reset input RE (+DC 24V↓)  
with signal output F (group signal, N/O)



operating condition: SC-SO closed  
fault condition: SC-SO open

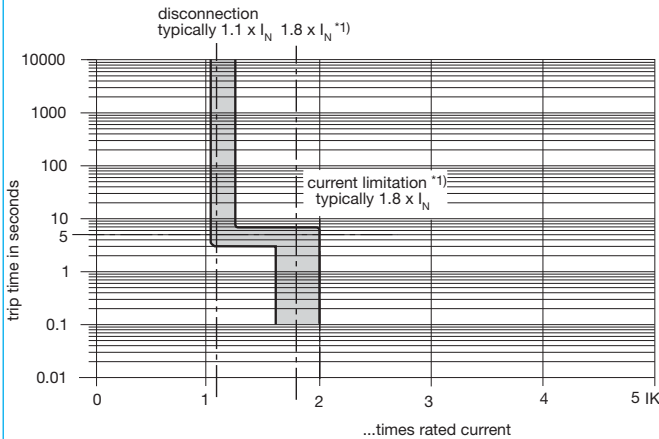
#### ESX10-127-...

with reset input RE (+DC 24V↓)  
with status output SF inverted, 0V = load output ON



operating condition: SF 0V = OK  
fault condition: SF +24V

## Time/Current characteristic curve ( $T_A = 25^\circ\text{C}$ )



- The trip time is typically 3 s in the range between  $1.1 \times I_N$  and  $1.8 \times I_N$ .
- Electronic current limitation occurs at typically  $1.8 \times I_N$  which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed  $1.8 \times I_N$  times the current rating. Trip time is between 100 ms (short circuit current  $I_K$ ) and 3 sec (at overload with high line attenuation).
- Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.

\*1) current limitation typically  $1.8 \times I_N$  times rated current at  $I_N = 0.5 \text{ A} \dots 6 \text{ A}$   
 current limitation typically  $1.5 \times I_N$  times rated current at  $I_N = 8 \text{ A}$  or  $10 \text{ A}$   
 current limitation typically  $1.3 \times I_N$  times rated current at  $I_N = 12 \text{ A}$

**Table 3: Reliable trip of ESX10**

### Reliable trip of ESX10 with different cable lengths and cross sections

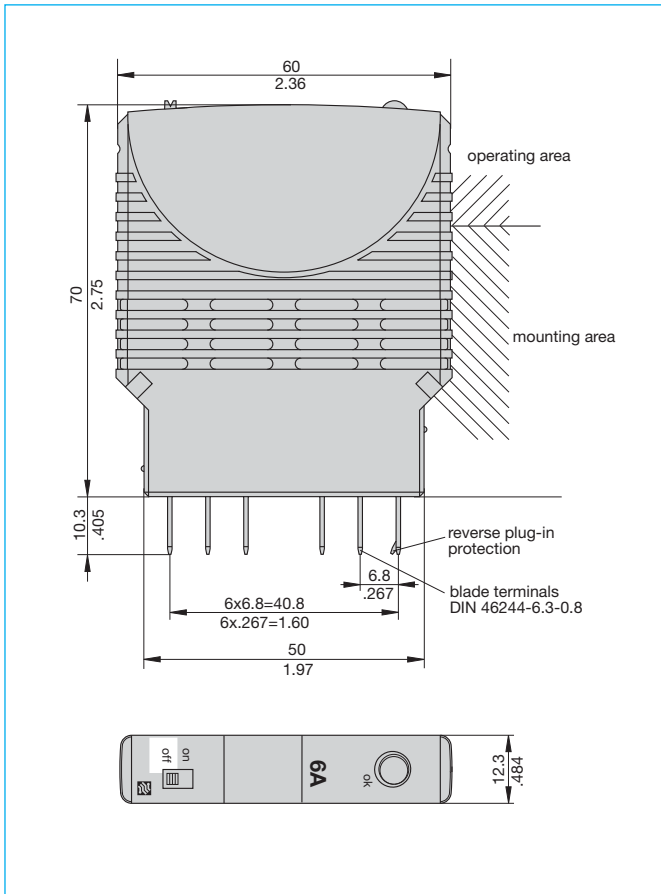
Resistivity of copper $\rho_0 =$	0.0178 (Ohm x mm <sup>2</sup> ) / m		
$U_S = \text{DC } 19.2 \text{ V}$ (= 80 % v. 24 V)	voltage drop of ESX10 and tolerance of trip point (typically $1.1 \times I_N = 1.05 \dots 1.35 \times I_N$ ) have been taken into account.		
ESX10-selected rating $I_N$ (in A) →	<b>3</b>	<b>6</b>	→ <b>ESX10 trips after 3 s</b>
e. g. trip current $I_{ab} = 1.25 \times I_N$ (in A) →	3.75	7.5	
$R_{\text{max}}$ in Ohm = $(U_S / I_{ab}) - 0.050$ →	<b>5.07</b>	<b>2.51</b>	

### The ESX10 reliably trips from 0 Ohm to max. circuitry resistance $R_{\text{max}}$

Cable cross section A in mm <sup>2</sup> →	0.14	0.25	0.34	0.5	0.75	1	1.5
cable length L in meter (= single length) ↓	cable resistance in Ohm = $(R_0 \times 2 \times L) / A$						
	↓	↓	↓	↓	↓	↓	↓
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

<b>Example 1:</b>	max. length at 1.5 mm <sup>2</sup> and 3 A	<b>214 m</b> →
<b>Example 2:</b>	max. length at 1.5 mm <sup>2</sup> and 6 A	<b>106 m</b> →
<b>Example 3:</b>	mixed wiring: (Control cabinet – sensor/actuator level)	$R_1 = 40 \text{ m in } 1.5 \text{ mm}^2$ and $R_2 = 5 \text{ m in } 0.25 \text{ mm}^2$ : $R_1 = 0.95 \text{ Ohm}$ , $R_2 = 0.71 \text{ Ohm}$ <b>Total (<math>R_1 + R_2</math>) = 1.66 Ohm</b>

## Dimensions



5

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.

## Accessories for ESX10

### Description

**Module 17plus** is a power distribution system for use with electronic circuit protectors ESX10.

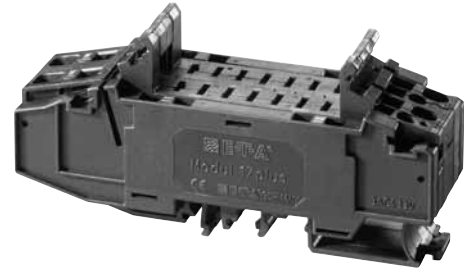
Each module accommodates two protectors with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.

The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected.

Electrical connections are by means of spring-loaded terminals. The reference potential for the ESX10 (GND pin 11) is also looped through and connected to the terminal blocks at the sides.

The integral status output SF of the ESX10-104/-106/-124/-127 can be tapped at terminal 12 of the relevant channel (single signalisation). The reset input RE may be connected via terminal 13 or 14 (ESX10-124/-127) or terminal 12 (ESX10-125). The integral control input IN+ of ESX10-115 is connected via terminal 12.

Depending on the version a potential-free signal contact is available (ESX10-101/-102/-103/-104/-105/-106/-115/-125). Meets the requirements of UL60950.



**17plus**

### Technical data

Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
LINE feed (1)	spring-loaded terminals for 1.5-10 mm <sup>2</sup> (AWG 10), SD 2 (0.8x4.0)
LOAD output (2)	spring-loaded terminals for 0.25-4 mm <sup>2</sup> (AWG 12), SD 1 (0.6x3.5)
Reference potential GND/ group signal terminals (11 or 13, 14):	spring-loaded terminals for 0.25-2.5 mm <sup>2</sup> (AWG 14), SD 1 (0.6x3.5)
single signal terminal (12)	spring-loaded terminal for 0.25-1.5 mm <sup>2</sup> (AWG 16), SD 0 (0.4x2.5)

Test probe for testing the group signal for line interruption: ≤ 2 mm Ø

Voltage rating (without ESX10)	AC 433 V; DC 65 V
Current rating (without ESX10)	
LINE feed (1)	50 A
LOAD output (2)	25 A
Reference potential GND (11)	10 A
single signal (12)	1 A (with ESX10: 0.5 A)
Group signal /(13-14)	1 A (with ESX10: 0.5 A)
Internal resistance values (without ESX10)	
LINE-LOAD (1-2)	≤ 5 mΩ
Group signal (13-14) per module	≤ 8 mΩ per pole +5 mΩ for each additional module

Busbar for power distribution	
insulated busbar (blue or red):	$I_{max}$ 32 A
non-insulated busbar:	$I_{max}$ 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	

Dielectric strength of Module 17plus (without ESX10)	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V

Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

### Ordering information

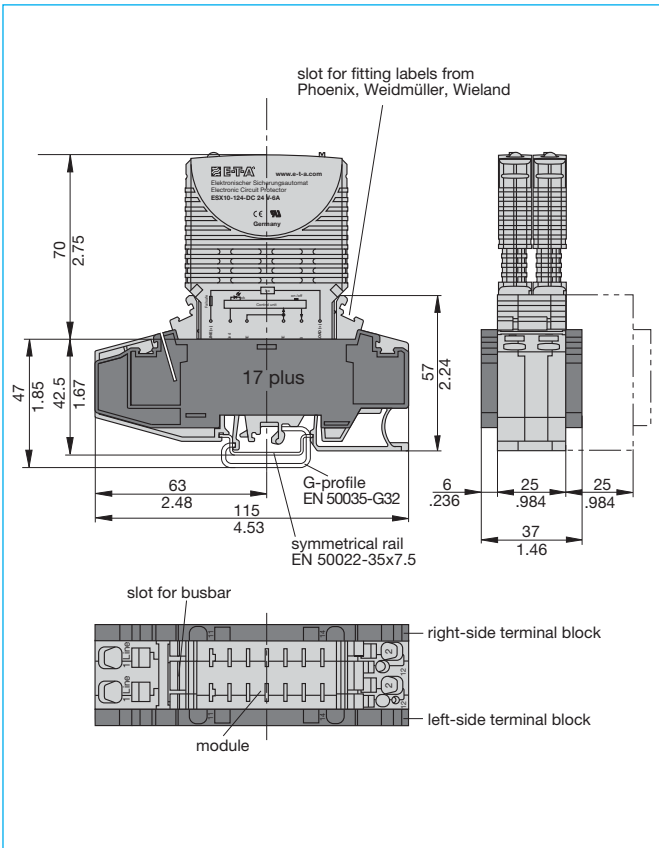
17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.

### Pin configuration, fitted with ESX10-124 (Example)

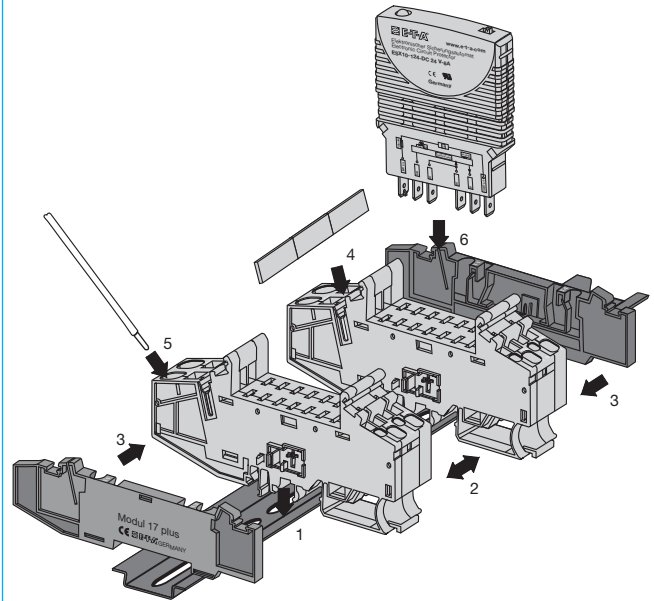
#### ESX10-124 Modul 17 plus

LINE (+)	(1)		operating voltage PLUS, DC 24 V
GND	(11)		operating voltage MINUS
RE	(13)		reset input RE
-----			
RE	(14)		reset input RE
SF	(12)		status output SF
LOAD (+)	(2)		protected load output

## Dimensions

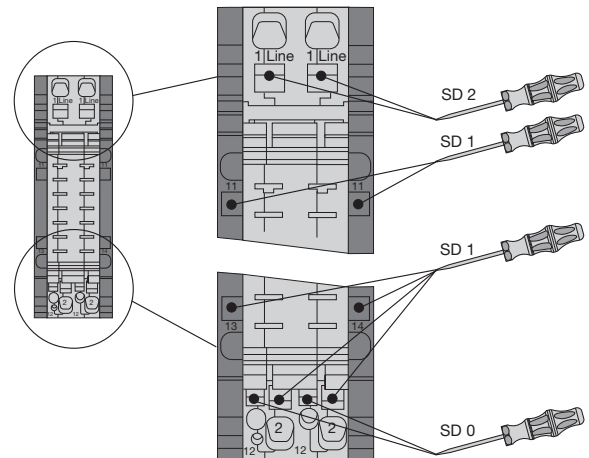


## Installation example



### Installation:

- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in ESX10.



Connection and disconnection of cables with screw driver

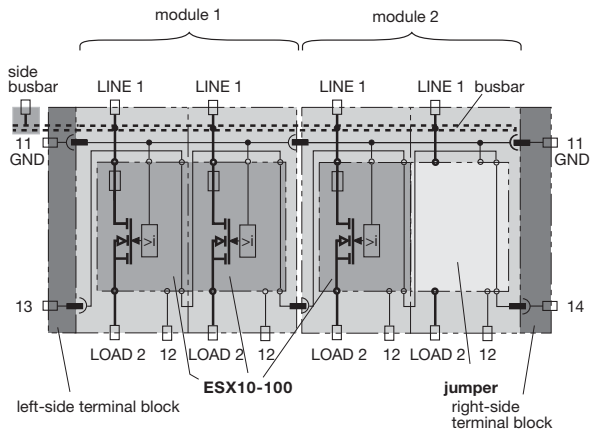
5

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



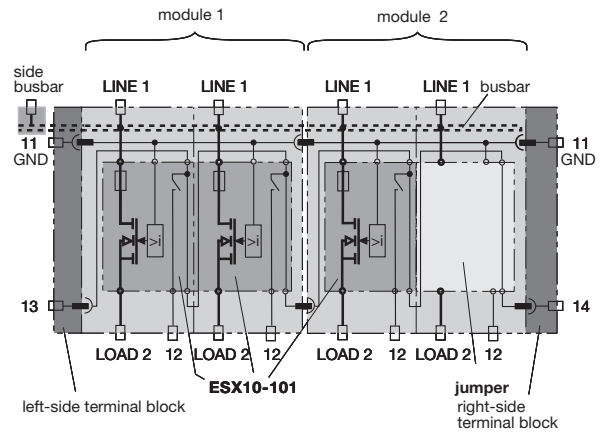
## Connection diagram for ESX10-...

### Module 17plus with ESX10-100



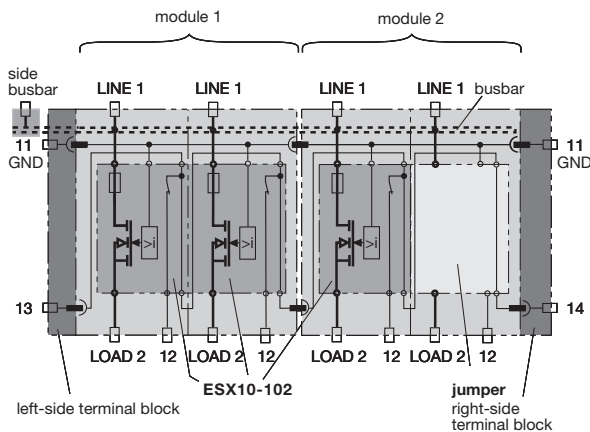
11 GND  
13, 14 looped through

### Module 17plus with ESX10-101



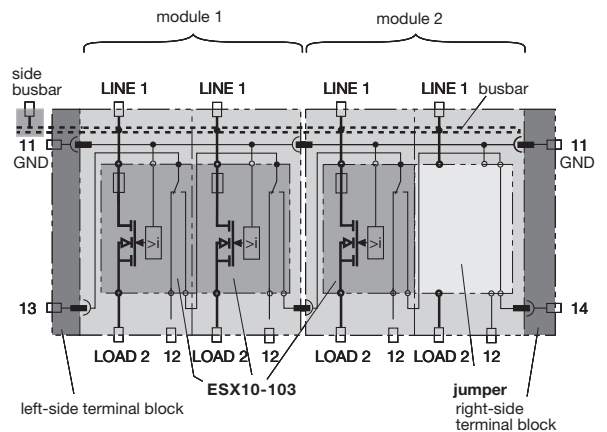
11 GND  
12 output single signalisation per channel (N/O)  
13, 14 feed single signalisation

### Module 17plus with ESX10-102



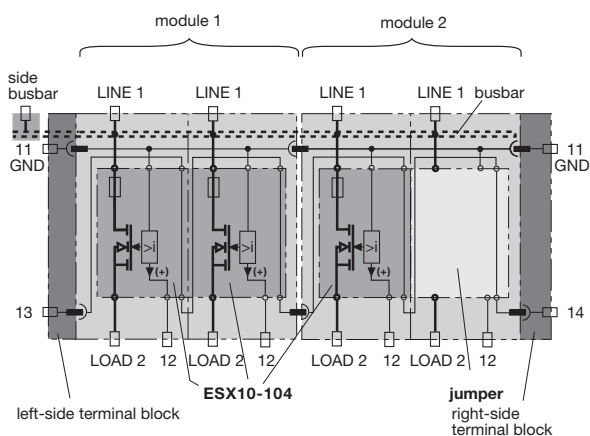
11 GND  
12 output single signalisation per channel (N/C)  
13, 14 feed single signalisation

### Module 17plus with ESX10-103



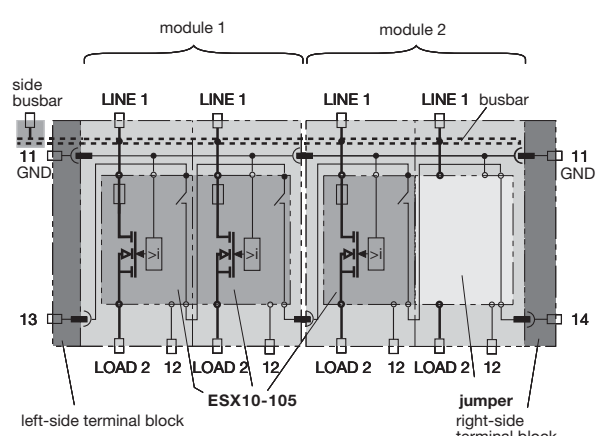
11 GND  
12, 13, 14 terminal group signalisation (change-over)  
(13-12 N/C, 13-14 N/O)

### Module 17plus with ESX10-104



11 GND  
12 status indication SF +24V=OK  
13, 14 looped through

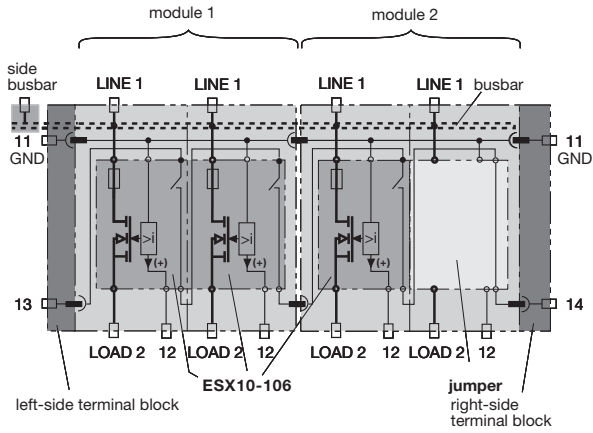
### Module 17plus with ESX10-105



11 GND  
13, 14 terminal group signalisation (N/O)

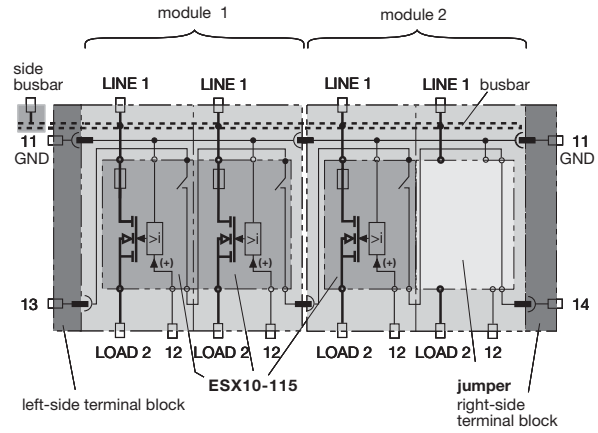
## Connection diagram for ESX10-...

### Module 17plus with ESX10-106



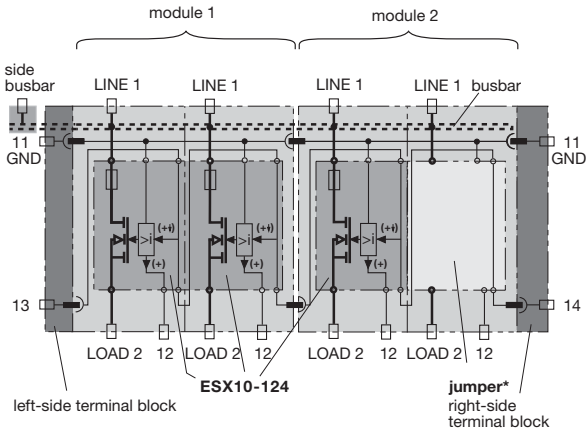
- 11 GND
- 12 status indication SF +24V=OK
- 13, 14 terminal group signalisation (N/O)

### Module 17plus with ESX10-115



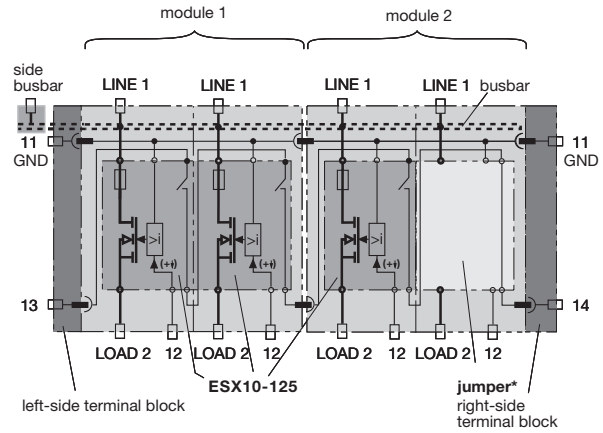
- 11 GND
- 12 terminal control signal ON (+24V DC)
- 13, 14 terminal group signalisation (N/O)

### Module 17plus with ESX10-124



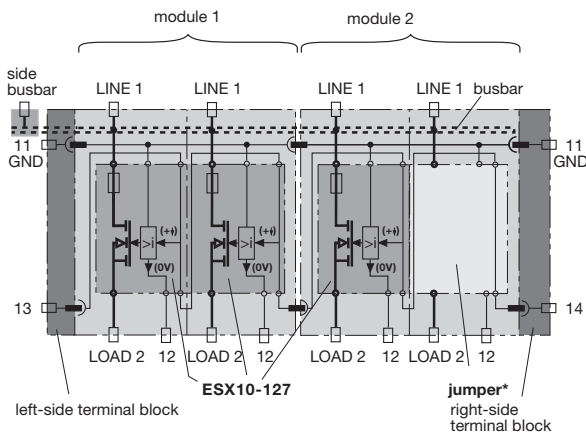
- 11 GND
  - 12 status indication SF +24V=OK
  - 13, 14 reset input RE (group reset), +24V falling edge
- \*Caution: unused slots have to be fitted with jumpers

### Module 17plus with ESX10-125



- 11 GND
  - 12 reset input RE (single reset), +24V falling edge
  - 13, 14 terminal group signalisation (N/O)
- \*Caution: unused slots have to be fitted with jumpers

### Module 17plus with ESX10-127



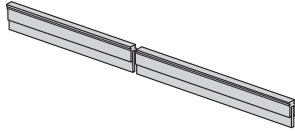
- 11 GND
  - 12 status indication SF inverted, 0V=OK
  - 13, 14 reset input RE (group reset), +24V falling edge
- \*Caution: unused slots have to be fitted with jumpers

5

## Accessories for ESX10

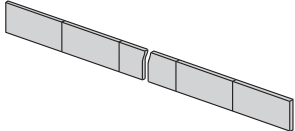
### Busbar 32 A

- X 222 005 01 blue insulation, 500 mm/19.68 in.
- X 222 005 02 red insulation, 500 mm/19.68 in.
- X 222 005 03 grey insulation, 500 mm/19.68 in.



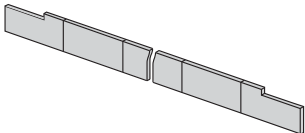
### Busbar 50 A

- Y 307 016 01 non-insulated, 500 mm/19.68 in.

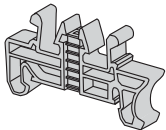


### Busbar 50 A

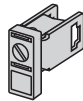
- Y 307 016 11 non-insulated, 500 mm/19.68 in.



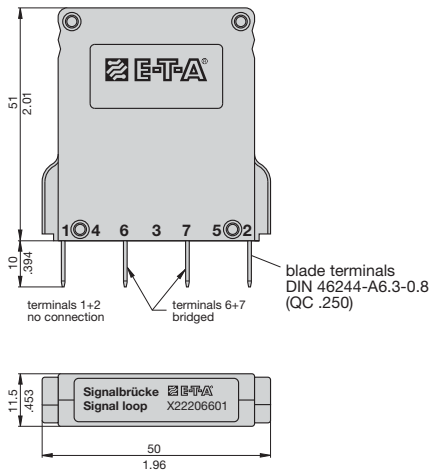
### End bracket X 222 004 01



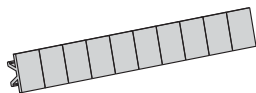
### Screw terminal for busbar X 211 156 01 non insulated



### Jumper X 222 066 01



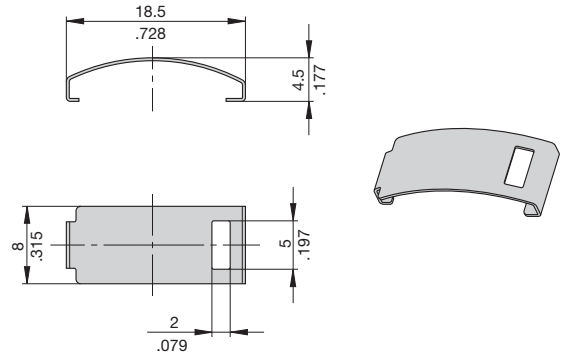
**Labels**  
marking area 6 x 10 mm  
(packing unit 10 pcs = 1 strip)  
part. no. Y 307 942 61



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

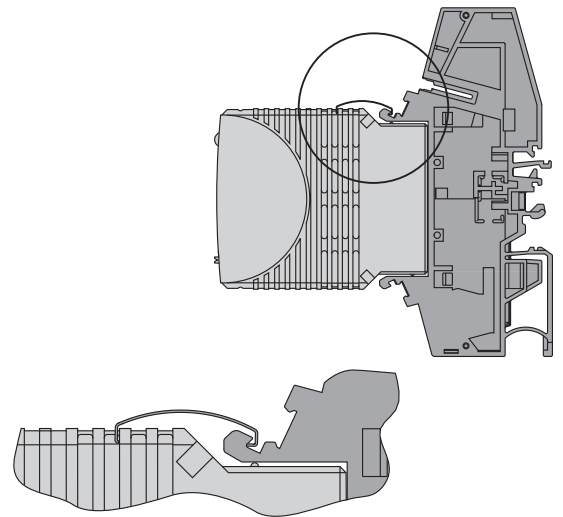
## Accessories for ESX10

### Retaining clip Y 307 754 01

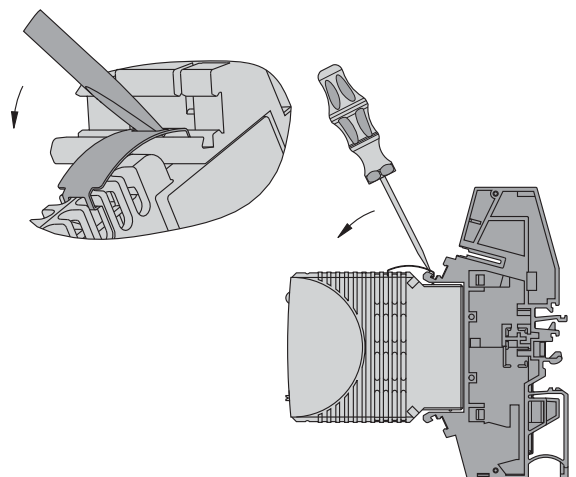


## Mounting of retaining clip

ESX10 with retaining clip Y 307 754 01 for power distribution system module 17plus



## Removal of retaining clip Y 307 754 01

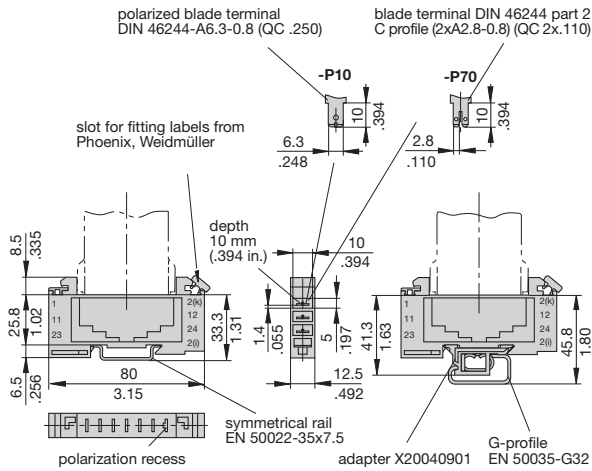


## Accessories for ESX10

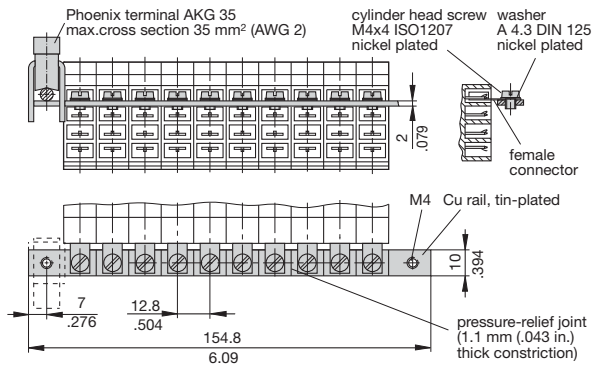
**Single mounting sockets**  
(up to 16 A max. load)  
**17-P10-Si**  
**17-P70-Si**

(with adapter)

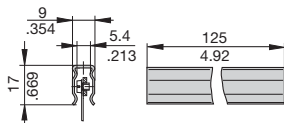
**17-P10-Si-20025**  
**17-P70-Si-20025**



**Busbar (10-way)** (supplied as a complete package)  
**for type 17 socket**  
(for max. 100 A continuous load,  
more positions available on request)  
**X 211 157 01** with terminal  
**X 211 157 02** without terminal



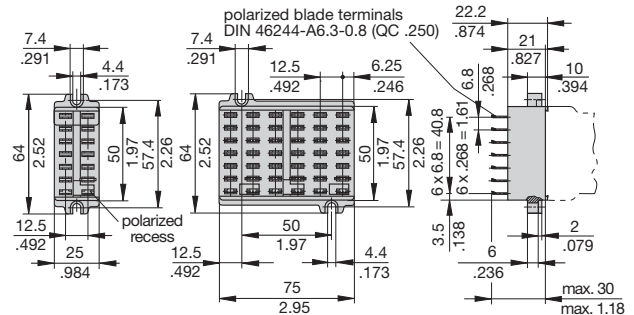
**Insulating sleeving for busbar (10-way)**  
**Y 303 824 01**



**2-way mounting socket**  
**23-P10-Si**

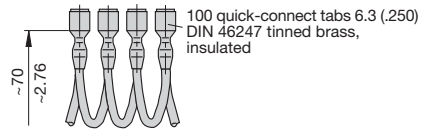
(retaining clip Y 300 581 03 available on request)

**6-way mounting socket**  
**63-P10-Si**



**Connector bus links -P10**

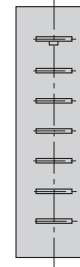
**X 210 588 01/ 1.5 mm²**, (AWG 16), brown (up to 13 A max. load)  
**X 210 588 02/ 2.5 mm²**, (AWG 14), black (up to 20 A max. load)  
**X 210 588 03/ 2.5 mm²**, (AWG 14), red (up to 20 A max. load)  
**X 210 588 04/ 2.5 mm²**, (AWG 14), blue (up to 20 A max. load)



## Pin selection, fitted with ESX10-124 (Example)

**ESX10-124 17-P10-Si**

LINE (+) [2(k)]  
GND [12]  
RE [24]  
[2(i)]  
RE [23]  
SF [11]  
LOAD (+) [1]



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

**Table 4: ESX10-... - Pin assignment 17-P10-Si**

17-P10-Si	ESX10-											
Pins	-100	-101	-102	-103	-104	-105	-106	-115	-124	-125	-127	
[2(k)]	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	LINE (+) DC +24 V	
[12]	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	
[24]		single SF N/O terminal	single SF N/C terminal	group SF changeover terminal		group SF N/O	group SF N/O	group SF N/O	reset IN+ +24 V ↓	group SF N/O	reset IN+ +24 V ↓	
[2(i)]	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	not assigned	
[23]		single SF N/O terminal	single SF N/C terminal	group SF changeover N/O		group SF N/O	group SF N/O	group SF N/O	reset IN+ +24 V ↓	group SF N/O	reset IN+ +24 V ↓	
[11]		single SF N/O output	single SF N/C output	group SF changeover N/C	status OUT +24 V = OK		status OUT +24 V = OK	control signal IN+ +24 V = ON	status OUT +24 V = OK	reset IN+ +24 V ↓	status OUT +0 V = OK	
[1]	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	LOAD (+)	

## Description

Electronic circuit protector type ESX10-T is designed to ensure **selective** disconnection of DC 24 V load systems.

DC 24 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through **selective** disconnection the ESX10-T responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by active current limitation. The ESX10-T limits the highest possible current to 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on **capacitive loads of up to 20,000 µF**, but they are disconnected only in the event of an overload or short circuit.

For optimal alignment with the characteristics of the application the current rating of the ESX10-T can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact. Remote operation is possible by means of a remote reset signal or a remote ON/OFF control signal. The manual ON/OFF button allows separate actuation of individual load circuits.

The ESX10-T, with a width of only 12.5 mm, can be snapped onto symmetrical rails ensuring ease of installation and saving space in control cabinets.

**Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The load circuit can be re-activated via the remote electronic reset input, control input or manually by means of the ON/OFF button.**

## Features

- Selective load protection, electronic trip characteristics.
- Active current limitation for safe connection of capacitive loads up to 20,000 µF and on overload/short circuit.
- Current ratings 0.5 A...12 A.
- Reliable overload disconnection with  $1.1 \times I_N$  plus, even with long load lines or small cable cross sections (see table 3).
- Manual ON/OFF button (S1).
- Control input IN+ for remote ON/OFF signal (option).
- Electronic reset input RE (option).
- Clear status and failure indication through LED, status output SF or Si contact F.
- Integral fail-safe element adjusted to current rating.
- Width per unit only 12.5 mm.
- Rail mounting
- Ease of wiring through busbar LINE+ and 0 V as well as signal bars and bridges.

## Approvals

Authority	Voltage rating	Current ratings
UL 2367	DC 24 V	0.5...12 A
UL 1604 (class I, div. 2, group A, B, C, D)	DC 24 V	0.5...12 A
UL 508 / cUL 508	DC 24 V	0.5...12 A
CSA C22.2 No: 213 (class I, division 2) pending		
CSA C22.2 No: 142 pending		



ESX10-T

## Technical data (T<sub>ambient</sub> = 25 °C, operating voltage U<sub>S</sub> = DC 24 V)

### Operating data

Operating voltage U <sub>S</sub>	DC 24 V (18...32 V)
Current rating I <sub>N</sub>	fixed current ratings: 0.5, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A
Closed current I <sub>0</sub>	ON condition: typically 20...30 mA depending on signal output
Status indication by means of	<ul style="list-style-type: none"> <li>● <b>multicolour LED:</b> <ul style="list-style-type: none"> <li>GREEN: unit is ON, power-MOSFET is switched on <ul style="list-style-type: none"> <li>- status output SF ON, supplies + DC 24 V</li> </ul> </li> <li>ORANGE: in the event of overload or short circuit until electronic disconnection</li> <li>RED: <ul style="list-style-type: none"> <li>- unit electronically disconnected</li> <li>- load circuit/Power-MOSFET OFF</li> </ul> </li> <li>OFF: <ul style="list-style-type: none"> <li>- manually switched off (S1 = OFF) or device is dead</li> <li>- undervoltage (U<sub>S</sub> &lt; 8 V)</li> <li>- after switch-on till the end of the delay period</li> </ul> </li> </ul> </li> <li>● status output SF (option)</li> <li>● potential-free signal contact F (option)</li> <li>● ON/OFF/ condition of switch S1</li> </ul>

### Load circuit

Load output	Power-MOSFET switching output (high side switch)
Overload disconnection	typically $1.1 \times I_N$ ( $1.05...1.35 \times I_N$ )
Short-circuit current I <sub>K</sub>	active current limitation (see table 1)
Trip time for electronic disconnection	see time/current characteristics typically 3 s at I <sub>Load</sub> > $1.1 \times I_N$ typically 3 s...100 ms at I <sub>Load</sub> > $1.8 \times I_N$ (or $1.5 \times I_N/1.3 \times I_N$ )
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring load output	with hysteresis, no reset required load "OFF" at U <sub>S</sub> < 8 V
Starting delay t <sub>start</sub>	typically 0.5 sec after every switch-on and after applying U <sub>S</sub>
Disconnection of load circuit	electronic disconnection
Free-wheeling circuit	external free-wheeling diode recommended with inductive load
Several load outputs must not be connected in parallel	

## Technical data ( $T_{\text{ambient}} = 25^{\circ}\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

Status output SF	ESX10-TB-114/-124/
Electrical data	plus-switching signal output, connects $U_S$ to terminal 12 of module 17 plus nominal data: DC 24 V / max. 0.2 A (short circuit proof) status output is internally connected to GND with a 10 kOhm resistor
Status OUT	ESX10-TB-114/-124 (signal status OUT), at $U_S = +24 \text{ V}$ $+24 \text{ V} = \text{S1}$ is ON, load output connected through $0 \text{ V} = \text{S1}$ is ON, load output blocked and/or switch S1 is OFF red LED lighted
OFF condition	0 V level at status output when: <ul style="list-style-type: none"> <li>switch S1 is in ON position, but device is still in switch-on delay</li> <li>switch S1 is OFF, or control signal OFF, device is switched off</li> <li>no operating voltage <math>U_S</math></li> </ul>
Signal output F	ESX10-TB-101/-102
Electrical data	potential-free signal contact max. DC 30 V/0.5 A, min. 10 V/10 mA
ON condition LED green	voltage $U_S$ applied, switch S1 is in ON position no overload, no short circuit
OFF condition LED off	<ul style="list-style-type: none"> <li>device switched off (switch S1 is in OFF position)</li> <li>no voltage <math>U_S</math> applied</li> </ul>
Fault condition LED orange	overload condition $> 1.1 \times I_N$ up to electronic disconnection
Fault condition LED red	electronic disconnection upon overload or short circuit device switched off with control signal (switch S1 is in ON position)
ESX10-TB-101	single signal, make contact contact SC/SO-SI open
ESX10-TB-102	single signal, break contact contact SC/SO-SI closed
Fault	signal output fault conditions: <ul style="list-style-type: none"> <li>no operating voltage <math>U_S</math></li> <li>ON/OFF switch S1 is in OFF position</li> <li>red LED lighted (electronic disconnection)</li> </ul>
Reset input RE	ESX10-TB-124/-127
Electrical data	voltage: max. +DC 32 V high $> \text{DC } 8 \text{ V} \leq \text{DC } 32 \text{ V}$ low $\leq \text{DC } 3 \text{ V} > 0 \text{ V}$ power consumption typically 2.6 mA (+DC 24 V) min. pulse duration typically 10 ms
Reset signal RE (terminal 22)	The electronically blocked ESX10-TB-124/-127 may remotely be reset via an external momentary switch due to the falling edge of a +24 V pulse. A common reset signal can be applied to several devices simultaneously. Switched on devices remain unaffected.
Control input IN+	ESX10-TB-114
Electrical data	see reset input RE
Control signal IN+ (terminal 21)	+24V level (HIGH): device will be switched on by a remote ON/OFF signal 0 V level (LOW): device will be switched off by a remote ON/OFF signal
Switch S1 ON/OFF	unit can only be switched on with S1 if a HIGH level is applied to IN+

## Technical data ( $T_{\text{ambient}} = 25^{\circ}\text{C}$ , operating voltage $U_S = \text{DC } 24 \text{ V}$ )

General data	
Fail-safe element:	backup fuse for ESX10-T <u>not required</u> because of the integral redundant fail-safe element
Terminals	LINE+ / LOAD+ / 0V
screw terminals	M4
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.5 - 10 mm <sup>2</sup>
multi-lead connection (2 identical cables)	
rigid/flexible	0.5 - 4 mm <sup>2</sup>
flexible with wire end ferrule without plastic sleeve	0.5 - 2,5 mm <sup>2</sup>
flexible with TWIN wire end ferrule with plastic sleeve	0.5 - 6 mm <sup>2</sup>
wire stripping length	10 mm
tightening torque (EN 60934)	1.5 - 1.8 Nm
Terminals	aux. contacts
screw terminals	M3
max. cable cross section	
flexible with wire end ferrule w/wo plastic sleeve	0.25 - 2.5 mm <sup>2</sup>
wire stripping length	8 mm
tightening torque (EN 60934)	0.5 Nm
Housing material	moulded
Mounting	symmetrical rail to EN 50022-35x7.5
Ambient temperature	0...+50 °C (without condensation, see EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP20 DIN 40050 terminals: IP20 DIN 40050
EMC (EMC directive, CE logo)	emission: EN 61000-6-3 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 pollution degree 2 re-inforced insulation in operating area
dielectric strength	max. DC 32 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Approvals	UL 2367, File E306740, Solid State Overcurrent Protectors UL 1604, File E320024, (class I, division 2, groups A, B, C, D) UL 508 / cUL 508, File E322549 CSA C22.2 No: 213 (class I, division 2) pending CSA C22.2 No: 142 pending CE logo
Dimensions (W x H x D)	12.5 x 80 x 83 mm
Mass	approx. 65 g

**Table 1: voltage drop, current limitation, max. load current**

current rating $I_N$	typically voltage drop $U_{\text{ON}}$ at $I_N$	active current limitation (typically)	max. load current at 100 % ON duty	
			$T_{\text{ambient}} = 40^{\circ}\text{C}$	$T_{\text{ambient}} = 50^{\circ}\text{C}$
0.5 A	70 mV	$1.8 \times I_N$	0.5 A	0.5 A
1 A	80 mV	$1.8 \times I_N$	1 A	1 A
2 A	130 mV	$1.8 \times I_N$	2 A	2 A
3 A	80 mV	$1.8 \times I_N$	3 A	3 A
4 A	100 mV	$1.8 \times I_N$	4 A	4 A
6 A	130 mV	$1.8 \times I_N$	6 A	5 A
8 A	120 mV	$1.5 \times I_N$	8 A	7 A
10 A	150 mV	$1.5 \times I_N$	10 A	9 A
12 A	180 mV	$1.3 \times I_N$	12 A	10.8 A

Attention: when mounted side-by-side without convection the ESX10-T should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.

## Ordering information

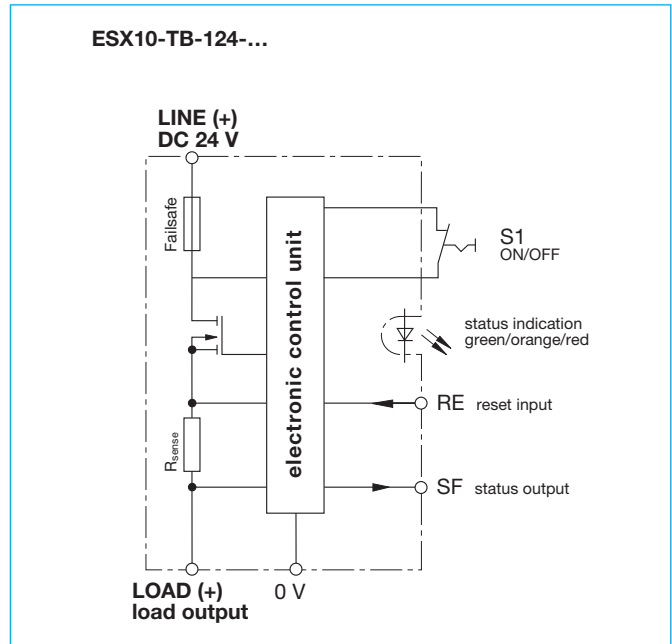
<b>Type No.</b>	
<b>ESX10</b>	Electronic Circuit Protector, with current limitation
<b>Mounting and design</b>	
<b>TA</b>	rail mounting, without signal contact
<b>TB</b>	rail mounting, with signal contact and slot for busbars and jumpers
<b>Version</b>	
<b>1</b>	standard, without physical isolation in the event of a failure
<b>Signal input</b>	
<b>0</b>	without signal input
<b>1</b>	with control input IN+, only ESX10-T-114
<b>2</b>	with reset input RE, only ESX10-T-124, ESX10-T-127
<b>Signal outputs</b>	
<b>0</b>	without signal output
<b>1</b>	signal contact N/O
<b>2</b>	signal contact N/C
<b>4</b>	status output SF (only ESX10-T-114, ESX10-T-124)
<b>7</b>	inverse status output SF (only ESX10-T-127)
<b>Operating voltage</b>	
<b>DC 24 V</b>	rated voltage DC 24 V
<b>Current rating</b>	
<b>0.5 A</b>	
<b>1 A</b>	
<b>2 A</b>	
<b>3 A</b>	
<b>4 A</b>	
<b>6 A</b>	
<b>8 A</b>	
<b>10 A</b>	
<b>12 A</b>	
<b>ESX10 - TA 1 0 0 - DC 24 V - 6 A</b>	ordering example

Description of ESX10-T signal inputs and outputs (wiring diagrams) see next page.

**Please note:**

- The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10-T used.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10-T.

## Schematic diagram ESX10-TB-124 (Example)



## Terminal wiring diagram ESX10-TB-124 (Example)

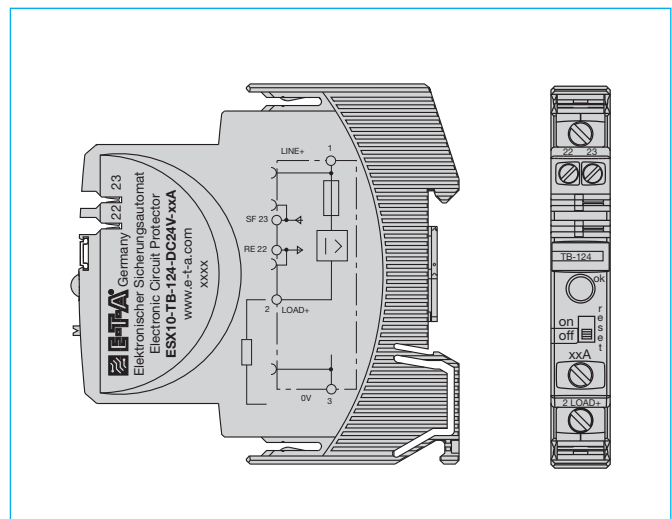
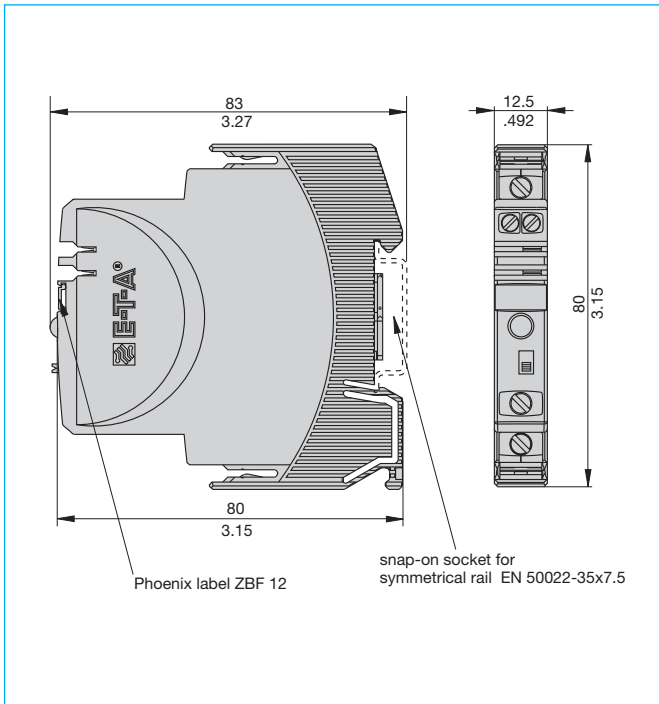


Table 2: ESX10-T - product version

Version		Signal input			Signal output					
					Signal output F (Signal contact)			Status output SF		
ESX10-..		without	Control input ON/OFF +24 V Control IN+	Reset input +24 V ↓ RE	without	single signal N/O (normally open NO)	single signal N/C (normally closed NC)	without	Status OUT +24 V = OK	Status $\overline{\text{OUT}}$ 0 V = OK
-TA	-100	x			x			x		
-TB	-101	x				x		x		
-TB	-102	x					x	x		
-TB	-114		x						x	
-TB	-124			x	x				x	
-TB	-127			x	x					x

### Dimensions



### Information on UL approvals

**UL**® UL1604  
File E320024

Operating Temperature Code T5

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only

**WARNING:**

- Exposure to some chemicals may degrade the sealing properties of materials used in the following device: relay

Sealant Material:

Generic Name: Modified diglycidyl ether of bisphenol A  
Supplier: Fine Polymers Corporation  
Type: Epi Fine 4616L-160PK

Casing Material:

Generic Name: Liquid Crystal Polymer  
Supplier: Sumitomo Chemical  
Type: E4008, E4009, or E6008

**RECOMMENDATION:**

- Periodically inspect the device named above for any degradation of properties and replace if degradation is found

**WARNING – EXPLOSION HAZARD:**

- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous
- Substitution of any components may impair suitability for Class I, Division 2

**UL**® UL2367  
Non-hazardous use - UL File E306740

**UL**® UL 508 / cUL 508  
File E322549

Class 2  
Meets requirement for Class 2 current limitation  
(ESX10-T...-0.5 A / 1 A / 2 A / 3 A)

CSA C22.2 No: 213 (Class I, Division 2) pending  
CSA C22.2 No: 142 pending

### Instruction leaflet



## Electronic Circuit Protector ESX10-T

**UL**® UL1604

This device is suitable for use in Class I, Div 2, Groups A, B, C, D;  
TC T5; UL File E320024

**Warnings:**

1. Remove power before disconnecting device.
2. Components substitutions may impair suitability of Class I, Div 2.
3. Chemical exposure may degrade internal relay's sealing property.

**UL**® UL2367

Non-hazardous use - UL File E306740

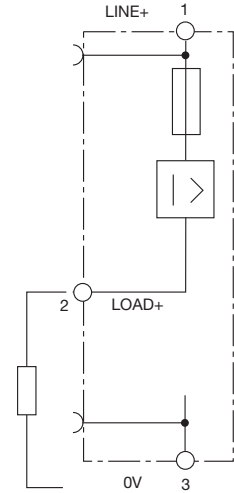
Refer to data sheet / installation guidelines for installation and safety instructions.

E-T-A Elektrotechnische Apparate GmbH  
Industriestraße 2-8 · 90518 ALTENDORF  
DEUTSCHLAND  
Tel. +49 (09187) 10-0 · Fax +49 (09187) 10-397  
E-Mail: info@e-t-a.de · www.e-t-a.com

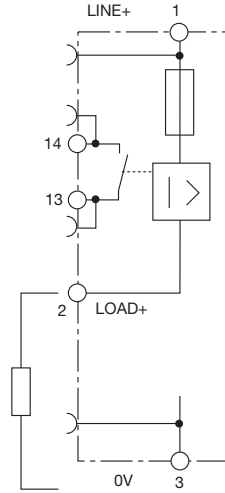


### ESX10-T Signal inputs / outputs (wiring diagram)

**ESX10-TA-100**  
without signal input/output

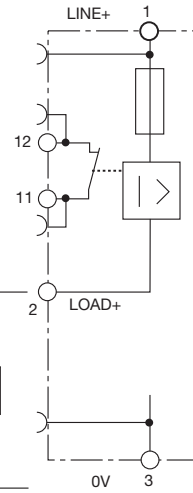


**ESX10-TB-101**  
without signal input  
with signal output F  
(single signal, N/O)



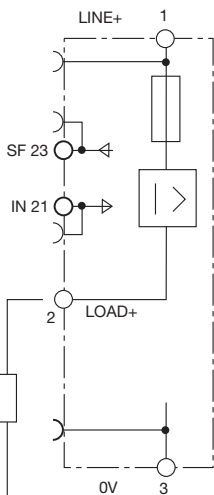
operating condition: 13-14 closed  
fault condition: 13-14 open

**ESX10-TB-102**  
without signal input  
with signal output F  
(single signal, N/C)



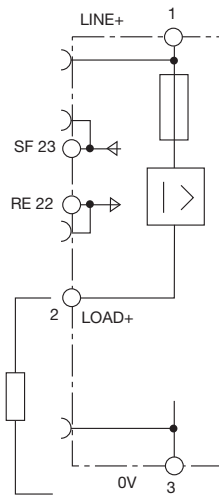
operating condition: 11-12 open  
fault condition: 11-12 closed

**ESX10-TB-114**  
with control input IN+  
(+DC 24 V)  
with status output SF  
(+24 V = load output ON)



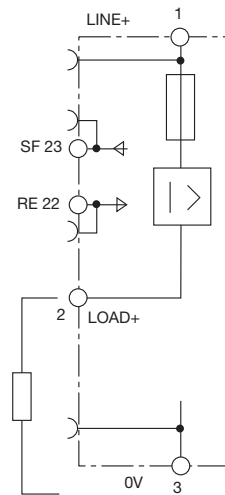
operating condition: SF +24 V = OK  
fault condition: SF 0 V

**ESX10-TB-124**  
with reset input RE  
(+DC 24 V ↓)  
with status output SF  
(+24 V = load output ON)



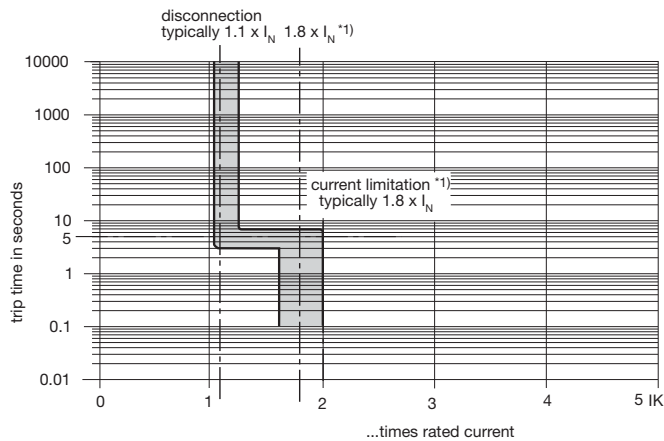
operating condition: SF +24 V = OK  
fault condition: SF 0 V

**ESX10-TB-127**  
with reset input RE  
(+DC 24 V ↓)  
with inverse status output SF  
(0 V = load output ON)



operating condition: SF 0 V = OK  
fault condition: SF +24 V

### Time/Current characteristic curve ( $T_A = 25\text{ }^\circ\text{C}$ )



- The trip time is typically 3 s in the range between  $1.1 \times I_N$  and  $1.8 \times I_N$ .
- Electronic current limitation occurs at typically  $1.8 \times I_N$  which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed  $1.8 \times I_N$  times the current rating. Trip time is between 100 ms and 3 sec (depending on overload or at short circuit).
- Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.

\*1) current limitation typically  $1.8 \times I_N$  times rated current at  $I_N = 0.5 \text{ A} \dots 6 \text{ A}$   
 current limitation typically  $1.5 \times I_N$  times rated current at  $I_N = 8 \text{ A}$  or  $10 \text{ A}$   
 current limitation typically  $1.3 \times I_N$  times rated current at  $I_N = 12 \text{ A}$

**Table 3: Reliable trip of ESX10-T**

#### Reliable trip of ESX10-T with different cable lengths and cross sections

Resistivity of copper $\rho_0 =$		0.0178 (Ohm x mm <sup>2</sup> ) / m	
$U_S = \text{DC } 19.2 \text{ V}$ (= 80 % of 24 V)		voltage drop of ESX10-T and tolerance of trip point (typically $1.1 \times I_N = 1.05 \dots 1.35 \times I_N$ ) have been taken into account.	
ESX10-T-selected rating $I_N$ (in A)	→	<b>3</b>	<b>6</b>
e. g. trip current $I_{ab} = 1.25 \times I_N$ (in A)	→	3.75	7.5
$R_{\text{max}}$ in Ohm = $(U_S / I_{ab}) - 0.050$	→	<b>5.07</b>	<b>2.51</b>

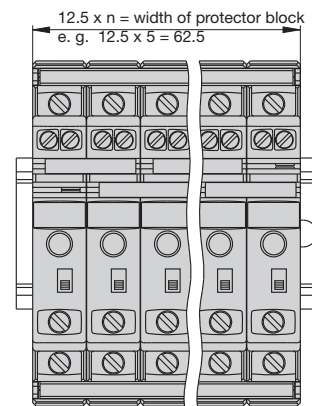
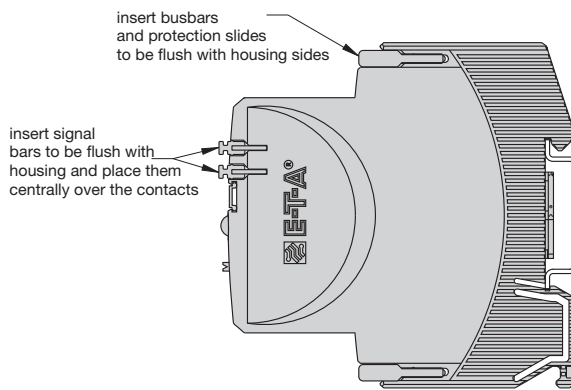
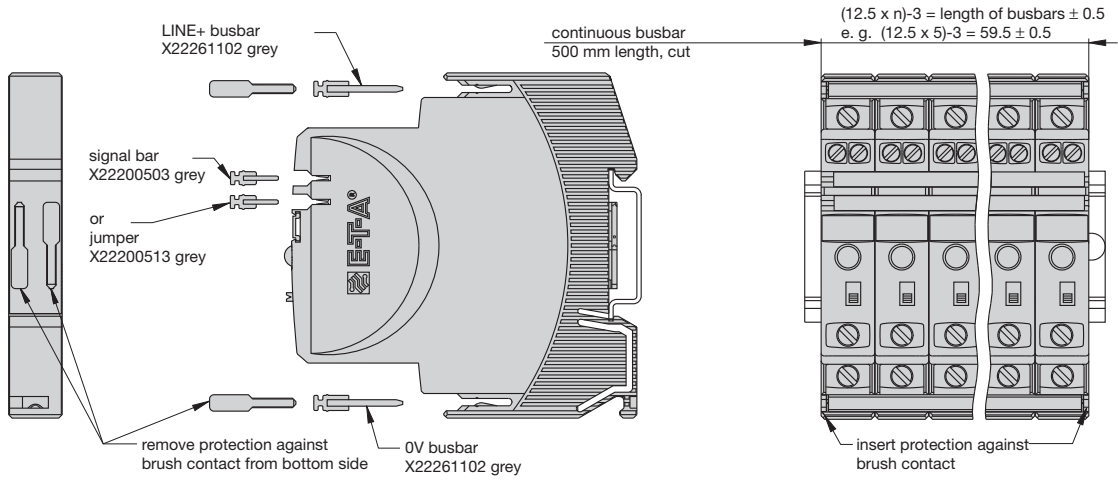
#### The ESX10-T reliably trips from 0 Ohm to max. circuitry resistance $R_{\text{max}}$

Cable cross section A in mm <sup>2</sup>	0.14	0.25	0.34	0.5	0.75	1	1.5
cable length L in meter (= single length)	cable resistance in Ohm = $(R_0 \times 2 \times L) / A$						
	↓	↓	↓	↓	↓	↓	↓
5	1.27	0.71	0.52	0.36	0.24	0.18	0.12
10	2.54	1.42	1.05	0.71	0.47	0.36	0.24
15	3.81	2.14	1.57	1.07	0.71	0.53	0.36
20	5.09	2.85	2.09	1.42	0.95	0.71	0.47
25	6.36	3.56	2.62	1.78	1.19	0.89	0.59
30	7.63	4.27	3.14	2.14	1.42	1.07	0.71
35	8.90	4.98	3.66	2.49	1.66	1.25	0.83
40	10.17	5.70	4.19	2.85	1.90	1.42	0.95
45	11.44	6.41	4.71	3.20	2.14	1.60	1.07
50	12.71	7.12	5.24	3.56	2.37	1.78	1.19
75	19.07	10.68	7.85	5.34	3.56	2.67	1.78
100	25.34	14.24	10.47	7.12	4.75	3.56	2.37
125	31.79	17.80	13.09	8.90	5.93	4.45	2.97
150	38.14	21.36	15.71	10.68	7.12	5.34	3.56
175	44.50	24.92	18.32	12.46	8.31	6.23	4.15
200	50.86	28.48	20.94	14.24	9.49	7.12	4.75
225	57.21	32.04	23.56	16.02	10.68	8.01	5.34
250	63.57	35.60	26.18	17.80	11.87	8.90	5.93

- Example 1:** max. length at 1.5 mm<sup>2</sup> and 3 A **214 m** →
- Example 2:** max. length at 1.5 mm<sup>2</sup> and 6 A **106 m** →
- Example 3:** mixed wiring:  $R_1 = 40 \text{ m}$  in 1.5 mm<sup>2</sup> and  $R_2 = 5 \text{ m}$  in 0.25 mm<sup>2</sup>:  
 (Control cabinet – sensor/actuator level)  $R_1 = 0.95 \text{ Ohm}$ ,  $R_2 = 0.71 \text{ Ohm}$  **Total ( $R_1 + R_2$ ) = 1.66 Ohm**

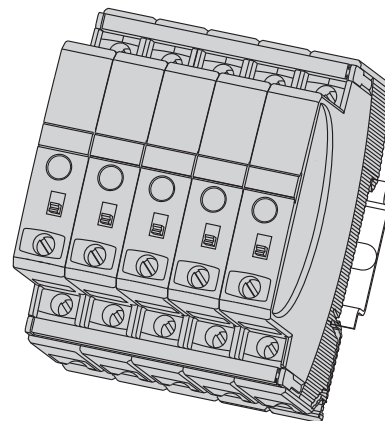
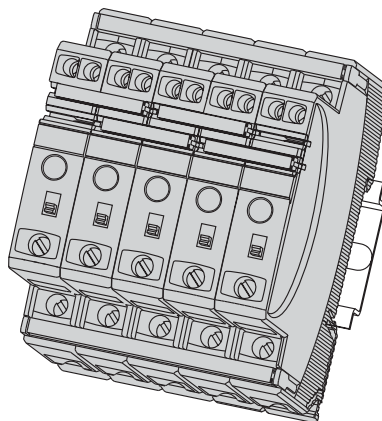
### Mounting examples for ESX10-T

The ESX10-T features an integral power distribution system.



5 ESX10-TB  
with busbars  
and jumpers

5 ESX10-TA  
with busbars



#### Mounting procedure:

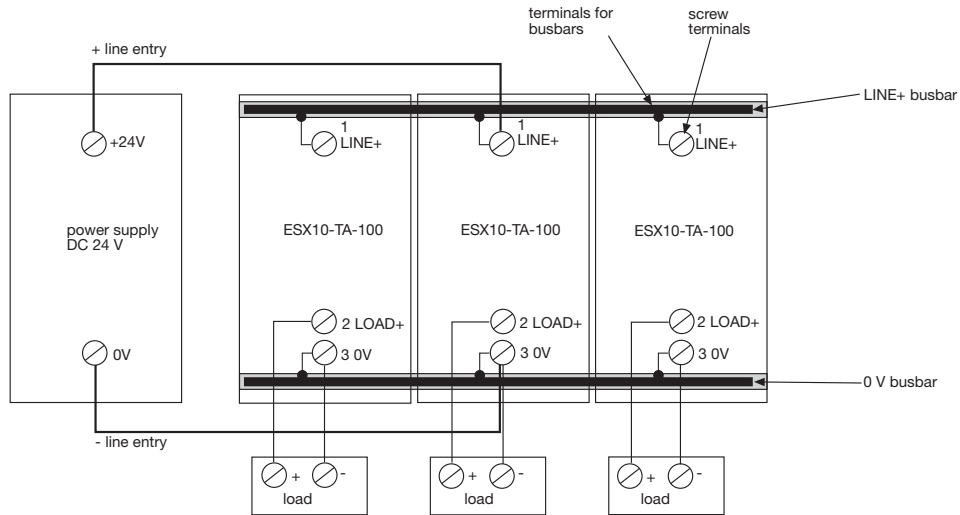
Before wiring insert busbars into protector block.

### Connection diagrams and application examples ESX10-T

#### Connection diagrams and application examples ESX10-T...

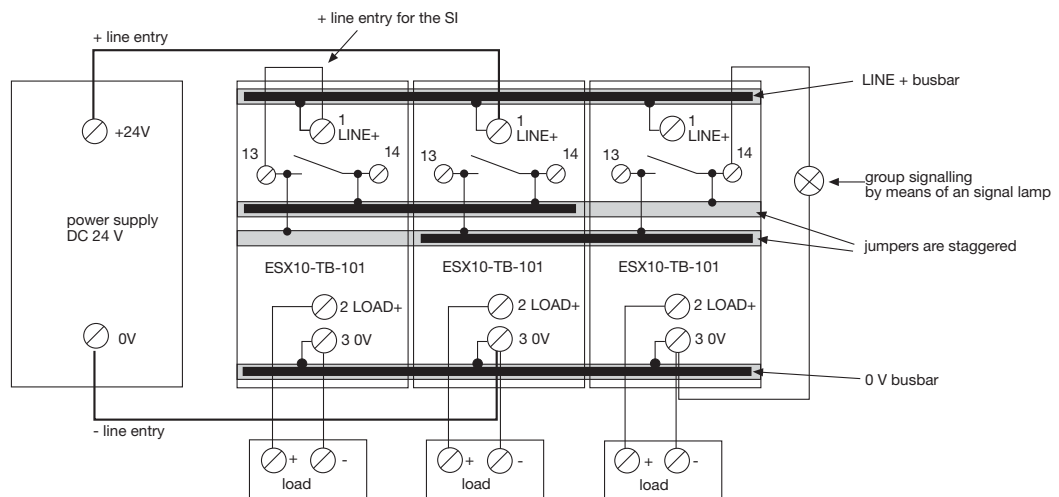
Signal contacts are shown in OFF or fault condition.

#### ESX10-TA-100



#### ESX10-TB-101

group signalling (series connection)

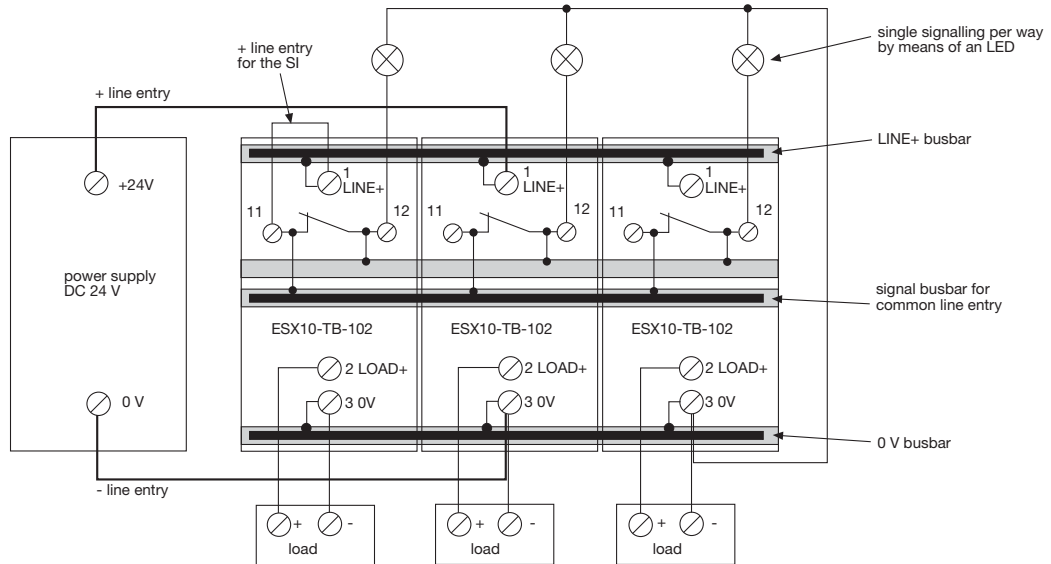


5

### Connection diagrams and application examples ESX10-T

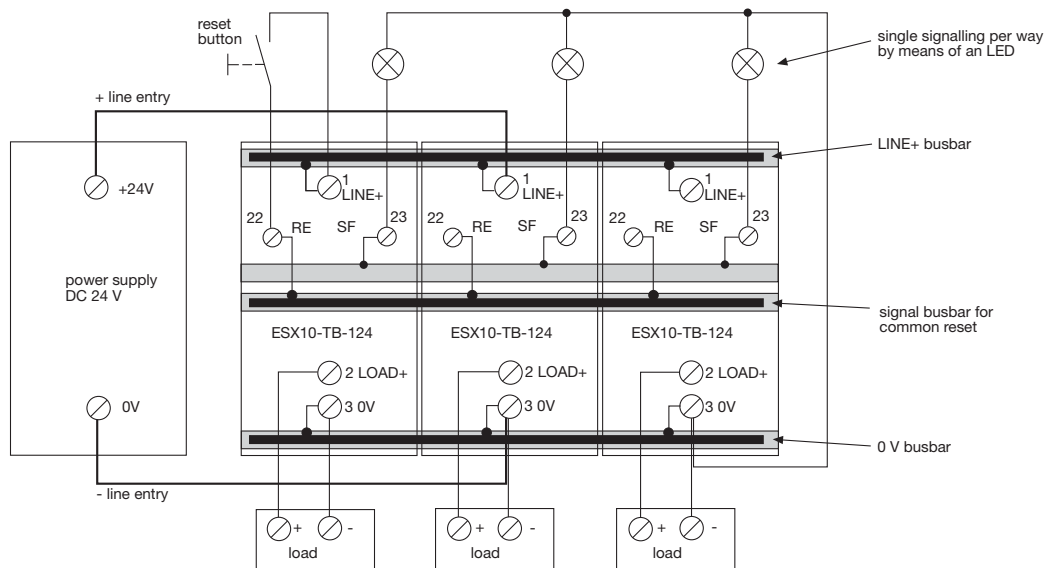
#### ESX10-TB-102

Single signalling with common line entry



#### ESX10-TB-124

Single signalling with common reset



### Connection diagrams and application examples ESX10-T

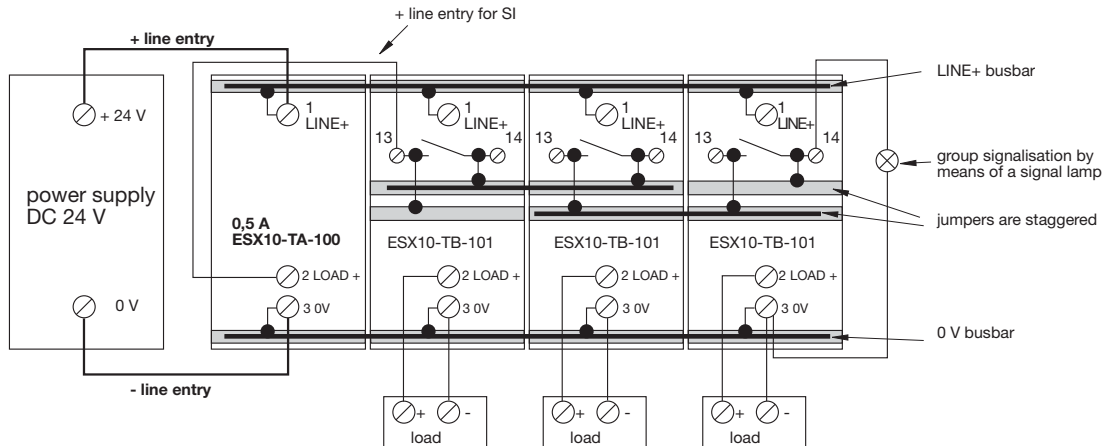
#### Application examples: feed in module with concurrent protection of auxiliary circuit

Auxiliary contacts are shown in the OFF of fault condition

##### ESX10-TB-101

Group signalisation (series connection)

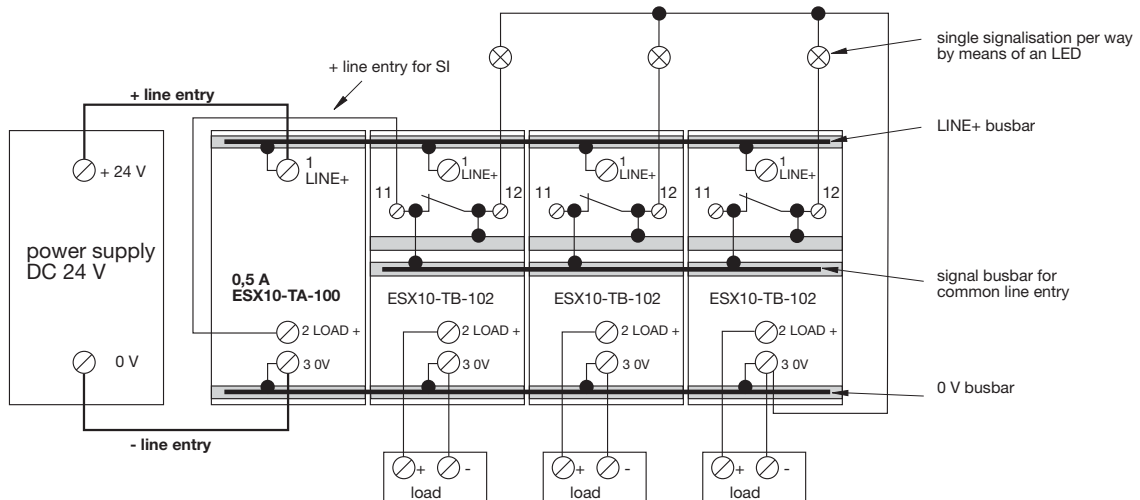
Type ESX10-TA-100-DC24V-0.5A can be used as a feed in module including protection of auxiliary circuit



##### ESX10-TB-102

Single signalisation with common line entry

Type ESX10-TA-100-DC24V-0.5A can be used as a feed in module including protection of auxiliary circuit



5

## Description

The ESX10-T features an integral power distribution system. The following wiring modes are possible with various pluggable current and signal busbars:

- LINE +(DC 24 V)
- 0 V
- **Caution:** The electronic devices ESX10-T require a 0 V connection
- signal contacts
- reset inputs

### Busbars for LINE+ and 0 V

max. load with one line entry (recommended: centre line entry)  $I_{max}$  50 A  
 max. load with two line entries  $I_{max}$  63 A  
 grey insulation, length: 500 mm  
**X 222 611 02**

### Signal busbars for signal contacts and reset inputs

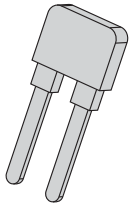
max. load with one line entry  $I_{max}$  1 A  
 with one series connection of signal contacts  $I_{max}$  0.5 A  
 grey insulation, length: 500 mm  
**X 222 005 03**

### Jumpers for signal contacts

grey insulation, length: 21 mm  
**X 222 005 13**  
 packing unit: 10 pcs

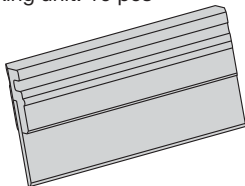
### Insulated wire bridge

optional as jumper for ESX10-TB-101  
 for group signalisation (series connection)  
**X 222 984 01**  
 packing unit: 10 pcs



### Busbars for LINE+ and 0 V

grey insulation  
 max. number of plug-on operations 10  
**X 222 611 34**, (3-unit-block ESX10-T), length: 34.5 mm  
**X 222 611 47**, (4-unit-block ESX10-T), length: 47 mm  
**X 222 611 59**, (5-unit-block ESX10-T), length: 59.5 mm  
 packing unit: 10 pcs



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

## Description

The E-T-A Solid State Remote Power Controller (SSRPC) E-1048-60. is an opto decoupled transistorised switching device providing both protection and signalisation. It may be used wherever safe switching and protection of resistive, inductive or lamp loads in DC voltage systems is required.

## Typical applications

### Automation

- interface module providing inexpensive power amplification at PLC outputs
- optimum protection of individual loads by monitoring the load circuit

### Protection and control of

- motors
- solenoids
- lamps

## Features

- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -600) and in the OFF and ON condition (version -602)
- Physically isolated fault indication.
- Compact plug-in type

## Ordering information

Type No.	
<b>E-1048</b>	Solid State Remote Power Controller
	<b>Version</b>
	<b>600</b> wire break indication in OFF condition (standard)
	<b>602</b> with permanent wire break monitoring
	<b>Voltage rating</b>
	<b>DC 24 V</b> DC 24 V (standard)
	<b>Current ratings</b>
	<b>0.5 A</b>
	<b>1.0 A</b>
	<b>2.0 A</b>
	<b>4.0 A</b>
<b>E-1048 - 600 DC24 V 1.0 A</b>	ordering example

Where remote control, wire break and LED indication is not required, please contact us for a thermal-magnetic circuit breaker (e.g. types 2210, 3600, 3900).



## Technical data (T<sub>ambient</sub> = 25 °C; at U<sub>N</sub>)

### Load circuit

Voltage rating U <sub>S</sub>	DC 24 V (18...36 V)
Current rating I <sub>N</sub>	0.5 A; 1 A; 2 A; 4 A (other ratings to special order)
Closed-circuit current I <sub>Contr</sub>	typically 0.3 mA
Min. load current	
Standard version:	I <sub>load</sub> > 1 mA
wire break indication in OFF condition	
Option: wire break indication in OFF and ON condition	
wire break ind. in OFF cond.	R <sub>load</sub> > typ. 500 kΩ
wire break ind. in ON cond.	I <sub>load</sub> < typ. 130 mA (0.5/1 A unit)
	I <sub>load</sub> < typ. 500 mA (2/4 A unit)
Voltage drop U <sub>DSmax</sub>	0.15 V; 0.3 V; 0.1 V; 0.2 V
Switch-on/switch-off time t <sub>on</sub> /t <sub>off</sub>	typ. 300 μs/700 μs with resistive load
Overload disconnection	approx. 1.5 (±0.3) × I <sub>N</sub> after approx. 100 ms
Short-circuit current (self-limiting)	max. 25 A (with 0.5 A and 1 A current ratings)
	max. 75 A (with 2 A and 4 A current ratings)
Short-circuit disconnection	< 250 μs

### Control circuit

Voltage rating	DC 24 V
Voltage controlled input U <sub>E</sub>	DC 0 V < low level < 5 V
	DC 8.5 V < high level < 36 V
Input current I <sub>E</sub>	1...10 mA (8.5...36 V)
Max. switching frequency f <sub>max</sub>	500 Hz
Reset time after short-circuit/overload disconnection	1 ms

### Fault indication output F (opto coupler)

Voltage rating range	DC 5...36 V
Voltage rating range	DC 5...36 V
Max. load current	100 mA (ΔU < 2 V), with reverse polarity protection
Error indication	output F+ / F- conductive
	- wire break in load circuit
	- after short-circuit/overload disconnection

Parallel connection possible, as leakage current < 10 μA

### General data

Temperature range	0 °C...+60 °C
Insulation voltage (IEC 60664/VDE 0110)	2.5 kV <sub>rms</sub>
Mass	28 g



## Technical description

At the appropriate input level (>8.5 V), the opto decoupled input in the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply ( $U_S$ ).

The transistor will switch off when

- the control voltage ( $U_E$ ) is removed
- there is a short-circuit/overload in the load circuit.

Status indication is provided by two LEDs (red and green).

Thermal-magnetic style overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.

The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets (see Accessories).

### Control circuit

#### ON condition:

If a voltage higher than 8.5 V is applied to the input terminals (-IN, +IN), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, the green LED will be lighted.

#### OFF condition:

A control voltage lower than 5 V will switch the output transistor off.

### Load circuit

The load circuit switches depending on the control signal ("0" or "1"). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250  $\mu$ s whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

### Fault indication output

The fault indication circuit (F+, F-) is opto decoupled from the load and control circuit.

In the OFF condition, this circuit will provide wire break indication, with the transistor output being open.

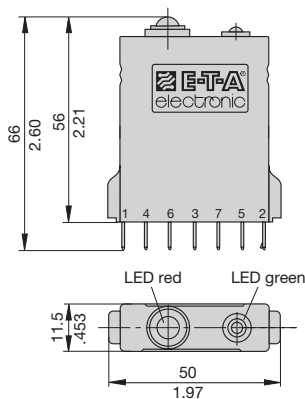
In the ON condition, the circuit will provide short-circuit and overload monitoring and indication.

Visual fault indication by red LED.

## Status indication

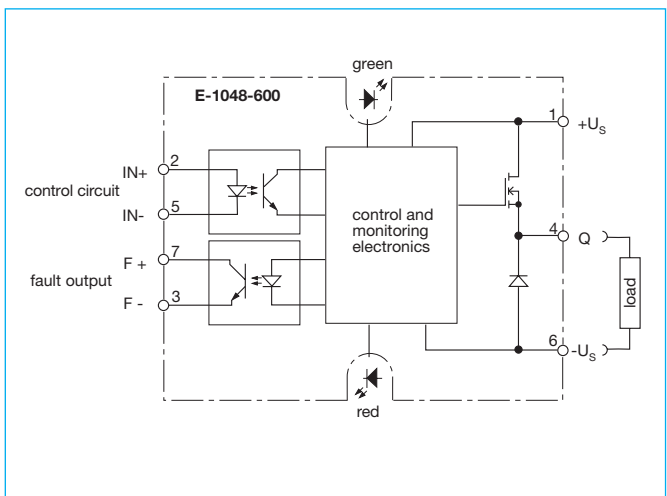
Status indication	Fault indication output (opto coupler)	LED	
		green	red
non-conductive, no duty		<input type="radio"/>	<input type="radio"/>
conductive, normal duty		<input checked="" type="radio"/>	<input type="radio"/>
overload or short circuit at the output (and with option wire break indication in ON condition)		<input checked="" type="radio"/>	<input checked="" type="radio"/>
wire break, in the OFF position		<input type="radio"/>	<input checked="" type="radio"/>

## Dimensions



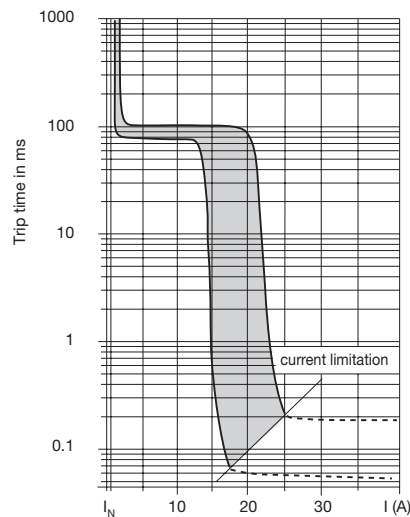
This is a metric design and millimeter dimensions take precedence ( $\frac{mm}{inch}$ )

## Connection diagram

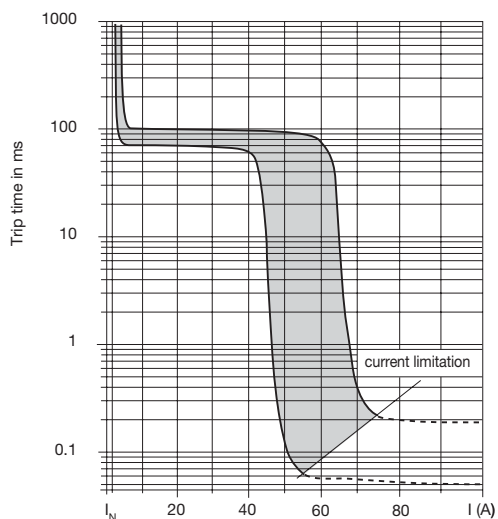


## Typical time/current characteristics ( $T_A = 25^\circ C$ )

### 0.5 A and 1 A

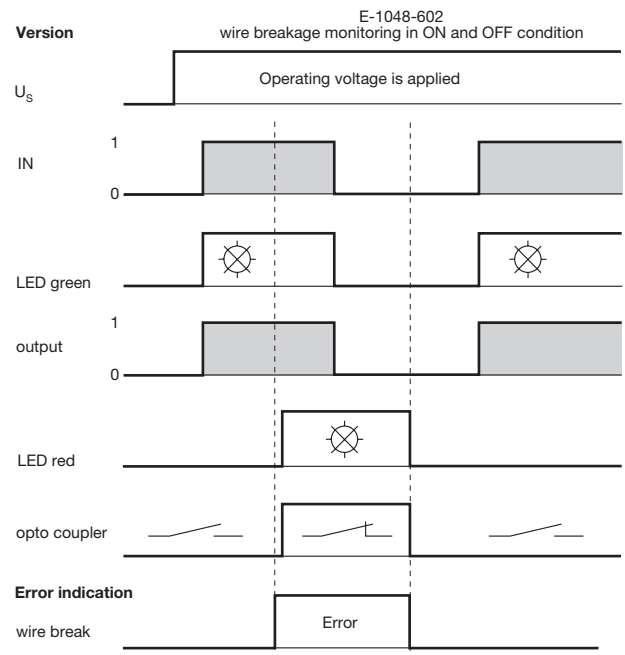
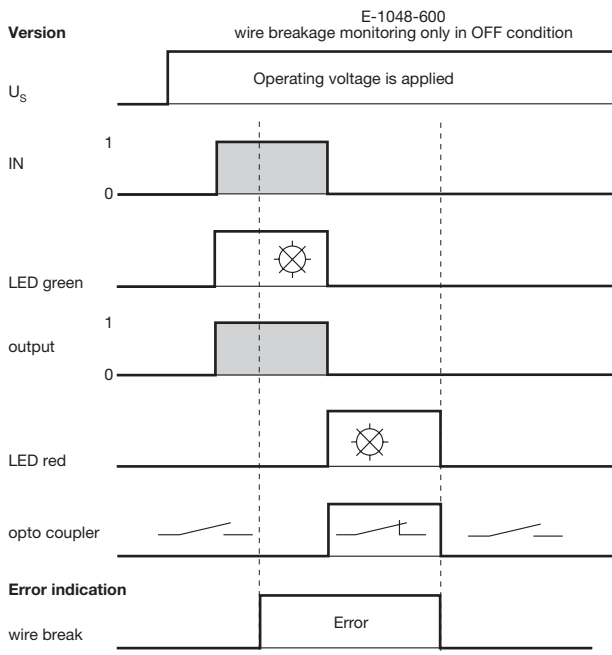


### 2 A and 4 A

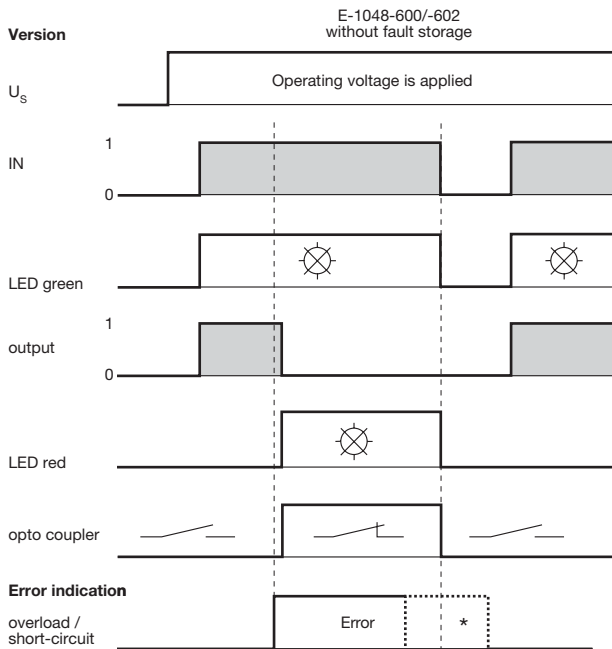


## Functional diagrams E-1048-60.

### Functional diagram E-1048-60. wire break indication



### Functional diagram E-1048-60. overload /short-circuit indication



\* Fault indication is reset when control voltage is switched off, whether the failure is still active or not.

1  
0  
IN = input set / output = switched through

LED lights

## Accessories for E 1048-60.

### Single mounting sockets

(up to 16 A max. load)

**17-P10-Si**

**17-P70-Si**

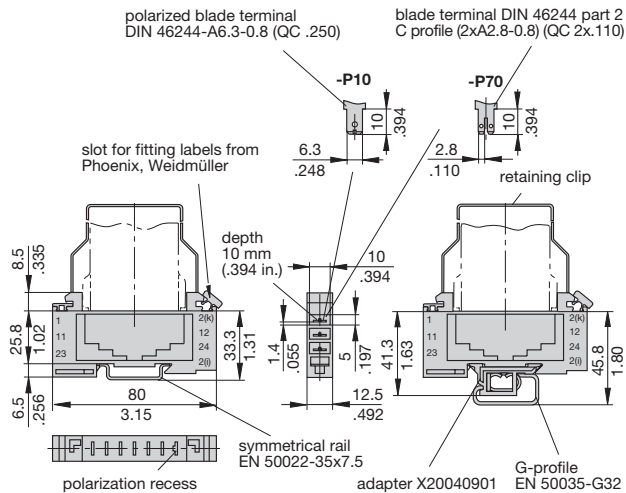
(retaining clip Y 300 581 11 available on request)

(with adapter)

**17-P10-Si-20025**

**17-P70-Si-20025**

(retaining clip Y 300 581 11 available on request)

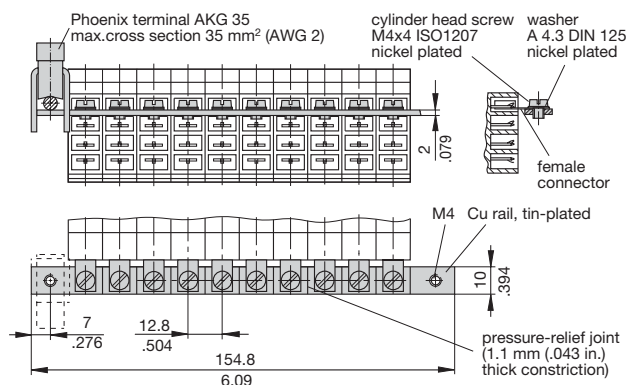


### Busbar (10-way) (supplied as a complete package) for type 17 socket

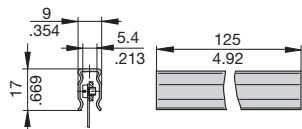
(for max. 100 A continuous load), more positions available on request

**X 211 157 01** with terminal

**X 211 157 02** without terminal



### Insulating sleeving for busbar (10-way) Y 303 824 01



### 2-way mounting socket

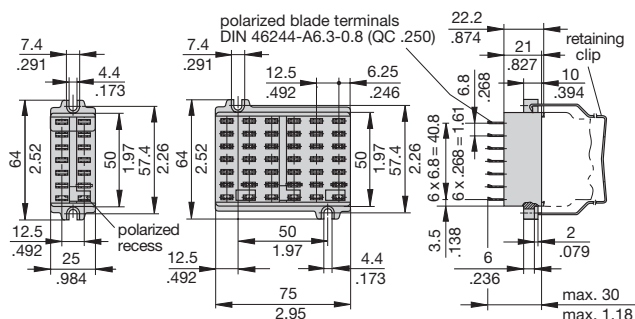
**23-P10-Si**

(retaining clip Y 300 581 03 available on request)

### 6-way mounting socket

**63-P10-Si**

(retaining clip Y 300 581 03 available on request)



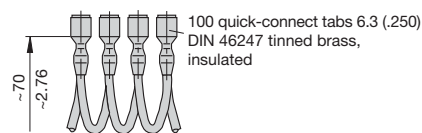
### Connector bus links -P10

**X 210 588 01/** 1.5 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), blau (up to 20 A max. load)

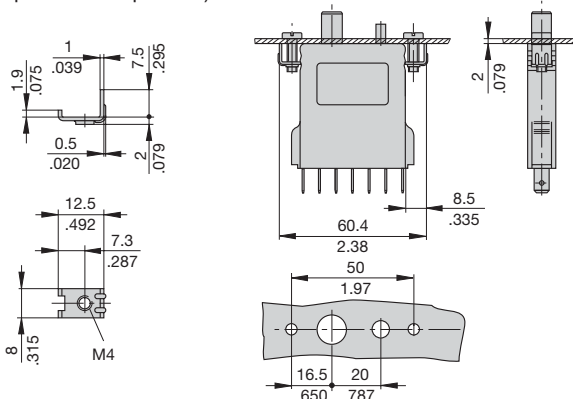


### 2 mounting clips

**Y 300 504 02**

(2 pcs needed per unit)

Installation drawing with mounting clips Y 300 504 02



### Pin selection 17-P10-Si fitted with E-1048-60.

E-1048-60.	17-P10-Si	
IN +	(2)	(2) [2(k)]
IN -	(5)	(5) [12]
F +	(7)	(7) [24]
F -	(3)	(3) [2(i)]
-U <sub>B</sub>	(6)	(6) [23]
Q	(4)	(4) [11]
+U <sub>B</sub>	(1)	(1) [1]

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

The E-T-A Solid State Remote Power Controller E-1048-7.. is a transistorised switching device providing both protection and signalisation. It is suitable for all applications where the capabilities of the existing PLC outputs are not sufficient or where no protection against overload and short circuit or wire breakage monitoring of connected loads is provided. The use of a costly, high-capacity output card becomes superfluous when only one or two powerful outputs are necessary.

Using the SSRPC E-1048-7.. in combination with the module 17plus creates a new, very flexible system capable of being subsequently changed or extended. Busbars, pre-wired signal contacts and spring-loaded terminals reduce installation times considerably (see accessories).

## Typical applications

### Automation

- interface module providing inexpensive power amplification at PLC outputs
- optimum protection of individual loads by monitoring the load circuit

### Protection and control of

- motors
- solenoids
- lamps

## Features

- Optimum load protection. Available in current ratings of 0.5 A; 1 A; 2 A; 4 A; 5 A. No derating required over entire temperature range!
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection (simulating thermal-magnetic CBE trip curve)
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalisation, and wire break indication in the OFF condition (version -700 and -710) and in the OFF and ON condition (version -702 and -712)
- Fault storage: version -710; -712 and -713
- Physically isolated fault indication
- Compact plug-in type
- Plug-in design for use with power distribution system module 17plus
- Integral pre-wiring of common supply and signal contacts

## Ordering information

Type No.	
E-1048	SSRPC for PLC outputs
<b>Version</b>	
700	wire break indication in OFF condition (standard)
710	wire break indication in OFF condition and fault storage
702	permanent wire break indication
712	permanent wire break indication and fault storage
703	without wire break indication
713	without wire break indication with fault storage
<b>Voltage rating</b>	
DC24 V	DC 24 V (standard)
<b>Current ratings</b>	
0.5 A	
1.0 A	
2.0 A	
4.0 A	
5.0 A	
E-1048 - 700	DC24 V 1.0 A ordering example



E-1048-7..

## Technical data (T<sub>ambient</sub> = 25 °C; at U<sub>N</sub>)

### Load circuit

Voltage rating U<sub>S</sub> DC 24 V (18...36 V)  
 Current rating I<sub>N</sub> 0.5 A; 1 A; 2 A; 4 A; 5 A  
 (other ratings to special order)  
 Closed-circuit current I<sub>Contr</sub> typically 0.3 mA

### Min. load current

#### Version -700/-710:

wire break indication in OFF condition

#### Optional: wire break indication in OFF and ON condition

wire break ind. in OFF cond. R<sub>load</sub> typically 500 kΩ

wire break ind. in ON cond. I<sub>load</sub> < typ. 130 mA (0.5/1 A unit)

I<sub>load</sub> < typ. 500 mA (2/4/5 A unit)

Voltage drop U<sub>DSmax</sub> 0.15 V; 0.3 V; 0.1 V; 0.2 V; 0.3 V  
 Switch-on/switch-off time t<sub>on</sub>/t<sub>off</sub> typ. 300 μs/700 μs with resistive load

Overload disconnection approx. 1.5 (± 0.3) × I<sub>N</sub> after approx. 100 ms

Short-circuit current (self-limiting) max. 25 A (with 0.5 A and 1 A current ratings)

max. 75 A (with 2 A/4 A/5 A current ratings)

Short-circuit disconnection < 250 μs

### Control input

Control level between IN+ and GND  
 Voltage rating DC 24 V  
 Voltage controlled input U<sub>E</sub> DC 0 V < low level < 5 V  
 DC 8.5 V < high level < 36 V  
 Input current I<sub>E</sub> 1...10 mA (8.5...36 V)

Max. switching frequency f<sub>max</sub> 1 kHz

Reset time after short-circuit/overload disconnection 1 ms

### Fault indication output F

**relay contact**  
 max. switching voltage DC 150 V  
 AC 125 V

max. interrupting capacity DC 30 W  
 AC 60 W

limiting continuous current 1 A

### General data

Temperature range 0 °C...+60 °C  
 Insulation voltage DC 500 V > 10 MΩ  
 (IEC 60664/VDE 0110)

Mass 28 g

## Technical description

At the correct input voltage ( $> 8.5\text{ V}$ ), the SSRPC will switch on a power transistor to connect the load to the plus pole of the load circuit supply ( $U_S$ ).

The transistor will switch off when

- the control voltage ( $U_E$ ) is removed
- there is a short-circuit/overload in the load circuit.

Status indication is provided by two LEDs (red and yellow).

Simulated thermal-magnetic overload protection occurs at approx. 1.5 times rated current. See time/current characteristic curves.

The SSRPC is fitted with blade terminals DIN 46244-A6.3-0.8 and is suitable for plug-in mounting with various E-T-A sockets or **module 17plus** (see Accessories).

### Control circuit

#### ON condition:

If a voltage higher than 8.5 V is applied to the input terminals ( $+I_N$  against GND), the control current (from the PLC) will flow through the opto coupler. The output transistor will be conductive, status indication by yellow LED.

#### OFF condition:

A control voltage lower than 5 V will switch the output transistor off.

### Load circuit

The load circuit switches depending on the control signal ("0" or "1"). It is electronically monitored for faults. In the event of a short-circuit the circuit is disconnected after max. 250  $\mu\text{s}$  whilst upon inadmissible overload it is disconnected according to the time/current curves shown.

### Fault indication output F

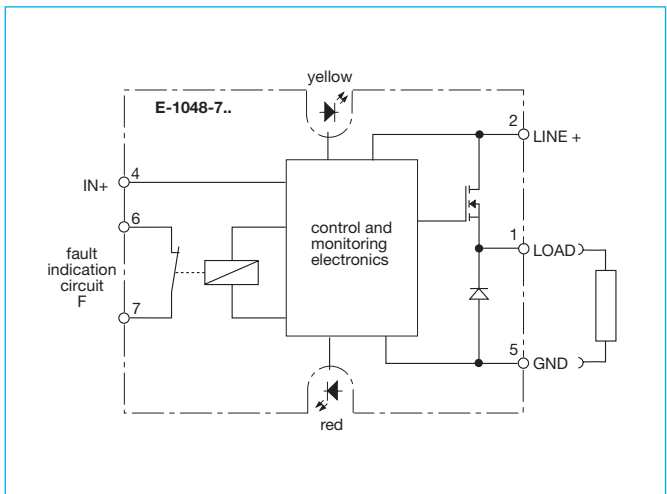
The fault indication circuit is physically isolated from the load and control circuits via a relay.

In the OFF condition, this circuit (with closed contact) will provide wire break indication, with the transistor output being open.

The versions with fault storage (-702/-712 and -713) store the fault signal until the control voltage is re-applied.

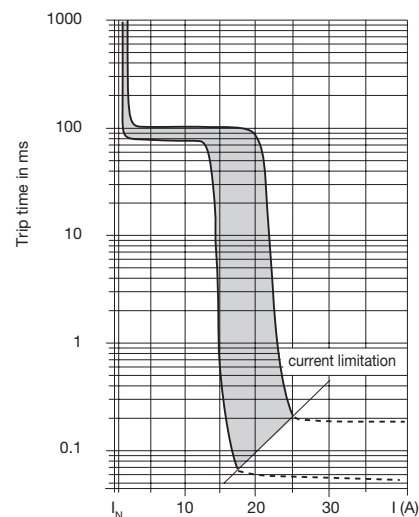
Visual fault indication by red LED.

## Connection diagram

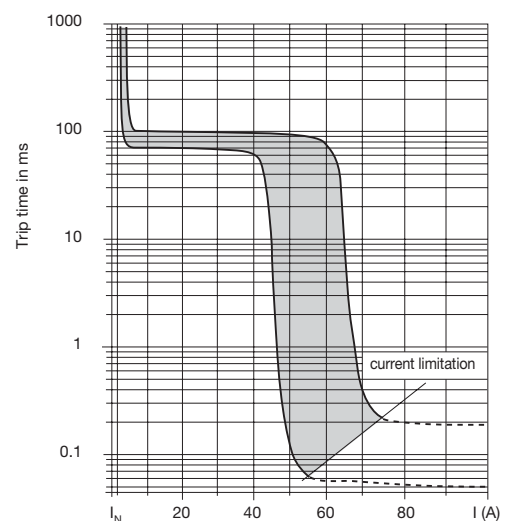


## Typical time/current characteristics ( $T_A = 25\text{ }^\circ\text{C}$ )

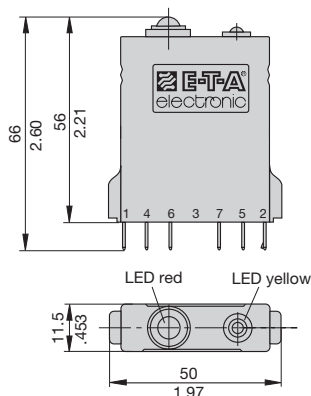
### 0.5 A and 1 A



### 2 A and 4 A



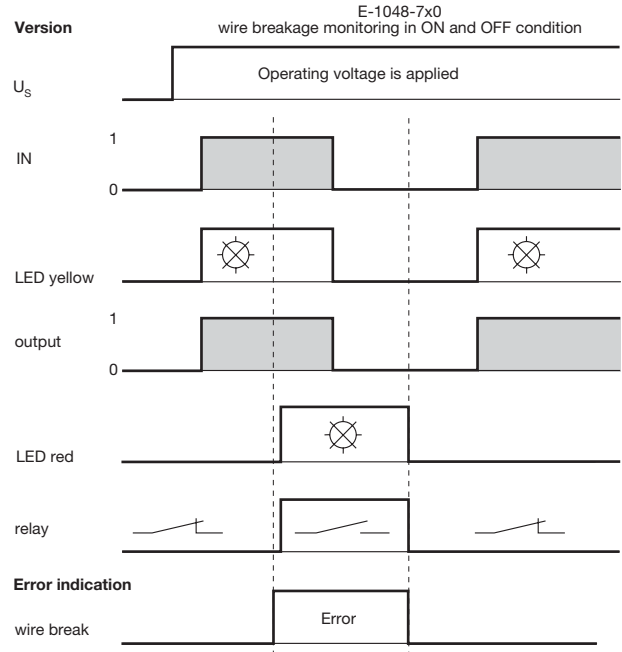
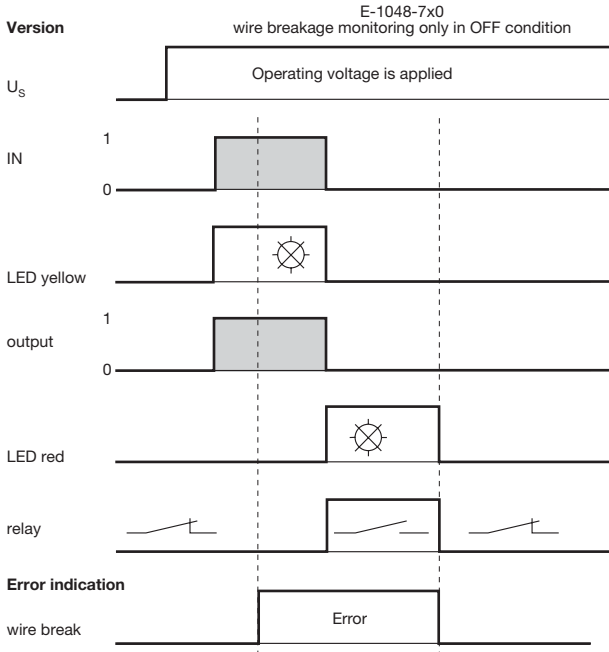
## Dimensions



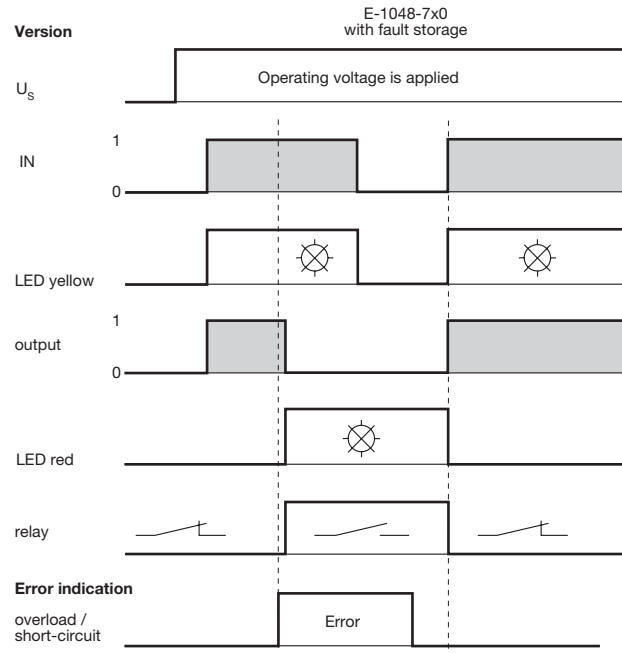
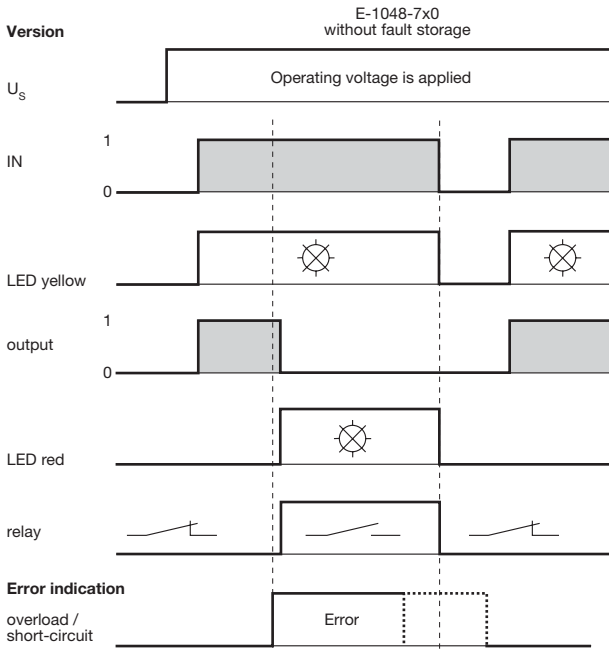
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Functional diagrams E-1048-7..

**Functional diagram E-1048-7..**  
wire break indication



**Functional diagram E-1048-7..**  
overload /short-circuit indication

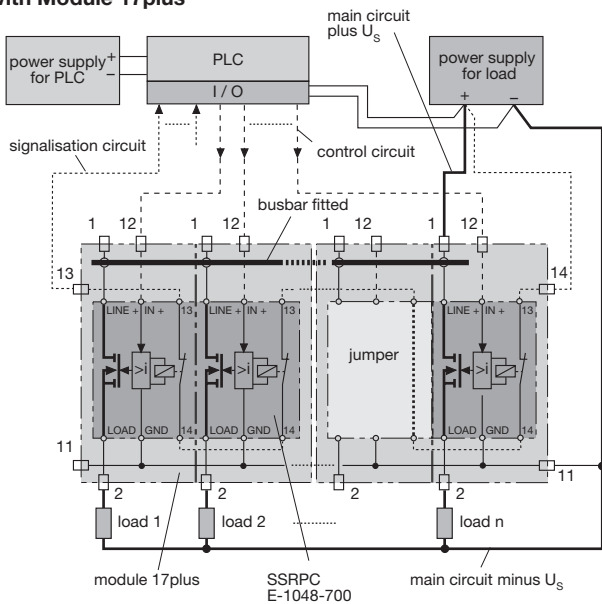


1 0 IN = input set / output = switched through

LED lights

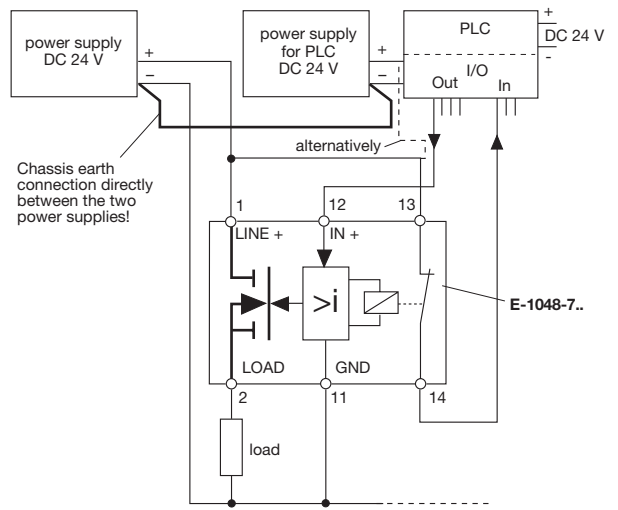
Connection diagram

Solid State Remote Power Controller E-1048-700 with Module 17plus



Wiring diagram

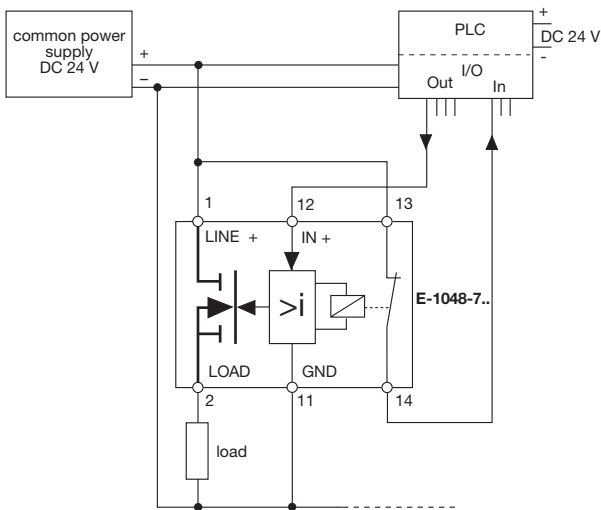
Separate power supply for load, PLC I/O and signal loop



**Caution:** If there is no firm chassis earth connection when using several separate power supplies, the connected fault indication loop may lead to intermittent operation of the SSRPC and resultant operational hazards.

Wiring diagram

Common power supply for load, PLC I/O and signal loop



6

## Accessories for E-1048-7..

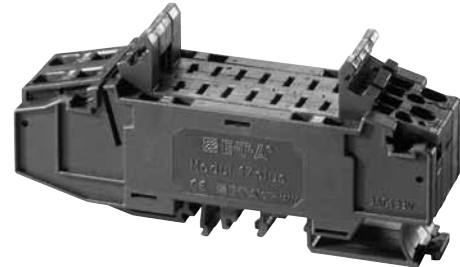
### Description

Module 17plus is a power distribution system for use with SSRPC E-1048-7.. for PLC outputs.

Each module accommodates two SSRPCs with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of spring-loaded terminals. The reference potential for the electronic amplifiers (GND pin 11) is also looped through and to the terminals connected at the sides. Control of the amplifiers (IN+), referenced to GND, is per channel via the separate terminal 12 beside the LOAD terminal. The SSRPC has an integral signal contact (break contact) used for group signalisation. Therefore the terminals of all break contacts are connected in series in the module 17plus and are connected to the terminal blocks via two terminals (13, 14). The module is designed to accommodate a probe for series connection continuity tests. When multipole circuit breakers are fitted auxiliary contacts are required for each pole. Individual circuit breaker signalisation is achieved through use of the break contacts (which close in the event of failure) connected in parallel by means of terminals on each module. The signalling circuitry between modules and the internal prewiring for the potential is automatically connected when the modules are linked together. Meets the requirements of UL60950.

### Ordering information

17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal, connection of signalisation etc.



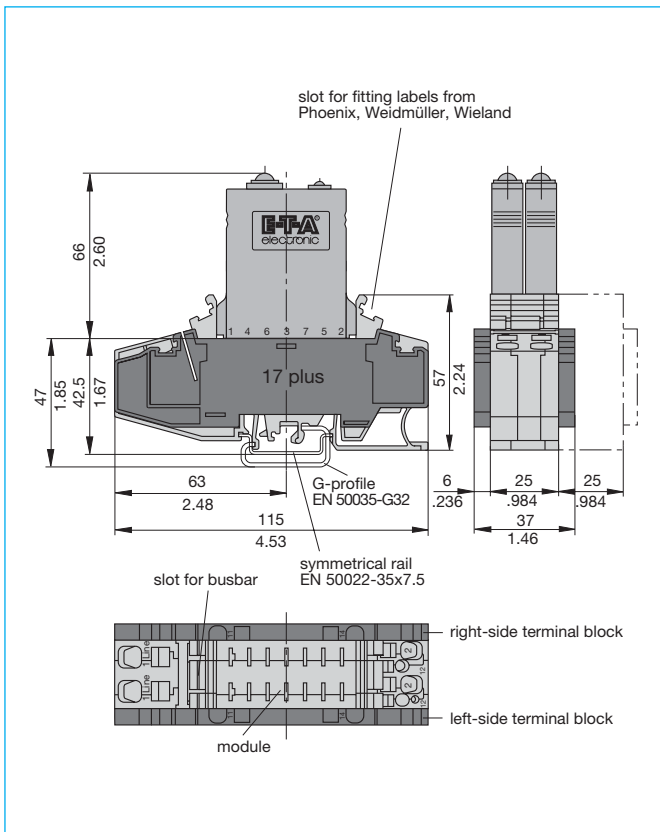
17plus

### Technical data

Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.
LINE feed (1):	spring-loaded terminals for 1.5-10 mm <sup>2</sup> , (AWG 20 - AWG 10) SD 2 (0.8x4.0)
LOAD output (2):	spring-loaded terminals for 0.25-4 mm <sup>2</sup> , (AWG 24 - AWG 12) SD 1 (0.6x3.5)
Reference potential GND and signalisation terminals (11, 13, 14):	spring-loaded terminals for 0.25-2.5 mm <sup>2</sup> , (AWG 24 - AWG 14) SD 1 (0.6x3.5)
control IN+ terminal (12)	spring-loaded terminal for 0.25-1.5 mm <sup>2</sup> , (AWG 24 - AWG 16) SD 0 (0.4x2.5)
Test probe for testing the group signal for line interruption: ≤ 2 mm ø	
Voltage rating (without SSRPC):	AC 433 V; DC 65 V
Current rating (without SSRPC)	
LINE feed (1)	50 A
LOAD output (2)	25 A
Reference potential GND (11)	10 A
Control IN+ (12)	1 A
Group signal /(13-14)	1 A
Internal resistance values (without SSRPC)	
LINE-LOAD (1-2)	≤ 5 mΩ
Group signal (13-14)	≤ 8 mΩ/per pole + 5 mΩ for each additional module
Busbar for power distribution	
insulated busbar (blue or red):	I <sub>max</sub> 32 A
non-insulated busbar:	I <sub>max</sub> 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	
Dielectric strength	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V
Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

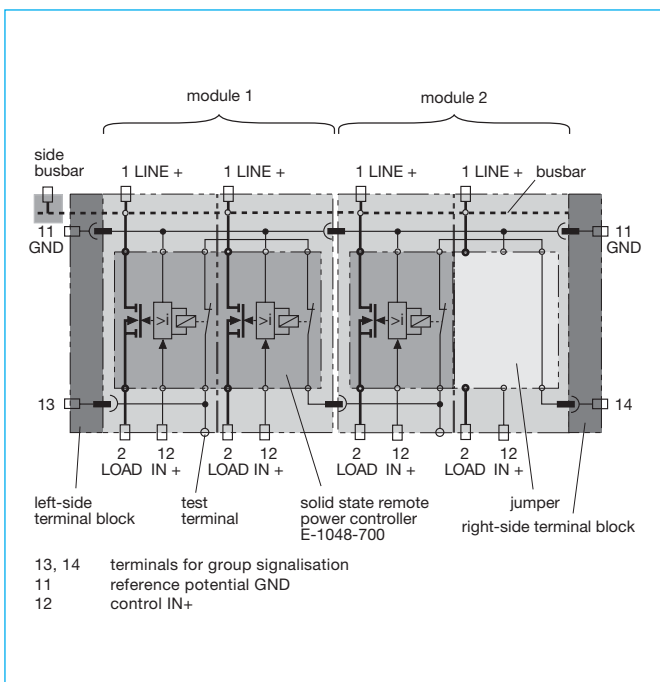


## Dimensions

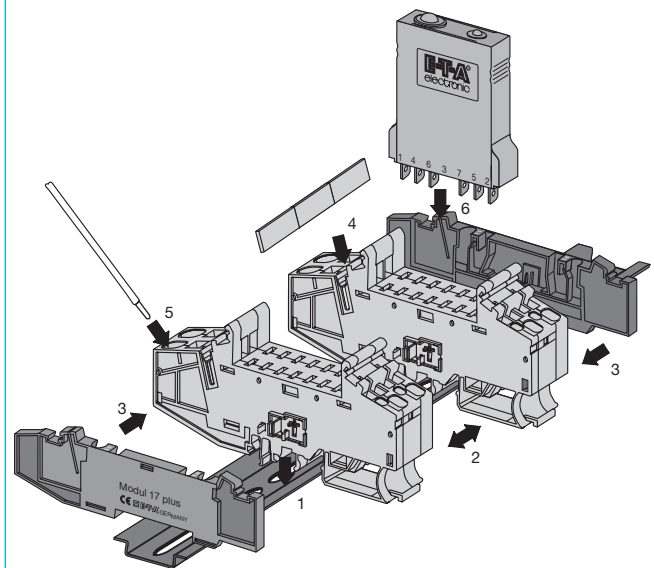


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Connection diagram

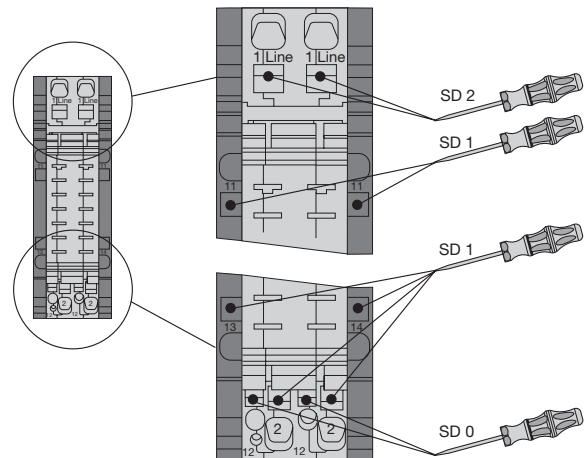


## Installation example



Installation:

- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in SSRPC E-1048-7...



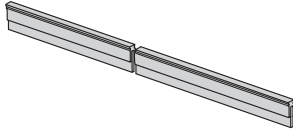
Connection and disconnection of cables with screw driver

## Pin selection, fitted with E-1048-7..

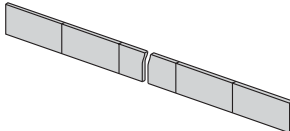
E-1048-7..	Module 17plus	
LINE + (2)	(1)	
GND (5)	(11)	
F 7 (7)	(13)	
F 6 (6)	(14)	
IN+ (4)	(12)	
LOAD (1)	(2)	

**Accessories**

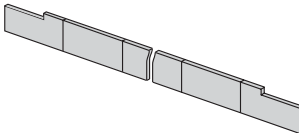
**Busbar 32 A**  
**X 222 005 01** blue insulation, 500 mm/19.68 in.  
**X 222 005 02** red insulation, 500 mm/19.68 in.  
**X 222 005 03** grey insulation, 500 mm/19.68 in.



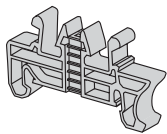
**Busbar 50 A**  
**Y 307 016 01** non-insulated, 500 mm/19.68 in.



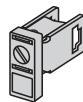
**Busbar 50 A**  
**Y 307 016 11** non-insulated, 500 mm/19.68 in.



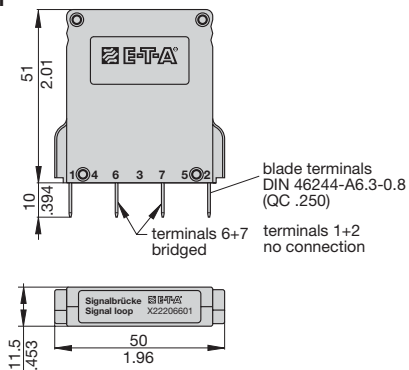
**End bracket**  
**X 222 004 01**



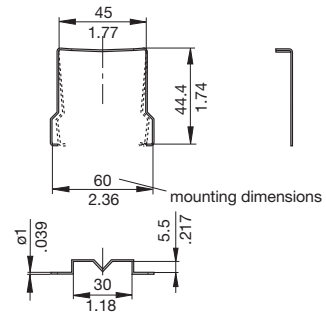
**Screw terminal for busbar**  
**X 211 156 01** non insulated



**Jumper**  
**X 222 066 01**

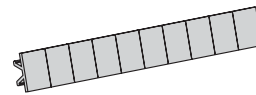


**Retaining clip for SSRPC E-1048-7..**  
 recommended for fitting the devices  
**Y 300 581 11**



**Labels**

marking area 6 x 10 mm  
 (packing unit 10 pcs = 1 strip)  
**part. no. Y 307 942 61**



## Accessories for E-1048-7..

### Single mounting sockets

(up to 16 A max. load)

**17-P10-Si**

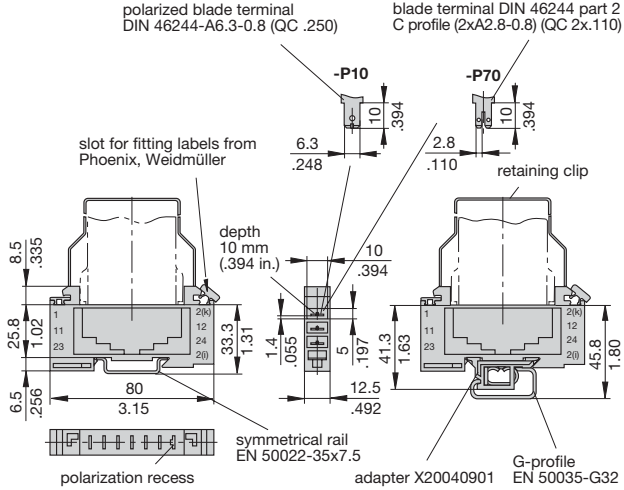
**17-P70-Si**

(retaining clip Y 300 581 11 available on request)

(with adapter)

**17-P10-Si-20025**

**17-P70-Si-20025**

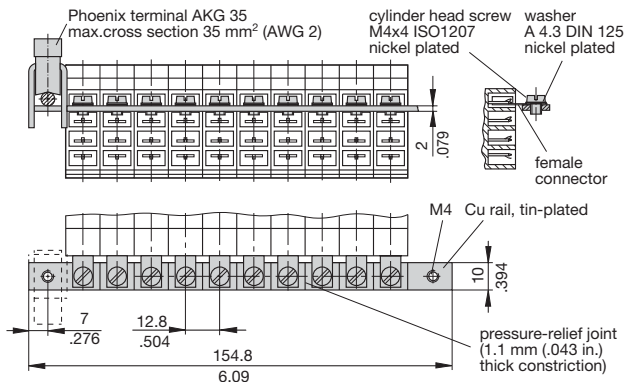


### Busbar (10-way) (supplied as a complete package) for type 17 socket

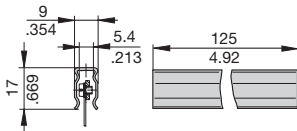
(for max. 100 A continuous load), more positions available on request

**X 211 157 01** with terminal

**X 211 157 02** without terminal



### Insulating sleeving for busbar (10-way) Y 303 824 01



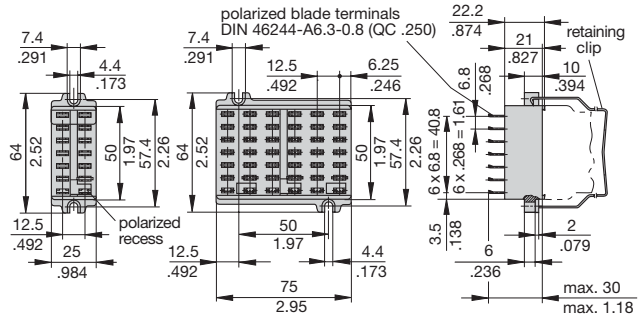
### 2-way mounting socket

**23-P10-Si**

(retaining clip Y 300 581 03 available on request)

### 6-way mounting socket

**63-P10-Si**



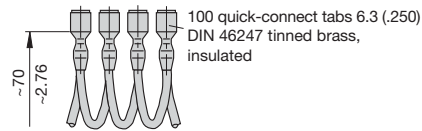
### Connector bus links -P10

**X 210 588 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)

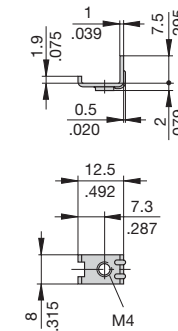
**X 210 588 04/** 2.5 mm<sup>2</sup>, (AWG 14), blau (up to 20 A max. load)



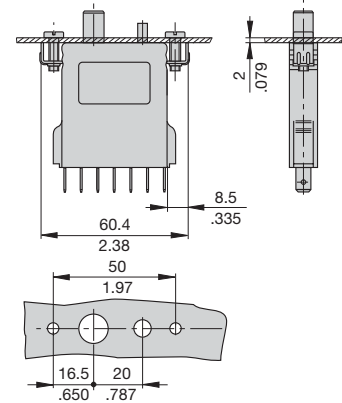
### 2 mounting clips

**Y 300 504 02**

(2 pcs needed per unit)



### Installation drawing with mounting clips Y 300 504 02



### Pin selection 17-P10-Si, fitted with E-1048-7..

E-1048-7..	17-P10-Si	
LINE + (2)	(2) [2(k)]	
GND (5)	(5) [12]	
F 7 (7)	(7) [24]	
	(3) [2(i)]	
F 6 (6)	(6) [23]	
IN+ (4)	(4) [11]	
LOAD (1)	(1) [1]	

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

The Smart Power Relay E-1048-8C.- is a remotely controllable electronic load disconnecting relay with three functions in a single unit:

- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin CUBIC version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

**Now type E-1048-8C combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.**

## Applications

Type E-1048-8C. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

## Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of an overload or short circuit, the trip curve is also suitable for smaller motor loads.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.



**E-1048-8C. CUBIC**

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

### Power supply LINE +

Type	DC power supply with small $R_i$ battery and generator etc.
Voltage ratings $U_N$	DC 12 V / DC 24 V
Operating voltage $U_S$ :	DC 9...32 V

### Load circuit LOAD

Load output	Power MOSFET, high side switching
Max. current rating $I_N$	25 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range $I_N$	1 A...20 A (fixed ratings) up to $85^\circ\text{C}$ ambient without load reduction, 25 A up to $60^\circ\text{C}$ . Two basic versions with factory pre-set ratings: version 1: 1 A / 2 A / 3 A / 5 A / 7.5 A / 10 A version 2: 15 A / 20 A / 25 A

Induced current consumption  $I_0$  of the unit (OFF condition) < 1 mA

Typical voltage drop  $U_{ON}$

at rated current $I_N$ (at $25^\circ\text{C}$ )		$I_N$	$U_{ON}$	$I_N$	$U_{ON}$
1 A	50 mV	10 A	110 mV		
2 A	55 mV	15 A	70 mV		
3 A	60 mV	20 A	90 mV		
5 A	80 mV	25 A	120 mV		
7.5 A	90 mV				

Switching point	typically $1.3 \times I_N$ ( $-40^\circ\text{C} \dots +85^\circ\text{C}$ : $1.1 \dots 1.5 \times I_N$ )
Trip time (standard curve)	typically 200 ms with switch-on onto overload and/or load increase on duty
Current limitation	version 1: typically 75 A version 2: typically 350 A
Temperature disconnection After trip	power transistor > $150^\circ\text{C}$ - resettable via external control signal (low-high) at control input IN+ - reset of supply voltage
Parallel connection of channels	for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).

Leakage current in OFF condition

version 1: max. 100  $\mu\text{A}$   
version 2: max. 500  $\mu\text{A}$

Free-wheeling diode for connected load

integral  
version 1: max. 40 A  
version 2: max. 100 A

Delay time  $t_{on} / t_{off}$  (resistive load)

typ. 5 ms / typ. 1.5 ms (EMC filter in control input)

## Technical Data ( $T_U = 25\text{ }^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } I_N$ )

Wire breakage monitoring in ON and OFF condition of load	<p>wire breakage thresholds:</p> <p>in OFF-condition (version 1):  <math>R_{load} &gt; \text{typically } 100\text{ k}\Omega</math></p> <p>in OFF-condition (version 2):  <math>R_{load} &gt; \text{typically } 10\text{ k}\Omega</math></p> <p>in ON-condition: <math>I_{load} &lt; \text{typically } 0.2 \times I_N</math></p> <p>indication via group fault signalisation FM (switching output)            Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear            (possible options:</p> <ul style="list-style-type: none"> <li>- wire breakage indication only in ON condition</li> <li>- wire breakage indication only in OFF condition</li> <li>- no wire breakage indication)</li> </ul>
Short circuit, overload in load circuit	<ul style="list-style-type: none"> <li>- disconnection of load, indication via group signal SF</li> <li>- no automatic re-start</li> <li>- after remedy of the fault unit has to be reset via control input IN+</li> </ul>

### Control input IN+

Control voltage IN+	0...5 V = "OFF", 8.5...32 V = "ON"
Control current $I_E$	1...10 mA (8.5...DC 32 V)
Reset in the event of a failure	<ul style="list-style-type: none"> <li>- reset via external control signal (low - high) at control input IN+</li> <li>- via reset of supply voltage</li> </ul>
Dimmer operation (e.g. PWM signal)	possible, see max. switching frequency

Switching frequency at resistive or inductive load max. 100 Hz

### Status and diagnostic functions

**Control signal AS** transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A  
 0 V-level: when unit is set (at IN+ = 8.4...32 V)

**Group signal SF** transistor output minus switching (LSS), open collector, short circuit and overload proof, load max. DC 32 V/2 A  
 0 V-level with overload and short circuit disconnection, wire breakage indication

**Analogue output U(I)** voltage output 0-5 V proportional to load current:  
 $1\text{ V} = 0.2 \times I_N$   
 $5\text{ V} = 1.0 \times I_N$   
 5 V... typically 6.5 V = overload range  
 tolerance: (for  $I_{load} > 0.2 \times I_N$ )  
 $\pm 8\%$  of  $I_N$   
 max. output current 5 mA  
 load resistance  $> 1\text{ k}\Omega$  against GND

Trip times definition of  $t_{90}$  reached 90% of final value  
 $t_{90} = \text{typically } 20\text{ ms}$   
 response time of load change on duty:  
 $t_{90} = \text{typically } 1\text{ ms}$

### Visual status indication

control signal AS	LED yellow
group fault signal SF	LED red

### General data

#### Reverse polarity protection

Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Status outputs	interference voltage resistance max. DC 32 V

## Technical Data ( $T_U = 25\text{ }^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } I_N$ )

<b>Temperature range</b>	
ambient temperature	<ul style="list-style-type: none"> <li>- standard: <math>-40...+85\text{ }^\circ\text{C}</math></li> <li>- without load reduction (<math>60\text{ }^\circ\text{C}</math> at 25 A)</li> <li>- for other temperature ranges please see ordering key</li> </ul>

### Tests

Humid heat	combined test, 9 cycles with functional test
Temperature change	test to DIN EN 60068-2-30, Z/AD min. temperature $-40\text{ }^\circ\text{C}$ , max. temperature $+90\text{ }^\circ\text{C}$
Vibration (random)	test to DIN IEC 60068-2-14, Nb in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz)
Shock	test to DIN EN 60068-2-27 25 g/11 ms, 10 shocks
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	housing -8C4 IP30 to DIN 40050 housing -8C5 IP54 to DIN 40050, higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EWG und 2006/28/EG

### Terminals of CUBIC version (7 pin, standard)

	5 blade terminals 6.3 mm x 0.8 mm and 2 blade terminals
	2.8 mm x 0.6 mm to DIN 46244
	Contact material CuZn37F44
Mounting:	- on automotive relay socket 7 pole or 9 pole

### Housing CUBIC

max. dimensions	30 x 30 x 40 mm when plugged in 30 x 30 x 51.6 mm including terminals
Materials	CUBIC: housing PA66-GF30 base plate PA6-GF30
Mass	approx. 23 g...43 g, depending on version

### Approvals

<b>CE, e1 logo</b>	according to EU, EMC and automotive directives, approvals no. e1 033880
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## Ordering Information

### Type

**E-1048-8C** Smart Power Relay DC 12 V/24 V - 1 A...20 A (25 A) in CUBIC housing

### Housing / temperature range

- 4 with housing -40 °C...85 °C (60 °C at I<sub>N</sub> = 25 A)
- 5 with housing -40 °C...85 °C (60 °C at I<sub>N</sub> = 25 A) increased environmental requirements (IP protection class etc.)

### Control input

**C** with control input (+ control 8.5...32 V)

### LEDs

- 0 without
- 3 2 LEDs: AS yellow, SF red

### Status output minus-switching

- A** without
- D** with AS and SF

### Contents of group fault signal SF/ LED indication SF

- 0 without
- 1 short circuit / overload
- 2 short circuit / overload + wire breakage off
- 3 short circuit / overload + wire breakage on
- 4 short circuit / overload + wire breakage off + wire breakage on

### Analogue output

- V0** without
- V1** 0...5 V

### Characteristic curve

- 4 200 ms standard switch-off delay with overload)

### Voltage rating

**U3** DC 12/24 V

### Current ratings / colour of label

- 1 A / black
- 2 A / grey
- 3 A / purple
- 5 A / light-brown
- 7.5 A / brown
- 10 A / red
- 15 A / blue
- 20 A / yellows
- 25 A / white

**E-1048-8C 5 - C 3 D 4 V1 - 4 U3 - 20 A**

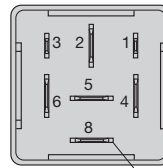
ordering example 1: "DELUXE"-version 7 pin

**E-1048-8C 4 - C 0 A 0 V0 - 4 U3 - 5 A**

ordering example 2: "BASIC"-version 4 pin

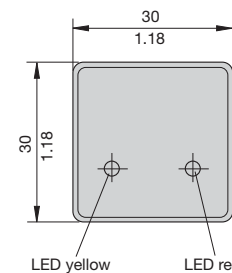
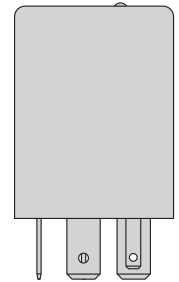
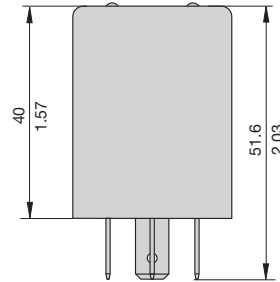
## Dimensions CUBIC (7 pin version)

with all options: - LED indications AS/SF  
- signal outputs AS/SF  
- analogue output U (I)



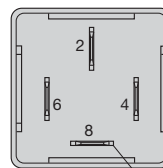
2, 4, 5, 6 and 8 - blade terminals 6.3 x 0.8  
1 and 3 - blade terminals 2.8 x 0.6

footprint to ISO 7588



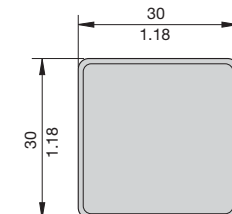
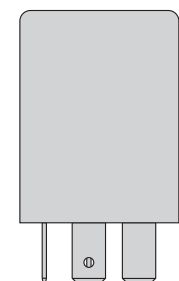
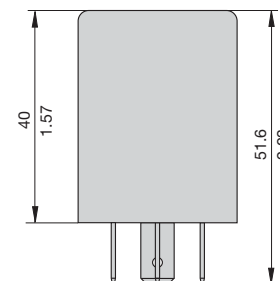
## Dimensions BASIC (4 pin version)

without options: - LED indication AS/SF  
- signal outputs AS/SF  
- analogue output U (I)



2, 4, 6 and 8 - blade terminals 6.3 x 0.8

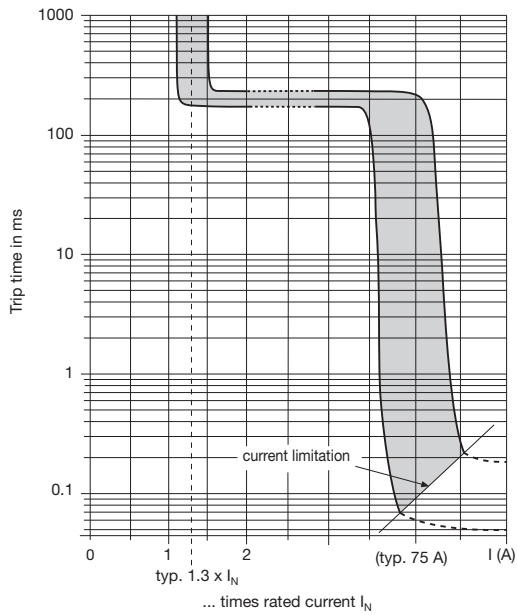
footprint to ISO 7588



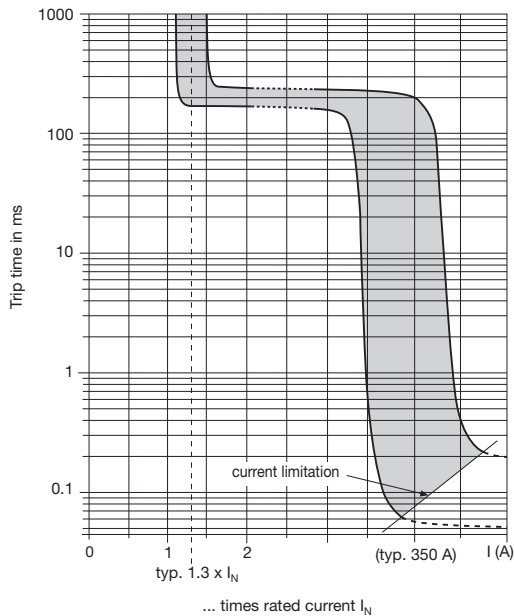
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics ( $T_A = 25\text{ }^\circ\text{C}$ )

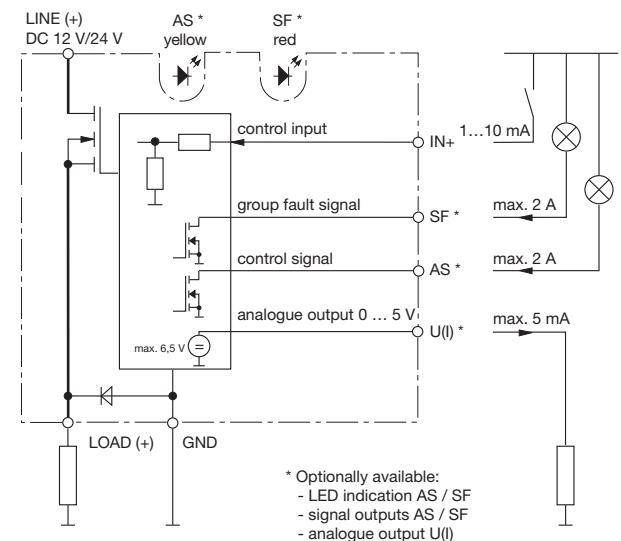
**Version 1:** 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)



**Version 2:** 15 A, 20 A and 25 A (standard 200 ms)



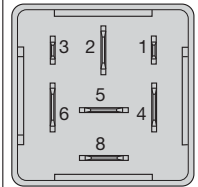
## Connection diagram



## Pin selection (7 pin = "DELUXE")

### E-1048-8C. Cubic

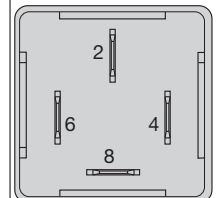
AS	(1)	control signal ( $\hat{=}$ LED yellow)
LINE +	(2)	plus $U_S$ (DC 12 V/24 V)
SF	(3)	group fault signal ( $\hat{=}$ LED red)
IN+	(4)	control input
U(I)	(5)	0 ... 5 V analogue output
GND	(6)	minus $U_S$
LOAD	(8)	load output



## Pin selection (4 pin = "BASIC")

### E-1048-8C. Cubic

LINE +	(1)	plus $U_S$ (DC 12 V/24 V)
IN+ (4)	(2)	control input
GND	(5)	minus $U_S$
LOAD	(8)	load output



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

## Description

The Smart Power Relay E-1048-8I.- is a remotely controllable electronic load disconnecting relay with three functions in a single unit:

- electronic relay
- electronic overcurrent protection
- status indication

The 7 pin INLINE version is designed for use with various E-T-A terminal blocks, e. g. 17-P10-Si. A choice of current ratings is available from 1 A through 20 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection
- a device for current measurement (shunt)

**Now type E-1048-8I. combines all these functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.**

## Applications

Type E-1048-8I. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

## Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of an overload or short circuit, the trip curve is also suitable for smaller motor loads.
- The load circuit is permanently monitored for wire breakage.
- Two status outputs for control signal AS and group signal SF provide status indication. For processing the actual value of the current flow in a power management system an analogue output from 0 to 5 V is provided. This voltage signal may also be used as an input to a control circuit or to switch off the unit by means of external control in the event of low load current value.
- For switching and monitoring loads of 20 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.



**E-1048-8I. INLINE**

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U =$ ambient temperature at $U_N$ )

### Power supply LINE +

Type	DC power supply with small $R_i$ battery and generator etc.
Voltage ratings $U_N$	DC 12 V / DC 24 V
Operating voltage $U_S$ :	DC 9...32 V

### Load circuit LOAD

Load output	Power MOSFET, high side switching
Max. current rating $I_N$	20 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range $I_N$	1 A...15 A (fixed ratings) up to $85^\circ\text{C}$ ambient without load reduction, 20 A up to $70^\circ\text{C}$ . Two basic versions with factory pre-set ratings: version 1: 1 A/2 A/3 A/5 A/7.5 A/10 A version 2: 15 A / 20 A

Induced current consumption  $I_0$  of the unit (OFF condition) < 1 mA

Typical voltage drop  $U_{ON}$  at rated current  $I_N$  (at  $25^\circ\text{C}$ )

$I_N$	$U_{ON}$	$I_N$	$U_{ON}$
1 A	50 mV	7.5 A	90 mV
2 A	55 mV	10 A	110 mV
3 A	60 mV	15 A	60 mV
5 A	80 mV	20 A	60 mV

Switching point typically  $1.3 \times I_N$  ( $-40^\circ\text{C} \dots +85^\circ\text{C}$ :  $1.1 \dots 1.5 \times I_N$ )

Trip time (standard curve) typically 200 ms with switch-on onto overload and/or load increase on duty

Current limitation  
version 1: typically 75 A  
version 2: typically 350 A

Temperature disconnection power transistor >  $150^\circ\text{C}$   
After trip  
- resettable via external control signal (low-high) at control input IN+  
- reset of supply voltage

Parallel connection of channels for loads of 20 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).

Leakage current in OFF condition  
version 1: max. 100  $\mu\text{A}$   
version 2: max. 500  $\mu\text{A}$

Free-wheeling diode for connected load  
integral  
version 1: max. 40 A  
version 2: max. 100 A



## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

Delay time $t_{on} / t_{off}$ (resistive load)	typically 5 ms / typically 1.5 ms (EMC filter in control input)
Wire breakage monitoring in ON and OFF condition of load	<p>wire breakage thresholds:</p> <p>in OFF-condition (version 1): <math>R_{load} &gt; \text{typically } 100\text{ k}\Omega</math></p> <p>in OFF-condition (version 2): <math>R_{load} &gt; \text{typically } 10\text{ k}\Omega</math></p> <p>in ON-condition: <math>I_{load} &lt; \text{typically } 0.2 \times I_N</math></p> <p>indication via group fault signalisation FM (switching output)</p> <p>Fault indication will not be stored, i.e. after remedy of wire breakage fault indication will disappear (possible options:</p> <ul style="list-style-type: none"> <li>- wire breakage indication only in ON condition</li> <li>- wire breakage indication only in OFF condition</li> <li>- no wire breakage indication)</li> </ul> <p>- disconnection of load, indication via group signal SF</p> <ul style="list-style-type: none"> <li>- no automatic re-start</li> <li>- after remedy of the fault unit has to be reset via control input IN+</li> </ul>
Short circuit, overload in load circuit	<ul style="list-style-type: none"> <li>- disconnection of load, indication via group signal SF</li> <li>- no automatic re-start</li> <li>- after remedy of the fault unit has to be reset via control input IN+</li> </ul>

### Control input IN+

Control voltage IN+	0...5 V = "OFF", 8.5...32 V = "ON"
Control current $I_E$	1...10 mA (8.5...DC 32 V)
Reset in the event of a failure	- reset via external control signal (low - high) at control input IN+ - via reset of supply voltage possible, see max. switching frequency
Dimmer operation (e.g. PWM signal)	

Switching frequency at resistive or inductive load max. 100 Hz

### Status and diagnostic function

<b>Control signal AS</b>	transistor output minus switching (LSS), open collector, short circuit and overload proof, max. load: DC 32 V/2 A 0 V-level: when unit is set (at IN+ = 8.4...32 V)
<b>Group signal SF</b>	transistor output minus switching (LSS), open collector, short circuit and overload proof, load max. DC 32 V/2 A 0 V-level with overload and short circuit disconnection, wire breakage indication voltage output 0-5 V proportional to load current: $1\text{ V} = 0.2 \times I_N$ $5\text{ V} = 1.0 \times I_N$ 5 V... typically 6.5 V = overload range tolerance: (for $I_{load} > 0.2 \times I_N$ ) $\pm 8\%$ of $I_N$ max. output current 5 mA load resistance $> 1\text{ k}\Omega$ against GND
<b>Analogue output U(I)</b>	response time when switching on a load: $t_{90} = \text{typically } 20\text{ ms}$ response time of load change on duty: $t_{90} = \text{typically } 1\text{ ms}$
Trip times definition of $t_{90}$ reached 90% of final value	

### Visual status indication

Control signal AS	LED yellow
Group fault signal SF	LED red

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

### General data

#### Reverse polarity protection

Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Status outputs	interference voltage resistance max. DC 32 V

### Temperature range

ambient temperature	- standard: $-40...+85^\circ\text{C}$ - without load reduction ( $70^\circ\text{C}$ at 20 A) - for other temperature ranges please see ordering key
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### Tests

Humid heat	combined test, 9 cycles with functional test
Temperature change	test to DIN EN 60068-2-30, Z/AD min. temperature $-40^\circ\text{C}$ , max. temperature $+90^\circ\text{C}$
Vibration (random)	test to DIN IEC 60068-2-14, Nb in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz)
Shock	test to DIN EN 60068-2-27 25 g/11 ms, 10 shocks
Corrosion Protection class	test to DIN EN 60068-2-52, severity 3 housing IP30 to DIN 40050 higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EW6 und 95/54/E6

### Terminals of INLINE version (7 pin, standard)

Mounting:	7 blade terminals 6.3 mm x 0.8 mm to DIN 46244-A6.3-0.8 contact material CuZn37F37 copper-plated and tin-plated - E-T-A socket type 17-P10-Si (max. load 16 A) - on a pc board with 6.3 mm receptacles
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### Housing

max. dimensions	INLINE: 11.5 x 50 x 56 mm when plugged in 11.5 x 50 x 66 mm including terminals
Materials	INLINE: Ultramid
Mass	approx. 23 g...33 g, depending on version

### Approvals CE, e1 logo

according to EU, EMC and automotive directives

## Ordering Information

### Type

**E-1048-8I** Smart Power Relay DC 12 V/24 V - 1 A...20 A in INLINE housing

### Housing / temperature range

- 3** with housing / 70 °C (without moisture condensation)
- 4** with housing / -40 °C...+85 °C (70 °C at I<sub>N</sub> = 20 A)

**C** with control input (+ control 8.5...32 V)

### LEDs

- 0** without LEDs
- 3** 2 LEDs: AS yellow, SF red

### Status output minus-switching

- A** without
- D** with AS and SF

### Contents of group fault signal SF / LED indication SF

- 0** without
- 1** short circuit / overload
- 3** short circuit / overload + wire breakage on
- 4** short circuit / overload + wire breakage off + wire breakage on

### Analogue output

- V0** without
- V1** 0...5 V

### Characteristic curve

- 4** 200 ms (switch-off delay with overload)

### Voltage rating

- U3** DC 12/24 V

### Current ratings / colour of label

- 1 A** / black
- 2 A** / grey
- 3 A** / purple
- 5 A** / light-brown
- 7.5 A** / brown
- 10 A** / red
- 15 A** / blue
- 20 A** / yellow

### Available configurations:

part number (without options = "BASIC")

**E-1048-8I 3 - C 0 A 0 V0 - 4 U3 - ... A**

part number (various options)

**E-1048-8I 4 - C 0 A 0 V0 - 4 U3 - ... A**

**E-1048-8I 4 - C 3 A 1 V0 - 4 U3 - ... A**

**E-1048-8I 4 - C 3 D 1 V0 - 4 U3 - ... A**

**E-1048-8I 4 - C 3 D 1 V1 - 4 U3 - ... A**

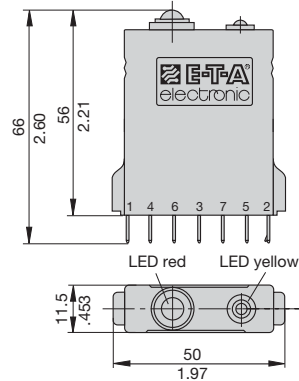
**E-1048-8I 4 - C 3 D 3 V0 - 4 U3 - ... A**

**E-1048-8I 4 - C 3 D 4 V0 - 4 U3 - ... A**

part number (all options = "DELUXE")

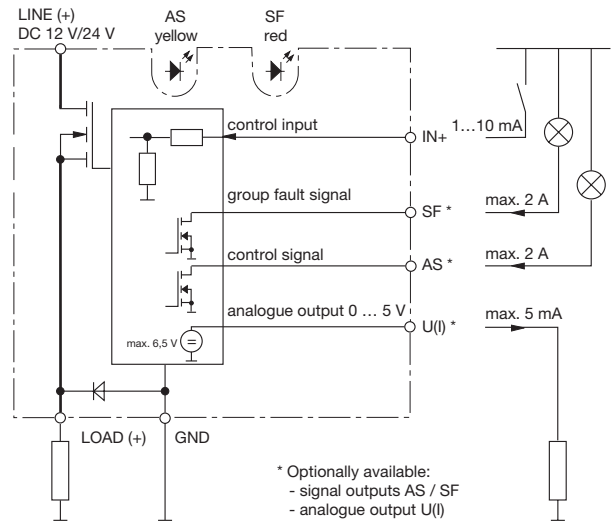
**E-1048-8I 4 - C 3 D 4 V1 - 4 U3 - ... A**

## Dimensions (all options = "DELUXE")



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

## Connection diagram (all options = "DELUXE")

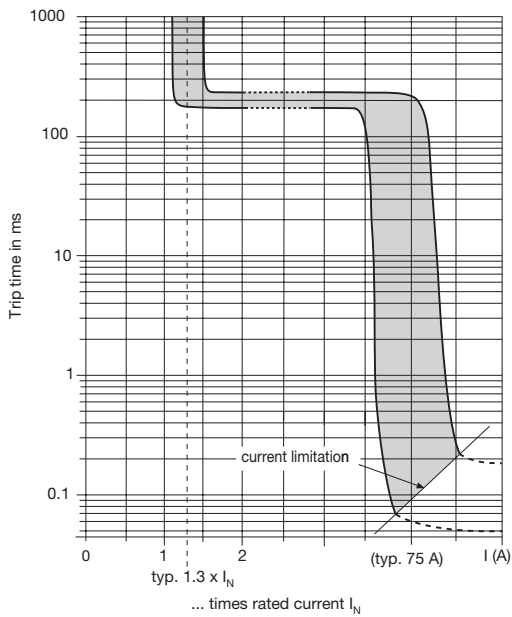


## Pin selection

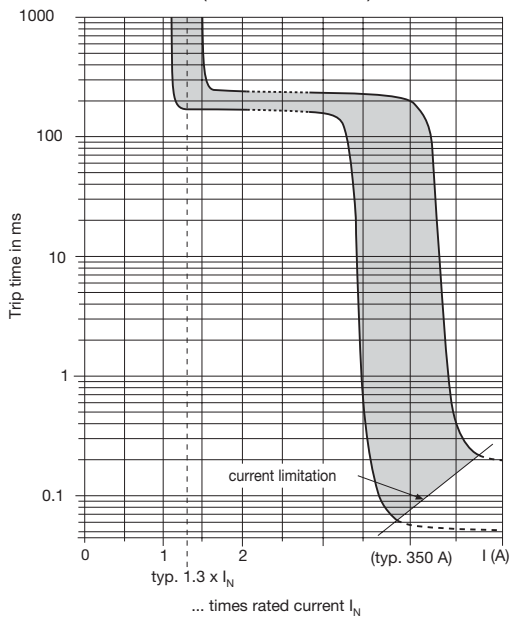
E-1048-8I.	17-P10-Si	
LINE + (2)	(2) [2(k)]	
GND (5)	(5) [12]	
SF (7)	(7) [24]	
U(I) (3)	(3) [2(i)]	
AS (6)	(6) [23]	
IN+ (4)	(4) [11]	
LOAD (1)	(1) [1]	

## Typical time/current characteristics ( $T_A = 25\text{ }^\circ\text{C}$ )

**Version 1:** 1 A, 2 A, 3 A, 5 A, 7.5 A and 10 A (standard 200 ms)



**Version 2:** 15 A and 20 A (standard 200 ms)



## Accessories for E-1048-8I.

### Single mounting sockets

(up to 16 A max. load)

**17-P10-Si**

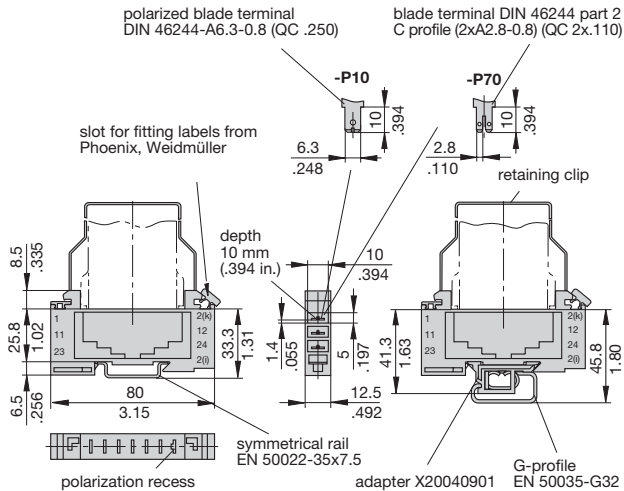
**17-P70-Si**

(retaining clip Y 300 581 11 available on request)

(with adapter)

**17-P10-Si-20025**

**17-P70-Si-20025**

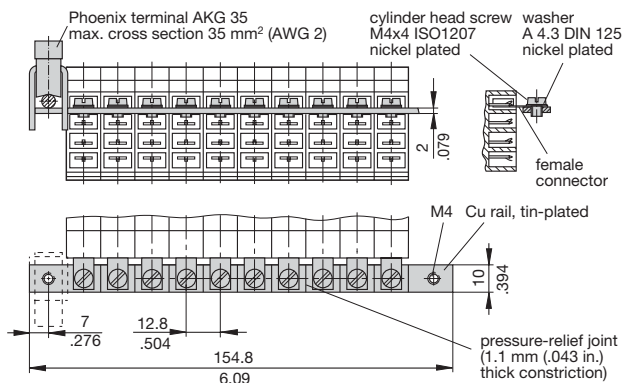


### Busbar (10-way) (supplied as a complete package) for type 17 socket

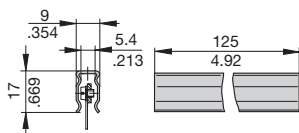
(for max. 100 A continuous load, more positions available on request)

**X 211 157 01** with terminal

**X 211 157 02** without terminal



### Insulating sleeving for busbar (10-way) Y 303 824 01



### 2-way mounting socket

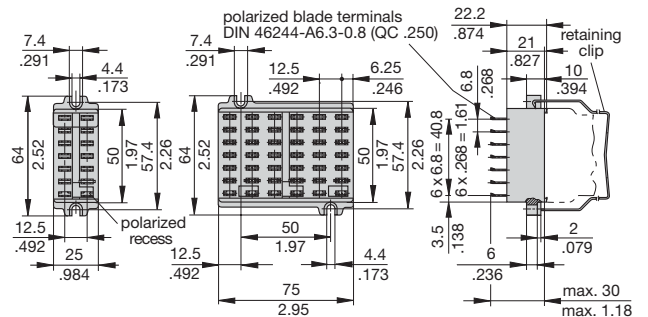
**23-P10-Si**

(retaining clip Y 300 581 03 available on request)

### 6-way mounting socket

**63-P10-Si**

(retaining clip Y 300 581 03 available on request)



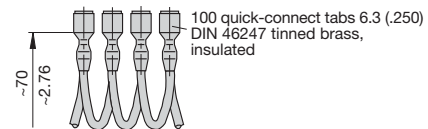
### Connector bus links -P10

**X 210 588 01/** 1.5 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)

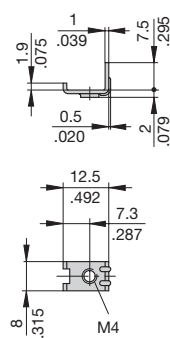
**X 210 588 04/** 2.5 mm<sup>2</sup>, (AWG 14), blue (up to 20 A max. load)



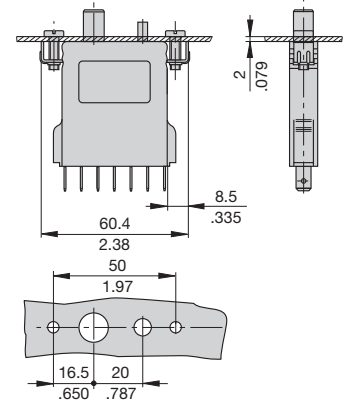
### 2 mounting clips

**Y 300 504 02**

(2 pcs needed per unit)



### Installation drawing with mounting clips Y 300 504 02



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

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

The Smart Power Relay E-1048-8D. is a remotely controllable electronic load disconnecting relay with two functions in a single unit:

- electronic relay
- electronic overcurrent protection

The 4 pin DICE version is designed for use with standard automotive relay sockets. A choice of current ratings is available from 1 A through 25 A. An operating voltage range of DC 9...32 V allows the connection of DC 12 V and DC 24 V loads.

In order to switch and protect loads remotely, it has until now been necessary to connect several discreet components together:

- an electro-mechanic relay, control cable and integral contact to close the load circuit
- an additional protective element (circuit breaker or fuse) for cable or equipment protection

**Now type E-1048-8D. combines these two functions in a single unit, thus minimising the number of connections in the circuit and thereby reducing the risk of failures.**

## Applications

Type E-1048-8D. is suited to all applications with DC 12 V or DC 24 V circuits, where magnetic valves, motors or lamp loads have to be switched, protected or monitored:

- road vehicles (utility vehicles, buses, special vehicles)
- rail vehicles
- marine industry (ships, boats, yachts etc.)

The Power Relay is also suitable for industrial use (process control, machine-building, engineering) as an electronic coupling relay between PLC and DC 12 V or DC 24 V load

## Features

- Integral power electronics provide a wear-resistant switching function, insensitive to shock and vibration.
- Only a fraction of the control power needed by electro-mechanical relays is required for switching loads. This is important for battery buffered load circuits which have to remain controlled even with the generator off line.
- The extremely low induced current consumption of less than 1 mA is absolutely necessary for battery buffered applications.
- The load circuit is disconnected in the event of a short circuit (ENTRY version) or overload/short circuit (ENTRYprotect version).
- For switching and monitoring loads of 25 A plus it is possible to connect several units in parallel. Uniform power distribution between units must be ensured by symmetrical design of the supply cables (length and cross section).
- Coloured label, e. g. red = 10 A, see ordering information.



**E-1048-8D. DICE**

## Technical Data ( $T_{amb.} = 25\text{ }^{\circ}\text{C}$ , $U_N = \text{DC } 24\text{ V}$ )

### Power supply LINE +

Type	DC power supply with small $R_i$ battery and generator etc.
Voltage ratings $U_N$	DC 12 V / DC 24 V
Operating voltage $U_S$	DC 9...32 V

### Load circuit LOAD

Load output	Power MOSFET, high side switching
Max. current rating $I_N$	25 A
Types of loads	resistive, inductive, capacitive, lamp loads, motors (depending on duration of inrush current)
Current rating range $I_N$	1 A...20 A (fixed ratings) up to 85 °C ambient without load reduction, 25 A up to 60 °C
ENTRY version	Load output with short circuit protection
ENTRYprotect version	Load output with short circuit and overload protection (typically 200 ms at $I_{Load} >$ typically $1.3 \times I_N$ ) $I_N = 1\text{ A...}10\text{ A}$ : see trip curve 1 $I_N = 15\text{ A...}25\text{ A}$ : see trip curve 2

Induced current consumption  $I_0$  of the unit (OFF condition) < 1 mA

Typical voltage drop  $U_{ON}$  at rated current  $I_N$  (at 25 °C)

$I_N$	$U_{ON}$	$I_N$	$U_{ON}$
1 A	50 mV	10 A	110 mV
2 A	55 mV	15 A	70 mV
3 A	60 mV	20 A	90 mV
5 A	80 mV	25 A	120 mV
7.5 A	90 mV		

Switching point (only ENTRYprotect)	typically $1.3 \times I_N$ (-40 °C...+85 °C: $1.1...1.5 \times I_N$ )
Trip time (standard curve) (only ENTRYprotect)	typically 200 ms with switch-on onto overload and/or load increase on duty
Current limitation	$I_N = 1\text{ A...}10\text{ A}$ : typically 75 A $I_N = 15\text{ A...}25\text{ A}$ : typically 350 A

Temperature disconnection After trip	power transistor > 150 °C - resettable via external control signal (low-high) at control input IN+ - reset of supply voltage
--------------------------------------	--

Parallel connection of channels for loads of 25 A plus, several units of identical current ratings may be connected in parallel. To ensure equal distribution of current between units, symmetrical design of the supply feed is necessary (length and cross section).

Leakage current in OFF condition

$I_N = 1\text{ A...}10\text{ A}$ : max. 100 $\mu\text{A}$
$I_N = 15\text{ A...}25\text{ A}$ : max. 500 $\mu\text{A}$

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

Free-wheeling diode for connected load	integral $I_N = 1\text{ A} \dots 10\text{ A}$ : max. 40 A $I_N = 15\text{ A} \dots 25\text{ A}$ : max. 100 A
Delay time $t_{\text{on}} / t_{\text{off}}$ (resistive load)	typically 0.5 ms / typically 1.5 ms (EMC filter in control input)
Short circuit, overload in load circuit	- disconnection of load - no automatic re-start - after remedy of the fault unit has to be reset via control input IN+

### Control input IN+

Control voltage IN+	0...5 V = "OFF", 8.5...32 V = "ON"
Control current $I_E$	typically 1 mA at 12 V / typically 5 mA at 24 V
Reset in the event of a failure	- reset via external control signal (low-high) at control input IN+ - via reset of supply voltage possible, see max. switching frequency
Dimmer operation (e.g. PWM signal)	
Switching frequency at resistive or inductive load	max. 100 Hz
Rising edge of IN+	< 5 ms

### General data

#### Reverse polarity protection

Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)

#### Temperature range

ambient temperature	- standard: $-40 \dots +85^\circ\text{C}$ without load reduction ( $60^\circ\text{C}$ at 25 A)
---------------------	---

### Tests

Humid heat	combined test, 9 cycles with functional test
Temperature change	test to DIN EN 60068-2-30, Z/AD min. temperature $-40^\circ\text{C}$ , max. temperature $+90^\circ\text{C}$
Vibration (random)	test to DIN IEC 60068-2-14, Nb in operation, with temperature change 6 g eff. (10 Hz...2,000 Hz)
Shock	test to DIN EN 60068-2-64 25 g/11 ms, 10 shocks test to DIN EN 60068-2-27
Corrosion	test to DIN EN 60068-2-52, severity 3
Protection class	housing -8D4 IP30 to DIN 40050 housing -8D5 IP54 to DIN 40050, higher protection class upon request
EMC requirements	EMC directive: emitted interference EN 50081-1 noise immunity EN 61000-6-2 Automotive directive: emitted interference, noise immunity: 72/245/EWG und 95/54/EG

### Terminals

(4 pin)	4 blade terminals 6.3 mm x 0.8 mm contact material CuZn37F44 - on automotive relay socket 4-pole
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### Housing

max. dimensions	30 x 30 x 30 mm when plugged in 30 x 30 x 41.6 mm including terminals
Materials	housing PA66-GF30 base plate PA6-GF30
Mass	approx. 20 g

### Approvals

CE	according to EMC directive
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## Ordering Information

### Type

**E-1048-8D** Smart Power Relay DC 12 V/24 V, 1 A...25 A in DICE housing

### Housing / temperature range

4	with housing $-40^\circ\text{C} \dots 85^\circ\text{C}$ ( $60^\circ\text{C}$ at $I_N = 25\text{ A}$ )
5	with housing $-40^\circ\text{C} \dots 85^\circ\text{C}$ ( $60^\circ\text{C}$ at $I_N = 25\text{ A}$ ) increased environmental requirements (IP protection class etc.)

### Control input

**C0** with control input (+ control 8.5...32 V)

### Options

**A0** without options

### Characteristic curve

0	ENTRY, short circuit protected
4	ENTRYprotect, 200 ms standard switch-off delay with overload, short circuit protected

### Voltage rating

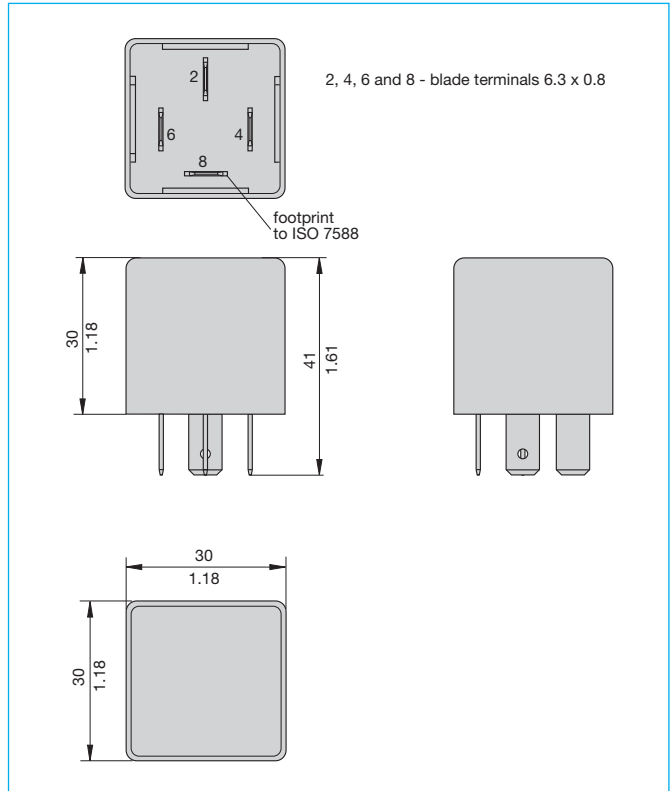
**U3** DC 12/24 V

### Current ratings / colour of label

1 A	black
2 A	grey
3 A	purple
5 A	light-brown
7.5 A	brown
10 A	red
15 A	blue
20 A	yellow
25 A	white

**E-1048-8D 4 - C0 A0 - 0 U3 - 10 A** ordering example:  
ENTRY version 4 pin

## Dimensions DICE (4 pin version)

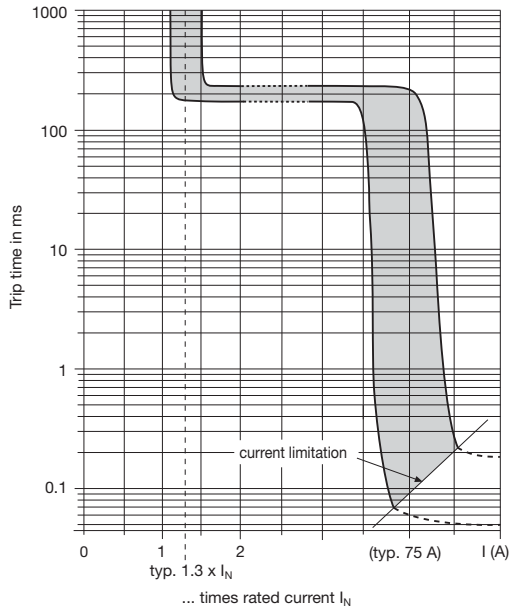


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Typical time/current characteristics ( $T_A = 25\text{ }^\circ\text{C}$ )

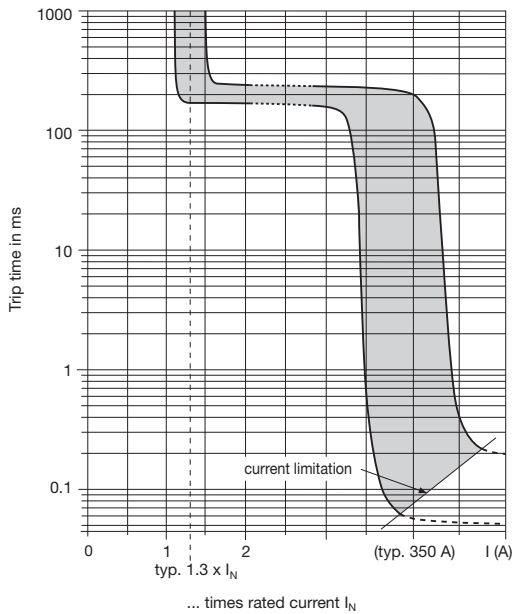
### Trip curve 1 "ENTRYprotect"

1 A, 2 A, 3 A, 5 A, 7,5 A and 10 A (standard 200 ms)

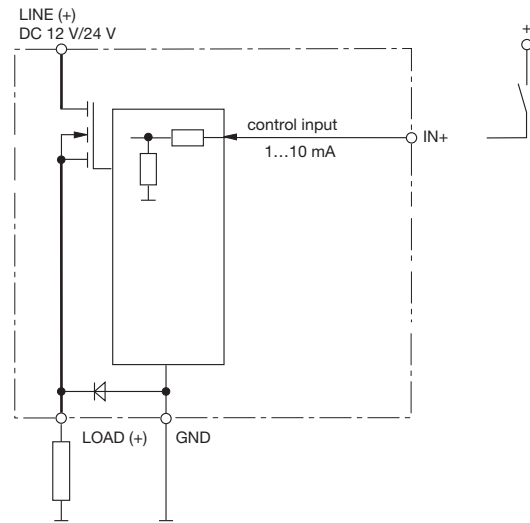


### Trip curve 2 "ENTRYprotect"

15 A, 20 A and 25 A (standard 200 ms)



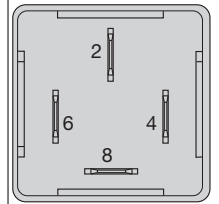
## Connection diagram



## Pin selection DICE (4 pin)

### E-1048-8D. DICE

LINE +	(1)	plus $U_S$ (DC 12 V/24 V)
IN+	(4)	control input
GND	(6)	minus $U_S$
LOAD	(8)	load output



## Description

The E-T-A Remote Power Controller E-1071-073 is an electronic ON/OFF control module with protective functions and is suitable for resistive and inductive loads such as solenoids in rolling mills and other large plant applications. It is specifically used in plant modernization where the load circuit supply should be maintained at DC 24 V.

## Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants.

## Features

- Solid-state relay with protective functions
- Solid-state switching avoids contact arcing and welding
- Inrush current limitation
- Overload and short-circuit proof output
- Low control power
- Control current indication by LED
- Auxiliary contact

## Ordering information

Type No.	
E-1071	SSRPC
	073 with signal output
	DC 24 V Voltage rating of load
	3.0 A Current rating
E-1071 - 073 - DC 24 V - 3.0 A ordering example	



**E-1071-073**

## Technical data (T<sub>ambient</sub> = 25 °C, U<sub>S</sub> = DC 24 V)

Voltage rating U <sub>N</sub>	DC 24 V
Operating voltage U <sub>S</sub>	DC 20...48 V
Current rating I <sub>N</sub>	3 A
Current consumption (U <sub>S</sub> = DC 24 V, U <sub>Contr</sub> = "0")	typically 17 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U <sub>S</sub> (terminals 1 and 2)
Physical isolation	2-pole - by circuit breaker hand release - approx. 5 s after overload disconnection

Load circuit	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A
Voltage drop at I <sub>N</sub>	max. 1.75 V
Overload disconnection	approx. 1.1 x I <sub>N</sub>
Storage time t <sub>S</sub> (at 2xI <sub>N</sub> )	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I <sub>N</sub>
Short-circuit response delay	approx. 4 μs
Load current monitoring	GREEN LED (lights at I <sub>load</sub> > 0.2 A)
Current measuring terminals	2 x 2 mm dia. (0.1 Ω shunt ± 1 %)
Leakage current (U <sub>Contr</sub> = "0")	max. 3 mA
Free-wheeling diode	integral

Control circuit	
Control	opto coupler in control input
Control voltage U <sub>Contr</sub>	"0" = 0...5 V "1" = 8.5...35 V
Control current I <sub>Contr</sub>	typically 5 mA
Switching frequency f <sub>max</sub>	100 Hz
Control signal (U <sub>Contr</sub> = "1")	YELLOW LED lights (IS flowing)
Protection	reverse polarity protection (diode)

Signal output	
Fault indication	auxiliary contact (N/O) - max. DC 30 V/3 A - physically isolated - closed with the circuit breaker tripped

General data	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm <sup>2</sup> to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 240 g



## Solid State Remote Power Controller E-1071-073

In principle, the E-T-A SSRPC E-1071-073 operates like conventional electro-mechanical relays, with additional protective and signal functions. The control input replaces the magnetic coil and the power transistor replaces the main contact.

### Control circuit

The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal "1") is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

### Load circuit

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

### Status indication

Status indication is provided by 2 LEDs (yellow and green) on the front of the housing.

YELLOW LED = correct control voltage

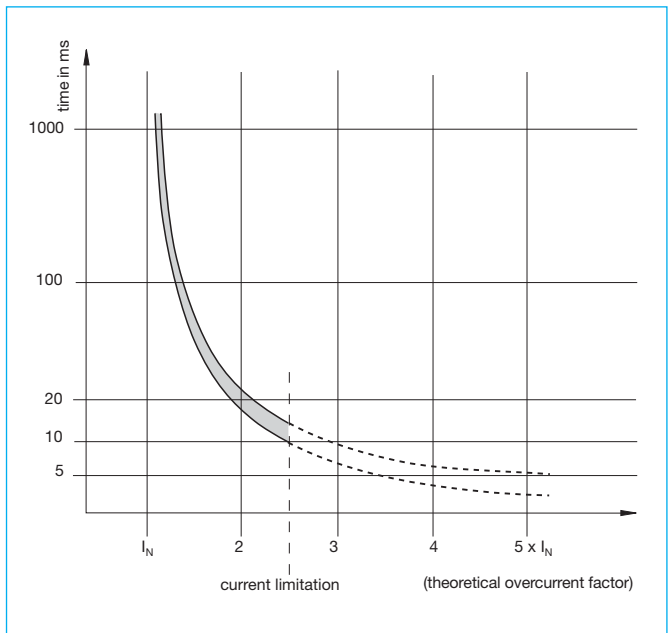
The LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED = correct load current

The green LED indicates when the load current is higher than 0.2 A.

Faults such as too high a load resistance, wire break, poor contact, or overload/short-circuit, are available when only the yellow LED indicates. SSRPC E-1071-073 includes two current measuring terminals (2 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit.

## Storage time characteristic curve $t_s$ ( $T_A = 25^\circ\text{C}$ )



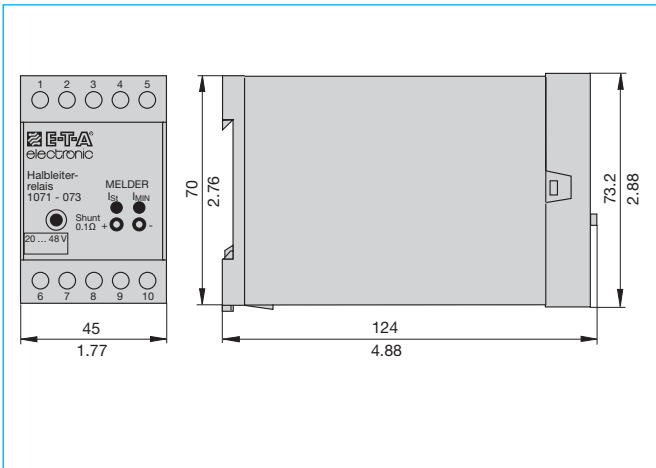
## Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
	"0"	"1"		"0"	"1"
Control input $U_{Contr}$	"0"	"1"	"1"	"0"	"1"
YELLOW LED - control current	0	1	1	0	1
GREEN LED - load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	circuit breaker tripped		

1 - LED indicates

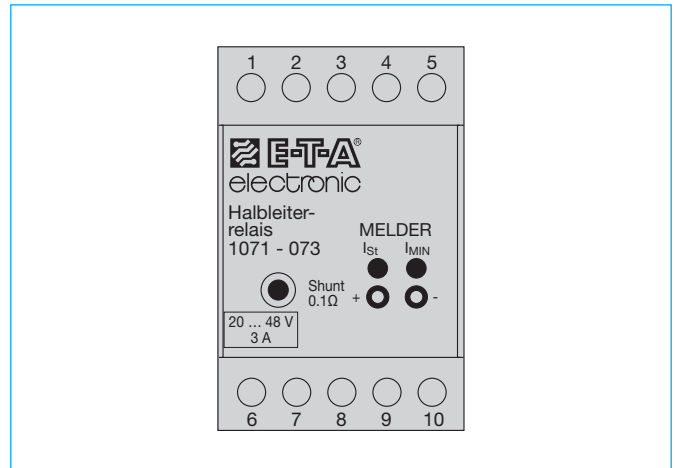
0 - LED does not indicate

## Dimensions

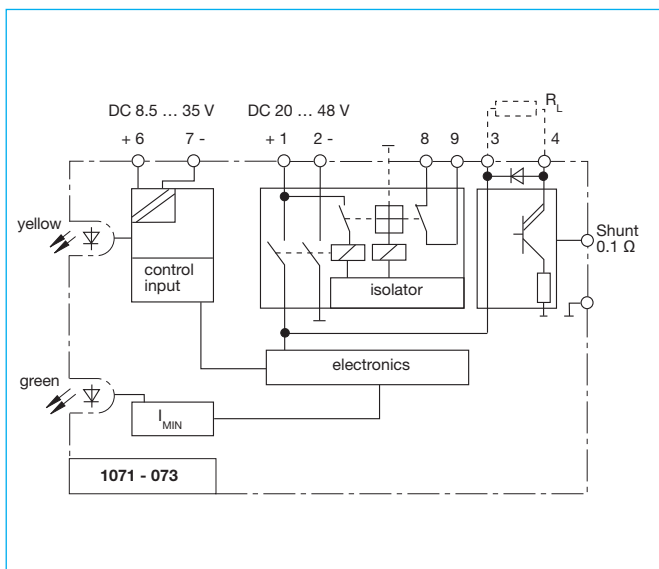


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Terminal selection



## Basic circuit diagram



## Terminal

- 1 operating voltage  $+U_S$ ; DC 20...48 V
- 2 operating voltage  $-U_S$
- 3 load (+)
- 4 load (-)
- 5 not used
- 6 control voltage  $+U_{Contr}$ ; max. DC 35 V
- 7 control voltage  $-U_{Contr}$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 not used

## Description

The E-T-A Solid State Remote Power Controller E-1071-128 is an electronic ON/OFF control module with protective and signalling functions. It is suitable for inductive loads (solenoids, magnetic brakes) when the load circuit supply cannot be increased to the voltage level required (e. g. DC 36 V). The operating status of the controller/load connected is continuously indicated and signalled via opto coupler.

## Typical applications

Control of hydraulic and pneumatic systems in production lines and chemical plants where check-back signals for process control systems are needed.

## Features

- Overcurrent and short-circuit proof switching output with electronic current limitation
- Switch-off current largely independent of operating voltage
- Inrush current limitation
- Physical isolation between control and load circuit via opto coupler
- Low control power; control current indication by LED
- Solid state switching avoids contact arcing and welding
- 2-pole physical isolation upon overload or when tripped manually
- Opto decoupled ON and fault indication by LED
- Setting of minimum current on front of housing, with minimum current indication (set at approx. 50 % of the load current rating)
- Current measuring terminals on front of housing
- Reverse polarity protection in control and load circuit

## Ordering information

Type No.	
E-1071	SSRPC
	128
	Voltage rating of load DC 24 V
	Current rating 3.0 A
E-1071 - 128 - DC 24 V - 3.0 A ordering example	



**E-1071-128**

## Technical data (T<sub>ambient</sub> = 25 °C, U<sub>S</sub> = DC 24 V)

Voltage rating U <sub>N</sub>	DC 24 V
Operating voltage U <sub>S</sub>	DC 20...48 V
Current rating I <sub>N</sub>	3 A
Current consumption (U <sub>S</sub> = DC 24 V, U <sub>Contr</sub> = "0")	typically 15 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	U <sub>S</sub> (terminals 1 and 2)
Physical isolation	2-pole - by manual release (circuit breaker) - approx. 5 s after overload disconnection
<b>Load circuit</b>	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A
Voltage drop at I <sub>N</sub>	max. 2 V
Overload disconnection	approx. 1.1 x I <sub>N</sub>
Storage time t <sub>s</sub> (at 2xI <sub>N</sub> )	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I <sub>N</sub>
Short-circuit response delay	approx. 4 μs
Load current monitoring I <sub>min</sub> (MIN monitoring, to be set by potentiometer at 50 % of the load current rating)	GREEN LED lights at I <sub>load</sub> > 0.2 I <sub>min</sub> switch position I: 0.1...1.1 A switch position II: 1.1...2.1 A
Current measuring terminals	2 x 2 mm dia. (shunt 0.1 Ω ± 1 %)
Leakage current (U <sub>Contr</sub> = "0")	max. 3 mA
Free-wheeling diode	integral
<b>Control circuit</b>	
Control	opto coupler in control input
Control voltage U <sub>Contr</sub>	"0" = 0...5 V "1" = 8.5...35 V
Control current I <sub>Contr</sub>	typically 5 mA
Switching frequency f <sub>max</sub>	10 Hz
Control signal (U <sub>Contr</sub> = "1")	YELLOW LED lights (I <sub>Contr</sub> flowing)
Protection	reverse polarity protection (diode)
<b>Status outputs</b>	
2 signal outputs	ON indication/fault indication - physically isolated by opto coupler - transistor outputs plus switching - max. DC 33 V/100 mA per output - integral free-wheeling diode - 20 ms time delay (eliminating false signals before the minimum current is reached)
ON indication (terminal 8)	U <sub>Contr</sub> = "0": output non-conductive U <sub>Contr</sub> = "1": output connecting plus potential (terminal 10) to terminal 8
Fault indication (terminal 9)	fault: output non-conductive no fault: output connecting plus potential (terminal 10) to terminal 9

## Technical data ( $T_{\text{ambient}} = 25\text{ }^{\circ}\text{C}$ , $U_S = 24\text{ V DC}$ )

### General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm <sup>2</sup> to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Burning behaviour (housing)	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection	IP20 housing, terminals (IEC 529/DIN 40050)
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

## Technical description

In principle, the E-T-A SSRPC E-1071-128 operates like conventional electro-mechanical relays, with additional protective and signalling functions. The control input replaces the magnetic coil and the power transistor replaces the main contact.

ON and fault indication outputs have more complex functions and may not be compared with auxiliary contacts.

### Control circuit

The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V (= control signal "1") is applied at the input terminals (6 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

### Load circuit

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

### Signal circuit

The signal circuit includes two opto couplers signaling either correct ON duty or a fault. These signals may be computer processed.

- The ON signal output indicates correct operating in the ON condition. This output is conductive

when control voltage is available

- AND the load current is higher than the set minimum current
- AND the circuit breaker has not tripped
- AND there is no wire break.

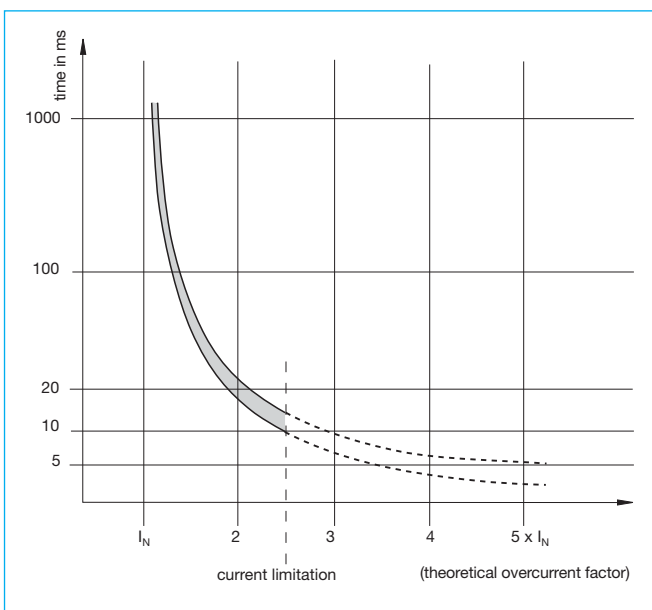
- The fault signal output signals the fault source which must be eliminated. This output is non-conductive when

the circuit breaker has tripped on overload or short-circuit

- OR there is a wire break
- OR control voltage is available AND the minimum current has not been reached
- OR no control voltage is applied although the load current is available.

The fault signal output operates on the closed-circuit principle, i.e. it carries plus potential during fault-free operation.

## Storage time characteristic curve $t_s$ ( $T_A = 25\text{ }^{\circ}\text{C}$ )



## Operating modes

Operating status	Fault-free operation		Short-circuit on the load		Wire break		Load current < minimum current	
	"0"	"1"	"0"	"1"	"0"	"1"	"0"	"1"
Control input $U_S$	"0"	"1"	"0"	"1"	"0"	"1"	"0"	"1"
YELLOW LED - control current	0	1	0	1	0	1	0	1
GREEN LED - min. current indication	0	1	0	0	0	0	0	0
GREEN LED - ON indication	0	1	0	0	0	0	0	0
RED LED - fault indication	1	1	1	0	0	0	1	0
Remarks	load OFF	load ON	phys. isolation after approx. 5 s		no load connected, wire break			

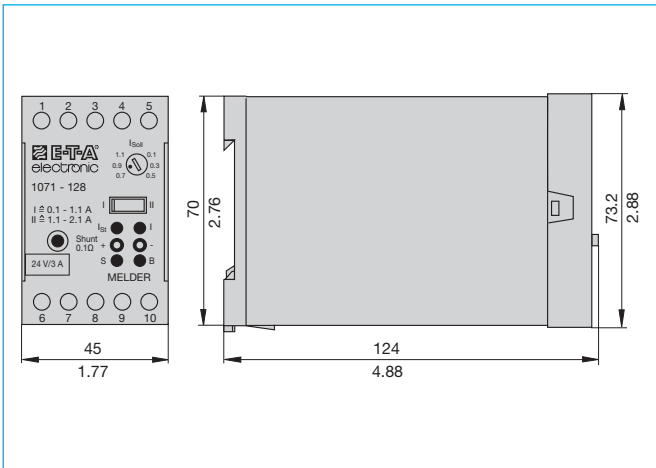
- 1 - LED indicates
- 0 - LED does not indicate

## Status outputs

ON Terminal 8	Fault Terminal 9	Remark
0	0	wire break or load current < minimum current (switched on) or short-circuit (switched on)
0	1	fault-free operation (switched off)
1	1	fault-free operation (switched on)

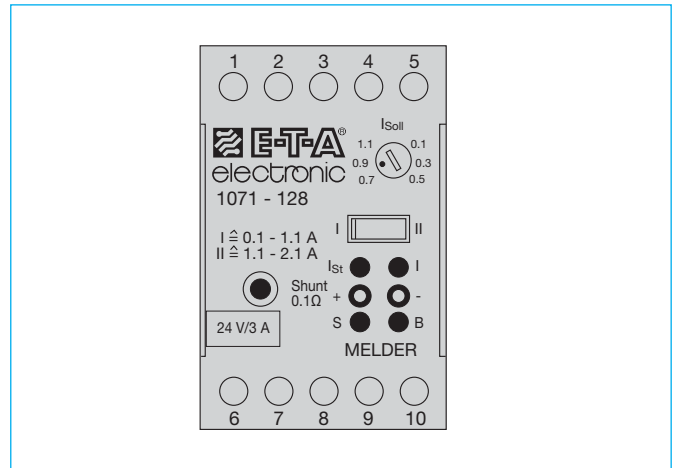
- 1 - status output carries plus potential
- 0 - status output carries minus potential

## Dimensions



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

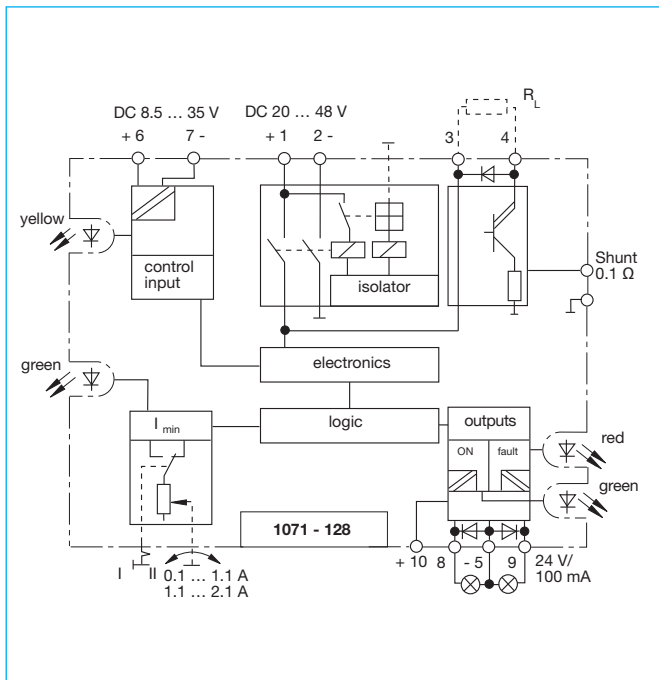
## Terminal selection



### Terminal

- 1 operating voltage +Us: DC 20...48 V
- 2 operating voltage -Us
- 3 load (+)
- 4 load (-)
- 5 auxiliary voltage -UA for status outputs
- 6 control voltage +UContr: max. DC 35 V
- 7 control voltage -UContr
- 8 ON status output (max. 100 mA)
- 9 fault status output (max. 100 mA)
- 10 auxiliary voltage +UA for status outputs: max. DC 33 V

## Basic circuit diagram



## Description

The E-T-A Solid State Remote Power Controller E-1071-343 is a double relay with protective function both for resistive and inductive **DC 48 V** loads. It is particularly suitable to control upward/downward and forward/backward movements. **Failure of one channel will also cause the other channel to disconnect.**

## Typical applications

- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected after failure of one of the circuits.

## Features

- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
  - approx. 5 s after electronic fault disconnection
  - by manual release
- Both part units are disconnected upon isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

## Ordering information

Type No.	
E-1071	SSRPC
	343 double unit
	Voltage rating of load DC 48 V
	Current rating 3 A / 3 A
E-1071 - 343 - DC 48 V - 3 A / 3 A	ordering example



**E-1071-343**

## Technical data ( $T_{\text{ambient}} = 25\text{ °C}$ , $U_S = \text{DC } 48\text{ V}$ )

Voltage rating $U_N$	DC 48 V
Operating voltage $U_S$	DC 36...60 V
Current rating $I_N$	3 A/3 A (2 A + 2 A)
Current consumption ( $U_S = \text{DC } 48\text{ V}$ , $U_{\text{Contr}} = \text{"0"}$ )	typically 21 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	$U_S$ (terminals 1 and 2)
Physical isolation	2-pole
	- by manual circuit breaker release
	- approx. 5 s after overload disconnection
	- upon thermal response (approx. +130 °C)

### Load circuits (I/II)

Load output	NPN transistor, minus switching
Load rating	DC 48 V/0.2...3 A per channel with parallel duty of both channels: max. 4 A (e. g. 2 A + 2 A)
	max. 1.8 V
Voltage drop at $I_N$	approx. $1.1 \times I_N$
Overload disconnection	typically 20 ms (see storage time curve)
Storage time $t_S$ (at $2 \times I_N$ )	approx. $2.5 \times I_N$
Short-circuit limitation	approx. 4 $\mu\text{s}$
Short-circuit response delay	GREEN LED lights at $I_{\text{load}} > 0.1\text{ A}$
Load current monitoring	3 x 4 mm dia. (shunt $0.1\ \Omega \pm 1\%$ )
Current measuring terminals	max. 3 mA
Leakage current ( $U_{\text{Contr}} = \text{"0"}$ )	integral
Free-wheeling diode	

### Control circuits (I/II)

Control	opto coupler in control input
Control voltage $U_{\text{Contr}}$	"0" = 0...5 V
	"1" = 8.5...35 V
Control current	typically 5 mA
Switching frequency $f_{\text{max}}$	100 Hz
Control signal ( $U_{\text{Contr}} = \text{"1"}$ )	RED LED lights ( $I_S$ flowing)
Protection	reverse polarity protection (diode)

### Signal output

Fault indication	auxiliary contact (N/O)
	- max. DC 30 V/3 A
	- physically isolated
	- closed when the circuit breaker has tripped

### General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals $2 \times 2.5\text{ mm}^2$ to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black
Mounting	symmetric rail to EN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

## Technical description

Under normal operating conditions, the E-T-A SSRPC E-1071-343 allows the connection and disconnection of the load outputs of two channels independent of each other.

### Control circuits (I/II)

The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V ( $\hat{=}$  control signal "1") is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

### Load circuits (I/II)

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

### Status outputs

Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

#### RED LED

##### ON indication (I/II)

The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

#### GREEN LED

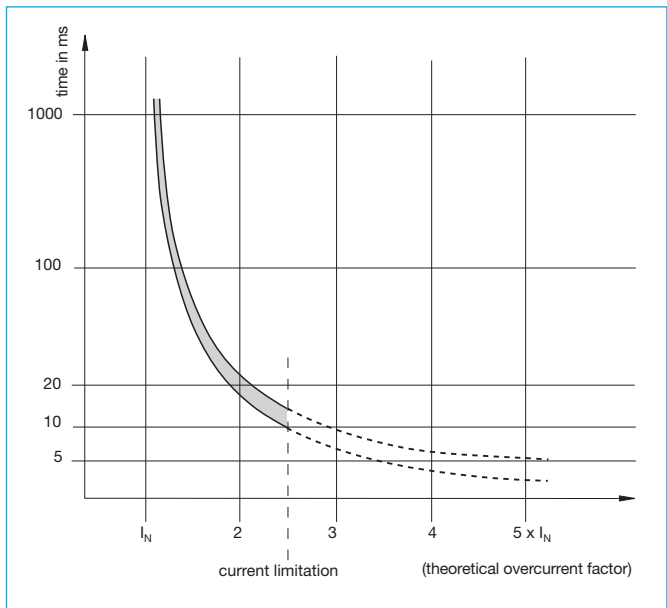
##### Current flow indication (I/II)

The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-343 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1  $\Omega$  shunt in the load circuit (I/II).

## Storage time characteristic curve $t_s$ ( $T_A = 25^\circ\text{C}$ )

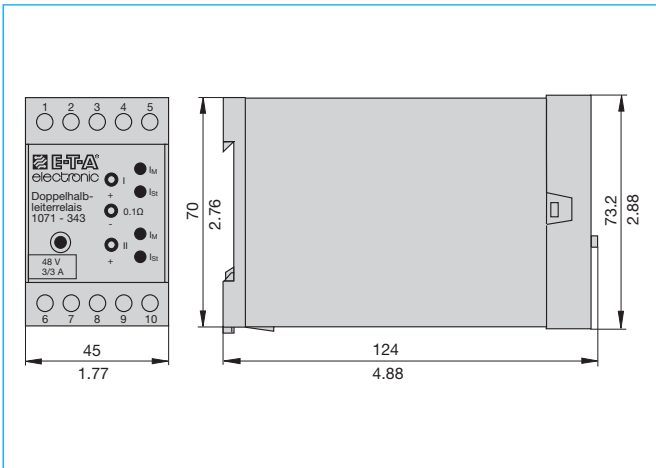


## Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
	"0"	"1"		"0"	"1"
Control input	"0"	"1"	"1"	"0"	"1"
RED LED - Control current	0	1	1	0	1
GREEN LED - Load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	both load circuits disconnected		

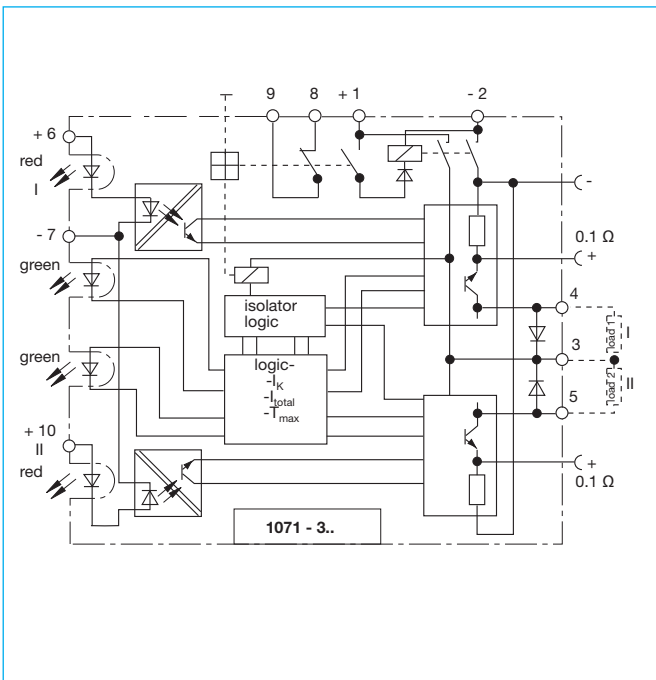
1 - LED indicates  
0 - LED does not indicate

## Dimensions

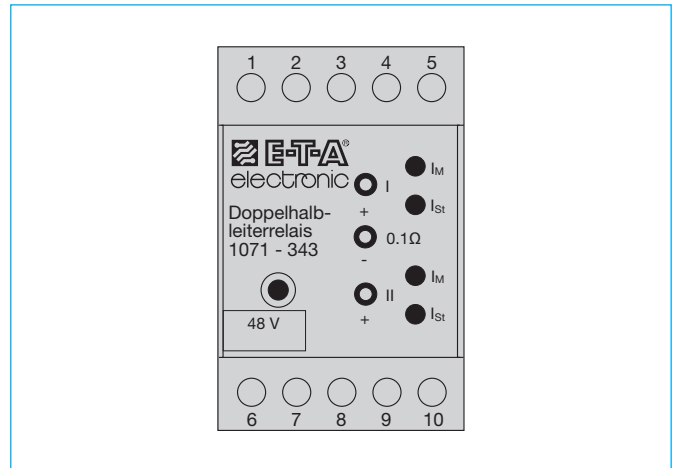


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Basic circuit diagram



## Terminal selection



## Terminal

- 1 operating voltage  $+U_S$ : DC 36..60 V
- 2 operating voltage  $-U_S$
- 3 load (+) (carrying plus potential)  
**CAUTION:** Do not connect to GND/ $-U_S$
- 4 load I (-)
- 5 load II (-)
- 6 control voltage I  $+U_{\text{Contr}}$ : max. DC 35 V
- 7 control voltage I, II  $-U_{\text{Contr}}$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 auxiliary voltage II  $+U_{\text{Contr}}$ : max. DC 35 V



## Description

The E-T-A Solid State Remote Power Controller E-1071-353 is a double relay with protective function both for resistive and inductive **DC 24 V** loads. It is particularly suitable to control upward/downward and forward/backward movements. **Failure of one channel will also cause the other channel to disconnect.**

## Typical applications

- Valve timing gears for forward/backward or upward/downward movements (overlapping operation is possible)
- Parallel circuits which must be completely disconnected upon failure of one of the circuits.

## Features

- Small double relay with protective function
- Overcurrent and short-circuit proof outputs
- Two pole physical isolation of both channels
  - approx. 5 s after electronic disconnection of a fault
  - by manual release
- Both part units are disconnected upon the isolator tripping
- Current load of each unit: max. 3 A; total current max. 4 A
- Electrical isolation between control and load circuit by means of opto coupler
- Control current indication by RED LED
- Load current indication by GREEN LED
- With auxiliary contact (fault indication)
- Temperature disconnection

## Ordering information

Type No.	
E-1071	SSRPC
	353 double unit
	Voltage rating of load
	DC 24 V
	Current rating
	3 A / 3 A
E-1071 - 353 - DC 24 V - 3 A / 3 A ordering example	



**E-1071-353**

## Technical data ( $T_{\text{ambient}} = 25\text{ °C}$ , $U_S = \text{DC } 24\text{ V}$ )

Voltage rating $U_N$	DC 24 V
Operating voltage $U_S$	DC 20...48 V
Current rating $I_N$	3 A/3 A (2 A + 2 A)
Current consumption ( $U_S = \text{DC } 24\text{ V}$ , $U_{\text{Contr}} = \text{"0"}$ )	typically 30 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection	$U_S$ (terminals 1 and 2)
Physical isolation	2-pole <ul style="list-style-type: none"> <li>- by manual circuit breaker release</li> <li>- approx. 5 s after overload disconnection</li> <li>- upon thermal response (approx. +130 °C)</li> </ul>
<b>Load circuits (I/II)</b>	
Load output	NPN transistor, minus switching
Load rating	DC 24 V/0.2...3 A per channel with parallel duty of both channels: max. 4 A (e. g. 2 A + 2 A)
Voltage drop at $I_N$	max. 1.8 V
Overload disconnection	approx. $1.1 \times I_N$
Storage time $t_S$ (at $2 \times I_N$ )	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. $2.5 \times I_N$
Short-circuit response delay	approx. 4 $\mu\text{s}$
Load current monitoring	GREEN LED lights at $I_{\text{load}} > 0.1\text{ A}$
Current measuring terminals	3 x 4 mm dia. (shunt $0.1\ \Omega \pm 1\%$ )
Leakage current ( $U_{\text{Contr}} = \text{"0"}$ )	max. 3 mA
Free-wheeling diode	integral
<b>Control circuits (I/II)</b>	
Control	opto coupler in control input
Control voltage $U_{\text{Contr}}$	"0" = 0...5 V "1" = 8.5...35 V
Control current $I_{\text{Contr}}$	typically 5 mA
Switching frequency $f_{\text{max}}$	100 Hz
Control signal ( $U_{\text{Contr}} = \text{"1"}$ )	RED LED lights ( $I_{\text{Contr}}$ flowing)
Protection	reverse polarity protection (diode)
<b>Signal output</b>	
Fault indication	auxiliary contact (N/O) <ul style="list-style-type: none"> <li>- max. DC 30 V/3 A</li> <li>- physically isolated</li> <li>- closed when the circuit breaker has tripped</li> </ul>
<b>General data</b>	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2 x 2.5 mm <sup>2</sup> to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black symmetric rail to EN 50022-35
Mounting	to UL 94: V = 0; VDE 0304: grade 1
Self-extinguishing properties	IP20 housing, terminals
Degree of protection (IEC 529/DIN 40050)	
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

## Technical description

Under normal operating conditions, the E-T-A SSRPC E-1071-353 allows the connection or disconnection of the load outputs of two channels independent of each other.

### Control circuits (I/II)

The control current flows through the LED and the opto coupler immediately a voltage higher than 8.5 V ( $\Delta$  control signal "1") is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

### Load circuits (I/II)

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

### Status outputs

Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

#### RED LED

ON indication (I/II)

The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

#### GREEN LED

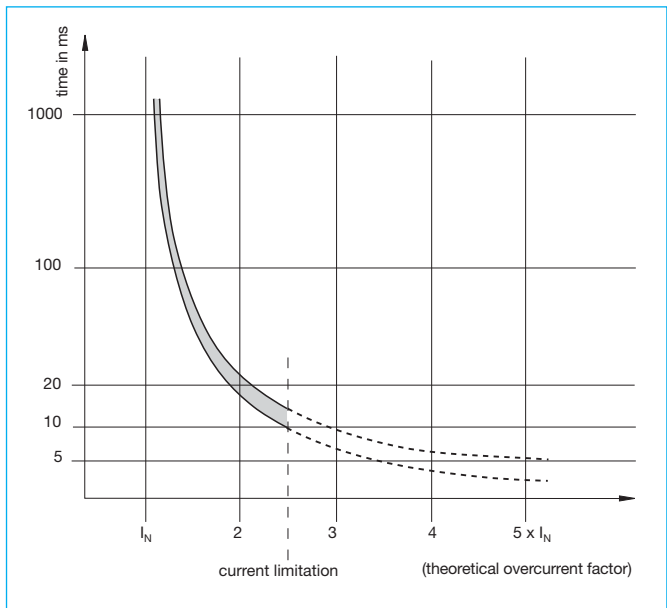
Current flow indication (I/II)

The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-353 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1  $\Omega$  shunt in the load circuit (I/II).

## Storage time characteristic curve $t_s$ ( $T_A = 25^\circ\text{C}$ )

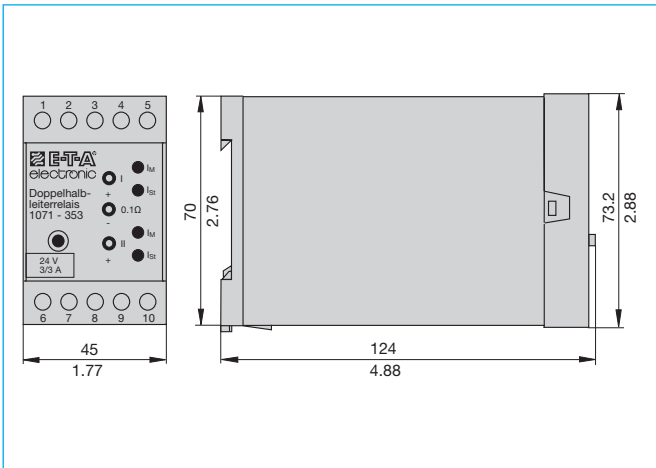


## Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break	
	"0"	"1"		"0"	"1"
Control input	"0"	"1"	"1"	"0"	"1"
RED LED - control current	0	1	1	0	1
GREEN LED - Load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	both load circuits disconnected		

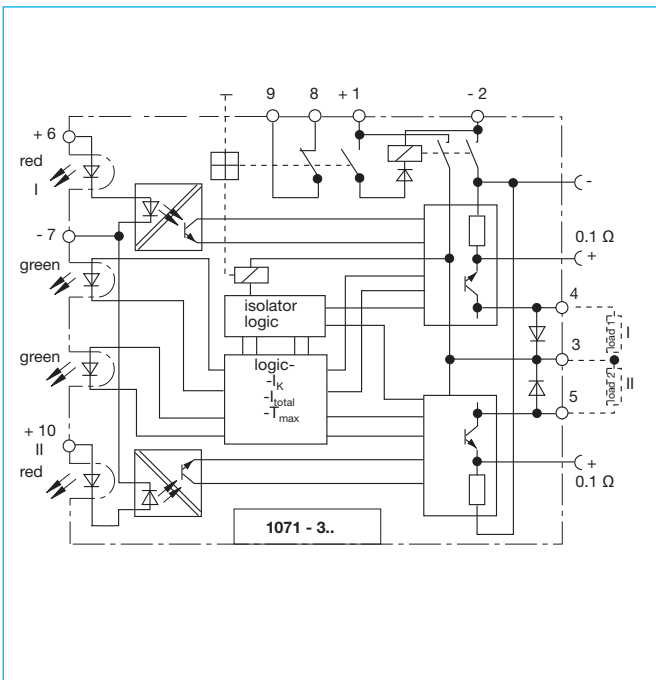
1 - LED indicates  
0 - LED does not indicate

## Dimensions

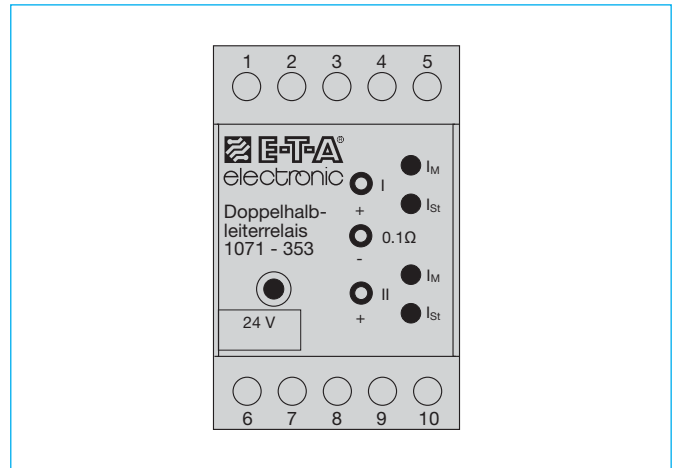


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Basic circuit diagram



## Terminal selection



## Terminal

- 1 operating voltage +  $U_S$ : DC 20...48 V
- 2 operating voltage -  $U_S$
- 3 load (+) (carrying plus potential)
- 4 load I (-)
- 5 load II (-)
- 6 control voltage I +  $U_{Contr}$ : max. DC 35 V
- 7 control voltage I, II -  $U_{Contr}$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 auxiliary voltage II +  $U_{Contr}$ : max. DC 35 V

## Description

The E-T-A Solid State Remote Power Controller E-1072-100 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

**The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply ('IT systems') (see Machinery Directive EN 60204 part 1, para. 9.4.3.1).**

## Typical applications

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionality of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contacts).
- Two pole physical isolation upon overload or when tripped manually.

## Features

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e.g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon
  - an overload in the load circuit,
  - short-circuit in the load (load+/load-, load+/-U<sub>S</sub>, and load-/+U<sub>S</sub>), followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input "In/Ctrl" with control current indication (YELLOW LED).
- "O.K." and availability indication (GREEN LED).
- Short-circuit and overload indication (fault indication F and RED LED).
- "Err1" group fault signalisation – all faults will be signalled:
  - wire breakage in the load circuit
  - earth fault at switching output
  - internal faults
  - overload or short circuit in the load circuit
- "Err2" fault signalisation:
  - only overload or short circuit in the load circuit
  - reset required
- Integral protection against reverse polarity and overvoltage for the control and load circuit.

## Ordering information

Type No.	Solid State Remote Power Controller SSRPC			
E-1072	100	(trips only with overload or short circuit)		
		<b>Voltage rating of load</b>		
		DC 24 V		
		<b>Current rating</b>		
		3 A		
<b>E-1072 - 100 - DC 24 V - 3 A</b>				



**E-1072-100**

## Technical data (T<sub>ambient</sub> = 25 °C, U<sub>S</sub> = DC 24 V)

Voltage rating U <sub>N</sub>	DC 24 V
Operating voltage U <sub>S</sub>	DC 19.2...36 V
Current rating I <sub>N</sub>	max. 3 A
Current consumption I <sub>0</sub> (U <sub>Contr</sub> = "0")	typically 24 mA
Power loss P <sub>max</sub> (I <sub>N</sub> =3 A)	typically 3.5 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U <sub>S</sub>	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication "Err1" and "Err2")
<b>Load Circuit</b>	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V/3 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at I <sub>N</sub>	typically 0.9 V (R <sub>i</sub> typically 300 mΩ)
Switch times (t <sub>on</sub> / t <sub>off</sub> )	typically 2 ms (resistive load)
Overload disconnection	approx 1.15 x I <sub>N</sub> (typically 3.45 A)
Trip time (I <sub>load</sub> = 2 x I <sub>N</sub> )	typically 400 ms
Short-circuit current I <sub>K</sub>	typically 12 A current limitation
Trip time (upon I <sub>K</sub> )	typically 50 ms, 2-pole isolation of load circuit after approx. 200 ms -> RED LED indicates, fault indication F "Err1" and "Err2"
Wire break monitoring	with the load switched on or off; RED LED "Error" lighted, group fault signalisation "Err1" (U <sub>Contr</sub> = "0") wire break threshold R <sub>load</sub> > 10 kΩ (U <sub>Contr</sub> = "1") minimum current I <sub>load</sub> < 30 mA
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I <sub>load</sub> > 30 mA
Leakage current (U <sub>Contr</sub> = "0")	typically 1 mA
Free-wheeling circuitry	integral
Load current measurement (term. 33: +shunt/ term. 34: -shunt)	no isolation of load circuit required as a 0.1 Ω± 1 % measuring shunt is integral with the device. Measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)
Isolation of load circuit	2-pole by relay contacts - by manual release of RED button - approx. 200 ms after electronic tripping due to overload or short circuit ("OFF")

## Technical data (cont'd)

<b>Control circuit</b>	
Control "In/Ctrl"	internal low-level signal relay in control input (with integral free-wheeling diode)
Control voltage $U_{Contr}$	"0" : 0...2.4 V "1" : 18...32 V
Control voltage $I_{Contr}$	typically 5...10 mA
Switching frequency $f_{max}$	10 Hz
Control signal ( $U_{Contr}$ "1")	"In/Ctrl" YELLOW LED lights with $I_{Contr}$ flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)

<b>Fault indication "Err1"</b>	group fault signalisation potential-free relay contact N/O, DC 30 V/0.5 mA...1 A
Fault indication "Err1"	- wire breakage in the load circuit - load current < 30 mA - other faults (ground fault in load circuit or internal fault) - overload/short circuit (= "Err2") - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed
Signal delay	typically 600 ms

<b>"Err2"</b>	fault indication potential-free auxiliary contact, make contact N/O, DC 30 V/0.5 mA...1 A
Fault indication »Err2«	- overload or short circuit in the load circuit - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed - auxiliary contact "Err2" closed - RED button "OFF" - reset required - load circuit isolated 2-pole - manual release "OFF" - reverse polarity of $U_S$ (LEDs not indicating)
Signal delay	typically 200 ms

<b>General data</b>	
Ambient Temperature	0...+50 °C (without condensation)
Storage temperature	-20 ...+70 °C
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm <sup>2</sup> max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC	circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals)
Housing material	PA 66-FR
Mounting	symmetric rail to EN 50022-35
Vibration	3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050)	IP20 housing
EMC	IP20 terminals emitted interference EN 50081-1 interference suppression EN 61000-6-2
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 130 g

## Status matrix

Operating status	Fault-free operation		Short circuit/overload in load circuit	Wire break in load circuit		Other faults
	"0"	"1"		"0"	"1"	
<b>Control input</b>	"0"	"1"	"1"	"0"	"1"	"0"
Load output	OFF 2-pole non-conductive	ON 2-pole conductive	OFF 2-pole non-conductive	OFF 2-pole non-conductive	ON 2-pole non-conductive	OFF 2-pole non-conductive
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	no	no	no

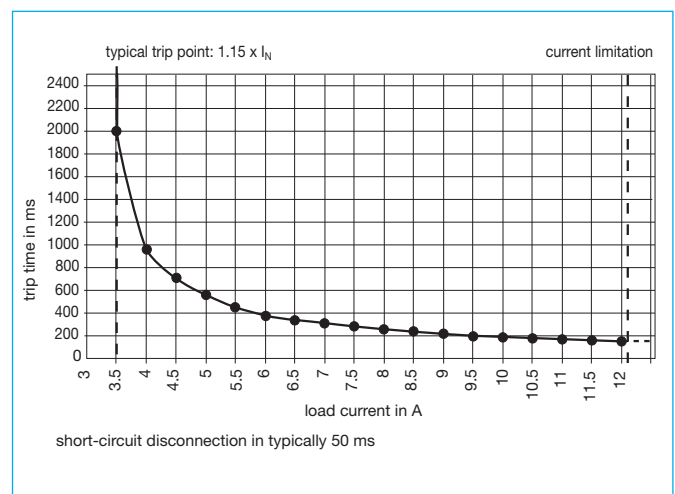
<b>Indication</b>						
YELLOW LED "In/Ctrl"	0	1	1	0	1	0
GREEN LED "O.K."	1	1	0	0	0	0
RED LED "Error"	0	0	1	1	1	1
relay contacts "Err1"	open	open	closed	closed	closed	closed
auxiliary contacts "Err2"	open	open	closed	open	open	open
RED operating/reset button	ON	ON	OFF ("OFF")	ON	ON	ON
Remark	availability	load: > 30 mA < 3 A	RED button to be reset			ground fault in load circuit or internal fault

1 = LED lights  
0 = LED does not light

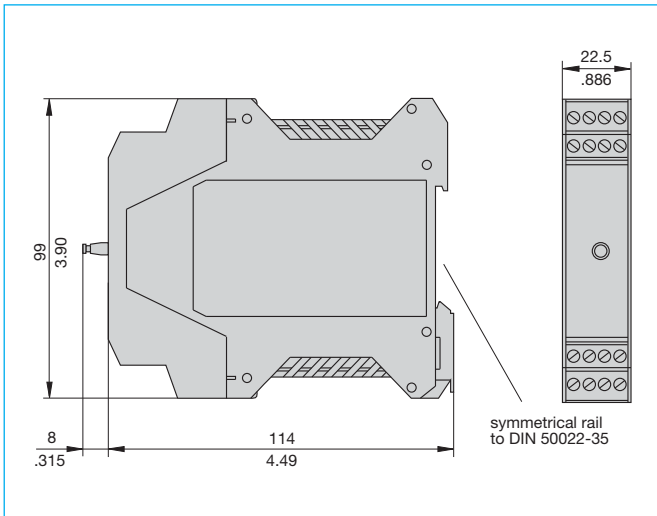
### Operating modes at:

- reverse polarity: indication of fault "Err2"; LEDs not illuminated!
- manual release "OFF" (RED button out): indication of fault "Err1" and "Err2", additionally lighted LED RED "Error".
- with  $U_S = 0$  V: not fault indication "Err1".

## Typical time/current characteristics ( $T_A = 25$ °C)

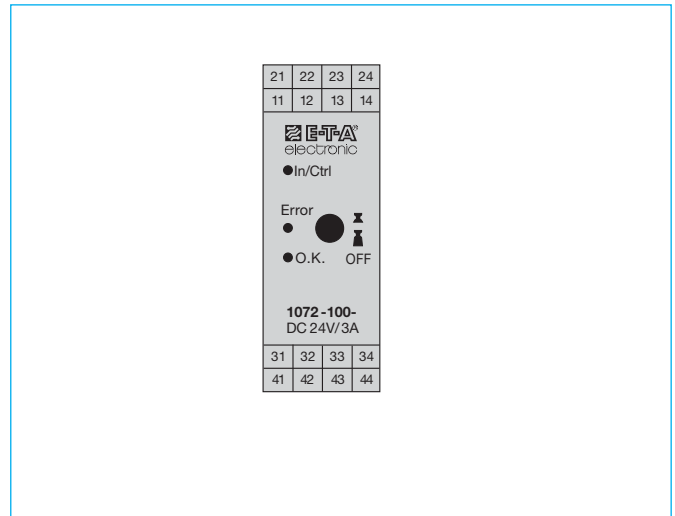


## Dimensions

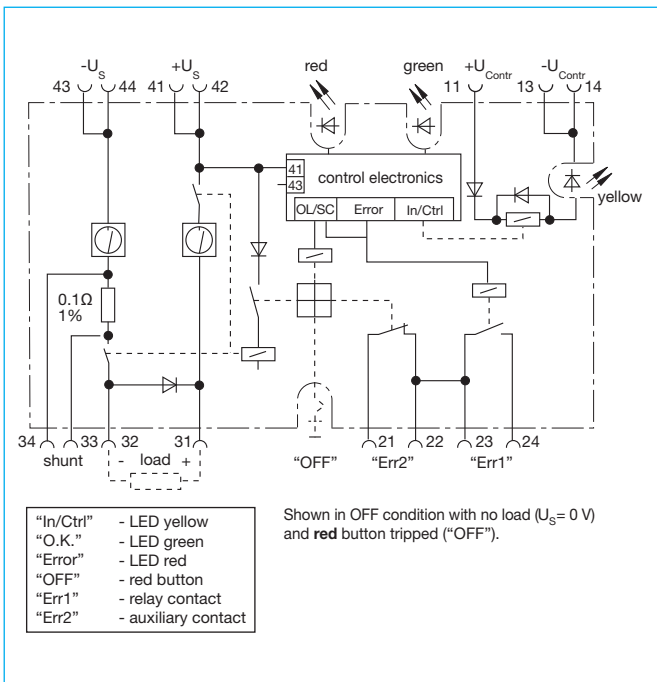


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Connection diagram



## Basic circuit diagram



## Terminal selection

Level	Terminal	Remark
1	11	+U <sub>Contr</sub> (control voltage plus) <b>DC 18...32 V</b>
1	13 / 14	-U <sub>Contr</sub> (control voltage minus)
1	12	not use
2	21	"Err2" fault indication OL/SC (signal contact <b>NO</b> )
2	22 / 23	joint terminal "Err1", "Err2" <b>C</b>
2	24	"Err1" group fault indication (relay contact <b>NO</b> )
3	31	load (+) <b>DC 24 V / max. 3 A</b>
3	32	load (-)
3	33 / 34	load current measurement by voltmeter (shunt 0.1 Ω ± 1 % integral with device, 100 mV $\hat{=}$ 1 A) term. 33: shunt+ / term. 34: shunt-
4	41 / 42	+U <sub>S</sub> (operating voltage plus) <b>DC 19.2...36 V</b>
4	43 / 44	-U <sub>S</sub> (operating voltage minus)

### Top side

21	22	23	24	LEVEL 2 (fault indication)
11	12	13	14	
				LEVEL 1 (control input)
31	32	33	34	LEVEL 3 (load circuit)
41	42	43	44	LEVEL 4 (voltage supply)

### Cable side (bottom)

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

## Description

The E-T-A Solid State Remote Power Controller E-1072-2.. complies with the EC Machinery Directive 98/37/EG and meets the requirements of EN60204 part 1 "Electrical equipment of machinery, safety of machinery" in ungrounded DC 24 V supply systems ("IT systems").

The E-1072-2.. is a double pole electronic switching amplifier for magnetic valves (hydraulic and pneumatic mechanisms), magnetic brakes and magnetic couplings with rated voltage DC 24 V and a max. current rating of 1 A or 2 A. It combines true circuit breaker characteristics with additional diagnostic functions.

## Why use the E-1072-2..

- for double pole switching of actuators (magnetic valves, magnetic brakes) in machinery and equipment
- for monitoring the electronic function of the loads and signal to the PLC
- for preventing a voltage dip of the DC 24 V output voltage in a switch-mode power supply, in the event of a short circuit, as a true 2 pole, remotely controllable electronic circuit breaker
- for protecting the cables of the load circuit
- for status signalling and for visually indicating load circuit faults (LEDs or RED trip button) via potential-free signal contacts
- for double-pole physical isolation of the load circuit – manually or electrically in the event of a failure (short circuit/overload)

## Features

- Voltage rating DC 24 V (19.2...36 V)
- Current rating  $I_N$  max. 1 A or 2 A (min. load current 30 mA)
- Activates and monitors DC 24 V magnetic valves
- PLC controllable 2 pole remote power controller with physical isolation of control input
  - Switching output with integral current limitation to  $2 \times I_N$
  - Disconnection of load in the event of short circuit or overload, followed by double pole physical isolation of load
  - Permanent wire break monitoring of load circuit
  - Group fault signalisation via relay contact "Err1"
  - Additional signal contact "Err2" when integral circuit breaker has tripped due to short circuit or overload in the load circuit
  - LED displays: LED green: OK  
LED red: Error  
LED yellow In/Ctrl (control current indication)
- Integral reverse polarity protection and overload protection for control and load circuit
- No back-up fuse required due to integral fail-safe element
- Track-mountable, width 22.5 mm

### Additional feature E-1072-210

- additional "status indication" relay output to facilitate confirmation to a PLC, for example, of activation and a load current > 30 mA.

### Additional feature E-1072-220 (see fig. "inrush current curve magnetic valves")

- Analogue output 4-20 mA proportional to load current enables permanent monitoring of magnetic valve circuits as well as recording of the load current via ET200 sub-assemblies or field bus modules (with analogue input). In addition it is possible to check the inrush current characteristic curve of a magnetic valve to determine whether the armature of the valve has moved or is stuck.



**E-1072-220**

## Technical Data ( $T_U = 25^\circ\text{C}$ , $U_S = \text{DC } 24\text{ V}$ ) ( $T_U = \text{ambient temperature at } U_N$ )

Voltage rating $U_N$	DC 24 V
Operating voltage $U_S$	DC 19.2...36 V
Current rating $I_N$	max. 1 A or 2 A
Current consumption $I_0$	typically 25 mA
( $U_{\text{Contr}} = "0"$ )	
Power loss $P_{\text{max}}$ ( $I_N = 1\text{ A}$ )	typically 1.6 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection $U_S$	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication "Err1" and "Err2") indication "BM"
<b>Load Circuit</b>	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V/1 A or 2 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at $I_N$ (with $I_N = 1\text{ A}$ )	typically 0.8 V
Switching times ( $t_{\text{on}} / t_{\text{off}}$ )	typically 1 ms (resistive load)
Overload disconnection	approx $1.15 \times I_N$
Trip time ( $I_{\text{load}} = 1.5 \times I_N$ )	typically 1 s
Short-circuit current $I_K$	typically $2 \times I_N$ current limitation
Trip time (upon $I_K$ )	typically 300 ms at $I_N = 1\text{ A}$ , 100 ms at $I_N = 2\text{ A}$ , 2-pole isolation of load circuit after approx. 20 ms -> RED LED indicates, fault indication F "Err1" and "Err2"
Wire break monitoring	with the load switched on or off; RED LED "Error" lighted, group fault signalisation "Err1" ( $U_{\text{Contr}} = "0"$ ) wire break threshold $R_{\text{load}} > 30\text{ k}\Omega$ ( $U_{\text{Contr}} = "1"$ ) minimum current $I_{\text{load}} < 30\text{ mA}$
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), $I_{\text{load}} > 30\text{ mA}$
Leakage current ( $U_{\text{Contr}} = "0"$ )	typically 1 mA
Free-wheeling circuitry	integral
Load current measurement	no isolation of load circuit required as a $I_N = 1\text{ A}$ : $0.2\ \Omega/1\%$ , $I_N = 2\text{ A}$ : $0.1\ \Omega/1\%$ measuring shunt is integral with the device. Measurement by voltmeter terminal 33 - terminal 34 (200 mV = $I_N$ )
Isolation of load circuit	2-pole by relay contacts - by manual release of RED button - approx. 20 ms after electronic tripping due to overload or short circuit ("OFF")

## Technical Data ( $T_U = 25\text{ }^\circ\text{C}$ , $U_B = \text{DC } 24\text{ V}$ ) ( $T_U =$ ambient temperature at $U_N$ )

### Control circuit

Control "In/Ctrl"	internal low-level signal relay in control input (with integral free-wheeling diode)
Control voltage $U_{\text{Contr}}$	"0" : 0...2.4 V "1" : 18...32 V
Control voltage $I_{\text{Contr}}$	typically 5...10 mA
Switching frequency $f_{\text{max}}$	10 Hz
Control signal ( $U_{\text{Contr}}$ "1")	"In/Ctrl" YELLOW LED lights with $I_{\text{Contr}}$ flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)

### Fault indication

"Err1"	group fault signalisation potential-free relay contact N/O, (closed circuit principle) DC 30 V/5 mA...1 A relay contact "Err1" open - wire breakage in the load circuit - load current < 30 mA - other faults (ground fault in load circuit or internal fault) - overload/short circuit (= "Err2") - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" closed
Fault indication "Err1"	typically 600 ms fault indication potential-free auxiliary contact, make contact N/O, DC 30 V/5 mA...1 A
Fault indication "Err2"	signal contact "Err2" closed - overload or short circuit in the load circuit - LED RED "Error" lighted - LED GREEN "O.K." not lighted - relay contact "Err1" open - auxiliary contact "Err2" closed - RED button "OFF" - reset required - 2-pole physical isolation in load circuit - manual release "OFF" - reverse polarity of $U_S$ (LEDs not indicating)
<b>Option -210</b>	with status indication "BM" potential-free relay contact DC 30 V / 5 mA...1 A
Function "BM"	relay contact closed, if $I_{\text{load}} > 30\text{ mA}$ relay contact open, with wire breakage and after trip of circuit breaker
<b>Option -220</b>	analogue output proportional to load current "ANA" 4-20 mA, max. load 500 $\Omega$ on $-U_S$ (term. 44) $U_{\text{Contr}} = \text{"0"} \rightarrow 4\text{ mA}$ $U_{\text{Contr}} = \text{"0"} \rightarrow 4\text{ mA}$ with 0 A (load current) 20 mA with $I_N$ Accuracy: $\pm 5\%$ of measured value

### General data

Ambient Temperature	0...+50 $^\circ\text{C}$ (without condensation)
Storage temperature	-20...+70 $^\circ\text{C}$
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm <sup>2</sup> max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A) not required because of integral fail-safe element with VDE approval
Back-up protection for SSRPC	PA 66-FR
Housing material	symmetric rail to EN 50022-35
Mounting	3 g, to IEC 60068-2-6 test Fc
Vibration	IP20 housing
Degree of protection (IEC 529/DIN 40050)	IP20 terminals
EMC	emitted interference EN 50081-1 interference suppression EN 61000-6-2
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 130 g

## Ordering information

### Type

<b>E-1072</b>	Solid State Remote Power Controller
<b>Version</b>	
<b>210</b>	with additional option: status indication
<b>220</b>	with additional option: analogue output 4-20 mA
<b>Voltage rating of load</b>	
<b>DC 24 V</b>	
<b>Current rating</b>	
<b>1 A or 2 A</b>	
<b>E-1072 - 210 - DC 24 V - 1 A</b> ordering example	

## Status matrix

Operating status	Fault-free operation		Short circuit/ overload in load circuit	Wire break in load circuit		Other faults
	"0"	"1"		"0"	"1"	
<b>Control input</b>	"0"	"1"	"1"	"0"	"1"	"0"
Load output	OFF 2-pole non-conductive	ON 2-pole conductive	OFF 2-pole non-conductive	OFF 2-pole non-conductive	ON 2-pole non-conductive	OFF 2-pole non-conductive
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	no	no	no

### Indication

	0	1	1	0	1	0
YELLOW LED "In/Ctrl"	0	1	1	0	1	0
GREEN LED "O.K."	1	1	0	0	0	0
RED LED "Error"	0	0	1	1	1	1
relay contacts "Err1" (group fault)	closed	closed	open	open	open	open
auxiliary contacts "Err2" (circuit breaker)	open	open	closed	open	open	open
RED operating/reset button	ON	ON	OFF "OFF"	ON	ON	ON
relays contact "BM" indication option-210	open	closed	open	open	open	open
analgo output option-220	4 mA	4 mA... 20 mA	> 20 mA 4 mA	4 mA	4 mA	4 mA
Remark	available	$I_{\text{load}} > 30\text{ mA}$ < 1 A or 2 A $I_N$	RED button to be reset		$I_{\text{load}} < 30\text{ mA}$	ground fault in load circuit or internal fault

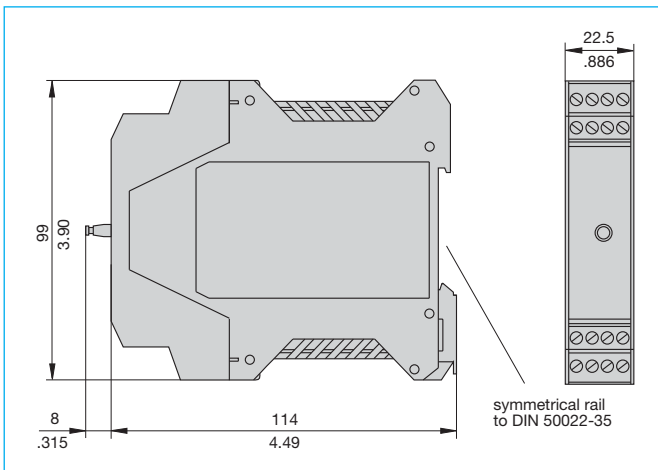
1 = LED lights  
0 = LED does not light

### Operating modes at:

- reverse polarity: indication of fault "Err2"; LEDs not illuminated!
- manual release "OFF" (RED button out): indication of fault "Err1" and "Err2", additionally lighted LED RED "Error".
- with  $U_S = 0\text{ V}$ : group fault signalisation »Err1« (closed circuit principle)

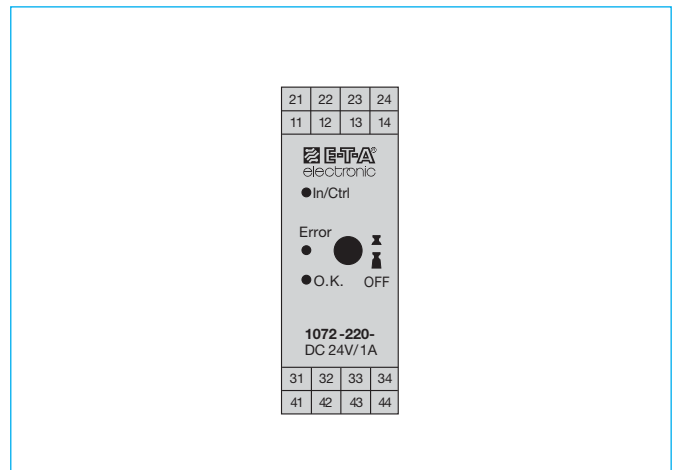


## Dimensions

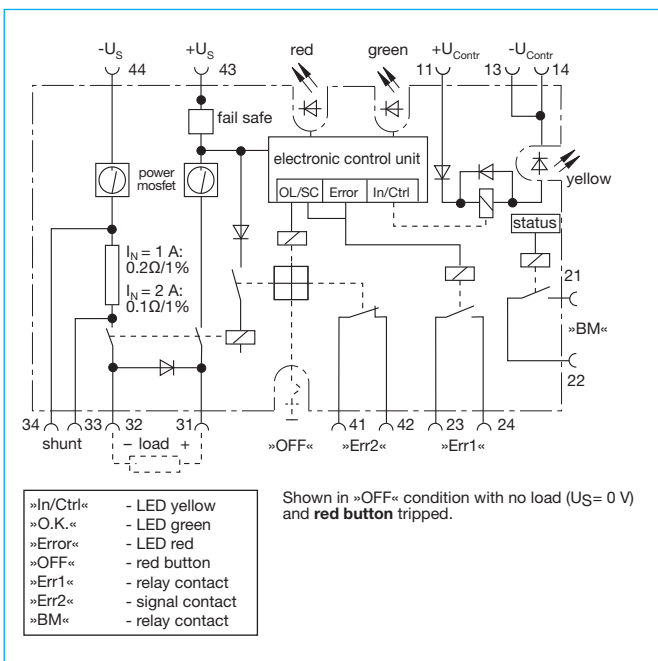


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

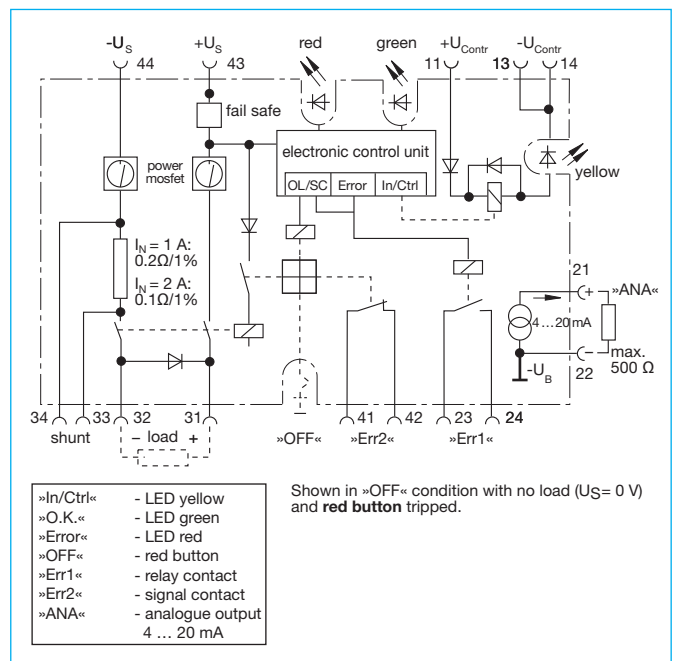
## Connection diagram



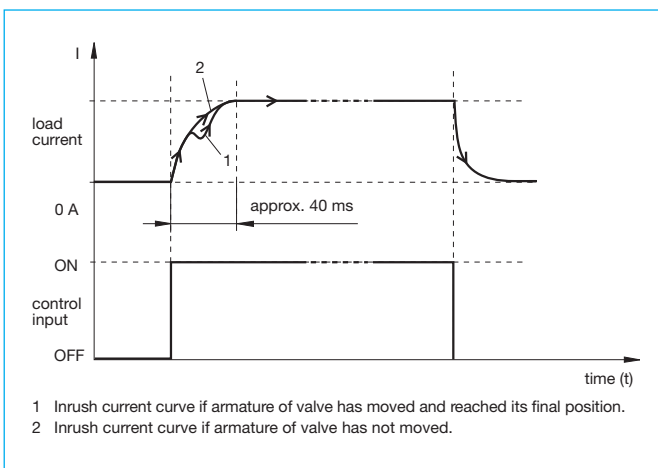
## Basic circuit diagram -210



## Basic circuit diagram -220



## Inrush current curve magnetic valve



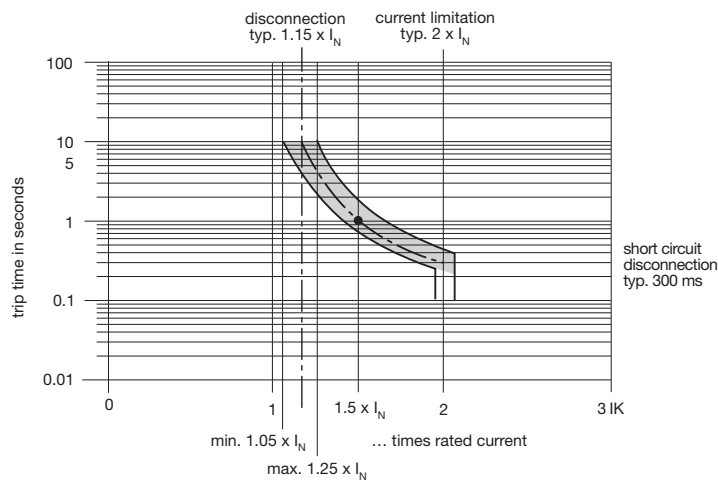
## Terminal selection

Level	Terminal	Remark
1	11	+U <sub>Contr</sub> (Control voltage plus)
	12	not used
	13 / 14	-U <sub>Contr</sub> (Control voltage minus)
<b>DC 18...32 V</b>		
2	21	option-210: _____ Kl. 21 (+)
	22	status indication "BM" analog output (relay contact) 4-20 mA Kl. 22 (-)
	23 / 24	"Err1" group fault signalisation (relay contact)
<b>DC 24 V / 1 A (or 2 A)</b>		
3	31	load (+)
	32	load (-)
	33 / 34	load current measurement by voltmeter I <sub>N</sub> = 1 A: shunt 0.2 Ω/1 % I <sub>N</sub> = 2 A: shunt 0.1 Ω/1 % shunt integral with device Kl. 33: shunt+ / Kl. 34: shunt-
4	41 / 42	"Err2" indication of fault circuit breaker (auxiliary contact)
	43	+U <sub>S</sub> (operating voltage plus)
	44	-U <sub>S</sub> (operating voltage minus)
	<b>DC 19.2...36 V</b>	

Top side				
21	22	23	24	LEVEL 2
11	12	13	14	LEVEL 1
31	32	33	34	LEVEL 3
41	42	43	44	LEVEL 4

**Cable side (bottom)**

## Typical time/current characteristics (T<sub>A</sub> = 25 °C)



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

## Description

The E-T-A Solid State Remote Power Controller E-1072 is a double pole electronic switching amplifier suitable for resistive and inductive loads (solenoids, magnetic brakes etc.) as well as for lamp loads and capacitive loads.

**The double pole electronic switching output eliminates inadvertent start-up or dangerous machine movements as may arise upon a ground fault in systems with ungrounded power supply ("IT systems") (see Machinery Directive EN 60204 part 1).**

## Typical applications

- Two pole actuator switching for machinery and plants.
- Monitoring of the electrical functionality of these loads.
- In-rush current limitation of lamp and capacitive loads.
- Protection of load circuit cables.
- ON and fault indication (by LEDs or RED trip button) and signalling (via potential-free auxiliary contact).
- Two pole physical isolation upon overload or when tripped manually.

## Features

- PLC controllable electronic switching amplifier (max. 3 A) with additional protective and control functions for DC 24 V loads (e. g. solenoids, magnetic brakes, electromagnetic clutches, monitoring and indicator lamps).
- Overload and short-circuit proof double pole switching output with in-rush current and short-circuit limitation.
- Electronic disconnection upon
  - an overload in the load circuit,
  - short-circuit in the load (load+/-load-, load+/-U<sub>S</sub>, and load-/+U<sub>S</sub>), followed by 2-pole isolation of the load circuit (via relay contacts).
- Control input with control current indication (YELLOW LED).
- OK and availability indication (GREEN LED).
- Short-circuit and overload indication (fault indication F and RED LED).
- Continuous wire break monitoring of the load circuit (fault indication F and ORANGE LED).
- Additional supervision of the power transistors and load output potential (e.g. ground fault) when not energized. Deviation from required state is indicated as an internal fault (fault indication F, RED + ORANGE LEDs).
- Integral reverse polarity and overvoltage protection of control and load circuits.
- Integral fault indication F (wire break, short-circuit, overload, ground fault, internal fault)
  - switch contact (N/O) with external status indication (RED actuator button tripped).
  - internal fault storage (push RED button to reset).

## Ordering information

Type No.	Description
E-1072	Solid State Remote Power Controller SSRPC
CF2	Voltage rating of load DC 24 V
	Current rating 3 A
<b>E-1072 - CF2 - DC 24 V - 3 A</b>	



**E-1072-CF2-..**

## Technical data (T<sub>ambient</sub> = 25 °C, U<sub>S</sub> = DC 24 V)

Voltage rating U <sub>N</sub>	DC 24 V
Operating voltage U <sub>S</sub>	DC 19.2...36 V
Current rating I <sub>N</sub>	max. 3 A
Current consumption I <sub>0</sub> (U <sub>Contr</sub> = "0")	typically 24 mA
Power loss P <sub>max</sub> (I <sub>N</sub> =3 A)	typically 3.5 W
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U <sub>S</sub>	integral -> fault release, LEDs not lighting Caution: Ensure free travel of actuator button.
Insulation voltage	AC 500 V (control circuit, load circuit, fault indication)
<b>Load circuit</b>	
Load output (term. 31-term. 32)	two pole switching output (minus and plus switching), MOS transistors
Max. load data	DC 24 V / 3 A (no derating over the entire temperature range!)
Min. load data	DC 24 V / 50 mA (wire break threshold 30 mA)
Voltage drop at I <sub>N</sub>	typically 0.9 V (R <sub>i</sub> typically 300 mΩ)
Switch times (t <sub>on</sub> / t <sub>off</sub> )	typically 2 ms (resistive load)
Overload disconnection	approx 1.15 x I <sub>N</sub> (typically 3.45 A)
Trip time (I <sub>load</sub> = 2 x I <sub>N</sub> )	typically 40 ms
Short-circuit current I <sub>K</sub>	typically 12 A current limitation
Trip time (upon I <sub>K</sub> )	typically 50 ms, 2-pole isolation of load circuit after approx. 1 s -> RED LED indicates, fault indication F with the load switched on or off; RED button trips after approx. 1 s -> ORANGE LED indicates, fault indication F (U <sub>Contr</sub> ="0") wire break threshold R <sub>load</sub> > 120 kΩ (U <sub>Contr</sub> ="1") minimum current I <sub>load</sub> < 30 mA
Wire break monitoring	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I <sub>load</sub> > 30 mA
Supervision of load circuit	with the load switched on, the load current is monitored via the two switching outputs GREEN LED indicates (OK signal), I <sub>load</sub> > 30 mA
Leakage current (U <sub>Contr</sub> = "0")	typically 1 mA
Free-wheeling circuitry	integral Option (on request): additional quick release (max. 30 W load)
Load current measurement (term. 33: +shunt/ (term. 34: -shunt)	no isolation of load circuit required as a 0.1 Ω/±1 % measuring shunt is integral with the device. Measurement by voltmeter terminal 33 - terminal 34 (100 mV = 1 A)
Isolation of load circuit	2 pole by relay contacts - by manual release of RED button - approx. 1 s after electronic fault sensing (wire break, overload, short-circuit, internal fault)

## Technical data (cont'd)

### Control circuit

Control	via low-level signal relay in control input (with integral free-wheeling diode)
Control voltage $U_{Contr}$	"0" : 0...2.4 V "1" : 18...32 V
Control voltage $I_{Contr}$	typically 5...10 mA
Switching frequency $f_{max}$	10 Hz
Control signal ( $U_{Contr}$ "1")	YELLOW LED lights with $I_{Contr}$ flowing
Protection	reverse polarity protection (diode), overvoltage protection (varistor)

### Fault indication

Fault indication F	Potential-free auxiliary contact (hard gold plated N/O contact), DC 30 V/0.5 mA...1 A
Faults	Contact F1-F2 closed after RED button has tripped upon <ul style="list-style-type: none"> <li>- wire break in load circuit (ORANGE LED indicates)</li> <li>- overload/short-circuit in load circuit (RED indicates)</li> <li>- internal fault (RED + ORANGE LEDs indicate) (e. g. ground fault in load circuit, power transistor failure)</li> </ul> Faults indicated by the LEDs remain stored until the RED button is reset! <ul style="list-style-type: none"> <li>- manual release (GREEN LED indicates)</li> <li>- reverse polarity of <math>U_S</math> (LEDs not indicating)</li> </ul>
LED	
Signal delay	typically 1 s

### General data

Ambient Temperature	0...+50 °C (without condensation)
Storage temperature	-20...+70 °C
Terminals	COMBICON MSTBO 2.5/4 1x2.5 mm <sup>2</sup> max. 16-pole Some are double terminals -> loop-through possibility (continuous load max. 6 A)
Back-up protection for SSRPC	circuit breaker for plus line (term. 41/42): depending on power supply capacity and number of loop-through arrangements, max. 12 A (= max. continuous load of the COMBICON terminals)
Housing material	PA 66-FR
Mounting	symmetric rail to EN 50022-35
Vibration	3 g, to IEC 60068-2-6 test Fc
Degree of protection (IEC 529/DIN 40050)	IP20 housing IP20 terminals
EMC	to EN 61326-1 (01-1998)
Mounting dimensions	22.5 x 99 x 122 mm (w x h x d)
Mass	approx. 135 g

## Operating modes

Operating status	Fault-free operation		Load short circuited	Wire break in load circuit		Internal fault
	"0"	"1"	"1"	"0"	"1"	"0"
Control input						
Load output	OFF 2-pole non-conductive	ON 2-pole conductive	OFF 2-pole non-conductive	OFF 2-pole non-conductive	OFF 2-pole non-conductive	OFF 2-pole non-conductive
Load circuit isolated 2 pole (via relay contacts)	no	no	yes	yes	yes	yes

### Indication

	0	1	1	0	1	0
YELLOW LED control current	0	1	1	0	1	0
GREEN LED OK signal	1	1	0	0	0	0
ORANGE LED wire break	0	0	0	1	1	1
RED LED fault (short-circuit, overload)	0	0	1	0	0	1
Fault auxiliary contacts	open	open	closed	closed	closed	closed
RED operating/ reset button	ON	ON	OFF	OFF	OFF	OFF
Remark	availability	load: > 30 mA < 3 A	RED button to be reset	RED button to be reset	RED button to be reset	RED button to be reset

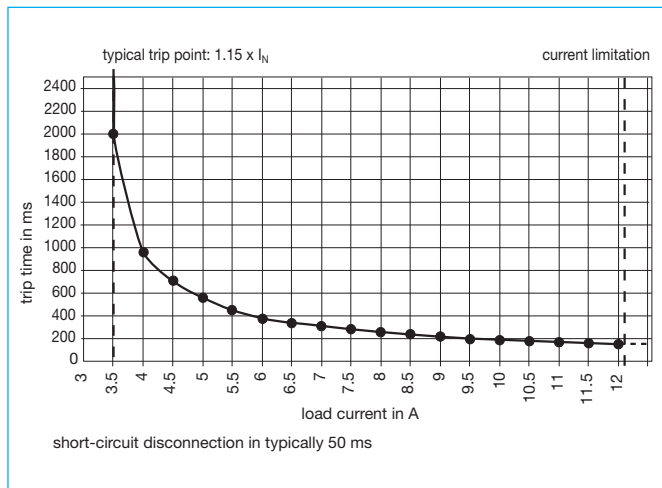
1 = LED lights  
0 = LED does not light

**Faults indicated by the LEDs remain stored until the RED button is reset!**

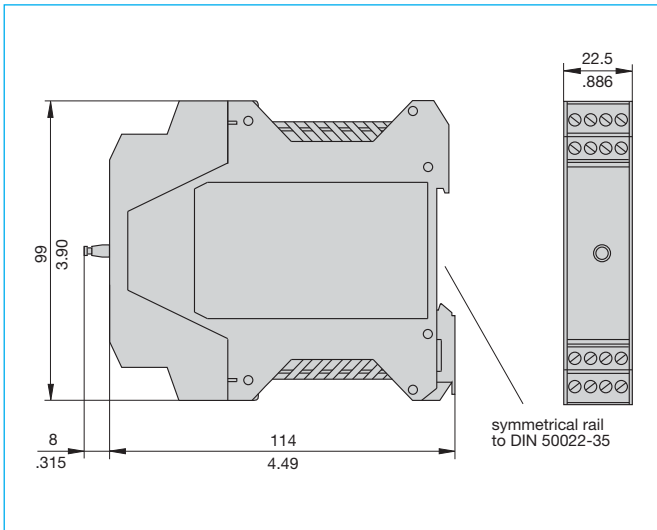
### Operating modes at:

- reverse polarity: indication of fault F; LEDs not illuminated!
- manual release (RED button out): indication of fault F, GREEN LED lights!

## Typical time/current characteristics ( $T_A = 25\text{ °C}$ )

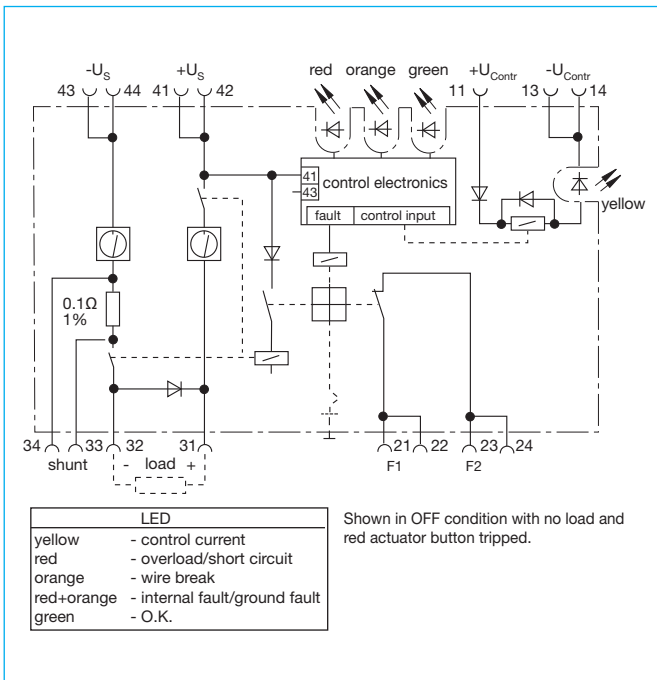


## Dimensions

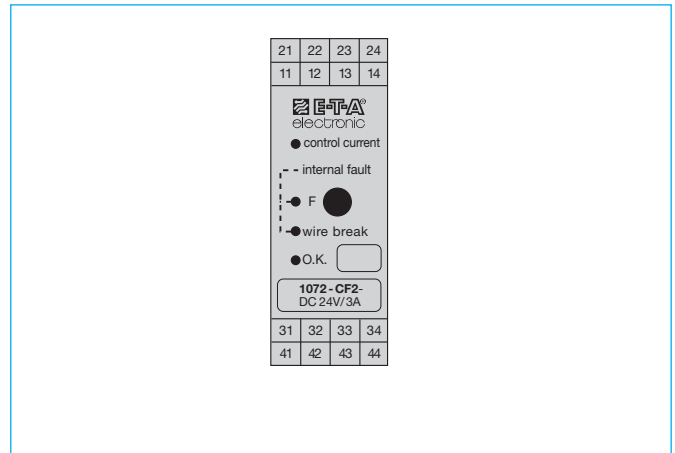


This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Basic circuit diagram



## Connection diagram



## Terminal selection

Level	Terminal	Remark
1	11	+U <sub>Contr</sub> (control voltage plus) <b>DC 18...32 V</b>
1	13 / 14	-U <sub>Contr</sub> (control voltage minus)
1	12	not use
2	21 / 22	F1 fault indication (circuit breaker contact) <b>NO</b>
2	23 / 24	F2 fault indication (circuit breaker contact)
3	31	load (+) <b>DC 24 V / max. 3 A</b>
3	32	load (-)
3	33 / 34	load current measurement by voltmeter (shunt 0.1 Ω/1 % integral with device, 100 mV $\Delta$ 1 A) KI. 33: shunt+ / KI. 34: shunt-
4	41 / 42	+U <sub>S</sub> (operating voltage plus) <b>DC 19.2...36 V</b>
4	43 / 44	-U <sub>S</sub> (operating voltage minus)

### Top side

21	22	23	24	LEVEL 2 (fault indication)
11	12	13	14	LEVEL 1 (control input)
31	32	33	34	LEVEL 3 (load circuit)
41	42	43	44	LEVEL 4 (voltage supply)

### Cable side (bottom)

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.

## Connections and terminals

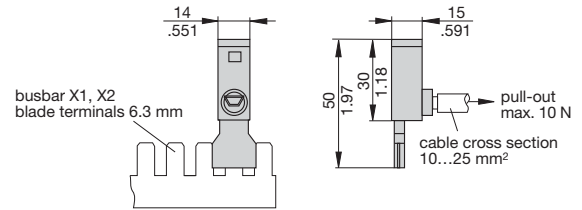
### Line terminal X 221 503 01

suitable for

**Power-D-Box with sockets pre-wired**

**Line terminal (max. 63 A)  
X 221 503 01**

max. tightening torque 3.0 Nm



**Caution:** cables must not be connected with terminal plugged in

### Load output terminal protected against reverse polarity X 222 847 01 X 222 625 01 X 222 848 01

suitable for

**19BGT-2-X8340-S02  
19BGT-2-X8340-SZ4  
X8340-S02  
X8340-SZ4**

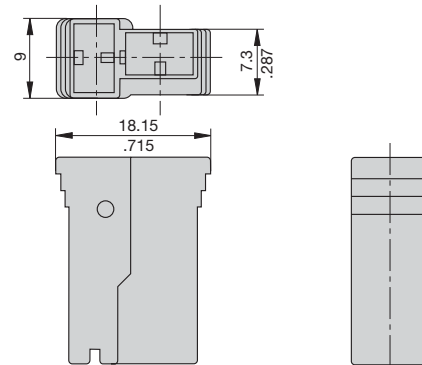
**Load output terminal protected against reverse polarity**

(set: 4 moduled sleeves, 8 blade terminals 6.3 x 0.8 mm)

**X 222 847 01** for cable cross section 0.7 ...2.0 mm<sup>2</sup>

**X 222 625 01** for cable cross section 2.5 ...4.0 mm<sup>2</sup>

**X 222 848 01** for cable cross section 4.0 ...6.0 mm<sup>2</sup>



### Screw terminal X 211 156 01

suitable for

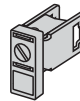
**Module 17plus**

**Screw terminal for busbar Y 307 016 11**

**X 211 156 01**

non insulated

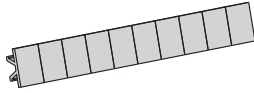
(max. 35 m<sup>2</sup>)



## Labels

**Label**

marking area 6 x 10 mm / .629 x .394 in.  
**Y 307 942 61**

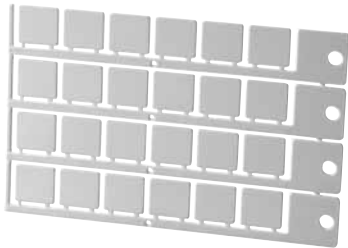


**Label white Y 307 942 61**  
**ordering unit 10 pcs = 1 strip**

suitable for **Module 17plus**

**Label**

marking area 16 x 13 mm / .629 x .512 in.  
**Y 308 327 01**



**Label white Y 308 327 01**  
**ordering unit 24 pcs = 1 plate**

suitable for  
**19BGT-2-X83S2**  
**19BGT-2-X83S4**  
**19BGT-2-X83Z4**  
**19BGT-2-X8345**

**Label**

markine area 46 x 13 mm / 1.81 x .512 in.  
**Y 308 328 01**



**Label white Y 308 328 01**  
**ordering unit 8 pcs = 1 plate**

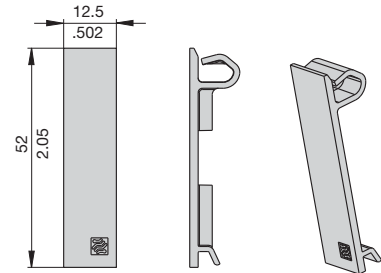
suitable for  
**19BGT-2-2210**  
**19BGT-2-3600**  
**19BGT-2-ESS20**  
**19BGT-2-ESX10**  
**19BGT-2-X2210**

**Blanking piece**

**Blanking piece Y 308 563 01**

suitable for **19BGT-2-2210**  
**19BGT-2-3600/3900**

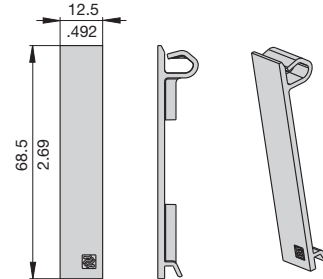
**Blanking piece for Power-D-Box**  
(circuit breaker types 3600/3900, 2210)  
**Y 308 563 01**



**Blanking piece Y 308 563 41**

suitable for **19BGT-2-ESS20**  
**19BGT-2-ESX10**

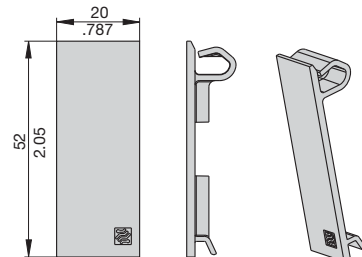
**Blanking piece for Power-D-Box**  
(circuit breaker types ESS20, ESX10)  
**Y 308 563 41**



**Blanking piece Y 308 563 21**

suitable for **19BGT-2-X8345**  
**19BGT-2-X83S2**  
**19BGT-2-X83S4**  
**19BGT-2-X83Z4**

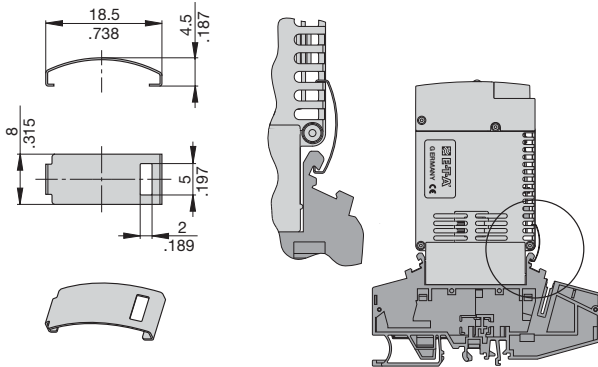
**Blanking piece for Power-D-Box**  
(circuit breaker types 8345, X8345-D01)  
**Y 308 563 21**





## Mounting aids

**Retaining clip for electronic circuit breaker ESS20/ESX10**  
recommended for fitting the devices  
**Y 307 754 01**

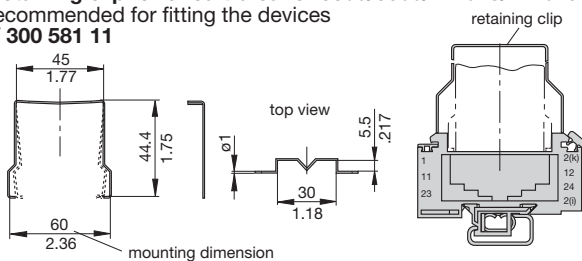


### Retaining clip Y 307 754 01

suitable for

**Module 17 plus mit ESS20**  
**Module 17 plus mit ESX10**

**Retaining clip for circuit breaker 3600/3900/E-1048/E-1079**  
recommended for fitting the devices  
**Y 300 581 11**



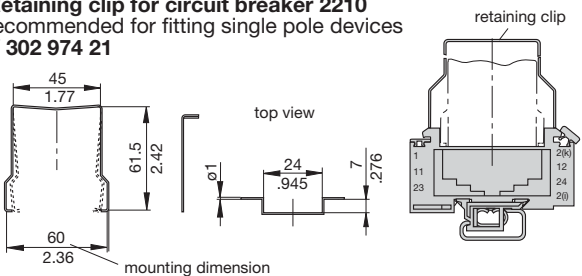
### Retaining clip Y 300 581 11

suitable for

**socket type 17...**  
**with 3600**  
**3900**  
**E-1048-6..**  
**E-1048-7..**  
**E-1079-6..**

**Module 17plus**  
**with 3600**  
**3900**  
**E-1048-6..**  
**E-1048-7..**  
**E-1079-6..**

**Retaining clip for circuit breaker 2210**  
recommended for fitting single pole devices  
**Y 302 974 21**



### Retaining clip Y 302 974 21

suitable for

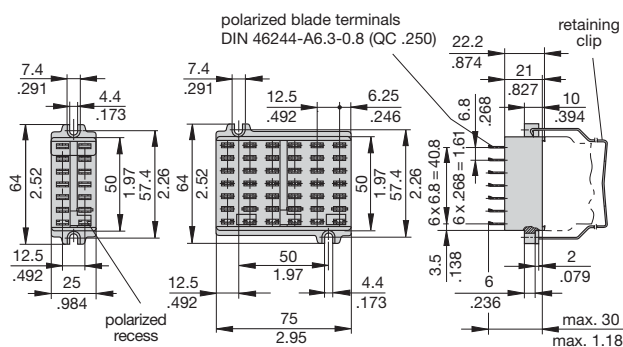
**socket type 17...**  
**with 2210-...**

**Module 17plus**  
**with 2210-...**

**Retaining clip for circuit breaker 3600/3900/E-1048/E-1079**  
recommended for fitting the devices  
**Y 300 581 03**

**23-P10-Si**

**63-P10-Si**



### Retaining clip Y 300 581 03

suitable for

**socket type 23...**  
**with 3600**  
**3900**  
**E-1048-6..**  
**E-1048-7..**  
**E-1079-6..**

**socket type 63...**  
**with 3600**  
**3900**  
**E-1048-6..**  
**E-1048-7..**  
**E-1079-6..**

## Mounting aids

### Retaining clip Y 302 974 01

suitable for

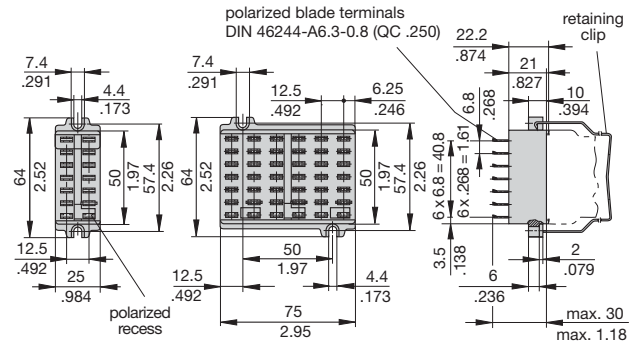
socket type 23...  
with 2210-S...

socket type 63...  
with 2210-S...

**Retaining clip for circuit breaker 2210-S...**  
recommended for fitting single pole devices  
**Y 302 974 01**

**23-P10-Si**

**63-P10-Si**



**Screw and washer X 223 019 01**  
1 set with 4 screw and  
4 washers  
in a plastic bag

suitable for

**19BGT...**

**Sufficient for mounting one Power-D-Box**

**Screw and washer**

screw for mounting the Power-D-Box (19BGT)  
**X 223 019 01**



### Barrier Y 308 139 01

suitable for

**19BGT-2-X8345**  
**X8345-D01**

**Barrier**

for isolating the load terminals of the Power-D-Box (High-Power)  
**Y 308 139 01**



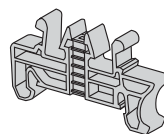
### End bracket X 222 004 01

suitable for

**Module 17plus**  
socket type 17

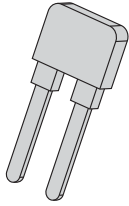
**End bracket**

recommended for fixing on symmetrical rails  
**X 222 004 01**



## Busbars and jumpers

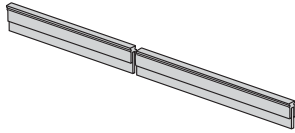
**Insulated wire bridge**  
**X 222 984 01**  
 packaging quantity: 10 pcs



**Insulated wire bridge X 222 984 01**  
 packaging quantity 1 pc = 10 wire bridges

suitable for **SVS.**

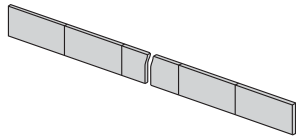
**Bus bar 32 A**  
**X 222 005 01** blue insulated, 500 mm  
**X 222 005 02** red insulated, 500 mm  
**X 222 005 03** grey insulated, 500 mm



**Bus bar 32 A**      **X 222 005 01** blue  
                          **X 222 005 02** red  
                          **X 222 005 03** grey

suitable for **Module 17plus**

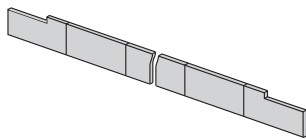
**Bus bar 50 A**  
**Y 307 016 01** non insulated, 500 mm



**Bus bar 50 A Y 307 016 01**

suitable for **Module 17plus**

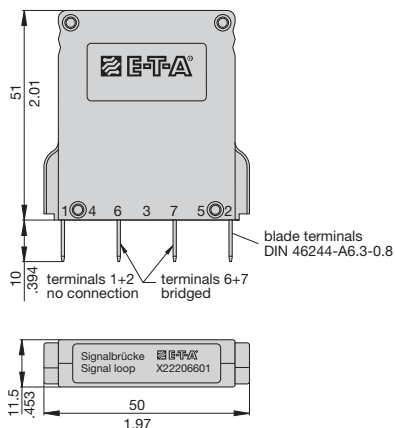
**Bus bar for line entry on the side**  
 (in combination with screw terminal X 211 156 01)  
**Y 307 016 11** non insulated, 500 mm



**Busbar Y 307 016 11**  
 for line entry on the side

suitable for **Module 17plus**

**Jumper**  
**X 222 066 01**



**Jumper X 222 066 01 old version**

suitable for **Module 17plus**  
**SVS.**  
**19BGT-2-2210**  
**19BGT-2-3600/3900**  
**19BGT-2-ESS20**  
**9BGT-2-ESX10**

**New version see jumper SB-S11-P1-01-1-1A**

7

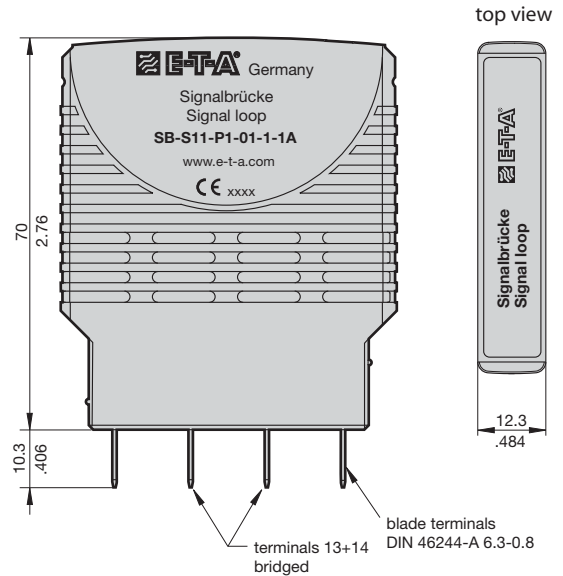
## Busbars and jumpers

### Jumper SB-S11-P1-01-1-1A

suitable for

**Module 17 plus  
SVS...  
19BGT-2-2210  
19BGT-2-3600/390  
19BGT-2-ESS20  
19BGT-2-ESX10**

### Jumper SB-S11-P1-01-1-1A



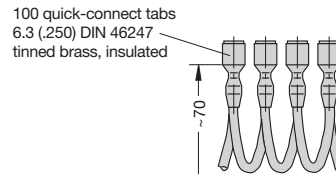
**Connector bus link -P10 X 210 588 01 (brown)  
X 210 588 02 (black)  
X 210 588 03 (red)  
X 210 588 04 (blue)**

suitable for

**Power-D-Box with sockets X 211 530 01**

### Connector bus link -P10

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

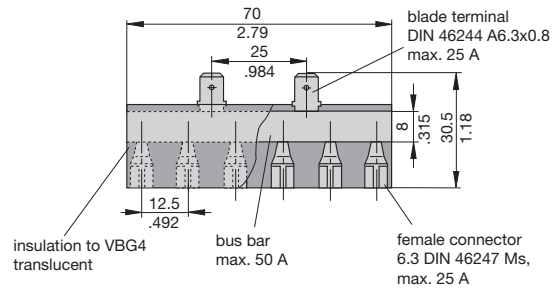


### Bus bar 50 A X 221 760 11

suitable for

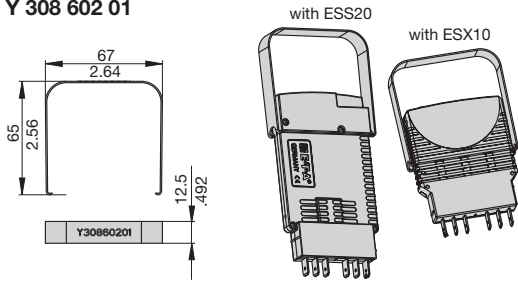
**Power-D-Box with sockets X 211 530 01**

### Bus bar 50 A for socket 63-P10-Si X 221 760 11



## Tools

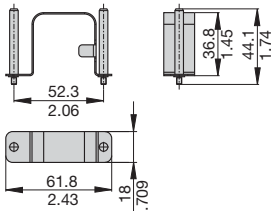
### Withdrawal tool for ESS20 /ESX10 Y 308 602 01



### Withdrawal tool Y 308 602 01

suitable for **19BGT-2-ESS20**  
**19BGT-2-ESX10**

### Withdrawal tool for removing circuit breaker type 8345 X 222 547 02



### Withdrawal tool X 222 547 02

suitable for **19BGT-2-X8345**  
**X8345-D01**

### Withdrawal tool for removing circuit breaker type 2210-S291 X 211 018 01



### Withdrawal tool X 211 018 01

suitable for **19BGT-2-X2210**  
**X2210-S06...**

## 1U compact solution



19" 1U Power-D-Box power distribution system (also for ETSI systems) accommodating plug-in thermal-magnetic circuit breakers type 2210-S or similar types, single or double pole, with or without signal contact.

8 single pole (or 4 double pole) circuit breakers are fitted transversely as vertical pairs, line entry is at the rear by means of screw terminals with 16 (25) mm<sup>2</sup> cable cross section capacity. Redundant design of the system (2 x 4 single pole circuit breakers) is also available.

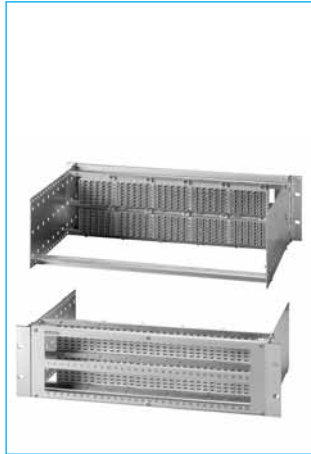
The load terminals are connected from the front by means of high current sub-D connectors or by means of screw terminals up to 4 mm<sup>2</sup>. Auxiliary contact terminals can be connected from the rear (serial or parallel connection possible).

For replacing or retrofitting circuit breakers part of the front plate can be removed.

Above and below the circuit breakers are two narrow strips for customer-specific marking. Permanent marking is available ex factory for the front plate as an option.

Max. rating per way is 16 A (due to the derating of the circuit breakers mounted closely side-by-side), max. load of the line entry is 63 A at DC 65 V / AC 250 V.

## 3 U multi-channel solution



19" 3U racks (also for ETSI systems) for accommodating plug-in type 2210-S or similar, single pole or multipole, with or without auxiliary contacts.

Up to 60 single pole circuit breakers can be fitted (in 2 rows above each other). Standard version of the rack is supplied without wiring, but customer-specific wiring is possible upon request.

Type and size of line entry, wiring of load outputs, signal contact connection as well as fitting with connecting terminals will be to order.

For replacing or retrofitting circuit breakers part of the front plate can be removed. Unused ways can be covered with blanking pieces.

Above and below the circuit breakers customer-specific marking is possible. Permanent marking is available ex factory for the front plate as an option.

Max. rating per way is 16 A (due to the derating of the circuit breakers mounted closely side-by-side), max. load of the line entry is 63 A at DC 65 V / AC 250 V.

## High Power



Power distribution system for direct mounting to the rear wall of a control cabinet. Featuring type X8345-D01 power distribution rail with a variable number of modules possible.

Plug-in type 8345 circuit breakers are installed allowing load output currents of up to 125 A per module, with a maximum of 160 A for two adjacent positions.

Line entry is on the side, connected directly to internal busbars with up to 300 A at max. DC 110 V / AC 230 V.

Optional auxiliary contacts are also connected from the side by means of 2.8 mm blade terminals, all contacts are connected in parallel.

Reliable main and load terminal connections are by means of M10/M12 hexagonal screws.

The entire power distribution system is protected against brush contact by a slide-on plexi glass cover.

The system is mounted on the rear wall of a control cabinet by means of aluminium brackets. The system is also available as a version offering system redundancy.

The circuit breakers are hot-swappable without removing the protective cover.

Above and below the circuit breakers customer-specific marking is possible. Permanent marking is available ex factory for the front plate as an option.

## 1U compact solution X482



1U rack for 19", 23" and ETSI systems for accommodating thermal circuit breakers type 482, single pole with or without auxiliary contact.

The rack is redundantly configurable with up to 8 circuit breakers (A + B supply). Line entry is at the rear by means of screw terminals or optionally by means of pluggable connector technology. The system is also available with only one line entry (1 x 16 circuit breakers).

Load terminals are connected from the side via high current contacts (optionally from the rear via screw terminals). Auxiliary contact terminals are on the side (serial and parallel wiring), optional LED indication is configurable on the front.

For replacing or retrofitting circuit breakers the front plate can be removed. Circuit breakers must be switched off but may be replaced with power on.

Customer-specific marking of the front plate is possible.

Max load of one way is 50 A (please observe derating factor), max. load of the line entry is 2 x 450 A at DC 72 V (optionally AC 230 V or AC 115 V).

2U version with front terminals



The Power-D-Box is a 2U 19" power distribution system (also for ETSI systems), accommodating plug-in type double pole thermal-magnetic circuit breakers 2210-S with auxiliary contacts.

All cable connections are on the front by means of feed-through terminals, partly pluggable.

Line entry is via two fixed feed-through screw terminals up to 10 mm<sup>2</sup> with cable feed from below, max. line current 50 A.

The load outputs are connected via double pole plug-in type screw terminals or alternatively spring-loaded terminals up to 4 mm<sup>2</sup>. Polarisation is colour-coded. Cable feed is from the front. Max. load current is 16 A. All auxiliary contacts are combined as a group signal (series or parallel connection are possible) and also have plug-in type terminals up to 4 mm<sup>2</sup>.

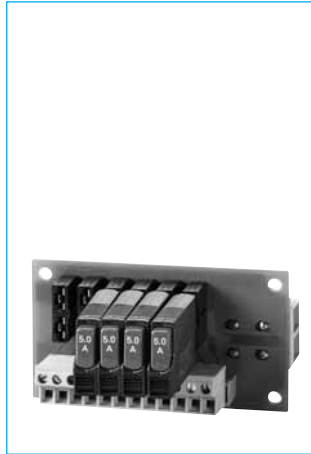
All connectors may optionally be fitted with a strain relief by means of wire wraps.

All terminals and circuit breakers are marked correspondingly.

The version shown above accommodates 8 double pole circuit breakers, variations upon request.

The front plate can be removed for replacing the circuit breakers.

Modular distribution system on pcb



Small compact power distribution system on printed circuit board to accommodate 6 plug-in type thermal overcurrent circuit breakers type 1180.

Line entry is on the rear via screw terminals up to 10 mm<sup>2</sup>, max. 16 A (back-up fuse required).

Load outputs are connected via a plug-in type screw terminal busbar, cable cross section 2.5 mm<sup>2</sup>, max. 10 A.

Dimensions of the system are 90 x 50 x 96 mm (l x w x d) including the installed circuit breakers.

Numbers of ways, termination as well as mechanical design of the power distribution system can be tailored to customers' needs.

Max. rated voltage DC 65 V, AC 250 V.

1U Compact Solution High Power



Two Power-D-Boxes, 1U 19" power distribution systems, for use with thermal high-performance circuit breakers type 482.

The power distribution systems feature a redundant design with 2 x 4 ways.

Connection of all cables can be either from the rear or on the front.

Line entry is on the right and left sides by means of screw-type feed-through terminals up to 16 mm<sup>2</sup> cable cross section, max. 100 A per side.

Load outputs are also via screw-type feed-through terminals up to 10 mm<sup>2</sup>, max. 50 A per way (please observe derating factor of the circuit breakers).

Plug-in design of the circuit breakers allows easy adaptation to changing loads.

The max. installation depth is less than 180 mm including front and rear screw terminals.

Max. rated voltage is DC 72 V or AC 230 V.

7

**Description**

Module 17plus is a power distribution system for use with E-T-A circuit breakers type 2210-S... or 3600-.../3900-... or electronic circuit breaker ESS20 or SSRPC E-1048-7... Each module accommodates two single pole plug-in circuit breakers with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails.

The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules, but each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of screwless spring loaded terminals.

Suitable electro-mechanical circuit breakers have integral make and break auxiliary contacts. Depending on the application these may be used for either single or group signalisation. For group signalisation, the make contacts (which open in the event of a fault) are connected in series to the terminal blocks of the modules. The module is designed to accommodate a probe for series connection continuity tests. When multipole circuit breakers are fitted auxiliary contacts are required for each pole.

Single signalisation is achieved through use of the break contacts (which close in the event of failure) connected in parallel by means of terminals on each module. Both types of signalisation (individual and group signalisation) are available at the same time if the circuit breakers used provide auxiliary contacts (please note when ordering). The signalling circuitry between modules is automatically connected when modules are linked together.

Meets the requirements of UL60950

**Ordering information**

**For thermal magnetic circuit breakers types 2210-S, 3600, 3900:**

**For electronic circuit breaker type ESS20:**

**For solid state remote power controller E-1048-7..:**

17PLUS-Q02-00	Module 17plus, centre piece, two-way
17PLUS-QA0-LR	one each left- and right-side terminal block for supply feed from the side by means of screw terminal

<b>Technical data of:</b>	<b>please see:</b>
Circuit Breaker 2210-S, 3600, 3900	product group 2
Electronic Circuit Breaker ESS20, ESX10	product group 5
Solid State Remote Power Controller E-1048-7..	product group 6

**Approvals**

Authority	Voltage ratings	Current ratings
UL USA + Canada	AC 250 V; DC 80 V	50 A



**17plus**

**Technical data**

Connection	Spring-loaded terminals for rigid wires and flexible cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals. Line feed (1): spring-loaded terminals for 1.5 – 10 mm <sup>2</sup> , SD 2 (0.8x4.0) Load output (2): spring-loaded terminals for 0.25-4 mm <sup>2</sup> , SD 1 (0.6x3.5) Signalisation: terminals (11, 13, 14): spring-loaded terminals for 0.25-2.5 mm <sup>2</sup> , SD 1 (0.6x3.5) terminal (12): spring-loaded terminal for 0.25-1.5 mm <sup>2</sup> , SD 0 (0.4x2.5)
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Test probe for testing the group signal for line interruption: ≤ 2 mm ø

Voltage rating (without circuit breaker):	AC 433 V; DC 65 V	
Current rating (without circuit breaker)	Internal resistances (without circuit breaker)	
Line feed (1)	50 A	Line/load (1-2) ≤ 5 mΩ
Load output (2)	25 A*)	Signalisation
Signalisation		parallel (11-12) ≤ 9 mΩ <sup>1)</sup> /per pole
Feed (11) (ground with electronic components)	10 A	serial per module (13-14) ≤ 8 mΩ <sup>2)</sup> /per pole plus
Single output (12)	1 A	<sup>1)</sup> + 2 mΩ
Group signal (13-14)	1 A	<sup>2)</sup> + 5 mΩ for each further module interconnected

\*) Caution: When several devices are mounted together, each should carry only max. 80 % (I<sub>N</sub> ≤ 16 A) or max. 65 % (I<sub>N</sub> > 16 A) of its rating.

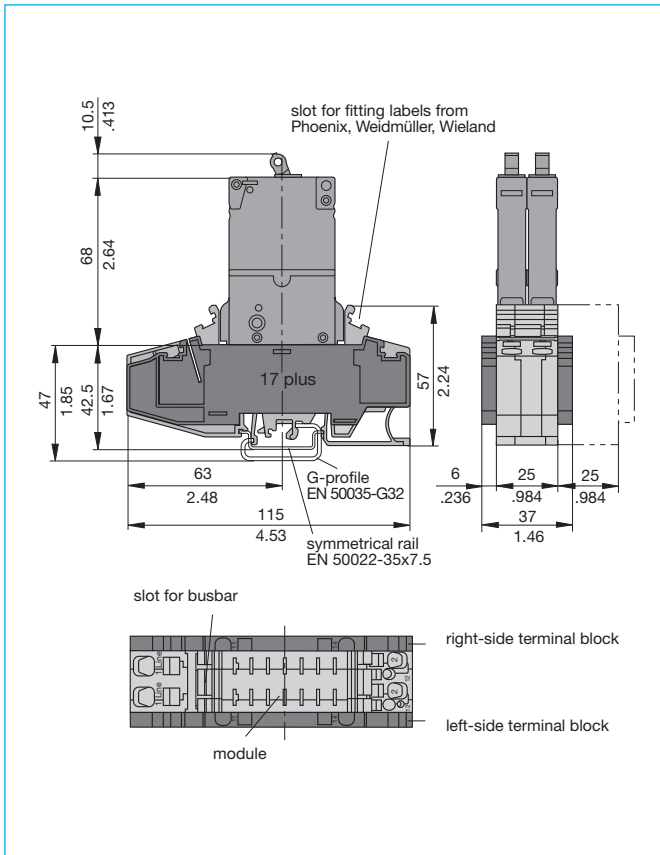
Busbar for power distribution	
insulated busbar (blue or red):	I <sub>max</sub> 32 A
non-insulated busbar:	I <sub>max</sub> 50 A
(The non-insulated busbar, too, meets brush contact safety standards when fitted.)	

Dielectric strength	
between main circuits (without busbar):	1,500 V
main circuit to auxiliary circuit:	1,500 V
between auxiliary circuits:	1,500 V

Mass: Module 17plus (centre piece)	approx. 85 g
terminal blocks (pair)	approx. 30 g

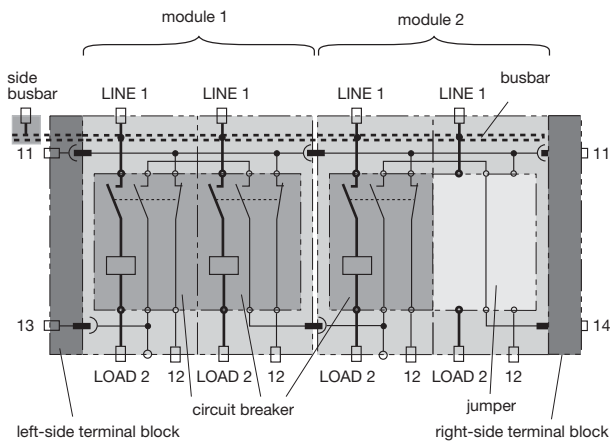


## Dimensions



## Connection diagram

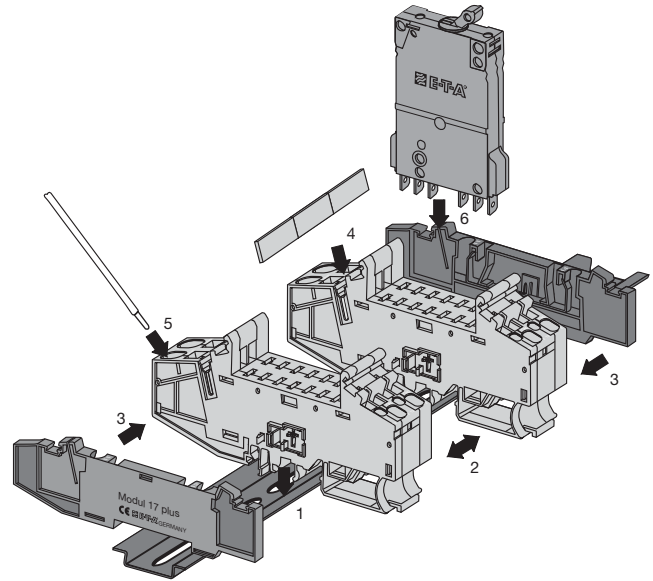
### Example for circuit breaker types 2210, 3600, 3900



- 13, 14 terminals for group signalisation
- 11 feed for single signalisation
- 12 terminal for single signalisation

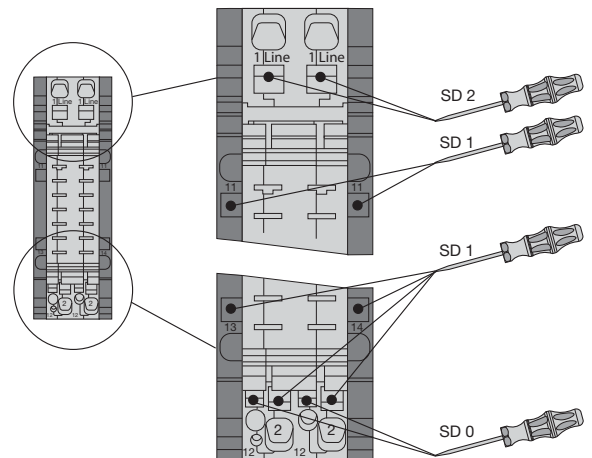
For connection diagram for electronic circuit breakers and components please see relevant data sheets of types ESS20, ESS21, E-1048-7..

## Installation example



Installation:

- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in circuit breakers.



Connection and disconnection of cables with screw driver

## Module 17plus for electronic overcurrent protection

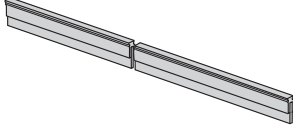
For technical data, dimensions, mounting examples, schematic diagrams and connection diagrams of

- ESS20-0... please see product group 5
- ESS20-1... please see product group 5
- ESX10 please see product group 5
- E-1048-7... please see product group 6

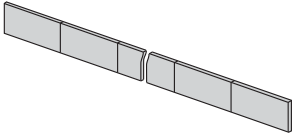
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

**Accessories**

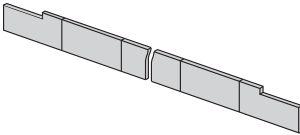
**Busbar 32 A**  
**X 222 005 01** blue insulation, 500 mm/19.68 in.  
**X 222 005 02** red insulation, 500 mm/19.68 in.  
**X 222 005 03** grey insulation, 500 mm/19.68 in.



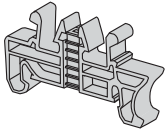
**Busbar 50 A**  
**Y 307 016 01** non-insulated, 500 mm/19.68 in.



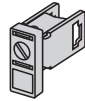
**Busbar 50 A**  
**Y 307 016 11** non-insulated, 500 mm/19.68 in.



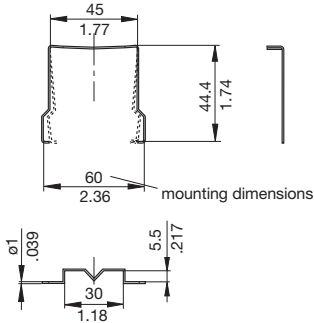
**End bracket**  
**X 222 004 01**



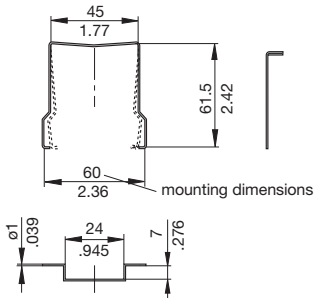
**Screw terminal for busbar**  
**X 211 156 01** non insulated  
 (up to 35 mm<sup>2</sup>)



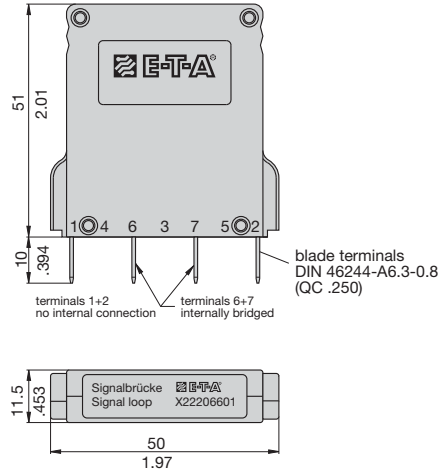
**Retaining clip for circuit breaker 3600/3900**  
 recommended for fitting the devices  
**Y 300 581 11**



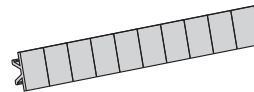
**Retaining clip for circuit breaker 2210**  
 recommended for fitting single pole devices  
**Y 302 974 21**



**Jumper X 222 066 01**



**Labels**  
 marking area 6 x 10 mm  
 (ordering unit 10 pcs = 1 strip)  
**Y 307 942 61**



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

The E-T-A power distribution system SVS02 is designed to accommodate the electronic circuit breaker series ESS20-003 or electronic circuit protector ESX10. It distributes the current supplied by a switch mode power supply up to 40 A to 4, 8, 12 or 16 channels. Input connections are via screw terminals. The individual circuit breakers can be plugged in. Loads are connected via spring-loaded screwless terminals. The power distribution includes integral wiring of the signalisation of the individual channels which can be combined to a group signal. The SVS02 can be snapped onto a DIN symmetrical rail.

- Suitable for**
- ESS20-003
  - ESX10-103
  - 2210-S21.
  - 3600

## Ordering information

### Type

- SVS02** Power distribution system for ESS20-003
- short circuit current limited DC 24 V applications
  - max. 40 A continuous load
  - two integral circuit breakers (CB1 and CB2): overcurrent protection of group signalisation of power distribution system, red LED glashes upon trip of CB1
  - 2 insulated wire bridges Y 303 881 08 included
  - without jumpers X 222 066 01 (for unused positions)

### Version, max. number of circuit breakers ESS20-003 on the power distribution system

- 04** 4 channels (F1...F4)
- 08** 8 channels (F1...F8)
- 12** 12 channels (F1...F12)
- 16** 16 channels (F1...F16)

### Screw terminals for power supply DC 24 V

- P310** 3 loop-through terminals (X 21) max. 10 mm<sup>2</sup> for DC 24 V (+) / DC 24 V (-) / FE functional earth

### Load outputs per channel (F1 .. Fn, n = 04, 08, 12, 16)

- L50** 5 load outputs per channel, max. 8 A each
- (L+S) group output (+) internally bridged over all channels
  - (L+L) protected load output (+), per channel
  - (-) DC 24 V (-)
  - (-) DC 24 V (-)
  - (FE) functional earth

### Signal outputs

- S15** 1 signal terminal (X31) for group signal, 5-pole, complete with plug-in terminal, wiring 5 x max. 2.5 mm<sup>2</sup> / without connector sleeve, max. 0.5 A:
- (+) internal +DC 24 V supply for signalisation via insulated wire bridge from (+) to (SC)
  - (SC) external supply possible +DC 24 V for signalisation
  - (S0) signal output group signalisation
  - (-) additional output DC 24 V (-)
  - (FE) additional functional earth

### Control input

- E00** without control input

### Fitting variants

- B10** complete with screwless spring-loaded terminals, (max. 2.5 mm<sup>2</sup>, without connector sleeve) (standard)
- B20** complete with plug-in screw terminals (max. 2.5 mm<sup>2</sup>, without connector sleeve)

SVS02 - 16-P310 - L50 - S15 - E00 - B10

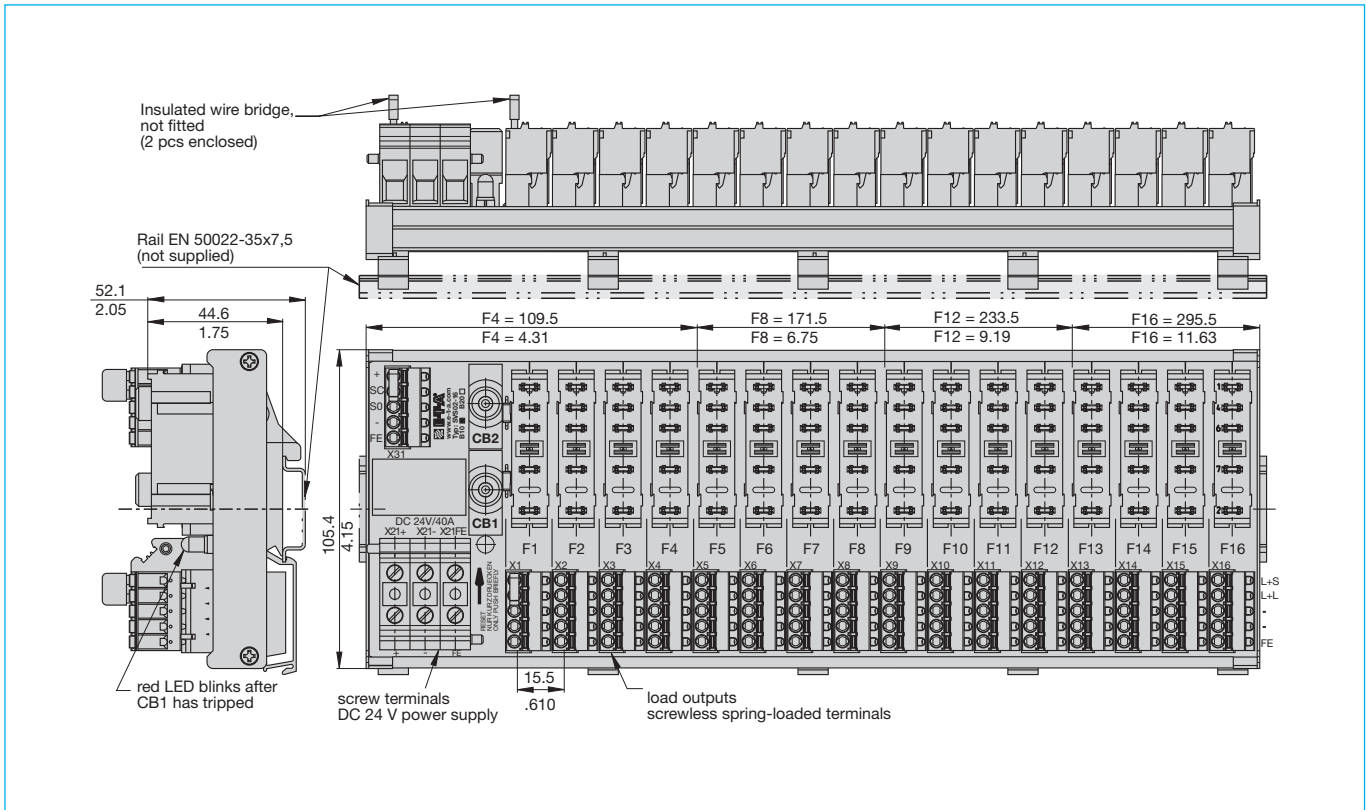


SVS02-08-...

## Technical data

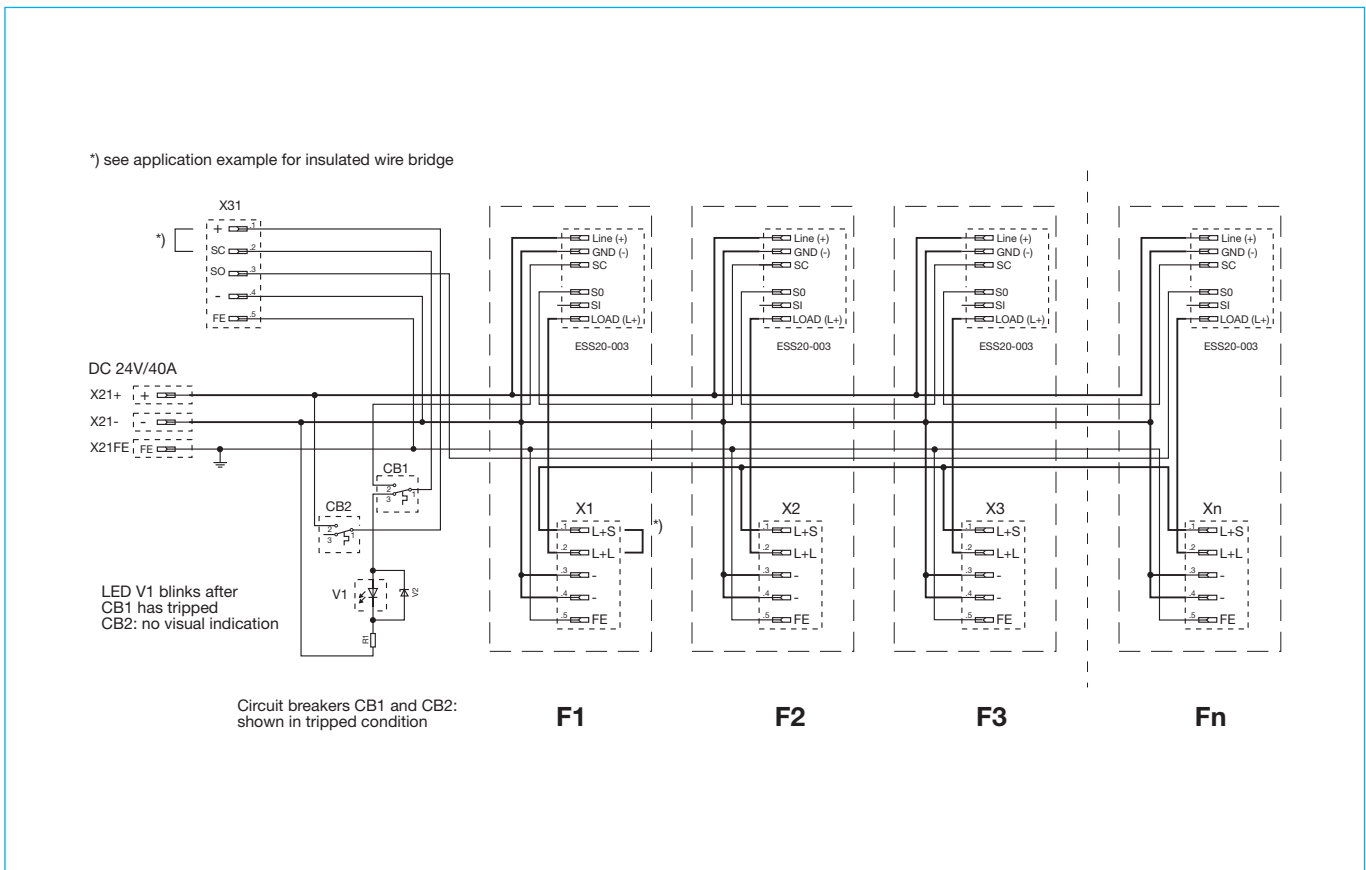
- Modular Power distribution system for short-circuit limited DC 24 V applications up to max. 40 A continuous load, max. voltage DC 32 V.
- Three screw terminals (max. 10 mm<sup>2</sup>/AWG 8) for:
  - DC 24 V (+) = X 21 +
  - DC 24 V (-) = X 21 -
  - FE (functional earth) = X 21 FE
 for connecting the DC 24 V power supply max. 40 A
- Modular design ESS20-positions F1...F4 (...F8, ...F12 or ...F16):
  - SVS02-04 / 4 channels / F1...F4 = Kl. X1...X4
  - SVS02-08 / 8 channels / F1...F8 = Kl. X1...X8
  - SVS02-12 / 12 channels / F1...F12 = Kl. X1...X12
  - SVS02-16 / 16 channels / F1...F16 = Kl. X1...X16
- 5 load outputs per channel complete with Combicon screwless connectors, wiring 5 x max. 2.5 mm<sup>2</sup> (AWG 14)/ without connector sleeve max. 8 A:
  - (L+S) group output (+), internally bridged across all channels
  - (L+L) load output (+), per channel
  - (-) DC 24 V (-)
  - (-) DC 24 V (-)
  - (FE) functional earth
- Signal terminal (X31) for group signal complete with Combicon screwless connectors, wiring 5 x max. 2.5 mm<sup>2</sup> (AWG 14)/ without connector sleeve, max. 0.5 A (signal contact ESS20):
  - (+) internal +DC 24 V supply for signalisation of terminal X 21 + via insulated jumper from (+) to (SC), protected by CB2
  - (SC) external supply possible +DC 24 V for signalisation, protected by CB1
  - (S0) signal output group signalisation
  - (-) additional output DC 24 V (-)
  - (FE) additional functional earth
- Selective overcurrent protection CB1 and CB2 for group signalisation of the power distribution system, red LED blinks after CB1 has tripped (see schematic diagram). Reset of circuit breakers: momentarily press red actuator button
- Protection class to: IP20
- Insulation co-ordination to IEC 60934: 0.5 kV / pollution degree 2
- Dielectric strength AC 500 V
- Temperature range: 0...50 °C (without condensation)
- for DIN symmetrical rail mounting EN 50022 - 35 x 7.5
- Dimensions: see dimensional drawing

## Dimensions SVS02-16



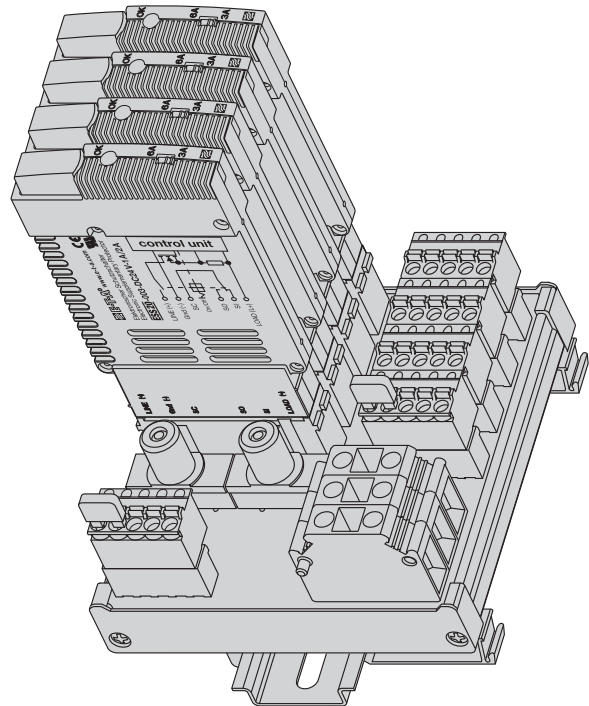
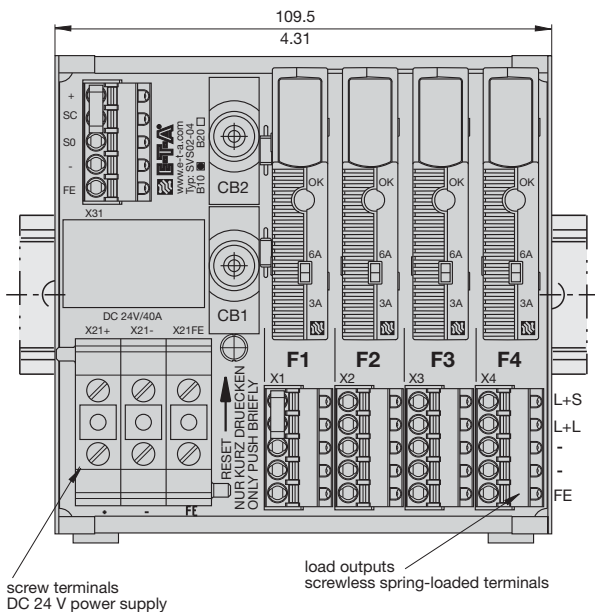
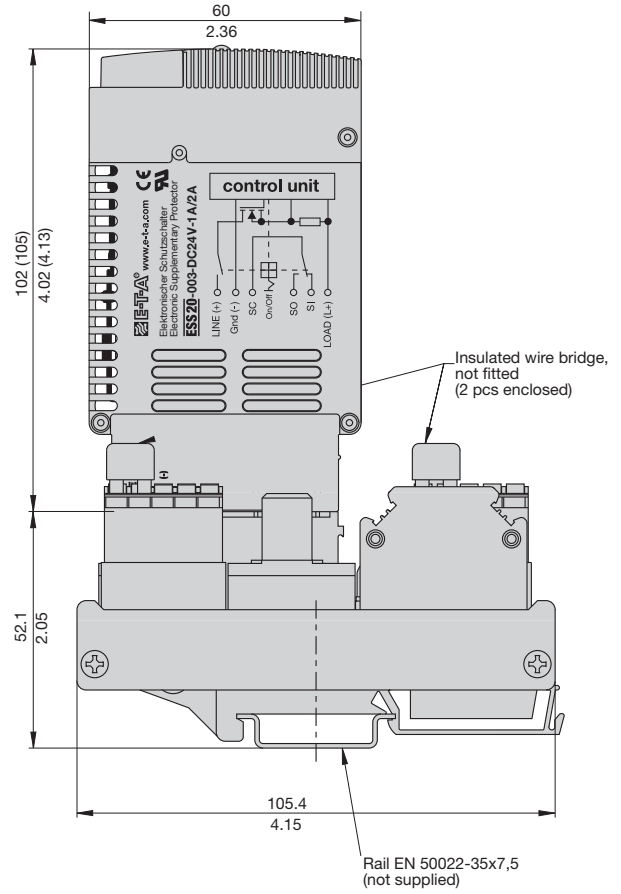
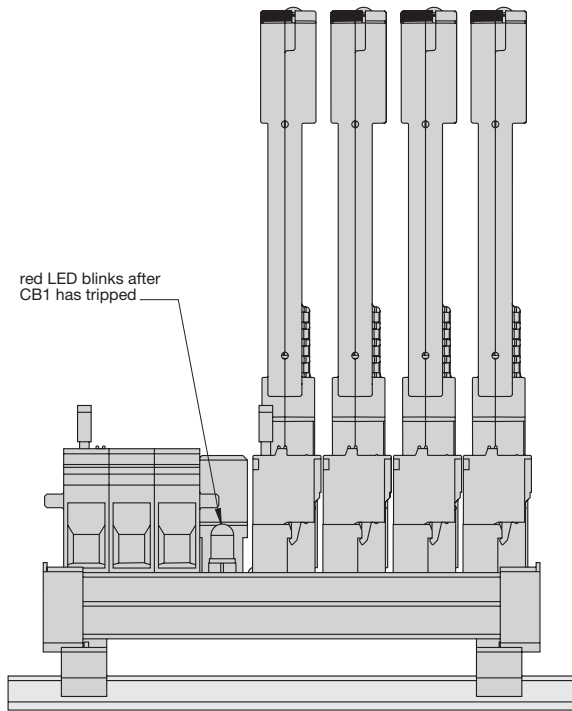
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

## Schematic diagram SVS02-(n) n = 04, 08, 12, 16



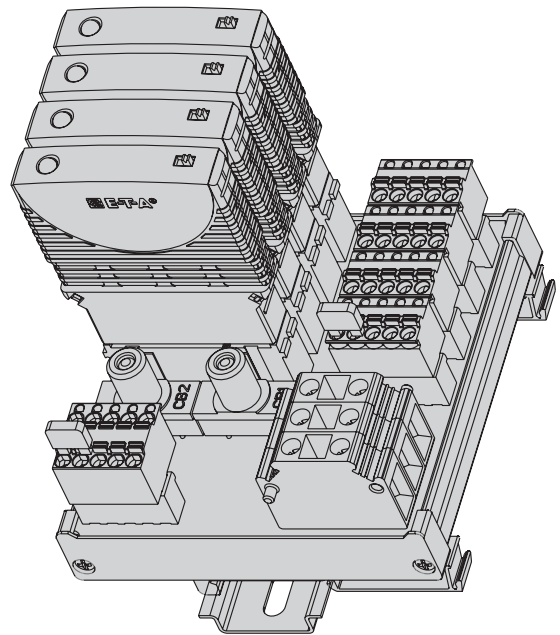
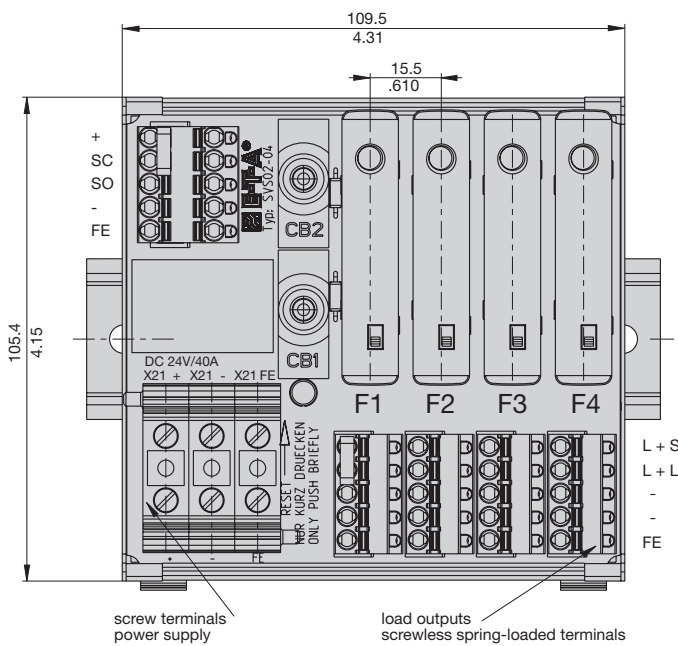
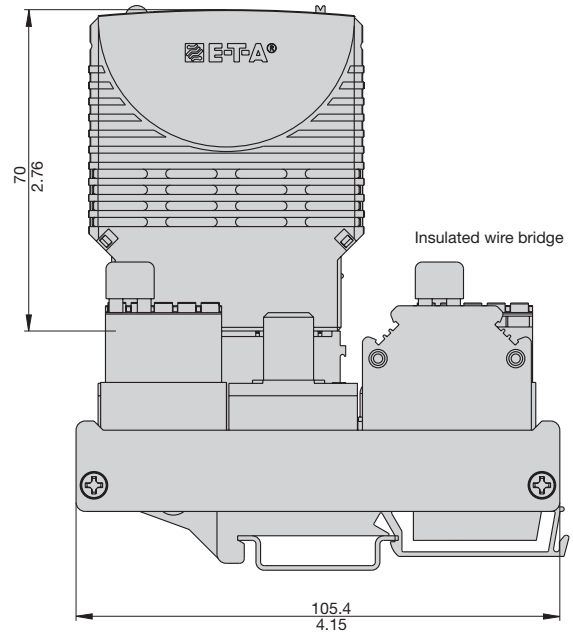
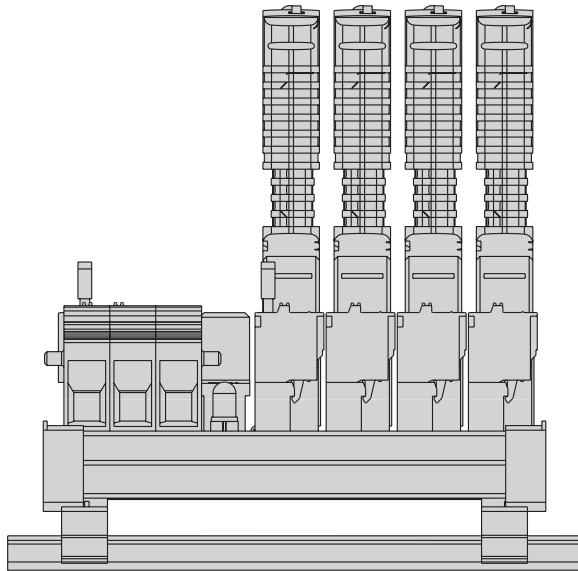
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Dimensions SVS02-04, fitted with ESS20-003



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

## Dimensions SVS02-04, fitted with ESX10-103



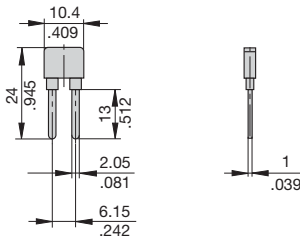
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**Accessories**

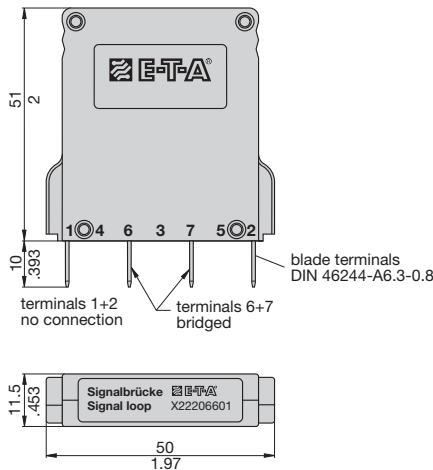
**Insulated wire bridge  
Y 303 881 08**

Two insulated wire bridges are supplied with the power distribution system. They may be used for:

- Channel X31: internal +DC 24 V supply for signalisation wire bridge from (+) to (SC)  
Signal circuit (+) to (SC) protected by CB2  
Signal circuit (SC) to (SO) protected by CB1
- Channel X1: Protected load output (L+L) of CBE position F1 takes over protection of (L+S) terminals of all CBEs F2 up to Fn (n= 04, 08, 12, 16)



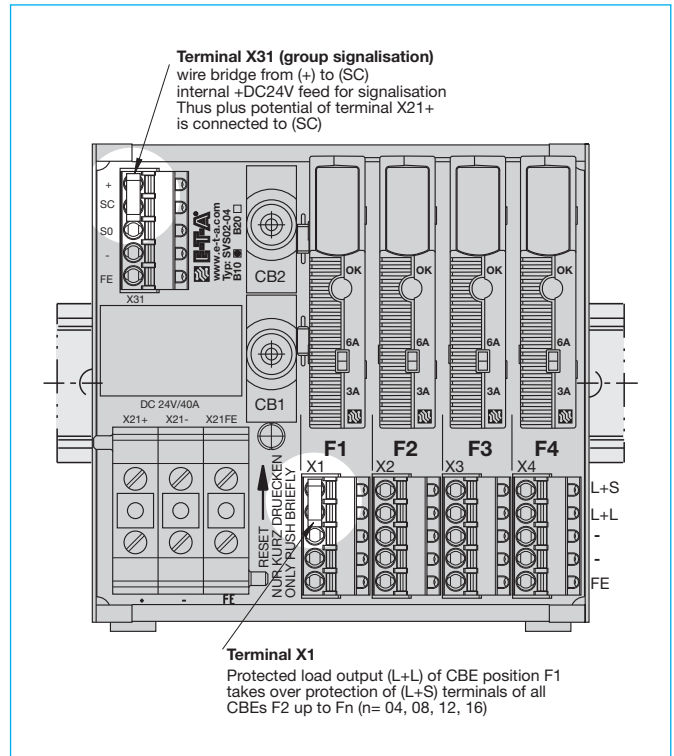
**Jumper  
X 222 066 01**



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**Application example for insulated wire bridge**

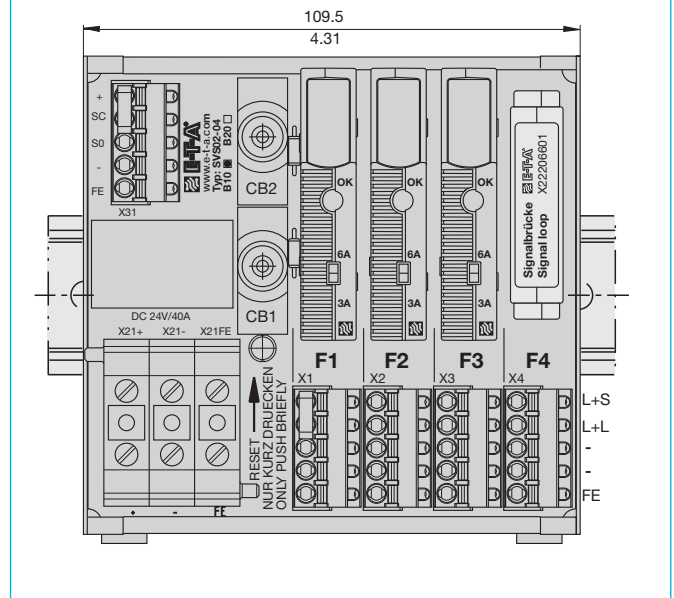


**Application example for jumper to replace ESS20-003**

- The signalling pathway of the group signalisation is as follows:
- feed-in of +DC 24 V potential in (SC = terminal 31.2)
  - via in-built overcurrent protection CB1
  - via all signal contacts of the fitted circuit breakers type ESS20-003
  - back to signal output of group signalisation (S0 = terminal 31.3)

In operating condition (i.e. all circuit breakers plugged in and functional) the signalling pathway (SC) to (S0) is closed.

**If the distribution rail is not completely fitted with ESS20-003, the open pathway (SC) to (S0) may be closed by means of a jumper type X 222 066 01.**



## Description

The SVS04 power distribution system for symmetrical DIN rail mounting is designed to distribute power from a switch-mode power supply to 4 or 8 channels. Selective protection of the load output circuits is provided by the plug-in type circuit breakers installed. With a max. load current of 8A per channel and a max. total current of 40A the SVS04 provides ease of wiring in short circuit current limited DC24V applications. Five protected "L+" load outputs per way and 15 or 30 minus terminals significantly reduce wiring time enormously.

Electronic circuit breaker ESS20-003, electronic circuit protector ESX10-103, thermal-magnetic circuit breakers 2210-S21. and 3600 are all suitable for use with the SVS04, plugging directly into the sockets provided for each of the 4 or 8 outputs.

## Ordering information

### Type

**SVS04** power distribution system for types ESS20-003, ESX10-103, 2210-S21., 3600

- for short circuit current limited DC 24 V applications
- max. 40 A continuous load
- one integral circuit breaker (CB1): overcurrent protection of group signalisation, red LED flashes upon trip of CB1
- including 1 insulated wire bridge Y 303 881 08
- accessories: jumper X 222 066 01 for unused ways, please order separately

### Version, max. number of circuit breakers on the power distribution system

**04** 4 circuit breakers F1...F4)

**08** 8 circuit breakers (F1...F8)

### Fitted versions

**B10** standard: fitted with screwless spring-loaded terminals (max. 2.5 mm<sup>2</sup>, without wire end ferrule)

**B20** fitted with plug-in type screw terminals (max. 2.5 mm<sup>2</sup>, without wire end ferrule)

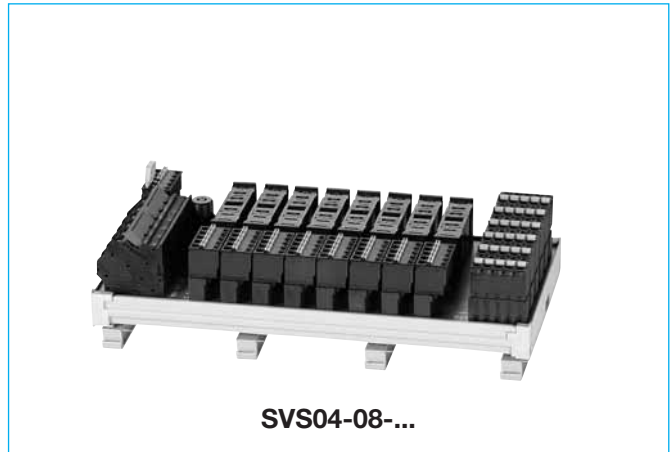
**C10** fitted with pcb terminals, spring-loaded terminals (max. 2.5 mm<sup>2</sup>, without wire end ferrule)

### Minus terminals

- 15 minus terminals

**K01** 30 minus terminals (only for SVS04-08)

SVS04 - 04 - B10 - ...



SVS04-08-...

## Technical data

### DC24 V supply

DC 24 V terminals, 2x3 terminals (screwless terminals max. 10 mm<sup>2</sup>), for current supply  
 - DC 24 V (+) = (X21) +/+/  
 - DC 24 V (-) = (X21) -/-/  
 Integral loop-through, for wiring and additional connection of an external buffer module.

### F positions

Number of ways for circuit breakers, suitable for types ESS20-003, ESX10-103, 2210-S21., 3600  
 SVS04-04... F1...F4 = terminals X1...X4  
 SVS04-08... F1...F8 = terminals X1...X8  
 Plug jumper X 222 066 01 into unused ways (please order separately, see accessories)

### Load outputs

5 x L+ protected per position F1...F4 (F1...F8), led through terminals X1...X4 (X1...X8), max. 2.5 mm<sup>2</sup> load current max. 8 A per position

### Signalisation

signalisation terminal X31, 5-pole, max. 2.5 mm<sup>2</sup>  
 +: DC 24 V feed from terminal X21, protected by integral circuit breaker CB1  
 total current max. 0.5 A  
**group signalisation:**  
 S: line feed DC 24 V, insert insulated wire bridge Y 303 881 08 (bulk shipped) between + and GR  
 AS: output of group signalisation  
**two-group signalisation**  
 GR: line feed, insert insulated wire bridge Y 303 881 08 (bulk shipped) between + and GR  
 AS: output group A (X5...X8)  
 B: output group B (X1...X4)

### Minus terminals

3 x 5 terminals (X22, X23, X24) or  
 6 x 5 terminals (X22, X23, X24, X25, X26, X27): version K01

### Termination

For signalisation, load outputs and minus terminals:  
 B10: screwless spring-loaded terminals max. 2.5 mm<sup>2</sup>, with integral test socket  
 B20: plug-in type screw terminals max 2.5 mm<sup>2</sup>, with integral test socket  
 C10: pcb terminal/spring-loaded terminal max. 2.5 mm<sup>2</sup>, with integral test socket

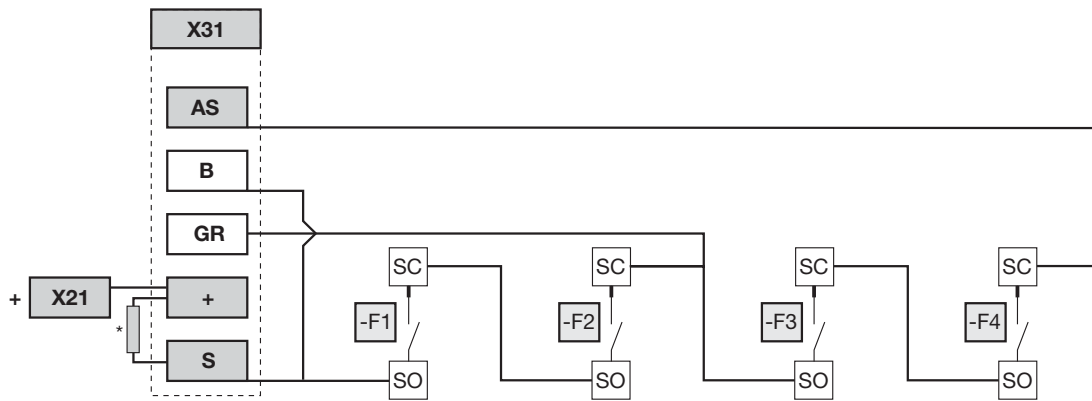
### General data

- protection class to DIN 40050: IP20
- insulation co-ordination to IEC 60934: 0.5 kV
- pollution degree 2
- dielectric strength AC 500 V
- temperature range: 0...50 °C (without condensation)
- for symmetrical DIN rail mounting EN50022 – 35 x 7.5
- dimensions: see dimensional drawings



## Wiring example: SVS04-04... with ESS20-003 and group signalisation

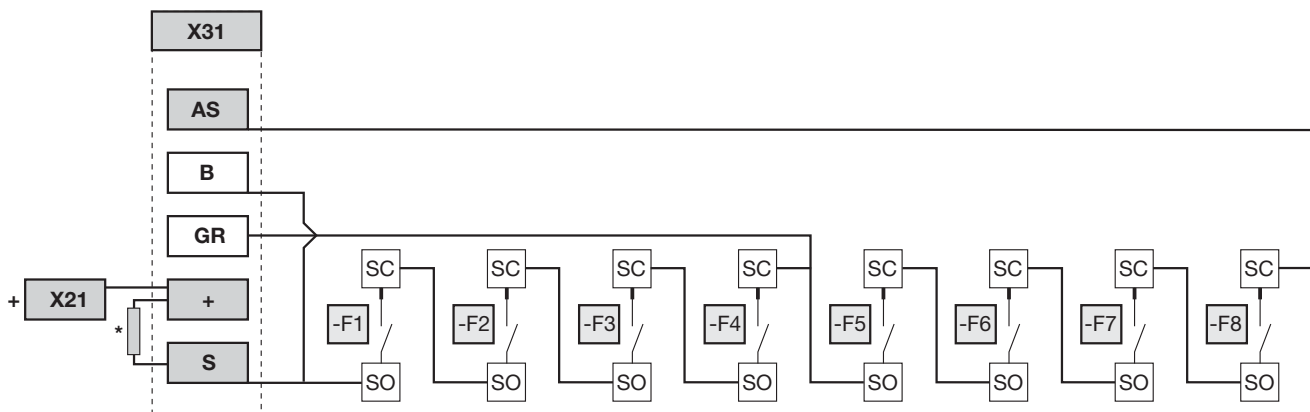
Signal path of group signalisation from F1 to F4



- X 31**     **signalisation terminal**
- AS        signal output group signal
- +         +DC 24 V from terminal 21, internally prewired and protected by CB1
- S         line feed group signalisation with insulation bridge\*
- SC / SO    auxiliary contact ESS20-003, make contact

## Wiring example: SVS04-08... with ESS20-003 and group signalisation

Signal path of group signalisation from F1 to F8

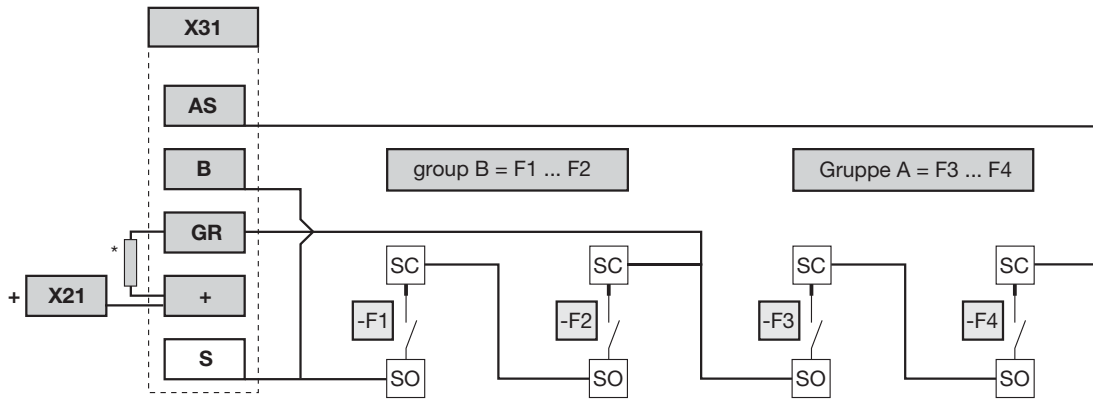


- X 31**     **signalisation terminal**
- AS        signal output group signal
- +         +DC 24 V from terminal 21, internally prewired and protected by CB1
- S         line feed group signalisation with insulation bridge\*
- SC / SO    auxiliary contact ESS20-003, make contact

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## Wiring example: SVS04-04... with ESS20-003 and two-group signalisation

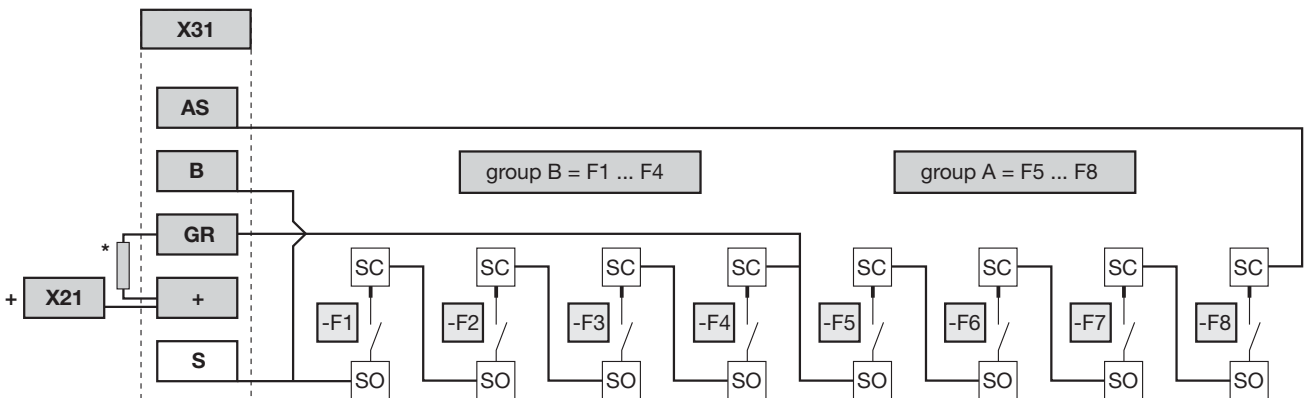
Signal path of two-group signalisation  
from F1 to F2 = group B, from F3 to F4 = group A



- X31**      **signalisation terminal**  
**AS**      signal output group A (F3 ... F4)  
**B**        signal output group B (F1 ... F2)  
**+**        +DC 24 V from terminal 21, internally prewired and protected by CB1  
**GR**      line feed two-group signalisation with insulation bridge\*  
**SC/SO**    auxiliary contact ESS20-003, make contact

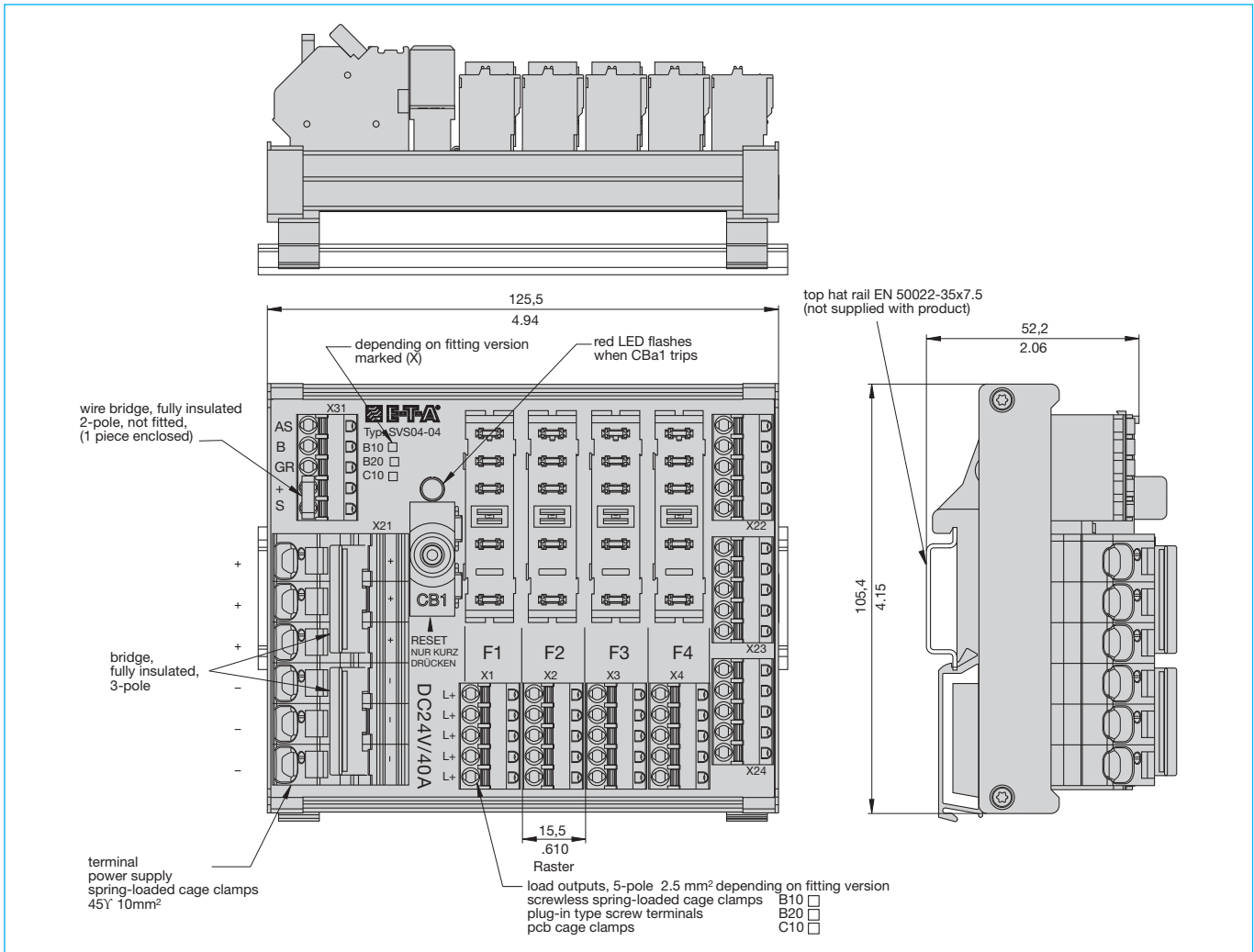
## Wiring example: SVS04-08... with ESS20-003 and two-group signalisation

Signal path of two-group signalisation  
from F1 to F4 = group B, from F5 to F8 = group A

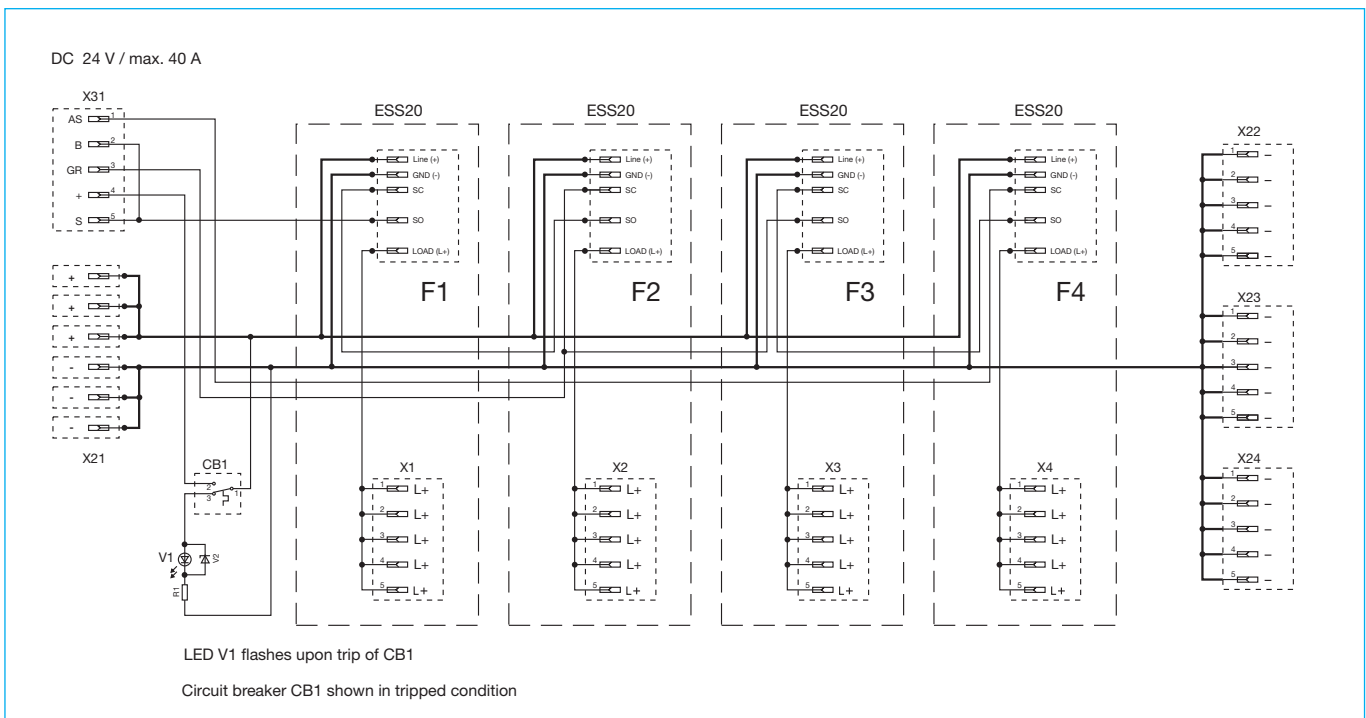


- X31**      **signalisation terminal**  
**AS**      signal output group A (F5 ... F8)  
**B**        signal output group B (F1 ... F4)  
**+**        +DC 24 V from terminal 21, internally prewired and protected by CB1  
**GR**      line feed two-group signalisation with insulation bridge\*  
**SC/SO**    auxiliary contact ESS20-003, make contact

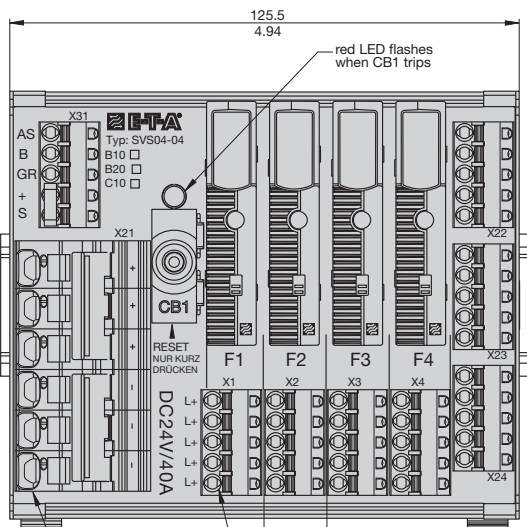
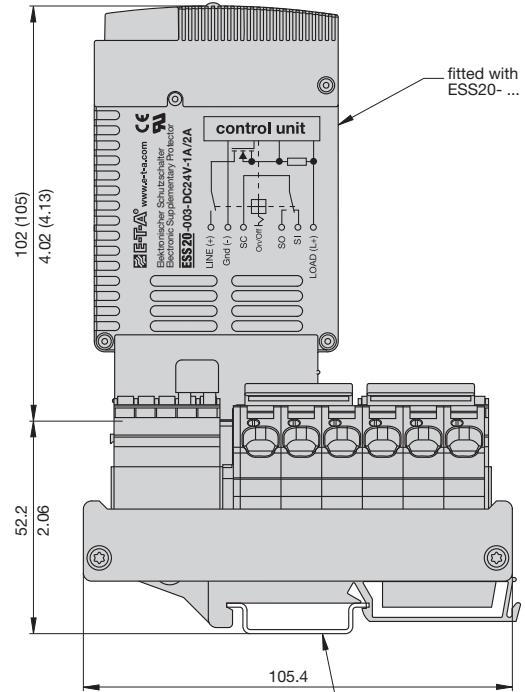
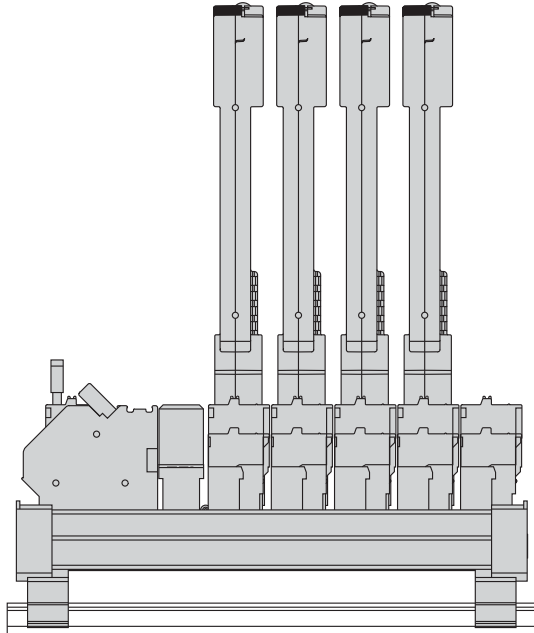
## Dimensions SVS04-04-... (with 15 minus terminals)



## Schematic diagram SVS04-04-... (fitted with ESS20-003)



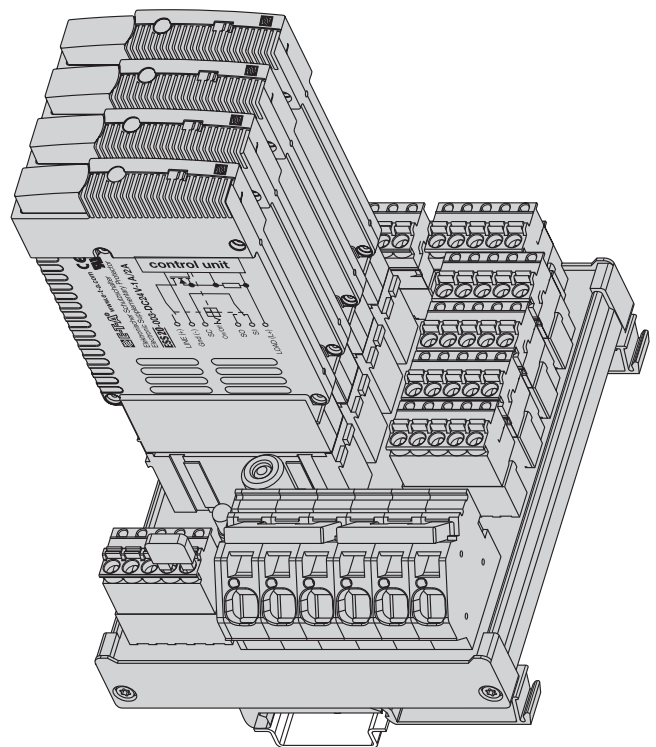
Dimensions SVS04-04-..., fitted with ESS20-003



terminal power supply spring-loaded cage clamps 45° 10mm<sup>2</sup>

load outputs, 5-pole 2.5 mm<sup>2</sup> depending on fitting version screwless spring-loaded cage clamps plug-in type screw terminals pcb cage clamps

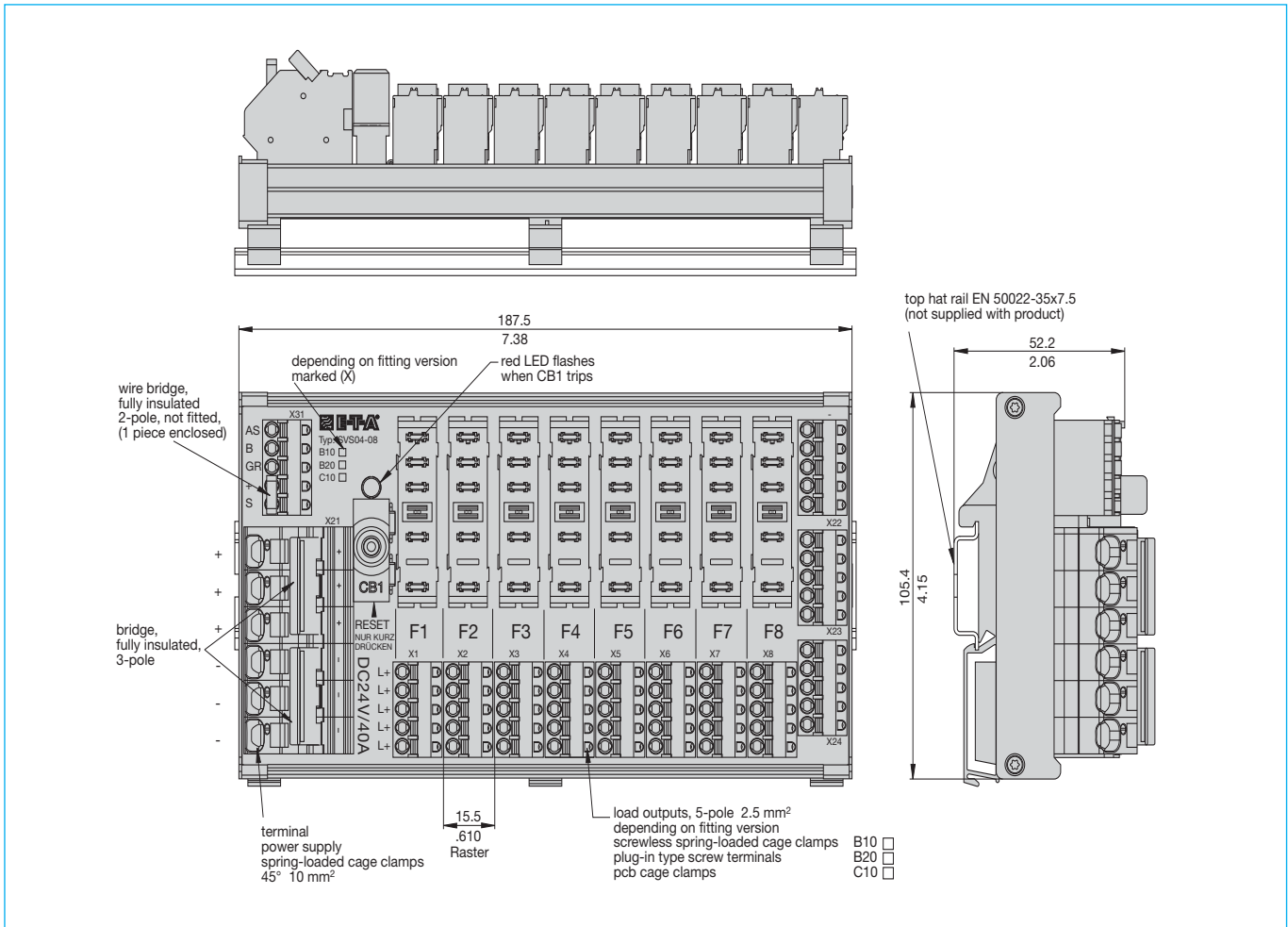
- B10
- B20
- C10



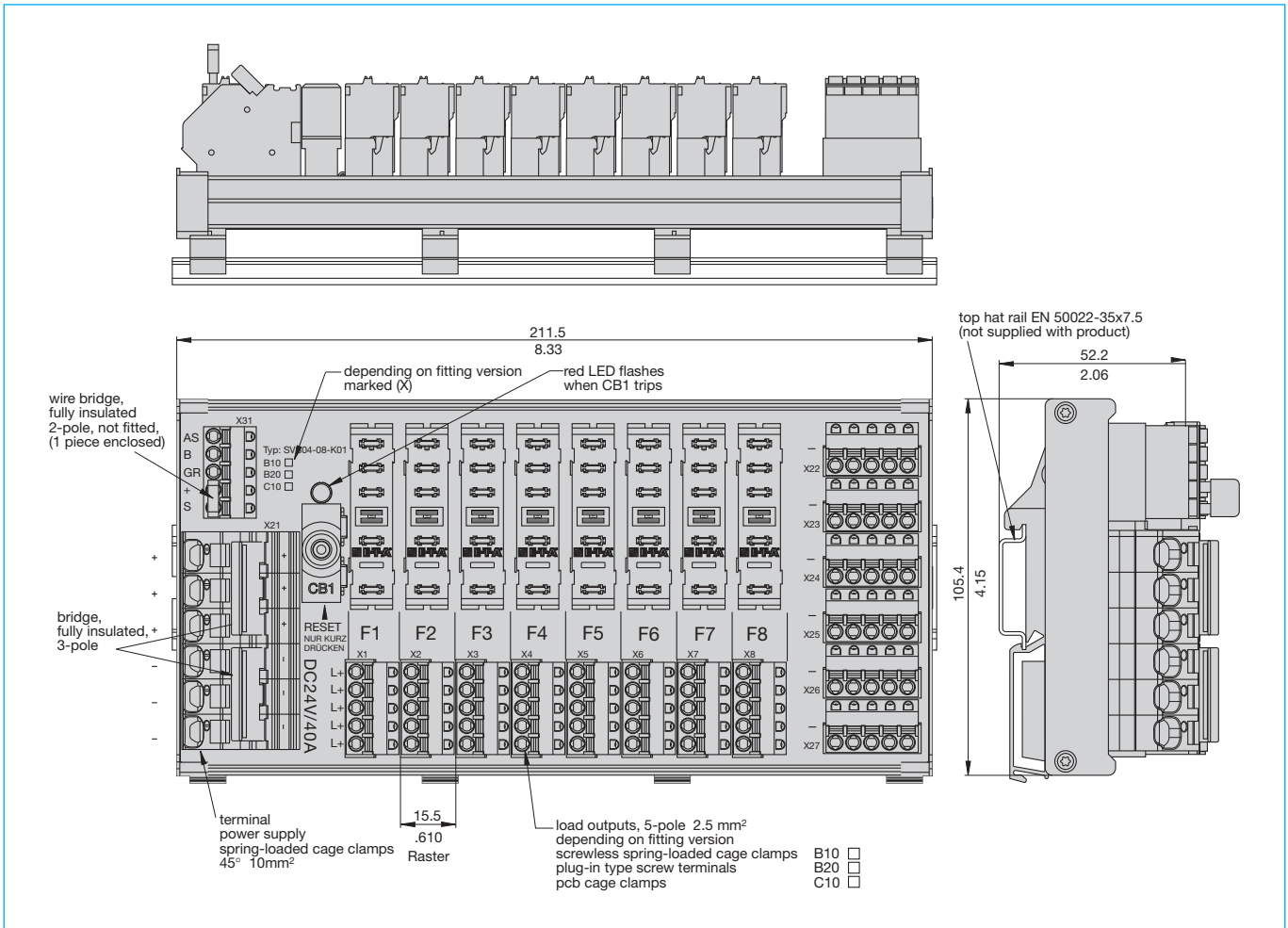
top hat rail EN 50022-35x7.5 (not supplied with product)

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

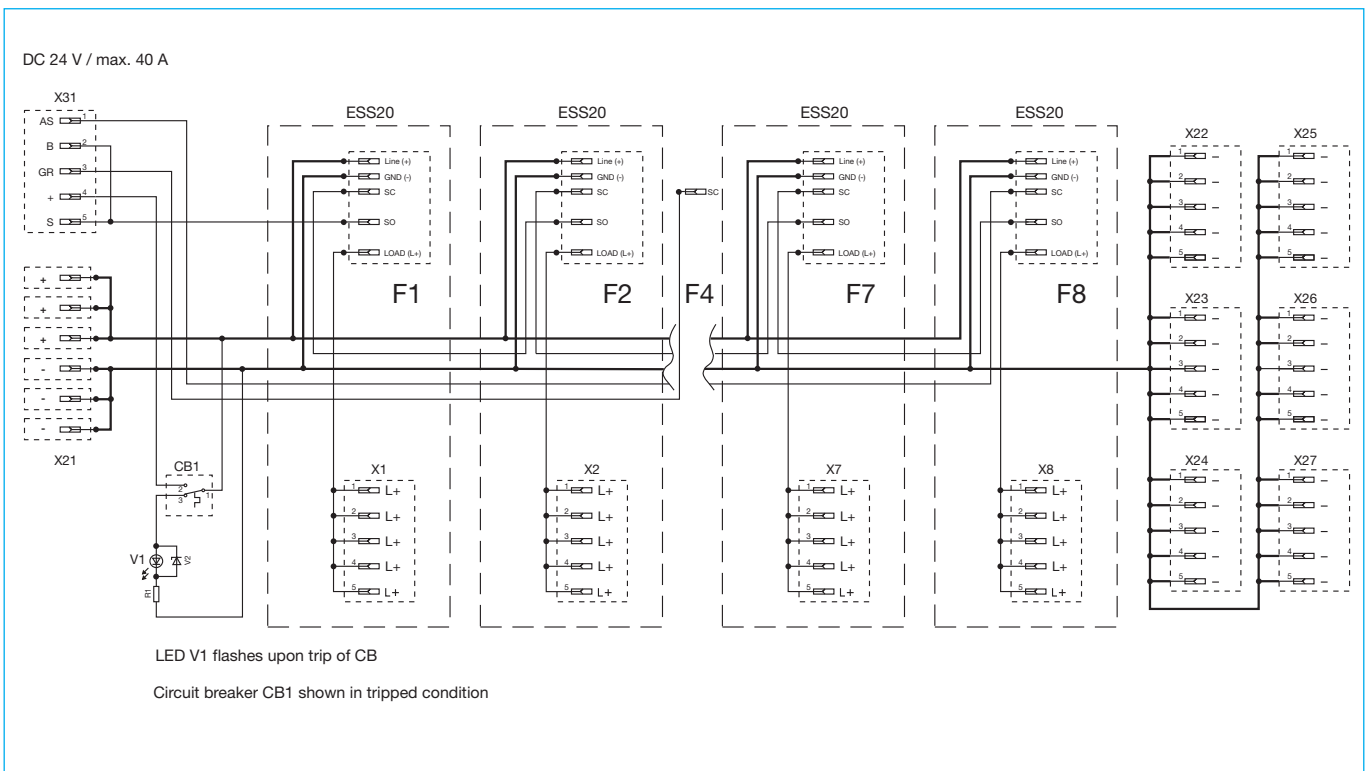
## Dimensions SVS04-08-... (with 15 minus terminals)



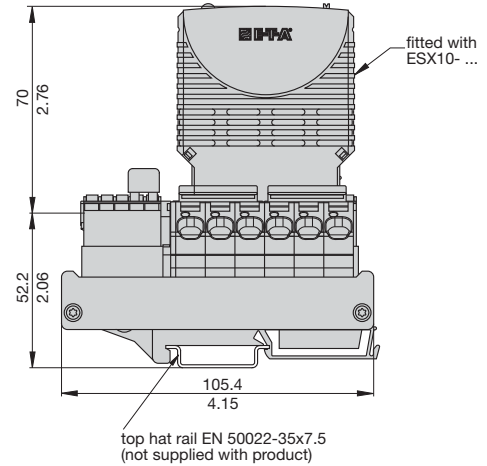
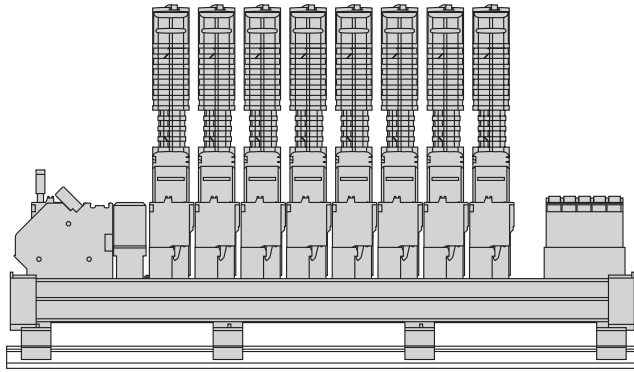
**Dimensions SVS04-08... K01 (with 30 minus terminals)**



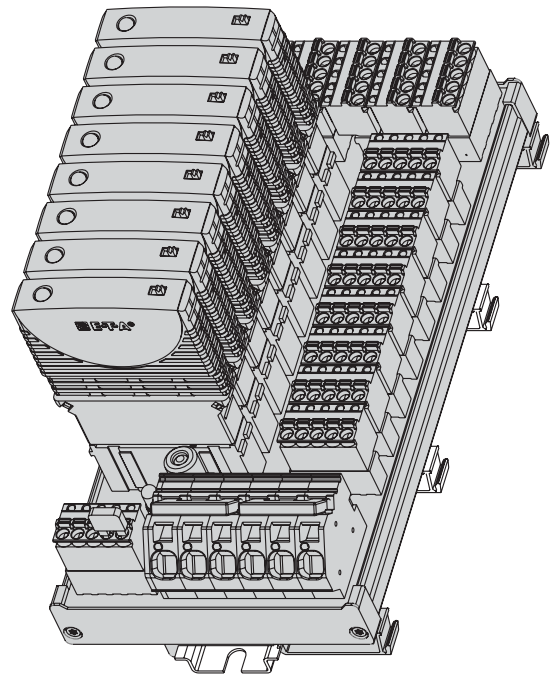
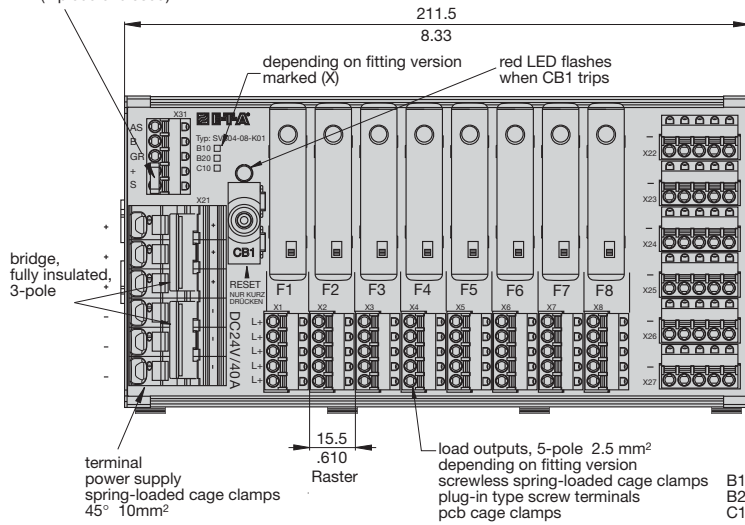
**Schematic diagram SVS04-08... K01 (fitted with ESS20-003)**



**Dimensions SVS04-08... K01, fitted with ESX10-103**



wire bridge, fully insulated 2-pole, not fitted, (1 piece enclosed)



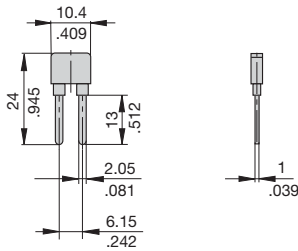
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

**Accessories**

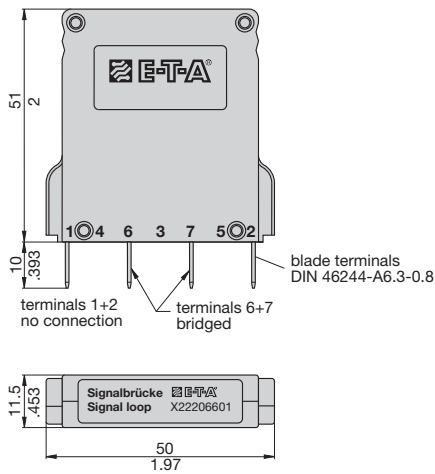
**Insulated wire bridge  
Y 303 881 08**

2 pcs of the insulated wire bridge are supplied with the power distribution system. The insulated wire bridges may be used for:

- terminal X31: internal DC 24 V feed for group signalisation wire bridge from (+) to (S) signal path protected by CB1
- terminal X31: internal DC 24 V feed for two-group signalisation wire bridge from (+) to (GR) signal path protected by CB1

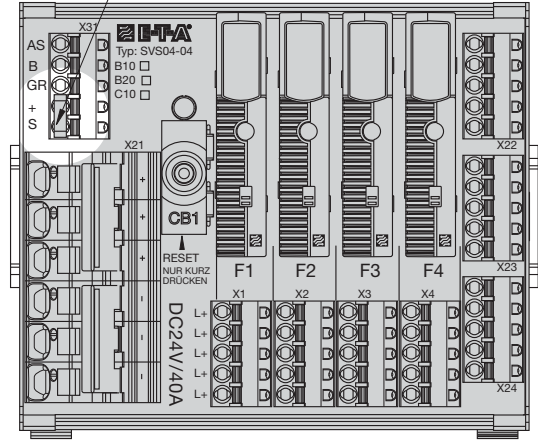


**Jumper (for unused slots)  
X 222 066 01**



**Application example for insulated wire bridge**

**Terminal X31 (group signalisation)**  
wire bridge from (+) to (SC)  
internal +DC24V feed for signalisation  
Thus plus potential of terminal X21+ is connected to (S)

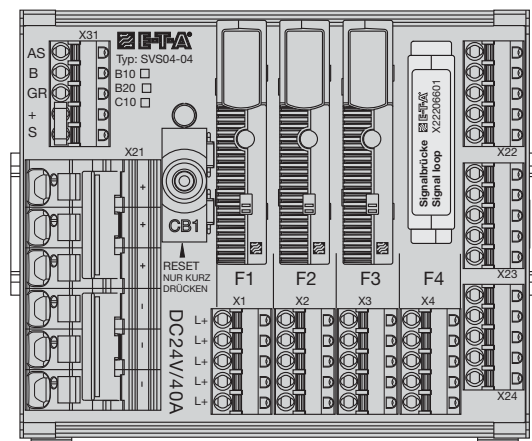


**Application example for jumper to replace ESS20-003**

- The signalling pathway of the group signalisation is as follows:
- feed-in of +DC 24 V potential in X31 (»+« terminal) via in-built overcurrent protection CB1
  - via all signal contacts of the fitted circuit breakers type ESS20-003
  - back to signal output of group signalisation X31 (»AS«)

In operating condition (i.e. all circuit breakers plugged in and functional) the signalling pathway X31 from »+« to »AS« is closed.

**If the distribution rail is not completely fitted with ESS20-003, the open pathway »+« to »AS« may be closed by means of a jumper type X 222 066 01.**



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

The SVS09 power distribution system with integral signalling module optimises DC 24 V distribution at the machine-oriented field level in automated process control, production plants and power plants. Offering 10-plug-in sockets for electronic and thermal-magnetic circuit breakers and an integrated alarm handling function for single and group signalisation, the SVS09 distribution board can be cascaded on the master-slave principle to meet specific requirements. This cascading allows transducers, actuators, valves, distributed PLCs, intelligent terminals etc. to be clustered into distinct function groups and to be conveniently incorporated into the plant's overall alarm monitoring scheme. Particularly for applications with a great number of sensors/actuators, the SVS09 offers possibilities for cost- and space-saving in the design of control cabinets.

Each load circuit that is interrupted by an overload or short circuit trip always generates a single alarm. In addition, a group alarm for the entire SVS09 cascade is induced which will be acknowledged by means of a command element (momentary switch, relay, PLC) either locally in the control cabinet or remotely in the control room. Acknowledging the group alarm immediately reactivates the group signalling function of the SVS09 cascade remobilising it for new incoming short-circuit or overload messages.

The power distribution system SVS09 is mounted on a symmetrical rail and accommodates 10 electronic or thermal-magnetic circuit breakers. All terminals (line entry DC +24 V, GND (-) for self-supply, load outputs L(+), signalling and acknowledgment) are spring-loaded terminals.

### Suitable for the following E-T-A circuit breaker types:

electronic circuit breaker	<b>ESS20-003..</b>
electronic circuit protector	<b>ESX10-103..</b>
thermal-magnetic circuit breakers	<b>2210-S211</b> (also with intermediate position)
	<b>3600-P10, 3900-P10</b>

## Features and benefits

- integral distribution, protection and signalling functions
- power distribution and selective protection of DC 24 V load circuits from one source
- single signalling with manual reset on the protective device
- group signalling and acknowledgement by means of momentary switch/signal (local/remote)
- ease of signalling integration into signal concept of the entire system
- cascading of several SVS09 systems on the master-slave principle
- ease of configuration with wire bridges on the master SVS09

## Ordering information

### Type No.

**SVS09** power distribution system for ESS20-003, ESX10-103, 2210-S211, 3600-P10, 3900-P10

- for short circuit limited DC 24 V applications
- max. continuous load per SVS09 system: 30 A
- max. continuous load per load output: 4 A

### Version

#### max. number of circuit breakers on the power distribution system

**10** 10 circuit breakers (F1...F10)

#### Assembly version, load output

**C10** standard: completely fitted with spring-loaded terminals (max. 1.5 mm<sup>2</sup>, without wire end ferrule)

**C20** option: completely fitted with screw terminals (max. 1.5 mm<sup>2</sup>, without wire end ferrule)

**SVS09 - 10 - C10** ordering example

**Accessory:** signalling module SIGMO-09-1xx, see Accessories

**NEW**



**SVS09-10-C10**

## Technical data (T<sub>amb</sub> = 25 °C, U<sub>S</sub> = DC 24 V)

### Application

modular power distribution system for short circuit limited DC 24 V applications

### Line entry

rated voltage	DC 24 V (19...28 V)
	residual ripple 5 % max.
total current	max. 30 A
	DC 24 V (+) = X 21:1+, X21:2+
	GND (-) = X 22:4-, X22:3- (for self-supply of circuit breakers)

### F positions

10 ways for circuit breakers, suitable for types ESS20-003, ESX10-103, 2210-S211, 3600-P10, 3900-P10  
SVS09-10 / 10-way / F1...F10 load output /way terminal block X24

### Load outputs per position

rated voltage:	DC 24 V (19...28 V)
current:	max. 4 A <sup>1)</sup>
number:	1 protected load output L(+) via circuit breaker (Fx)

### Single signalisation<sup>2)</sup>

10 x single signalisation for 10 x F(x)  
terminal block X23, contacts 30-40, 31-41, 32-42, ...  
potential-free make contacts (N/O)  
error indication: contact open  
OK indication: contact closed  
Empty way: contact closed  
reset: manually on plugged-in circuit breaker

### Group signalisation<sup>2)</sup>

1 x group signalisation pro SVS09-cascade (1 master + 5 slaves)  
terminal block master X22, contact 13-23,  
potential-free contact  
error indication: contact closed  
OK indication: contact open  
configuration as Local/Remote-group signal

### Acknowledgment of group signalisation<sup>1)</sup>

1 x acknowledgment instruction per SVS09-cascade (1 master + 5 slaves) acknowledgment only on the master  
terminal block master X22, contact 10-11,  
terminal potential-free break contact (N/C) or bridge  
with bridge: master, acknowledgment locally, momentary switch on SVS09 (module SIGMO)  
break contact N/C: master, acknowledgment locally and remote (momentary switch, relay, external PLC)

1) When mounted side-by-side or fully fitted with thermal-magnetic circuit breaker types 2210, 3600 or 3900, each breaker should only carry 80 % of its rating or a higher rating should be chosen.

2) For failure signalisation and for cascading functions on the master-slave principle the plug-in type signalisation module SIGMO-09-1xx is required. See accessories.

## Technical data ( $T_{amb} = 25\text{ °C}$ , $U_S = \text{DC } 24\text{ V}$ )

### Configuration master/slave and group signal<sup>1)</sup>

	configuration of master/slave functions of a SVS09-cascade on the master SVS09 via bridges <sup>3)</sup> on terminal block X22
X22: 20-21	master/slave-marking: with bridge = master without bridge = slave
X22: 13-23	group signal locally/remote pre-adjustment = only locally, LED on master-SVS09 terminal of external indication element = locally and remote
X22: 10-11	acknowledgment of group signal locally/remote with bridge = master, acknowledgment locally with break contact = master, acknowledgment locally and remote without bridge = slave, no acknowledgment

### Cascading several SVS09 systems

	cascading possible with 1 x master M and max. 5 slaves S1...S5 Loop through the following 4 lines: 24 V (+) supply voltage M-X21:2+ → S1-X21:1+ → S1-X21:2+ → S2-X21:1+...
GND (-)	self-supply circuit breaker/signalisation M-X22:3- → S1-X22:4- → S1-X22:3- → S2-X22:4-...
S (+)	group signalisation (+) M-X22:12 → S1-X22:11 → S1-X22:12 → S2-X22:11...
S (-)	group signalisation (-) M-X22:22 → S1-X22:21 → S1-X22:22 → S2-X22:21...

### Termination

C10	pcb spring-loaded terminals (standard) line entry DC 24 V on terminal block X21 line (+) terminals 1+ und 2+, connection capability (cable cross section) with and without wire end ferrule 0.25 - 10 mm <sup>2</sup> stripped length 12 mm
	configuration, GND (-) (self-supply) and group signal on terminal block X22 5x double level terminal block
	single signalisation on terminal block X23 10x double level terminal block
	load outputs on terminal block X24 5x double level terminal block connection capability (cable cross section) with and without wire end ferrule 0.25 - 1.5 mm <sup>2</sup> stripped length 7 mm
	plug-in type signalisation module SIGMO-09-1xx 50-pole Card Edge socket board
C20	pcb screw terminals (option)

### General data

- Mounting: symmetrical rail to EN 50022 - 35 x 7.5
- Temperature range: 0...50 °C (without condensation)
- Storage temperature: -20...+70 °
- Housing material: plastic
- Protection class
 

terminals	IP20 DIN 40050
pcb	IP00 DIN 40050 (double-lacquered)
- Insulation voltage: DC 250 V (pcb)
- Dimensions: see drawings  
(tolerances to DIN ISO 286 part 1 IT13)
- Mass: SVS09-10 approx. 380 g

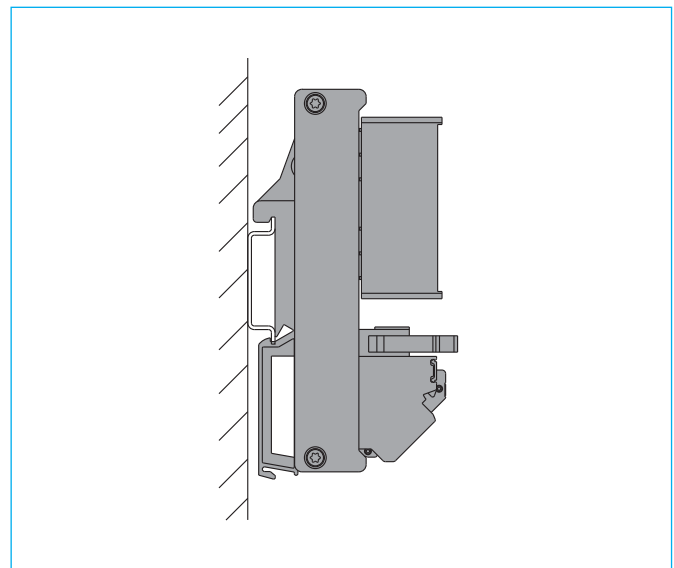
2) The plug-in type signalisation module SIGMO-09-1xx is required for failure signalisation and for the cascading functions on the master/slave principle. See accessories.

3) The SVS09 power distribution system is supplied without wire bridges and can thus be integrated into existing SVS09 cascade as a slave unit without further configuration. The user inserts wire bridges on terminal block X22 of the master.

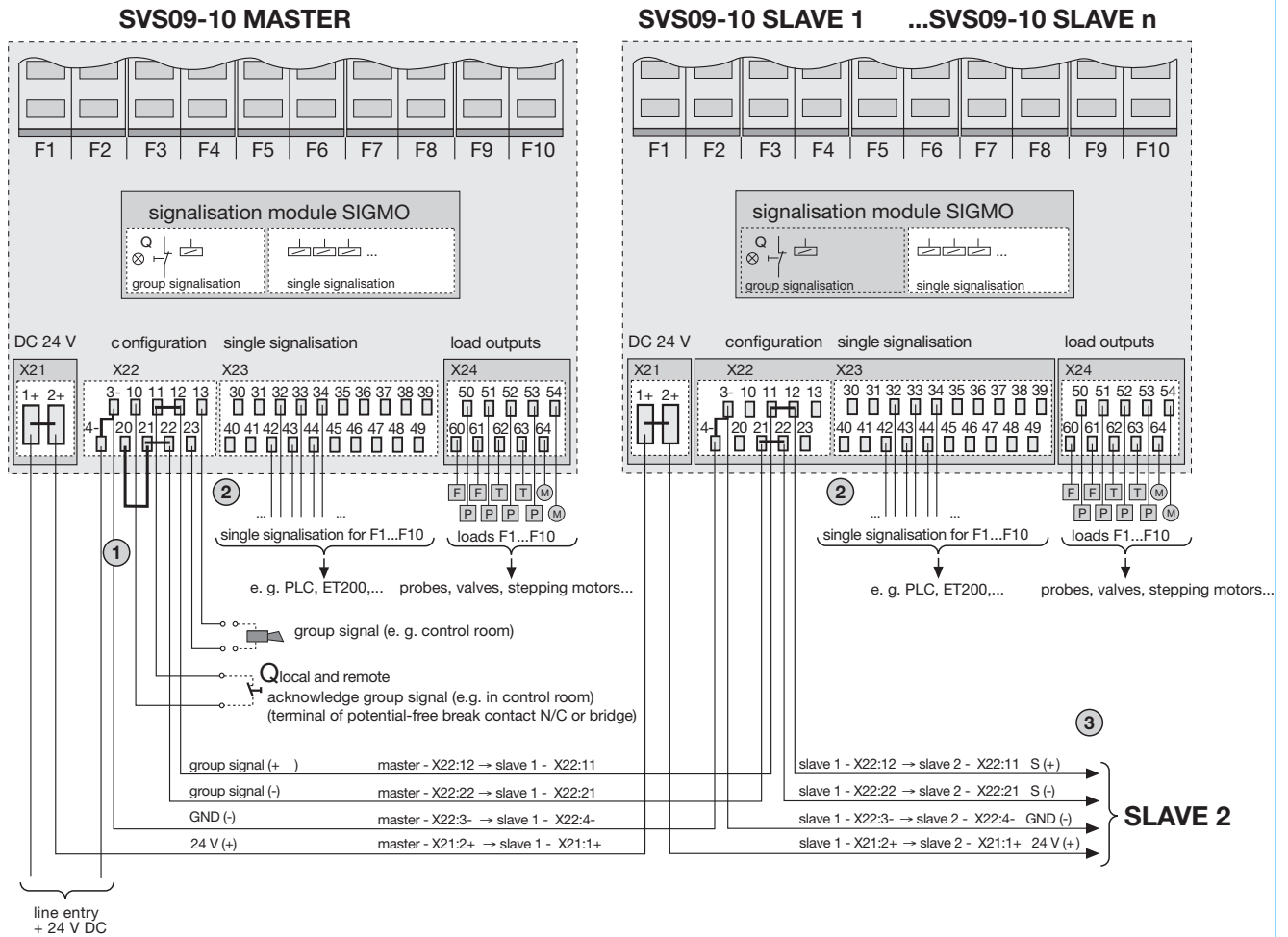
## Reference notes:

- The power distribution system must be installed by qualified personnel only.
- Only after expert installation may the assembly be connected to a power supply.
- The assembly is only suitable for use at safety extra-low voltage (DC 24 V).
- Connection to higher or not reliably disconnected voltages may be hazardous or cause damage.
- The max. total current of the SVS09 system must not be exceeded.
- In each load circuit the cable cross sections and the current rating of the protective device must be selected according to the rating of the connected load.
- The technical data of the circuit breakers used must be observed.
- According to "Machinery Directive 98/37/EG and EN 60204-1, Machine Safety" special precautions have to be taken in machinery (e. g. use of a safety PLC) to prevent inadvertent start-up of machinery parts. In the event of a failure (short circuit/overload) the load circuit will be disconnected by the circuit breaker.
- After tripping of the circuit breaker and before reset the cause of tripping (short circuit or overload) must be remedied.
- The international standards (e. g. DIN VDE 0100 for Germany) must be observed with respect to installation and selection of cables.

## Mounting position



## Power distribution system with overcurrent protection and integral signalling logic



### 1 Configuration master / slave

#### terminal block X22

**X22 20-21**

#### master / slave marking

with bridge: master  
without bridge: slave (factory setting)

**X22 10-11**

#### acknowledgment of group signalisation

with bridge: = master: acknowledgment locally  
break contact N/C: = master: acknowledgment locally + remote (momentary switch, PLC ...external)  
without bridge: = slave: (no acknowledgment on slave (factory setting))

### 2 Fault signalisation

#### single signal:

#### terminal block X23

terminals 30-40, 31-41, 32-42, 33-43, 34-44, 35-45, 36-46, ...  
potential-free contact  
fault: contact open  
OK: contact closed  
empty way: contact closed

#### group signal:

#### terminal block X22

locally LED on master  
remote terminals 13-23, potential-free contact  
fault: contact closed  
OK: contact open

### 3 Cascading

master → slave 1 → ... slave n

#### loop-through of 4 lines

24 V (+) LINE (supply voltage)  
M-X21:2+ → S1-X21:1+ X21:2+ → S2-X21:1+ X21:2+ → S3 ...  
S (+) group signalisation (+)  
M-X22:12 → S1-X22:11 X22:12 → S2-X22:11 X22:11 → S3 ...  
S (-) group signalisation (-)  
M-X22:22 → S1-X22:21 X22:22 → S2-X22:21 X22:22 → S3 ...  
GND (-) self-supply circuit breaker / plug-in type SIGMO module  
M-X22:3- → S1-X22:4- X22:3- → S2-X22:4- X22:3- → S3 ...

## Configuration instruction

### General information

- Application individually (1 SVS09-10 as master) or as cascade (1 master + max. 5 slaves)
- Any configuration with wire bridges will **only** be done on the master.
- The minimum configuration with a master and local signalisation and acknowledgment directly on the SVS09 power distribution system requires wiring of two bridges: X22:20-21 for master identification and X22:10-11 for group acknowledgment.
- Configuration of a cascade is always carried out **only** on the master with cascades consisting of several SVS09 mounted side-by-side. No adjustments are required on the slaves.
- Devices for status indication and acknowledgment for external signalisation must be connected only to the master. Should several external display elements be required (e. g. LED, acoustic signal), these must also be connected only to the corresponding signal outputs of the master.
- Unused slots do not have to be bridged, they have no influence on the signalisation of the installed circuit breakers. Unused slots forward to OK indication to the signalisation outputs.
- The SVS09 power distribution system invariably requires a plugged-in signalisation module SIGMO-09-xxx (on separate order).

### Individual application

#### Minimal configuration: 1 master with local group signalisation and acknowledgment

step	configuration
1	<b>mounting:</b> mount SVS09 on the symmetrical rail
2	<b>connect DC +24 V (+) supply:</b> on terminal block DC 24 V, +24 V to terminal 1+
3	<b>connect GND (-) supply:</b> <sup>1)</sup> on terminal block X22, GND (-) to terminal 4-
4	<b>master identification:</b> bridge terminals 20-21 on terminal block X22
5	<b>group signal locally:</b> pre-adjustment. In the event of group failure the red LED is always lighted (only) on the master.
6	<b>group acknowledgment locally:</b> bridge terminals 10-11 on terminal block X22 acknowledgment manually with red momentary switch on SVS09 (module SIGMO)
7	<b>single signalisation:</b> connect single signalisation for F1 through F10 on terminal block X23, F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42 ... F10: terminals 39-49 signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed
8	<b>loads:</b> on terminal block X24: connect loads to be protected to terminals 50 through 64

#### 1 master with local and external (remote) group signalisation and acknowledgment

step	configuration
1	<b>mounting:</b> mount SVS09 on the symmetrical rail
2	<b>DC +24 V (+) supply:</b> on terminal block DC 24 V, connect +24 V to terminal 1+
3	<b>GND (-) supply:</b> <sup>1)</sup> on terminal block X22, connect GND (-) to terminal 4-
4	<b>master identification:</b> bridge terminals 20-21 on terminal block X22
5	<b>group signal locally and remote:</b> on terminal block X22, connect to external display element to terminals 13-23 (e.g. LED, relay, acoustic signal). In addition the red LED is always lighted on the master with group signal signal: potential-free contact: fault = contact closed, OK = contact open
6	<b>group acknowledgment locally or remote:</b> on terminal block X22, connect a command element to the terminals 10-11, e.g. momentary switch, relay, PLC signal (potential-free break contact N/C)
7	<b>single signalisation:</b> on terminal block X23, connect single signalisation for F1 through F1 F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42, ... F10: terminals 39-49 signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed
8	<b>loads:</b> on terminal block X24: connect loads to be protected to terminals 50 through 64

<sup>1)</sup> GND (-) potential serves for self-supply of SVS09 (circuit breaker and SIGMO-module)

## Cascading: 1 master and several (n) slaves (max. 5)

### 1 master + n slaves: with local group signalisation and acknowledgment

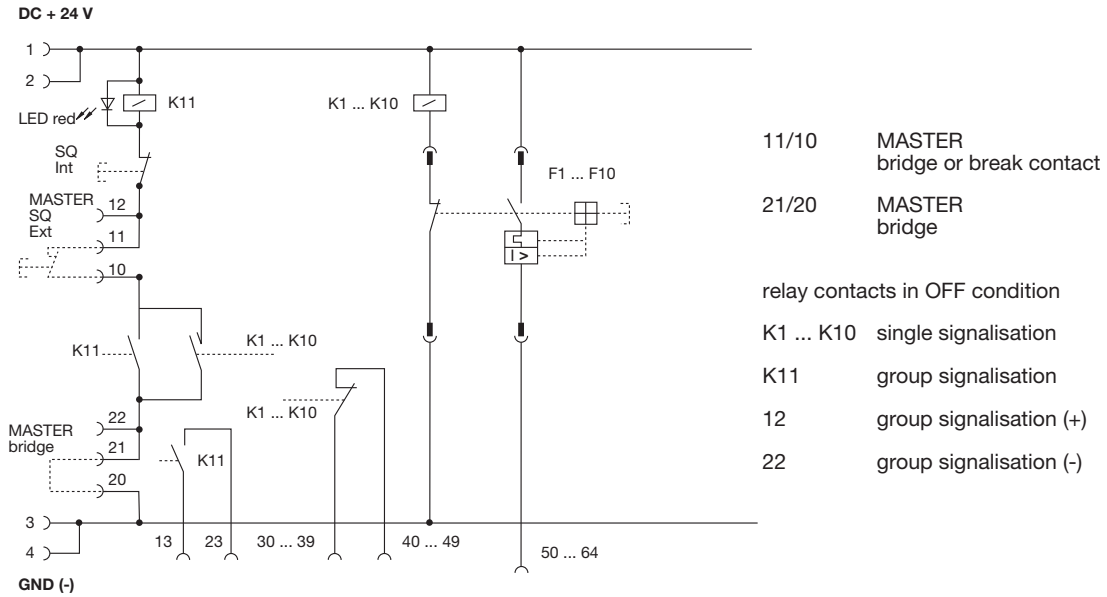
step	configuration
1	<b>mounting:</b> mount all SVS09 onto symmetrical rail
2	<b>DC +24 V (+) supply: terminal block DC 24 V</b> - on the master: connect +24 V (+) to terminal 1+ and lead through to terminal 2+ for slave 1 - on slave 1: connect +24 V (+) of master to terminal 1+ and lead through to terminal 2+ for slave 2 - on slave n: connect +24 V (+) of slave (n-1) to terminal 1+ - additional slaves: always lead through +24 V (+) of terminal 2+ for next slave, terminal 1+
3	<b>GND (-) supply: <sup>1)</sup> terminal block X22</b> - on the master: connect GND (-) to terminal 4- and lead through at terminal 3- for slave 1 - on slave 1: connect GND (-) of master to terminal 4- and lead through at terminal 3- for slave 2 - on slave n: connect GND (-) of slave (n-1) to terminal 4- - additional slaves: always lead through GND (-) of terminal 3- for next slave, terminal 4-
4	<b>master identification:</b> bridge terminals 20-21 on the SVS09-master, on terminal block X22 Note: no adjustments on the slaves required!
5	<b>group signal locally:</b> pre-adjustment. In the event of group fault the red LED is always lighted (only) on the master.
6	<b>group acknowledgment locally:</b> bridge terminals 10-11 on SVS09-master, terminal block X22 acknowledgment manually with red momentary switch on SVS09-master (module SIGMO) Note: no adjustments on the slaves required!
7	<b>single signalisation:</b> on terminal block X23, connect single signalisation for F1 through F10 F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42, ... F10: terminals 39-49 signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed
8	<b>loads:</b> on terminal block X24: connect loads to be protected to terminals 50 through 64

### 1 master + n slaves: with local and external (remote) group signalisation and acknowledgment

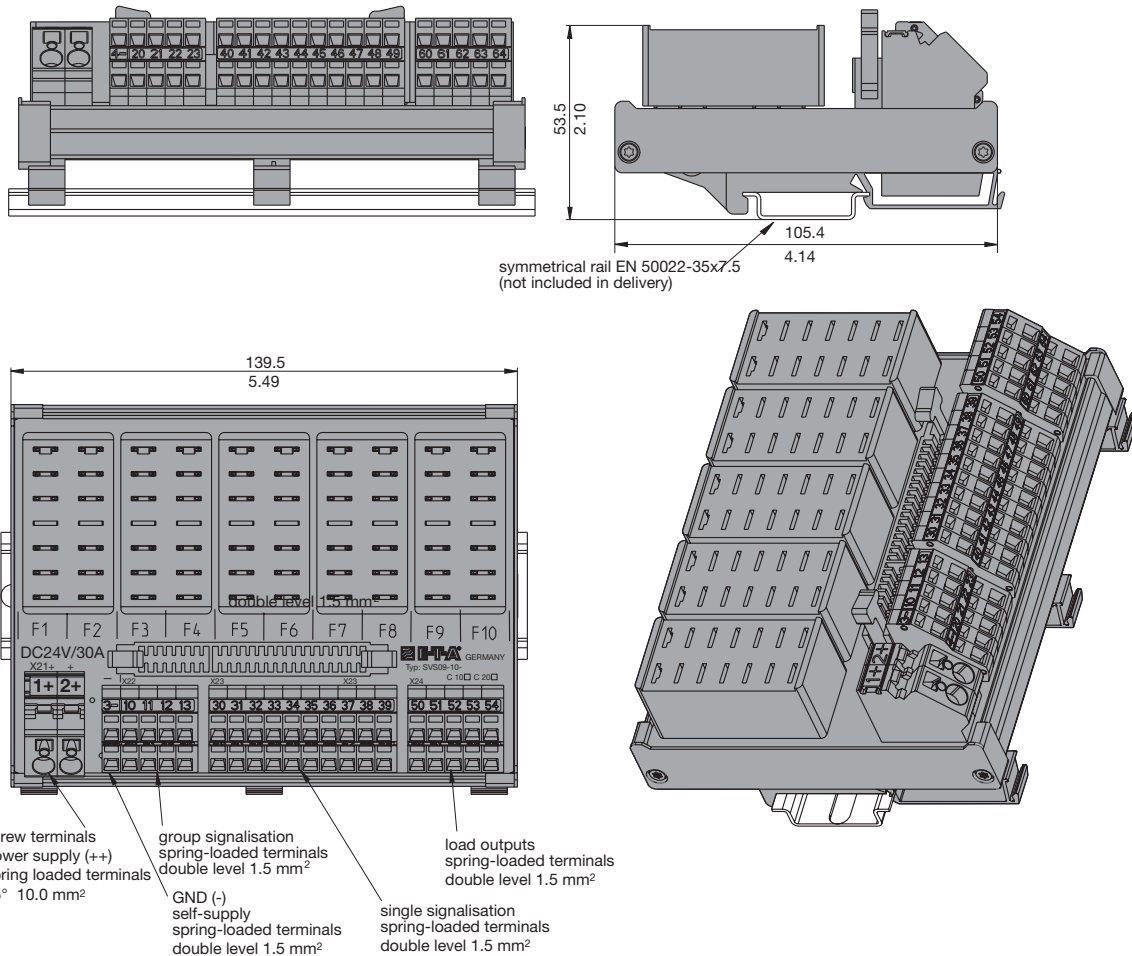
step	configuration
1	<b>mounting:</b> mount all SVS09 onto the symmetrical rail
2	<b>DC +24 V (+) supply: terminal block DC 24 V</b> - on the master: connect +24 V (+) to terminal 1+ and lead through terminal 2+ for slave 1 - on slave 1: connect +24 V (+) of master to terminal 1+ and lead through terminal 2+ for slave 2 - on slave n: connect +24 V (+) of slave (n-1) to terminal 1 - additional slaves: always lead through +24 V (+) of terminal 2+ for next slave, terminal 1+
3	<b>GND (-) supply: <sup>1)</sup> terminal block X22</b> - on the master: connect GND (-) to terminal 4- and lead through at terminal 3- for slave 1 - on slave 1: connect GND (-) of master to terminal 4- and lead through at terminal 3- for slave 2 - on slave n: connect GND (-) of slave (n-1) to terminal 4- - additional slaves: always lead through GND (-) of terminal 3- for next slave, terminal 4-
4	<b>master identification:</b> bridge terminals 20-21 on the SVS09-master, on terminal block X22 Note: no adjustments on the slaves required!
5	<b>group signal locally and remote:</b> connect an external display element (e.g. LED, relay, acoustic signal) on master, terminal block X22, to terminals 13-23. In addition the red LED is always lighted in the event of group signal. signal: potential-free contact: fault = contact closed, OK = contact open Note: no adjustments on the slaves required, group acknowledgment is valid for the entire cascade.
6	<b>group acknowledgment locally or remote:</b> connect a command element on master, terminal block X22, to terminals 10-11, e. g. momentary switch, relay, PLC signal (potential-free break contact N/C) Note: no adjustments on the slaves required, group acknowledgment is valid for the entire cascade.
7	<b>single signalisation:</b> on terminal block X23, connect single signalisation for F1 through F10 F1: terminals 30-40, F2: terminals 31-41, F3: terminals 32-42, ... F10: terminals 39-49 signal: potential-free contact: fault = contact open, OK = contact closed, empty way: contact closed
8	<b>loads:</b> on terminal block X24: connect loads to be protected to terminals 50 through 64

<sup>1)</sup> GND (-) potential serves for self-supply of the SVS09 (circuit breaker and SIGMO module)

## Schematic diagram



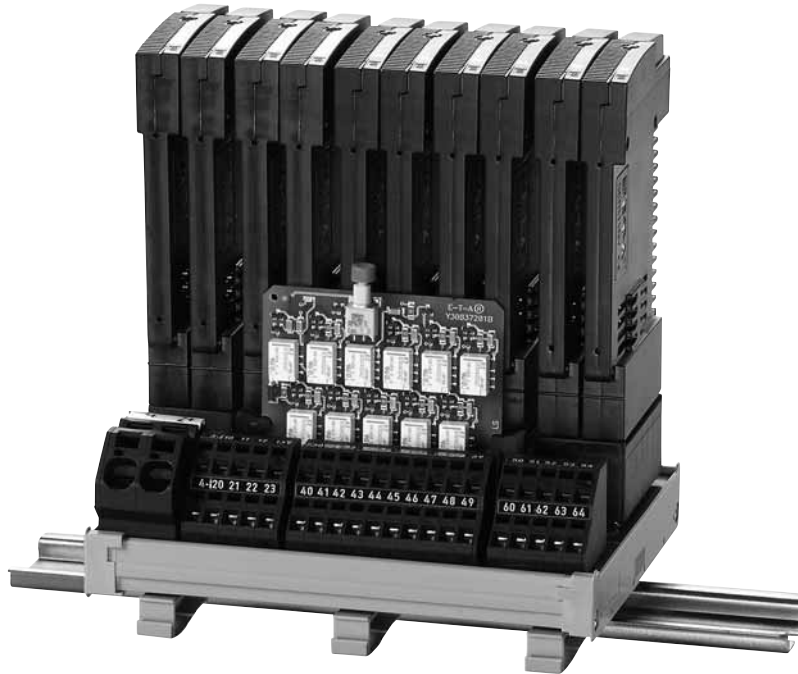
## Dimensions SVS09-10-C10



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

7

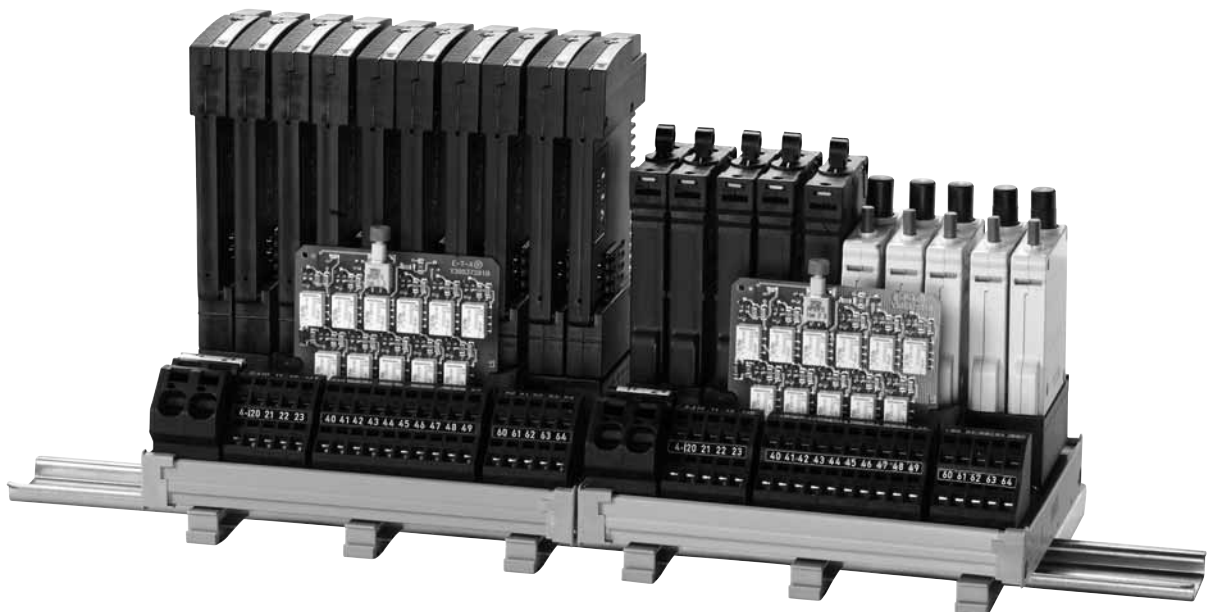
## Application example: SVS09-10-C10 fitted with ESS20-003



Plug-on module (circuit breaker / signalisation module SIGMO-09-1xx) to be ordered separately

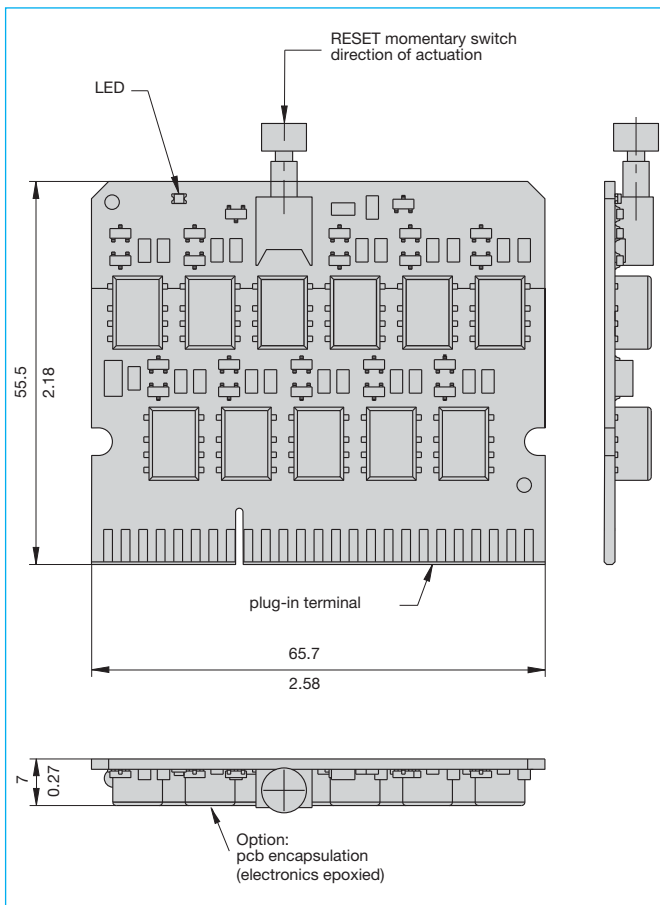
## Application example: SVS09 cascade with 1 master and 1 slave

SVS09-10-C10 master fitted with 10 x ESS20-003  
 SVS09-10-C10 slave fitted with 5 x 2210-S2 and 5 x 3600



## Accessories

### Signalisation module SIGMO-09-1xx



### Technical data ( $T_{amb} = 25\text{ °C}$ , $U_S = \text{DC } 24\text{ V}$ )

#### Voltage supply

rated voltage: DC 24 V (19...28 V)  
residual ripple 5 % max.  
supply via SVS09

#### Current load

normal operation without trip: 0 mA  
max. 150 mA with 10-way fault on SVS09 (all relays loaded)

#### Contacts

min. 10 V / 10 mA  
max. 28 V / 200 mA...

#### Status indication and actuation

LED red: lighted in the event of group fault  
momentary switch red: for local acknowledgment of group signalisation  
remote acknowledgment: terminal of an external command (momentary switch, relay, PLC signal)  
rupture capacity 28 V / 20 mA  
integral free-wheeling diode in SIGMO module

#### Reverse polarity protection

Protected against reverse polarity of potentials DC 24 V (+) and GND (-) on the SVS09. No function if connected reversely

### Application

Plug-in type signalisation module for the power distribution system SVS09 for group signalisation and acknowledgment for an isolated SVS09 application or a cascade. The SIGMO module ensures a group fault to be indicated after each trip of a circuit breaker on the SVS09. Fault indication can be – depending on the configuration<sup>1)</sup> – locally on the power distribution system (red LED) or locally and externally (remotely), e. g. by means of an acoustic signal in the control room. Acknowledgment of the group signal can also be only locally via a momentary switch on the power distribution system, or locally and remotely, e. g. via a momentary switch in the control room. Acknowledgment of the group signal re-activates the group signalisation, so that it is released again and ready for new error messages. The single signalisation and the tripped circuit breaker will be manually reset by actuating the push button of the circuit after remedy of the failure.

**Note: Proper function of the signalisation module SIGMO-09-1xx is ensured only in connection with the power distribution system SVS09-10-Cxx.**

<sup>1)</sup> see power distribution system SVS09, basic schematic diagram and configuration instruction

### Ordering information

#### Type No.

**SIGMO** signalisation module for SVS09 power distribution system

- plug-in type signalisation module
- DC 24 V-applications
- supply via SVS09

#### Version for power distribution system

**09** SVS09-10 for circuit breakers (F1...F10)

#### Pcb version

- 100** standard: plug-in type signalisation module for circuit breaker (F1...F10)  
pcb populated, open,
- 120** option: plug-in type signalisation module for circuit breaker (F1...F10)  
pcb populated, encapsulated

**SIGMO - 09 - 100** ordering example

ordering example

ordering example

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

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



## Description

Power-D-Box 19" power distribution system fitted with E-T-A sockets 63-P10-Si to accommodate thermal-magnetic circuit breakers with each terminal block accepting up to 6 circuit breakers. Other rack types upon request.

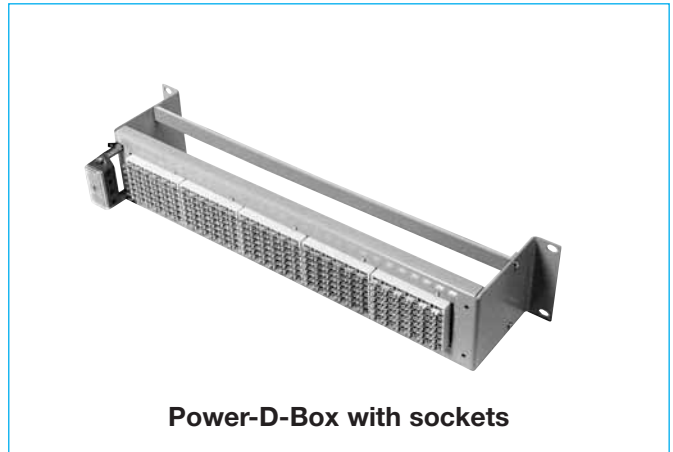
## Typical applications

Circuit breakers that may be accommodated on Power-D-Box 19" racks fitted with E-T-A sockets 63-P10-Si:

type 2210	see section 2 - thermal-magnetic overcurrent CBs
type 3600	see section 2 - thermal-magnetic overcurrent CBs
type 3900	see section 2 - thermal-magnetic overcurrent CBs
type E-1048-60.	see section 6 - SSRPCs

## Ordering information

X 211 530 01	for 5 E-T-A terminal blocks 63-P10-Si
--------------	---------------------------------------



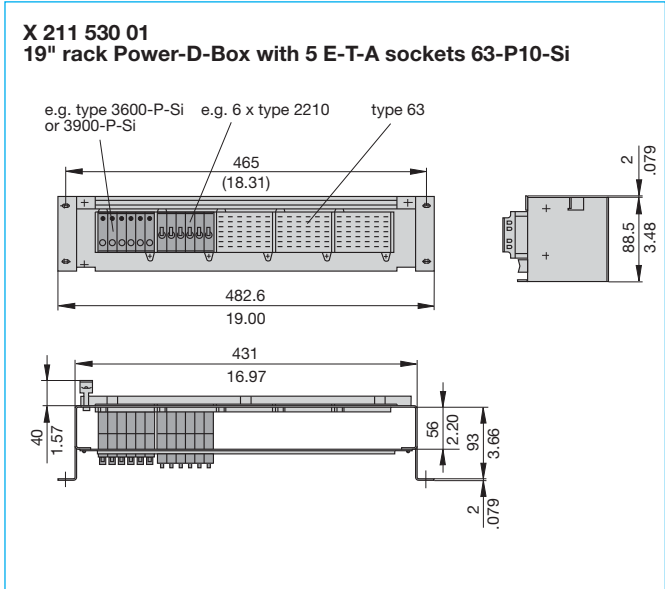
## Technical data

X 211 530 01	2 U
Material:	The Power-D-Box 19" power distribution system and the mounting flanges are made of 2 mm thick steel sheet.
Colour:	RAL 7032, grey

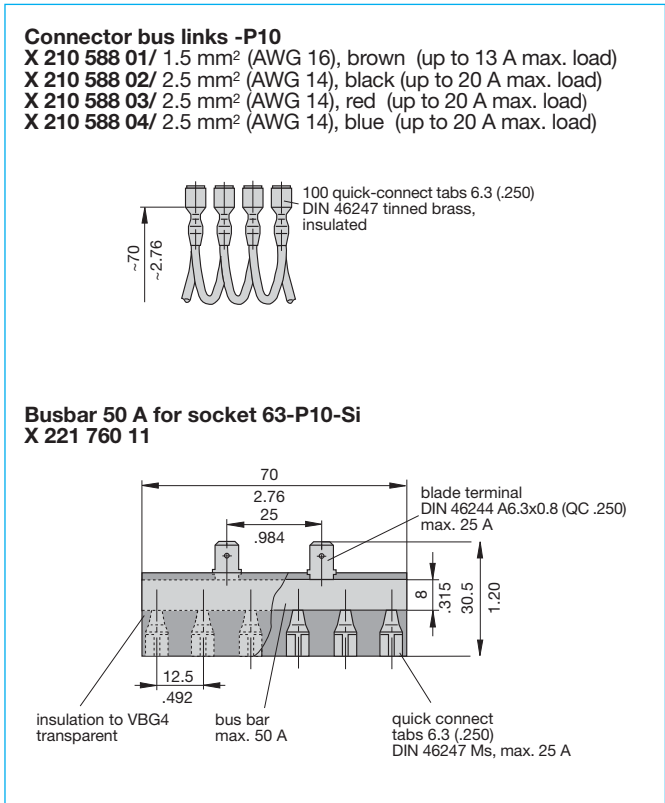
## Connection

By means of one or two 4-pole female multi-pin connectors for max. 4 mm<sup>2</sup> cables, which may be connected either on the right or left side of the rack.

**Dimensions**



**Accessories**



7

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

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

## Description

The compact 19" Power-D-Box features aluminium profiled cross members with an anodised front plate. The panel cutout accommodates up to 30 positions numbered 1 to 30. Blanks cover unused positions, with 6, 12, 24 or 30 being "open".

The rack can be fitted with plug-in type circuit breakers 3600/3900 and 2210, electronic circuit breakers ESS20 or electronic circuit protector ESX10 or E-T-A Solid State Remote Power Controllers (SSRPC) E-1048-600/700. Please specify the correct option according to the ordering information shown, as different depths as well as different heights of the front cut-out must be allowed for.

The devices are plugged into sockets 63-P10-Si (6 positions each). These sockets (S1...S5) are provided with 6.3 mm blade terminals on the rear.

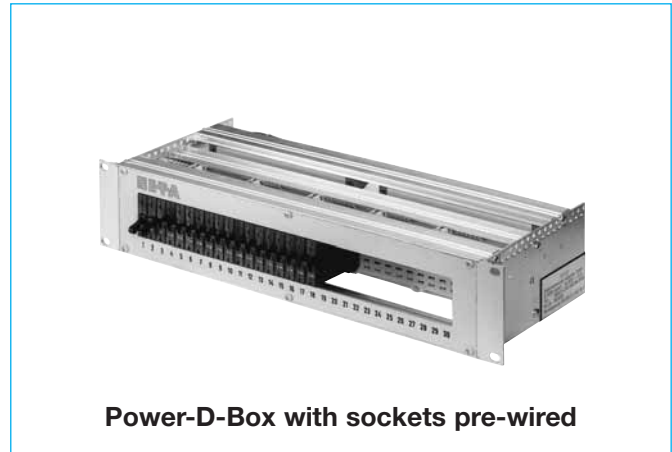
Four busbars (X1...X4) with 6 (signalisation) or 15 (feed) positions each (6.3 mm blade terminals) provide easy terminal connection.

Prewired options available ex factory are:

- Parallel connected feed (2.5 mm<sup>2</sup>) with separate supply for each socket via busbars X1 and X2.  
Choice of wiring colours: black, red, blue, grey. Outputs are not connected.
- Parallel connected auxiliary contacts (N/C) grouped per socket, 1 mm<sup>2</sup>, via busbars X3 (supply) and X4 (signalisation).  
Choice of wiring colours: black, red, blue, grey.
- Series connected auxiliary contacts (N/O) of all positions with 1 mm<sup>2</sup>, via busbars X3 (feed) and X4 (signalisation).  
Choice of wiring colours: black, red, blue, grey.
- Custom designed connection according to specification.

Other fittings, e.g. back-up fuse, separate circuits or redundancy, multipole circuits, screw terminals, custom designed markings etc., are available to special order (please enquire).

A compact printed circuit board with rear screw terminals is available as an alternative to the standard cable wiring (see pages 7 - 45 to 7 - 51).



**Power-D-Box with sockets pre-wired**

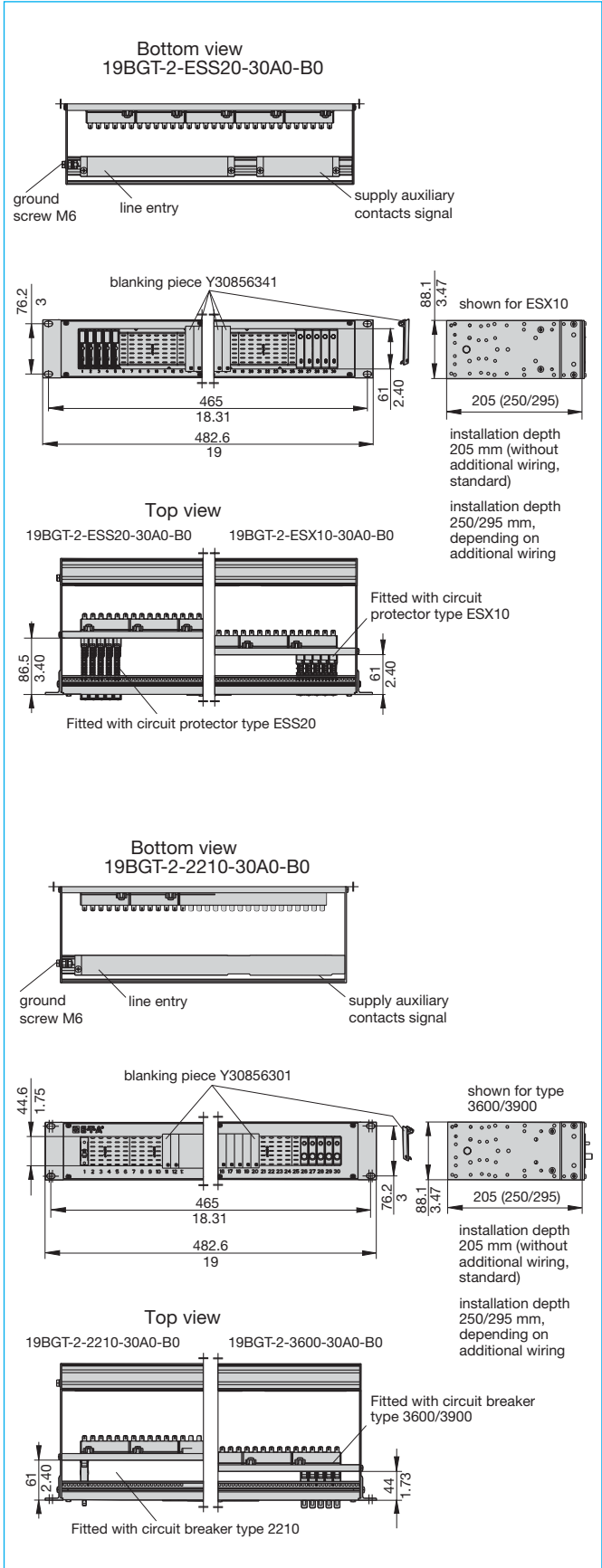
## Technical data

19" Power-D-Box	length: 84 modules (426.72 mm) height: 2 U (88.90 mm) depth: 205...295 mm (depending on the selected version) material: aluminium, anodized
Front cutout for 30 positions, numbered 1 through 30	1 socket = 6 positions (No. 1 - 6) 2 sockets = 12 positions (No. 1 - 12) 3 sockets = 18 positions (No. 1 - 18) 4 sockets = 24 positions (No. 1 - 24) 5 sockets = 30 positions (No. 1 - 30) blanks cover unused sockets.
Mounting socket	polarised E-T-A mounting socket type 63-P10-Si (6 positions) rear blade terminals 6.3 mm max. load: 16 A continuous
Busbars Feed (X1, X2)	15-way for 6.3 mm blade terminals max. current rating: 63 A
Busbars Auxiliary contacts (X3, X4)	6-way for 6.3 mm blade terminals max. current rating: 32 A
Feed	busbar 50 A per socket (= 6 positions) HO7Z-K cables 2.5 mm <sup>2</sup> with fully insulated 6.3 mm blade terminals to VBG 4 one cable per socket max. current rating: 20 A
Auxiliary contact wiring	HO7Z-K cables 1 mm <sup>2</sup> with fully insulated 6.3 mm blade terminals to VBG 4 max. current rating: 4 A
Wire colour option	black, red, blue or grey
Voltage rating	AC 250 V/DC 65 V
Housing ground/earth	on the inside via M6 screw by means of ring cable lug (two with redundant systems)

## Ordering information

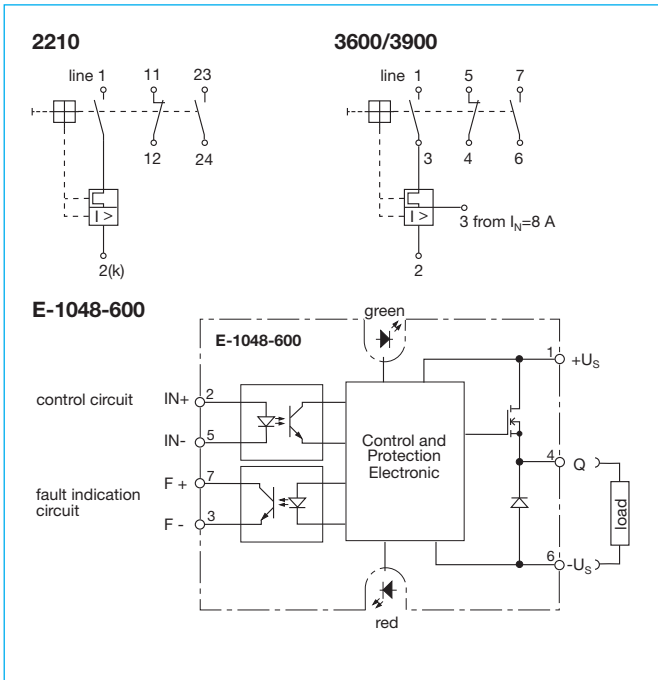
<b>Type No.</b>	19BGT 19" Power-D-Box with sockets pre-wired
<b>Height</b>	
<b>1</b>	1 U
<b>2</b>	2 U
<b>3</b>	3 U
	<b>Prepared for circuit breaker types (supplied separately)</b>
<b>2210</b>	for circuit breaker type 2210
<b>3600</b>	for circuit breaker type 3600/3900
<b>1048</b>	for SSRPC E-1048-600
<b>ESS20</b>	for electronic circuit breaker type ESS20
<b>ESX10</b>	for electronic circuit protector type ESX10
	<b>Number of positions</b>
<b>06</b>	6-poles
<b>12</b>	12-poles
<b>18</b>	18-poles
<b>24</b>	24-poles
<b>30</b>	30-poles
<b>nn</b>	number of poles (special version)
	<b>Feed prewired</b>
<b>A0</b>	without
<b>R0</b>	without, redundant
<b>A2</b>	line feed pre-wired (2.5 mm <sup>2</sup> ) 1-pole (or 1 circuit)
<b>R2</b>	line feed pre-wired 1-pole redundant
<b>A4</b>	line feed pre-wired (2.5 mm <sup>2</sup> ) 2-pole (or 2 circuits)
<b>R4</b>	line feed pre-wired 2-pole redundant
<b>A6</b>	line feed pre-wired 3-pole (or 3 circuits)
<b>R6</b>	line feed pre-wired 3-pole redundant
<b>A8</b>	line feed pre-wired 4-pole (or 4 circuits)
<b>R8</b>	line feed pre-wired 4-pole redundant
	<b>Wire colour (not with A0 + R0)</b>
	<b>1-pole</b>
<b>SW</b>	black
<b>RT</b>	red
<b>BL</b>	blue
<b>GR</b>	grey
	<b>2-pole</b>
<b>RB</b>	1 <sup>st</sup> pole red, 2 <sup>nd</sup> pole blue
<b>RS</b>	1 <sup>st</sup> pole red, 2 <sup>nd</sup> pole black
<b>SB</b>	1 <sup>st</sup> pole black, 2 <sup>nd</sup> pole blue
	<b>3-pole</b>
<b>SW</b>	1 <sup>st</sup> pole to 3 <sup>rd</sup> pole black
<b>SB</b>	1 <sup>st</sup> pole to 2 <sup>nd</sup> pole black, 3 <sup>rd</sup> pole blue
	<b>4-pole</b>
<b>SW</b>	1 <sup>st</sup> pole to 4 <sup>th</sup> pole black
<b>SB</b>	1 <sup>st</sup> pole to 3 <sup>rd</sup> pole black, 4 <sup>th</sup> pole blue
	<b>Auxiliary contacts prewired (1 mm<sup>2</sup>)</b>
<b>B0</b>	without
<b>B1</b>	auxiliary contacts connected in series (please consider plug-in device)
<b>B2</b>	auxiliary contacts connected in parallel (please consider plug-in device)
	<b>Wire colour (not with B0)</b>
<b>SW</b>	black
<b>RT</b>	red
<b>BL</b>	blue
<b>GR</b>	grey (standard)
<b>S...</b>	customer-specific version
<b>19BGT - 2 - 2210 - 24 A2 SW - B1 GR - S...</b>	ordering example

## Dimensions

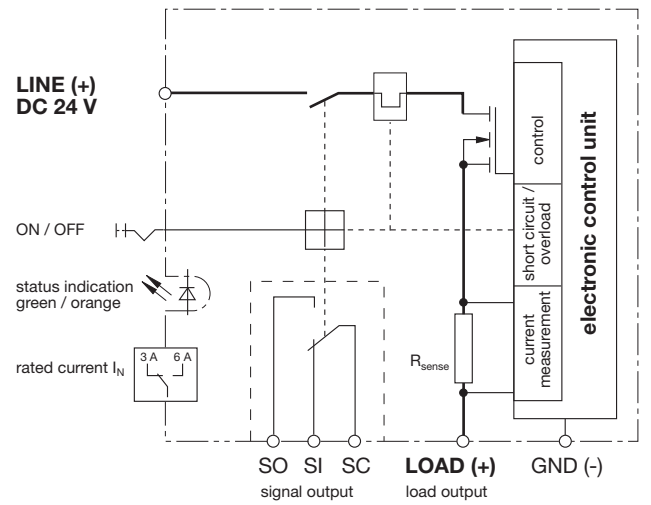


This is a metric design and millimeter dimensions take precedence (mm / inch)

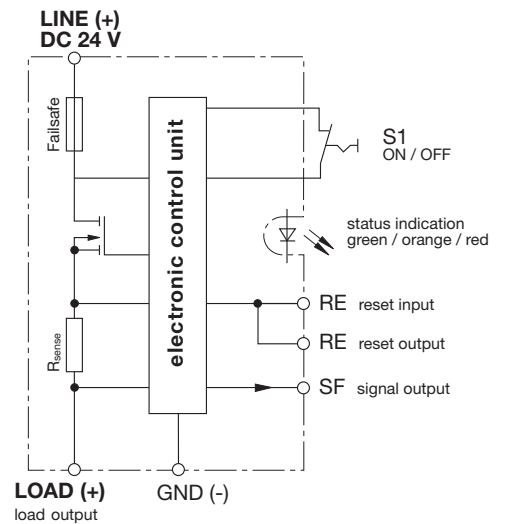
## Internal connection diagrams



**ESS20-003- ...** (group signalisation with change over)



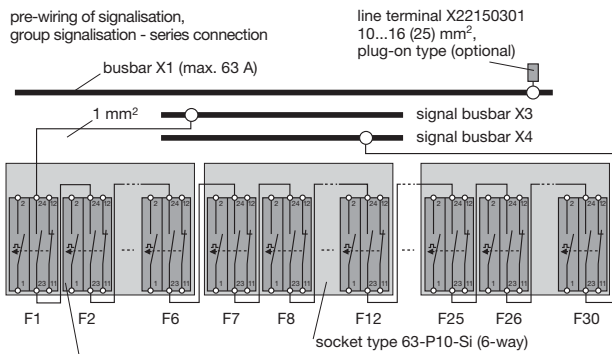
**ESX10-124-...**



## Termination

### 19BGT-2-2210/3600-30A0-B1

pre-wiring of signalisation,  
group signalisation - series connection



circuit breaker types 2210-S21x.../3600.../3900  
plug-in type (not included)

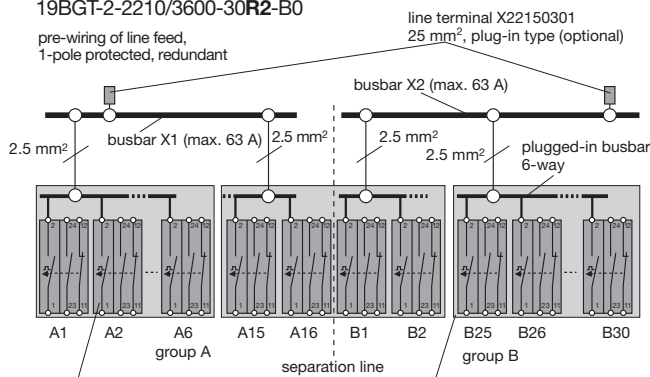
load terminal pin 1, blade terminals 6.3 mm  
auxiliary contact terminals:  
11-12 make contact, blade terminals 6.3 mm  
auxiliary contact terminals:  
23-24 break contact, blade terminals 6.3 mm

pin assignment  
socket 63-P10-Si  
(per pole)

	2210	3600/ 3900
2	2	1
12	4	4
24	6	6
n.c.	3	3
23	7	7
11	5	5
1	2	2

### 19BGT-2-2210/3600-30R2-B0

pre-wiring of line feed,  
1-pole protected, redundant



circuit breaker types  
2210-S21x.../3600.../3900  
plug-in type (not included)

load terminal pin 1, blade terminals 6.3 mm  
auxiliary contact terminals:  
11-12 make contact, blade terminals 6.3 mm  
auxiliary contact terminals:  
23-24 break contact, blade terminals 6.3 mm

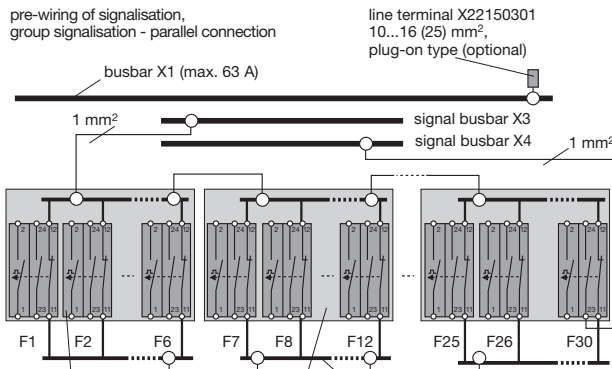
socket type  
63-P10-Si (6-way)

pin assignment  
socket 63-P10-Si  
(per pole)

	2210	3600/ 3900
2	2	1
12	4	4
24	6	6
n.c.	3	3
23	7	7
11	5	5
1	2	2

### 19BGT-2-2210/3600-30A0-B2

pre-wiring of signalisation,  
group signalisation - parallel connection



circuit breaker types  
2210-S21x.../3600.../3900...  
plug-in type (not included)

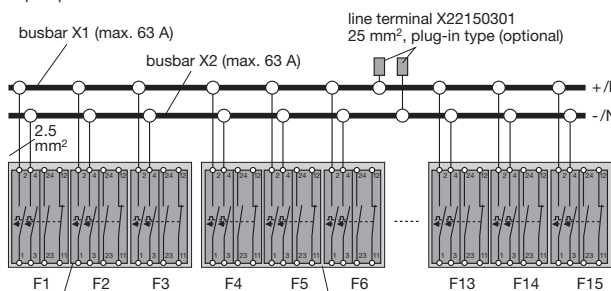
load terminal pin 1, blade terminals 6.3 mm  
auxiliary contact terminals:  
11-12 make contact, blade terminals 6.3 mm  
auxiliary contact terminals:  
23-24 break contact, blade terminals 6.3 mm

pin assignment  
socket 63-P10-Si  
(per pole)

	2210	3600/ 3900
2	2	1
12	4	4
24	6	6
n.c.	3	3
23	7	7
11	5	5
1	2	2

### 19BGT-2-2210/3600-30A4-B0

pre-wiring of line feed,  
2-pole protected/switched



circuit breaker types  
2210-S21x.../3600.../3900  
plug-in type (not included)

load terminals:  
Pin 1 (+/-), Pin 3 (+/-), blade terminal 6.3 mm  
auxiliary contact terminals:  
11-12 make contact, blade terminals 6.3 mm  
auxiliary contact terminals:  
23-24 break contact, blade terminals 6.3 mm

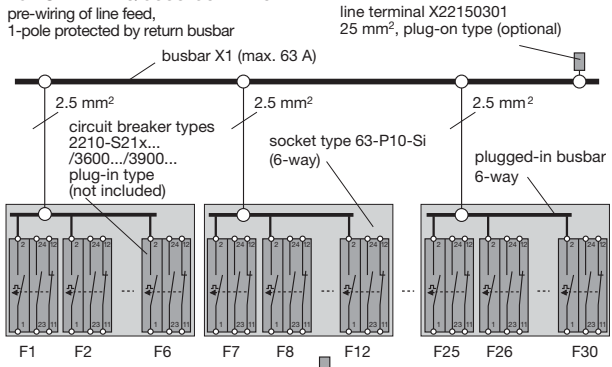
socket type  
63-P10-Si (6-way)

pin assignment  
socket 63-P10-Si  
(per pole)

	2210	3600/ 3900
2	2	1
12	4	4
24	6	6
n.c.	3	3
23	7	7
11	5	5
1	2	2

### 19BGT-2-2210/3600-30A2-B0

pre-wiring of line feed,  
1-pole protected by return busbar



circuit breaker types  
2210-S21x.../3600.../3900...  
plug-in type (not included)

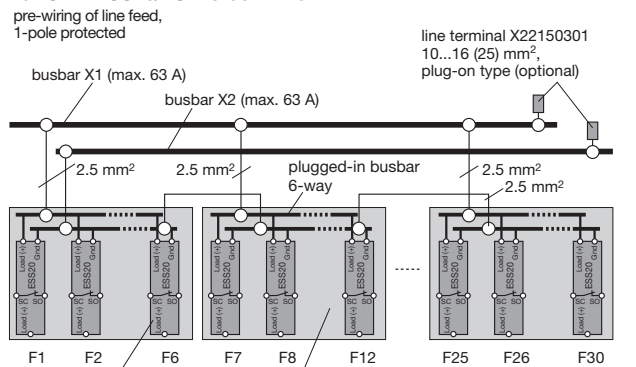
load terminals 1. pole to PIN 1, blade terminals 6.3 mm  
load terminals 2. pole to return busbar X2,  
blade terminals 6.3 mm  
auxiliary contact terminals: 11-12 make contact,  
blade terminals 6.3 mm  
auxiliary contact terminals: 23-24 break contact,  
blade terminals 6.3 mm

pin assignment  
socket 63-P10-Si  
(per pole)

	2210	3600/ 3900
2	2	1
12	4	4
24	6	6
n.c.	3	3
23	7	7
11	5	5
1	2	2

### 19BGT-2-ESS20/ESX10-30A4-B0

pre-wiring of line feed,  
1-pole protected



electronic circuit breaker type ESS20  
or electronic circuit protector  
plug-in type (not included)

load terminals LOAD(+), blade terminals 6.3 mm  
auxiliary contact terminals SC-SO make contact,  
blade terminals 6.3 mm

socket type  
63-P10-Si (6-way)

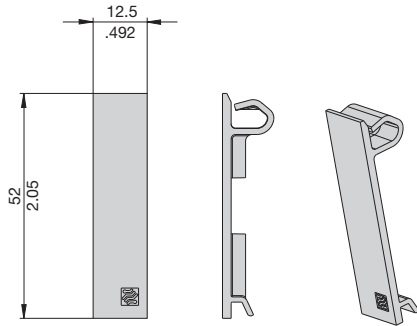
pin assignment  
socket 63-P10-Si  
(per pole)

	ESS20	ESX10
LINE	LINE	1LINE
Gnd	Gnd	11Gnd
SC	SC	13SC
n.c.	n.c.	n.c.
SO	SO	14SO
LOAD	LOAD	2LOAD

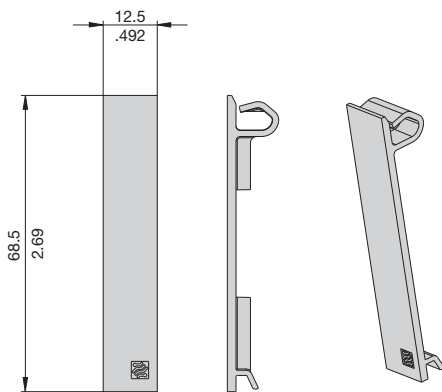
7

**Accessories**

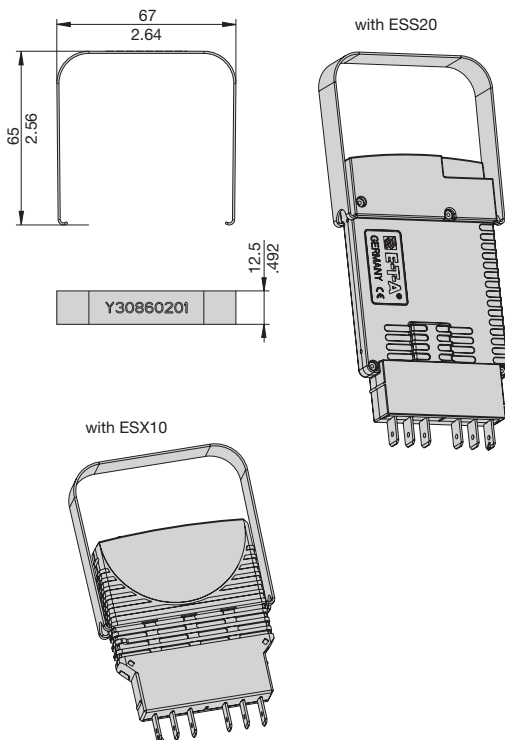
**Blanking piece for Power-D-Box**  
(types 3600/3900, 2210)  
**Y 308 563 01**



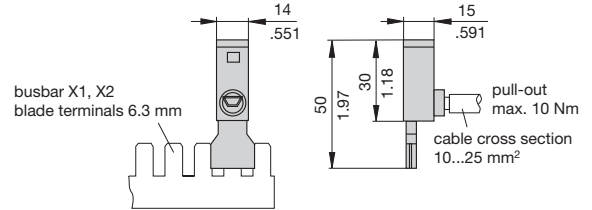
**Blanking piece for Power-D-Box**  
(types ESS20/ESX10)  
**Y 308 563 41**



**Withdrawal tool for ESS20/ESX10**  
**Y 308 602 01**

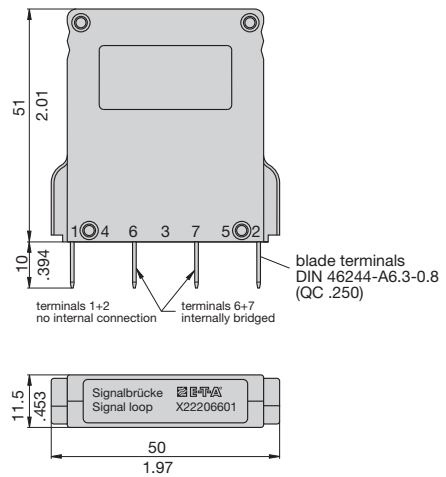


**Line Terminal (max. 63 A)**  
**X 221 503 01**  
max. tightening torque 3.0 Nm



**Caution: cables must not be connected with terminal plugged in**

**Jumper**  
to bypass looped through unused auxiliary contacts  
(series connection)  
**X 222 066 01**



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

The compact 2U 19" Power-D-Box with sockets mounted on a pcb and pre-connected features aluminium profiled cross members with an anodised front plate. The panel cutout accommodates up to 30 positions numbered 1 to 30. It is possible to have 6, 12, 18, 24 or 30 prepared slots or to have a redundant distribution with up to 2 x 15 positions.

The Power-D-Box accommodates plug-in type circuit breakers 3600/3900 and 2210, solid state remote power controller E-1048-700, electronic circuit breaker type ESS20 and electronic circuit protector ESX10. The required device must be specified in the ordering information as both different installation depth and pcb pin assignments must be allowed for.

The devices are plugged into corresponding sockets type 63-P10-Si (6 positions each), soldered onto the pcb and pre-connected.

The system is configured with redundancy as standard (2 x 15 positions), but the two groups may be interconnected so as to provide a non-redundant system if required. Line entry within each group is single pole or double pole.

With single pole line entry all slot numbers per group are combined and connected via an M6 terminal stud by means of a ring cable lug.

With double pole line entry, odd and even slot numbers are integrated into separate circuits each of which is connected via 10 mm<sup>2</sup> screw terminals. This allows use of double pole circuit breakers.

Load outputs are connected by means of screw terminals up to 4 mm<sup>2</sup> on the rear of the pcb.

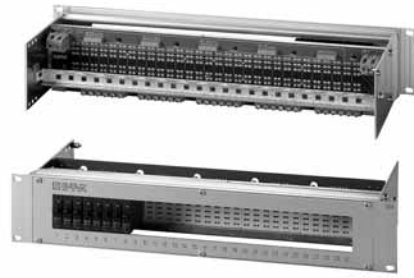
The system offers a number of signalisation possibilities and separation for redundancy is also possible:

- series connection of make contacts (group signalisation via closed circuit current)
- parallel connection of break contacts (double sided for group signalisation via closed circuit current)
- parallel connection of break contacts (only one-sided, second side of break contacts will be connected individually with the terminals for single signalisation via closed or open-circuit current)

Termination is on the rear side by means of screw terminals up to 1.5 mm<sup>2</sup> (group connection) and up to 1 mm<sup>2</sup> (single signalisation) on the pcb. When using ESS20, ESX10 or E-1048-700, the required Gnd terminals as well as control and reset signals will also be connected via the terminals for group or single signalisation.

Upon request the group distribution (redundancy) can be cancelled by means of jumpers. Additional terminals on the rear side of the rack simplify connection. It is also possible to provide terminals for return lines from the individual loads so as to integrate the necessary external wiring into the rack.

**NEW**



**Power-D-Box with pcb-mounted sockets**

## Technical data

19" Power-D-Box	length: 84 modules (426.72 mm) height: 2 U (88.90 mm) depth: 205...295 mm depending on the version material: aluminium, partly anodized
Front cutout for 30 positions, numbered 1 through 30	1 socket = 6 positions (no. 1 - 6) 2 socket = 12 positions (no. 1 - 12) 3 sockets = 18 positions (no. 1 - 18) 4 sockets = 24 positions (no. 1 - 24) 5 sockets = 30 positions (no. 1 - 30)
Mounting socket	polarised mounting socket type 63-P10-Si (6 positions), soldered onto the pcb from the rear with wiring Contact load: 16 A continuously
Line entry X0 Single pole	2 groups, single pole each (= 2 separate circuits) 2 x 100 A max. via terminal stud M6 for ring cable lug
Supply feed X0 Double pole	2 groups, double pole each (= 4 separate circuits) 4 x 40 A max. via screw terminal up to 10 mm <sup>2</sup> (max. 4 x 50 A at max. 40 °C ambient temperature)
Load outputs X1	30 channels 16 A max. per pole via screw terminals up to 4 mm <sup>2</sup>
Signalisation group signalisation X2	series connection of make contacts / parallel connection of break contacts (double sided) in 2 groups (interconnectable by means of wire bridges) max. 1 A total current via screw terminal up to 1.5 mm <sup>2</sup> max. 0.5 A single current via screw terminal up to 1 mm <sup>2</sup>
Rated voltage	AC 250 V; DC 65 V
Housing ground/earth	on the inside via M6 screw by means of ring cable lug (two with redundant systems)
Ambient temperature range	0...50 °C

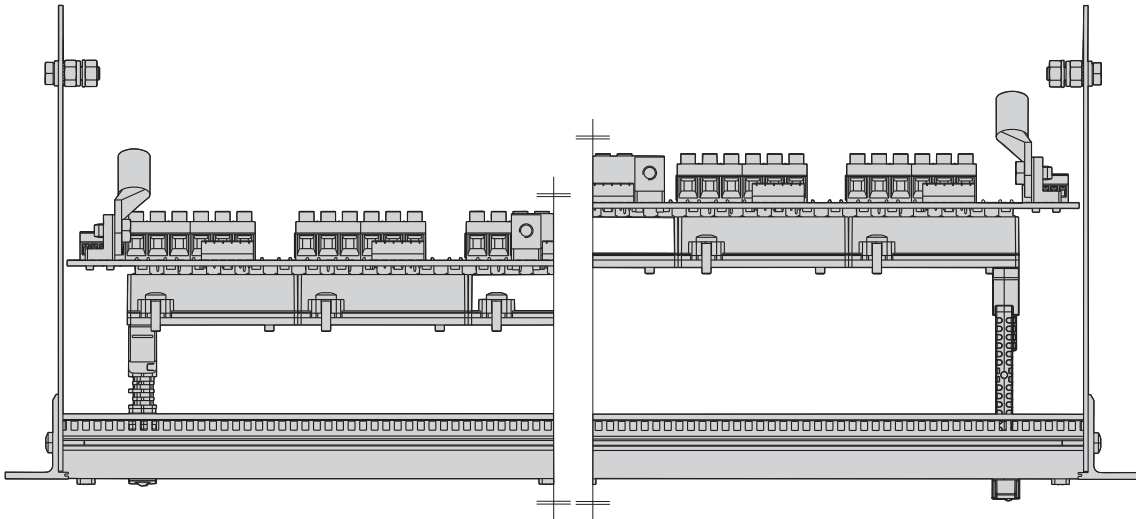
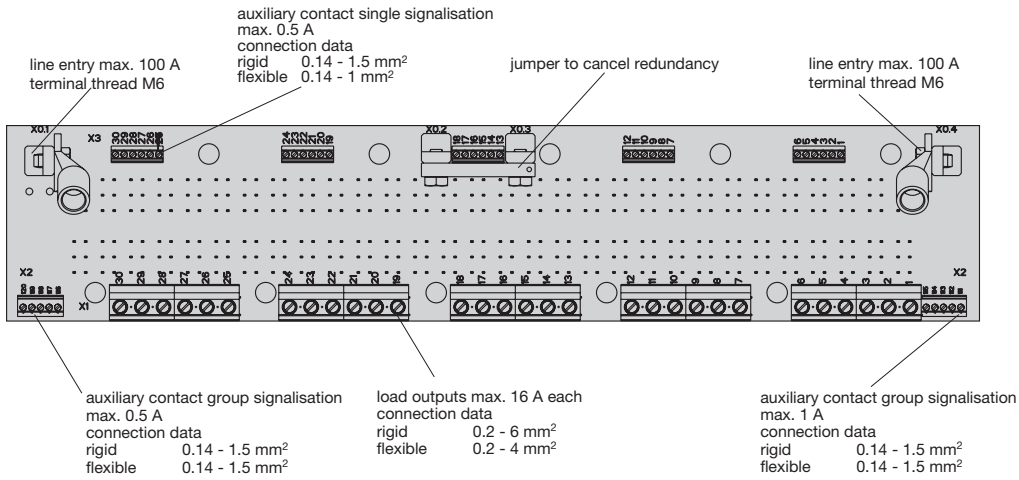


## Ordering Information

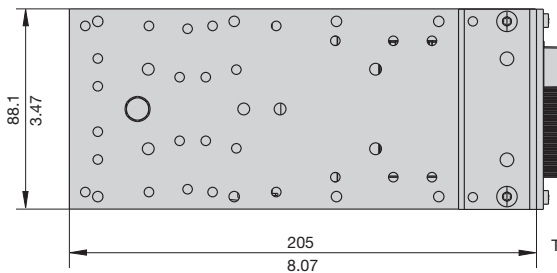
<b>Type number</b>	
19BGT	19" Power-D-Box with sockets pre-wired on pcb
<b>Height</b>	
2	2 U = 88.90 mm
<b>Device prepared for accommodation</b>	
3600	circuit breaker type 3600 or 3900
2210	circuit breaker type 2210-S
1048	solid state remote power controller E-1048-700
ESS20	electronic circuit breaker type ESS20
ESX10	electronic circuit breaker type ESX10
<b>Number of positions</b>	
06	6 poles
12	12 poles
18	18 poles
24	24 poles
30	30 poles
<b>Additional wiring and terminals for line feed</b>	
A0	without (only pcb with terminals)
R0	none (only pcb with terminals, redundant)
A2	line feed pre-wired 1-pole (all positions = 1 circuit)
R2	line entry pre-wired single pole redundant
A3	line feed pre-wired 1-pole (as A2 + return busbar)
R3	line feed pre-wired 1-pole + return busbar, redundant
A4	line feed pre-wired 2-pole connected (all positions = 2 circuits)
R4	line feed pre-wired 2-pole connected, redundant
<b>Colour for additional wiring, line feed (not with A0 + R0)</b>	
<b>single pole wiring</b>	
SW	black
RT	red
BL	blue
<b>multipole wiring</b>	
RB	1st pole red, 2nd pole blue
SB	1st pole black, 2nd blue
<b>Auxiliary contact function</b>	
B1	auxiliary contacts connected in series (group signalisation)
B2	auxiliary contacts connected in parallel (group signalisation)
B3	auxiliary contacts connected in parallel (single signalisation)
B5	as B1, with additional wiring (1 mm <sup>2</sup> ) to terminal (not with A0)
B6	as B2, with additional wiring (1 mm <sup>2</sup> ) to terminal (not with A0)
<b>Colour of additional wiring of auxiliary contacts</b>	
GR	grey (only with B5 or B6)
L	with printed circuit board (pcb)
S...	<b>suffix number</b> for customer specific version
19BGT - 2 - 2210 - 24 A2 ... - B1 ... - L S...	ordering example

7

## Dimensions

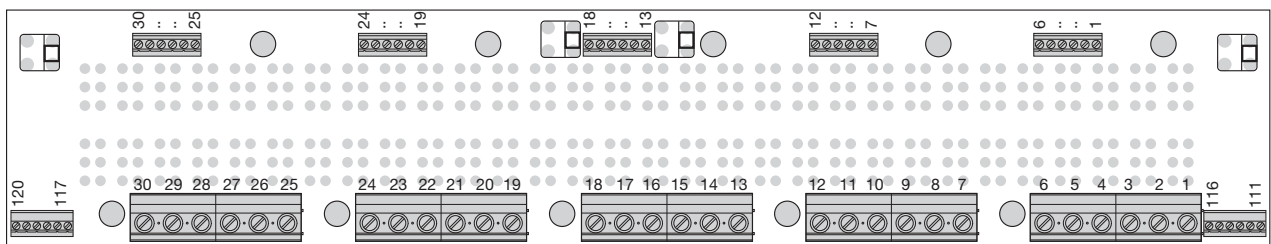


installation depth depending on additional wiring  
standard depth 205/250/295 mm



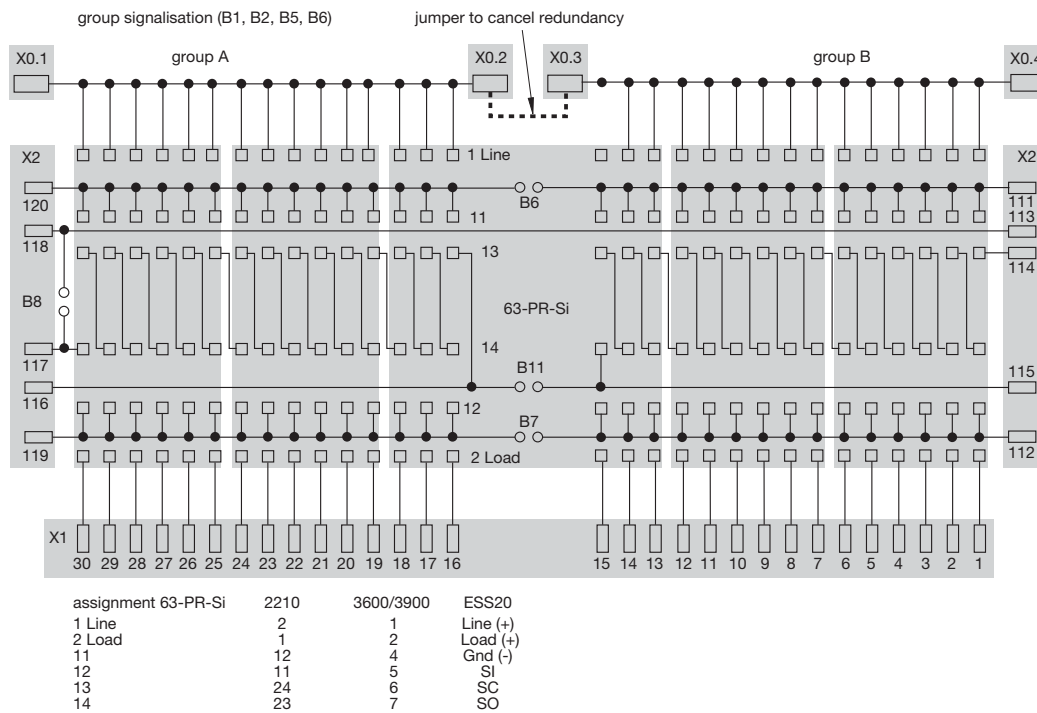
This is a metric design and millimeter dimensions take precedence ( $\frac{mm}{inch}$ )

## Pin assignment bus pcb (terminal side)

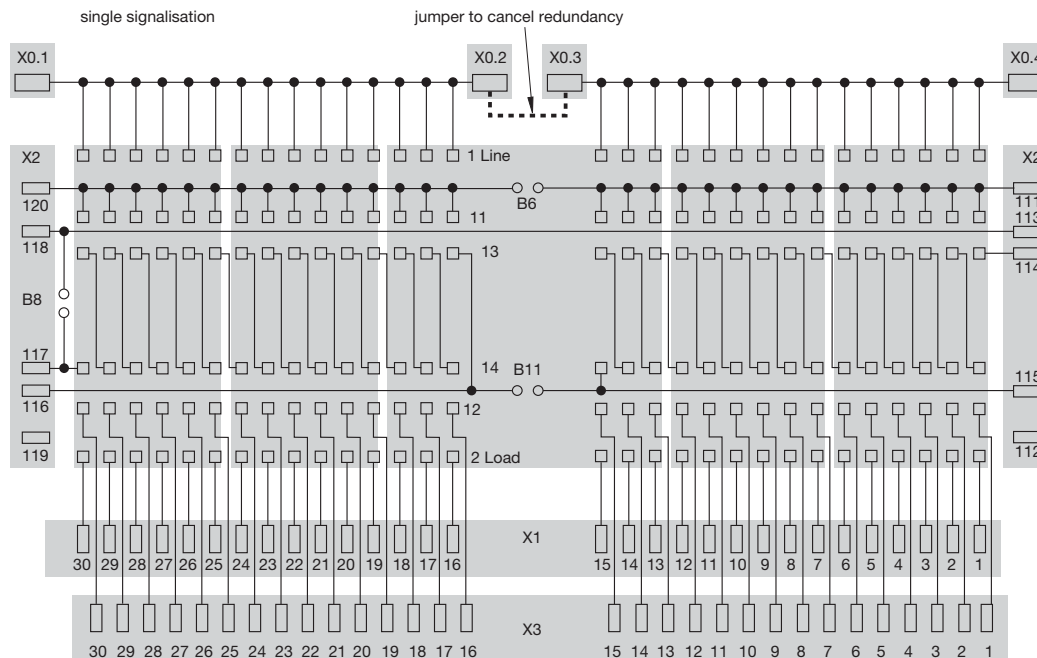


## Schematic diagrams

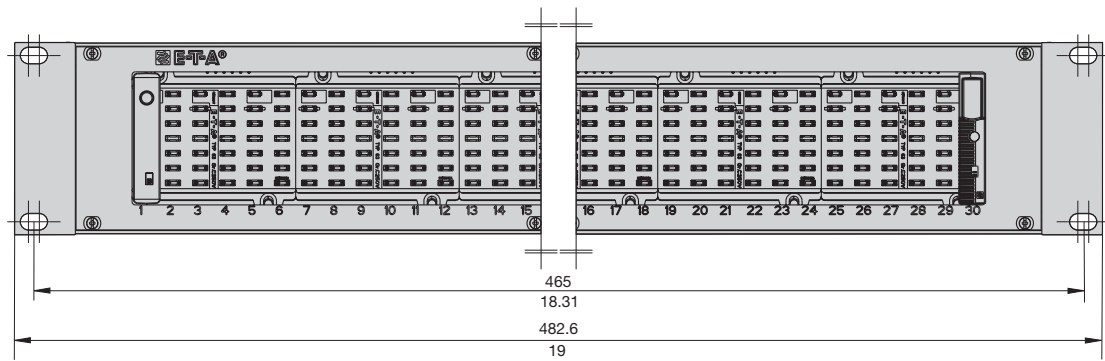
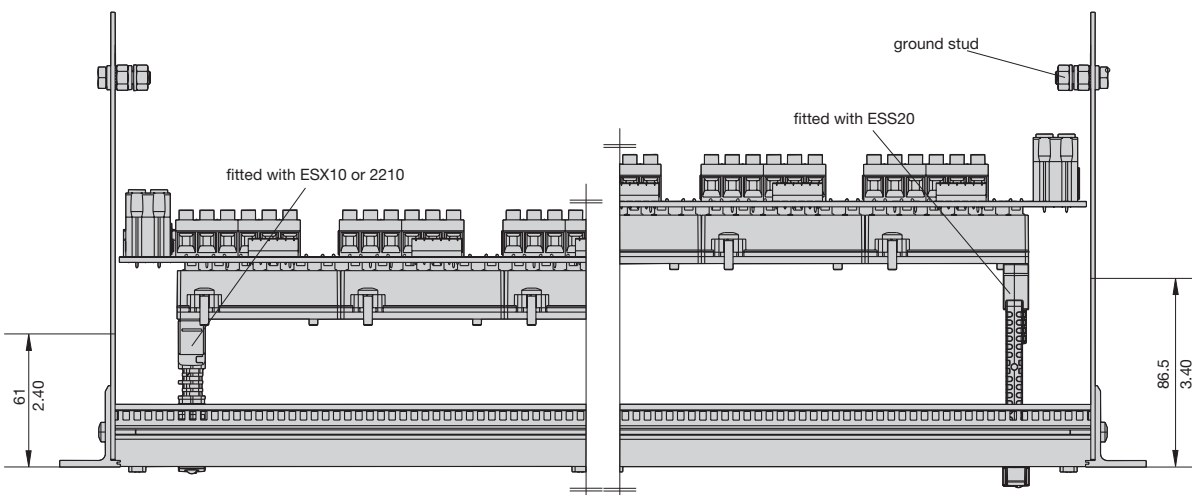
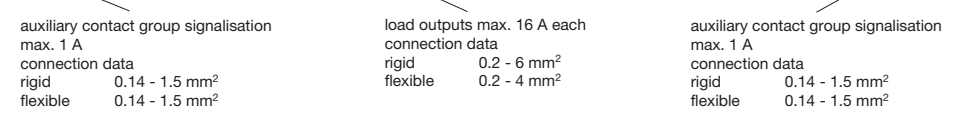
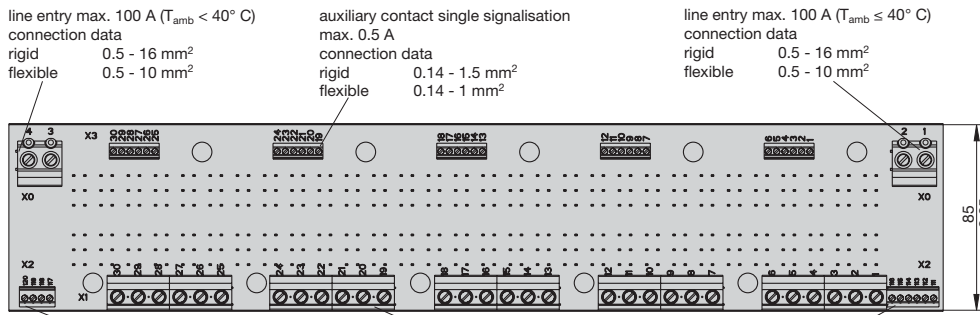
### Bus pcb (single pole version)



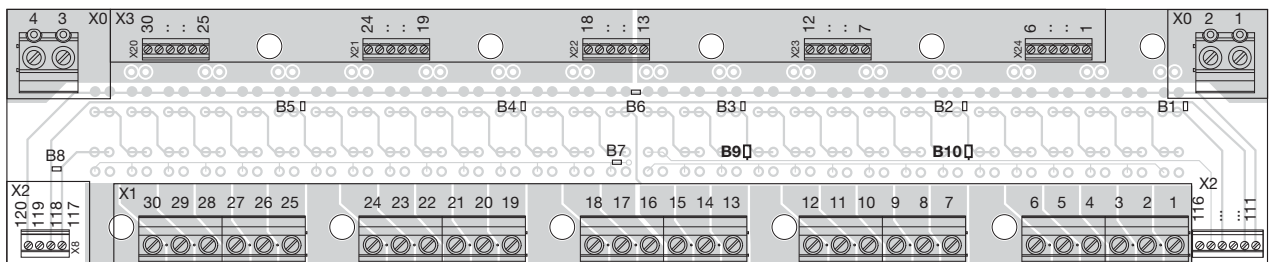
### Bus pcb (single pole version)



## Dimensions

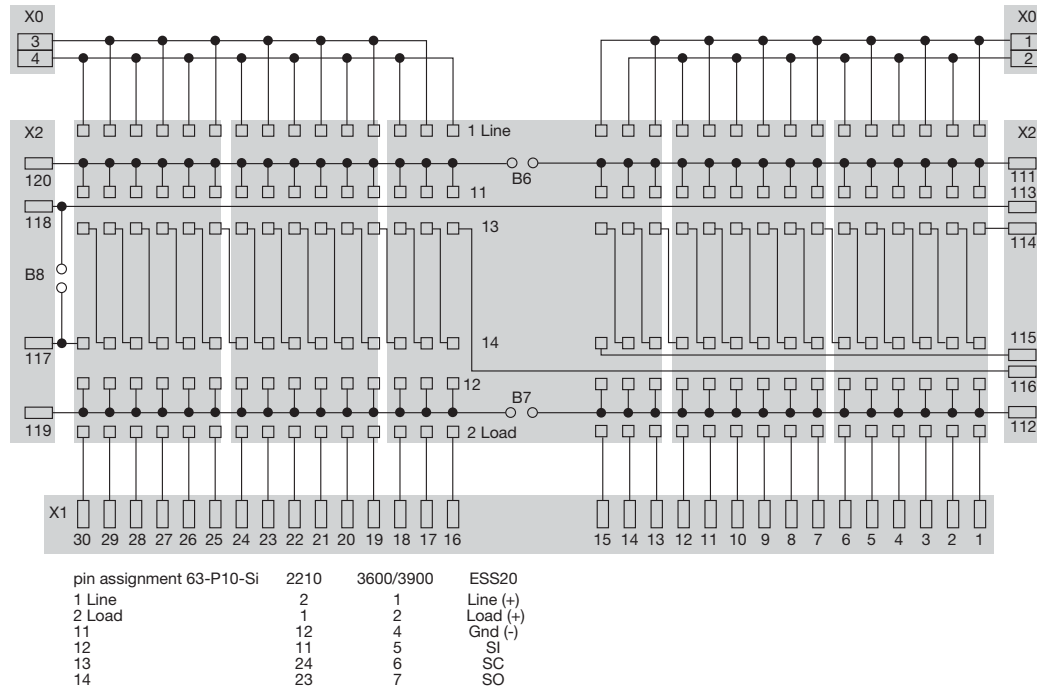


## Pin assignment bus pcb (terminal side)

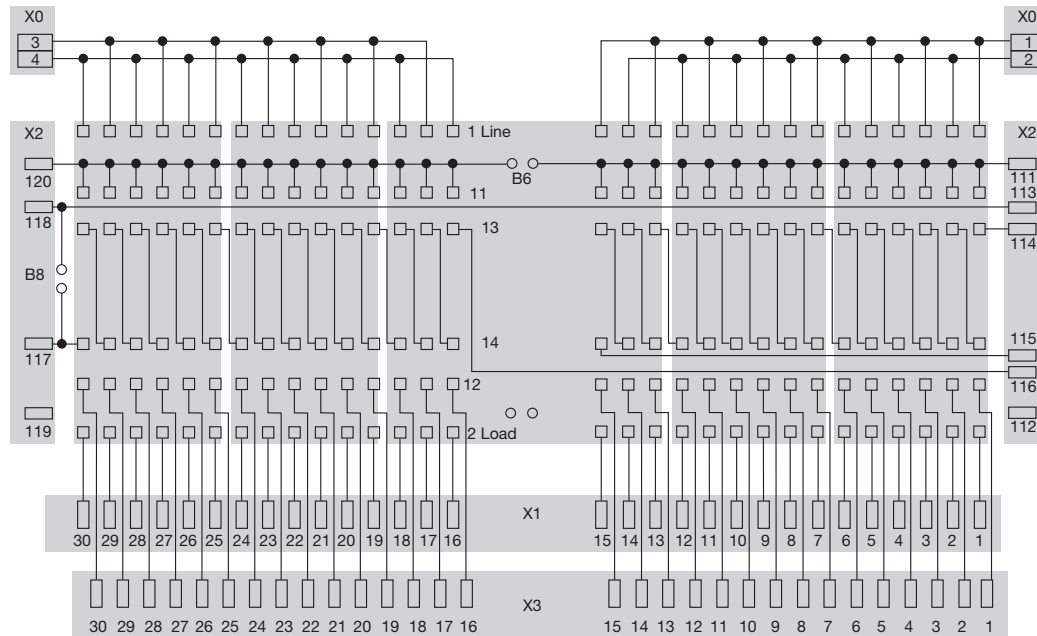


## Schematic diagrams

### Bus pcb (signalisation B1, B2, B5, B6)

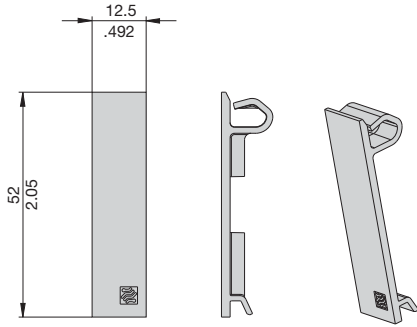


### Bus pcb (signalisation B3)

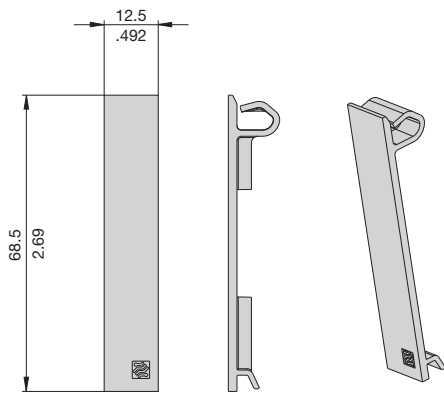


**Accessories**

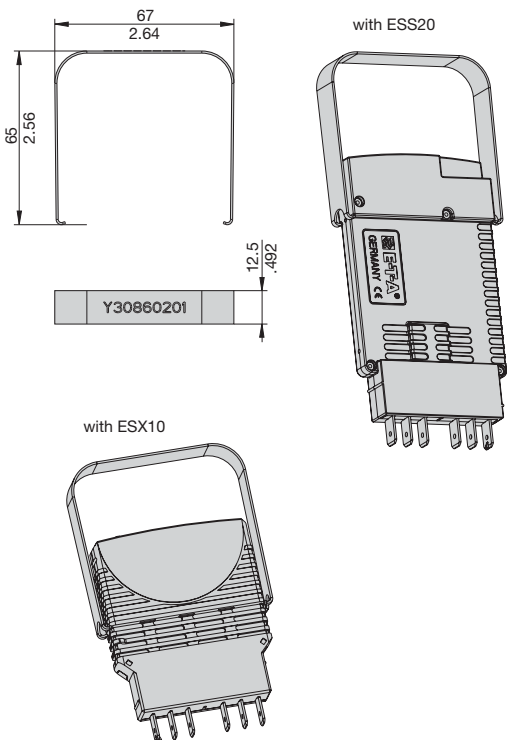
**Blanking piece for Power-D-Box**  
 (types 3600/3900, 2210)  
**Y 308 563 01**



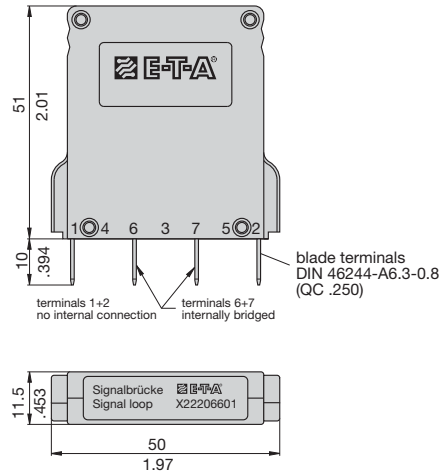
**Blanking piece for Power-D-Box**  
 (types ESS20/ESX10)  
**Y 308 563 41**



**Withdrawal tool for ESS20/ESX10**  
**Y 308 602 01**



**Jumper**  
 to bypass looped through unused auxiliary contacts  
 (series connection)  
**X 222 066 01**



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.

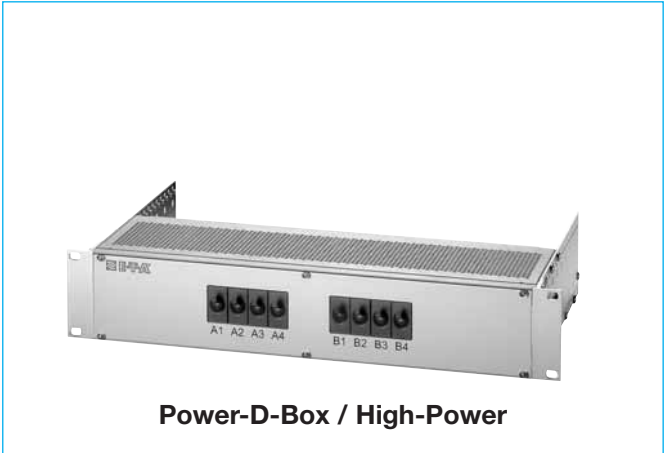
**Description**

The Power-D-Box is a compact 2U power distribution system made of aluminium.

The 19BGT-2-X is a compact 19" 2 U power distribution rack incorporating E-T-A plug-in circuit breakers type 2210-S291 (for 19BGT-2-X2210-...), 8340-F (for 19BGT-2-X83S2/..S4/..Z4-...) or 8345-.01.-W0 (for 19BGT-2-X8345-...). These are installed in pre-wired E-T-A power distribution rails type X2210-S, X8340-S02, X8340-S04, X8340-SZ4 or X8345-D01. Options available include separate circuits, redundant circuits and customer-specific marking.

**Ordering information**

<b>Type No.</b>	
19BGT	19" Modular Power-D-Box
<b>Height</b>	
2	2 U = 88.90 mm
<b>Distribution rails (pre-wired)</b>	
X2210	for X2210-S Economy, max. 12 poles / 2 x 6 poles
X83S2	for X8340-S02 Economy, max. 16 poles / 2 x 8 poles
X83S4	for X8340-S04 Economy, max. 3 x 4 poles
X83Z4	for X8340-SZ4 Economy, max. 16 poles / 2 x 8 poles
X8345	for X8345-D01 High-Power, max. 18 poles / 2 x 7 poles
<b>Number of slots (numbered)</b>	
02	2 poles
03	3 poles
04	4 poles
05	5 poles
06	6 poles
07	7 poles
08	8 poles
09	9 poles
10	10 poles
12	12 poles
14	14 poles
16	16 poles
18	18 poles
<b>Pre-wired supply-feed</b>	
A0	without, with single power distribution system
R0	without, with redundant power distribution system
<b>Pre-wired auxiliary contacts (0.75 mm<sup>2</sup>)</b>	
B0	without
S...	special version
19BGT - 2 - X2210 - 18 A0 B0 - S... ordering example	

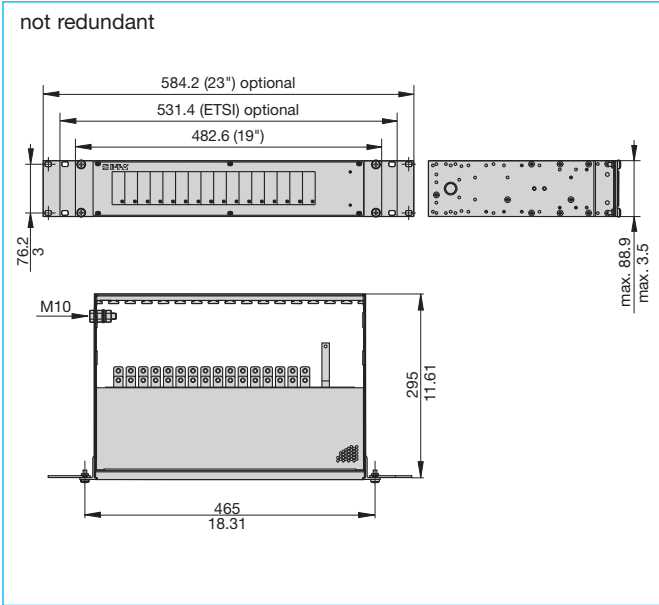


**Power-D-Box / High-Power**

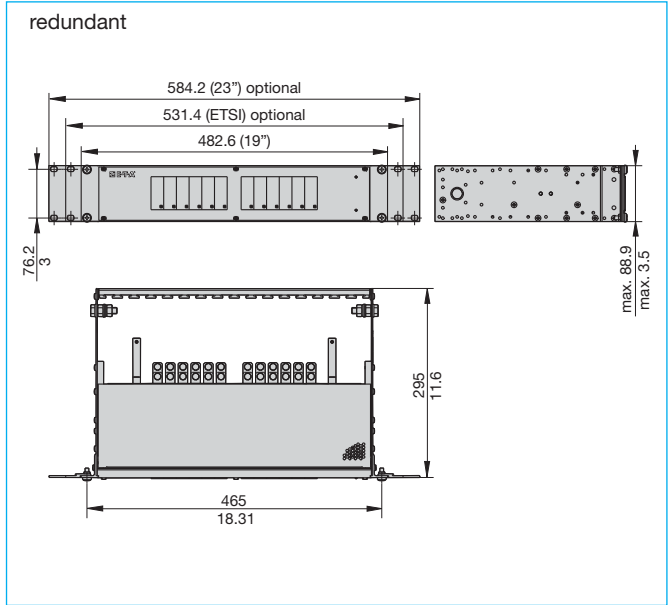
**Technical data**

19" Power-D-Box	length: 426.72 mm
	height: 2 U (88.90 mm)
	material: aluminium
Voltage rating	AC 230 V; DC 110 V; DC 80 V; DC 65 V
<b>Details of power distribution systems:</b>	
X2210-S...	pages 7 - 57 to 7 - 58
X8340-S02	pages 7 - 65 to 7 - 66
X8340-S04	pages 7 - 67 to 7 - 68
X8340-SZ4	pages 7 - 69 to 7 - 71
X8345-D01	pages 7 - 73 to 7 - 76

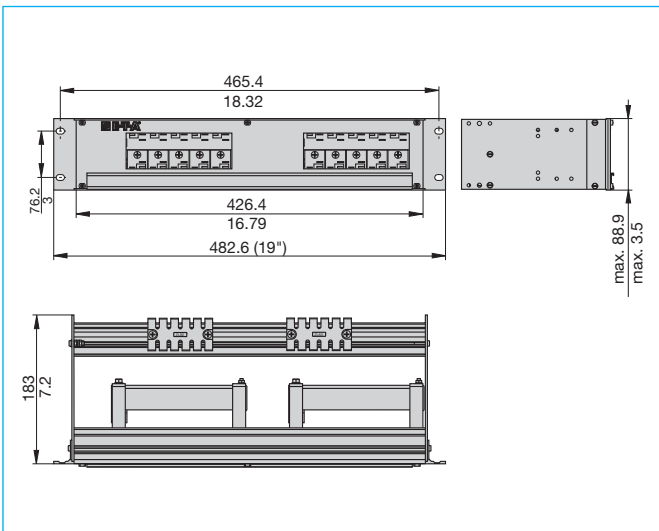
**Dimensions 19BGT-2-X8345 (High-Power)**



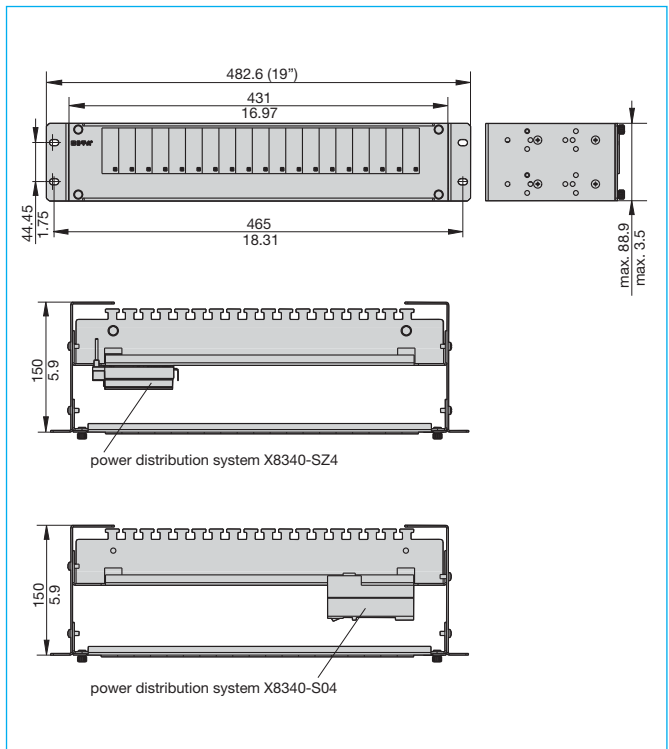
**Dimensions 19BGT-2-X8345 (High-Power)**



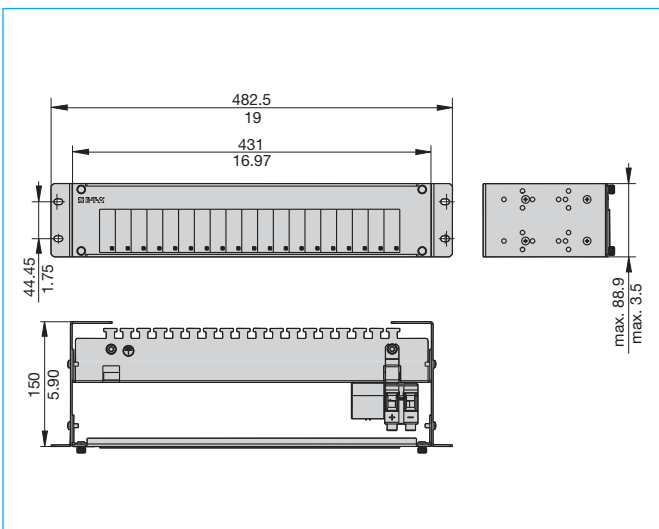
**Dimensions 19BGT-2-X2210 (Economy)**



**Dimensions 19BGT-2-X83S4 / -X83Z4 (Economy)**



**Dimensions 19BGT-2-X83S2 (Economy)**

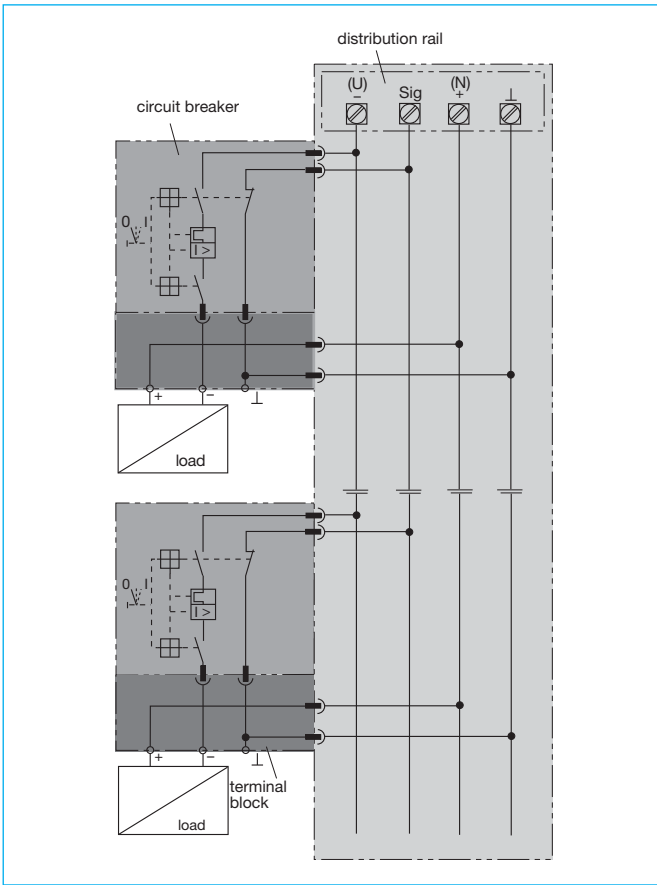


This is a metric design and millimeter dimensions take precedence (mm)  
inch

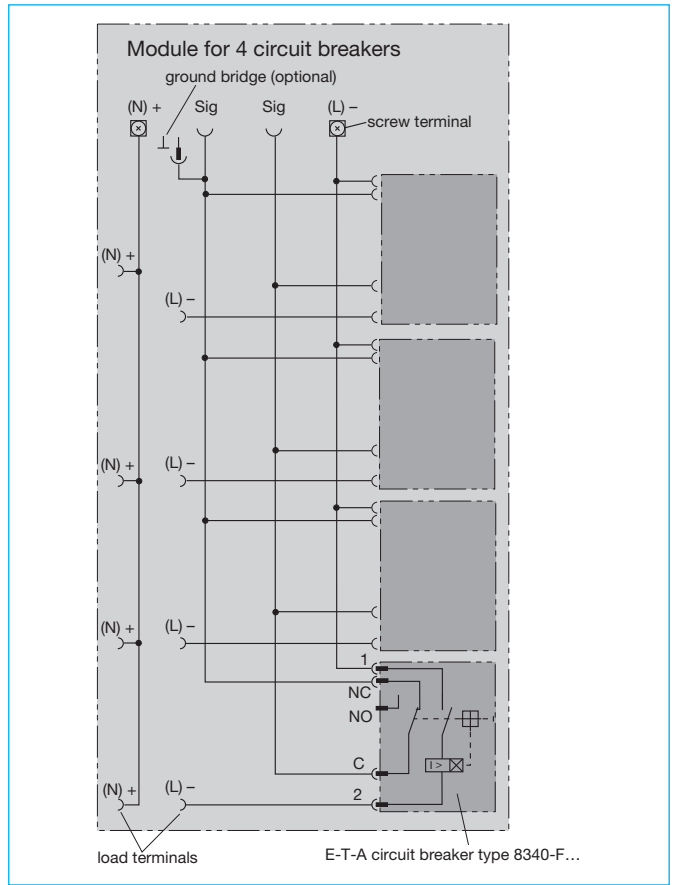
7



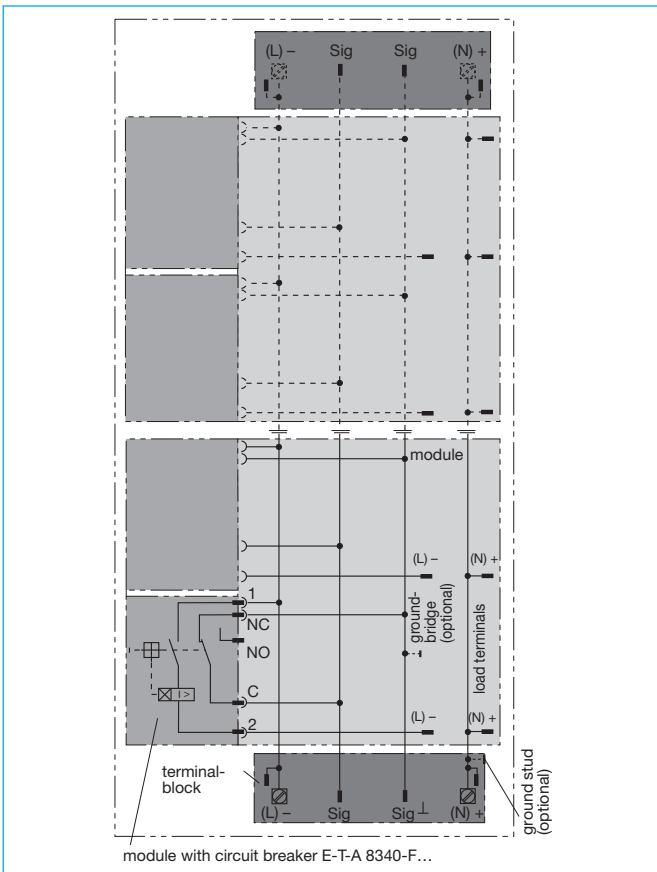
**Schematic diagram X2210-S (Economy)**



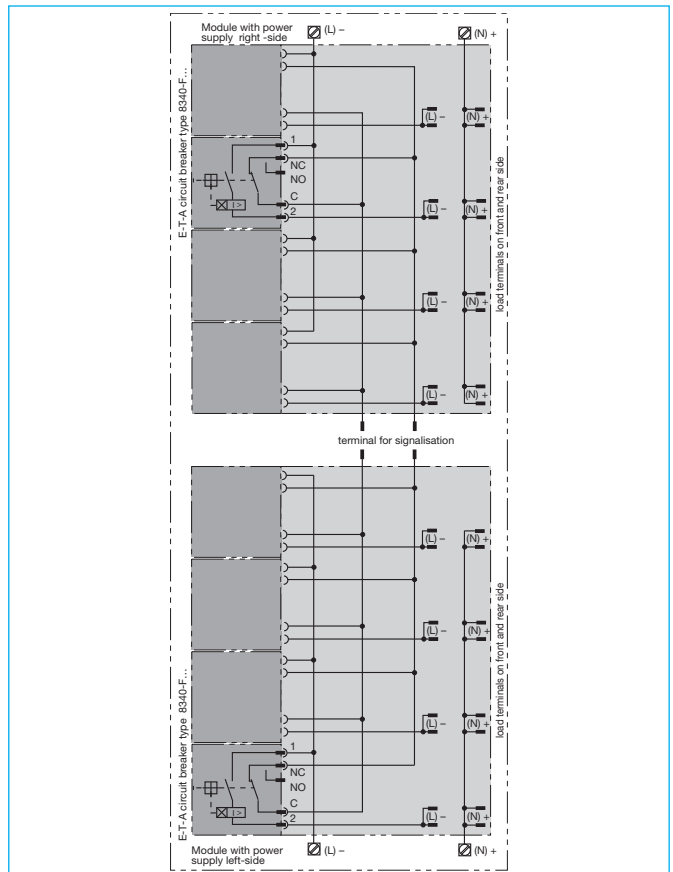
**Schematic diagram X8340-S04 (Economy)**



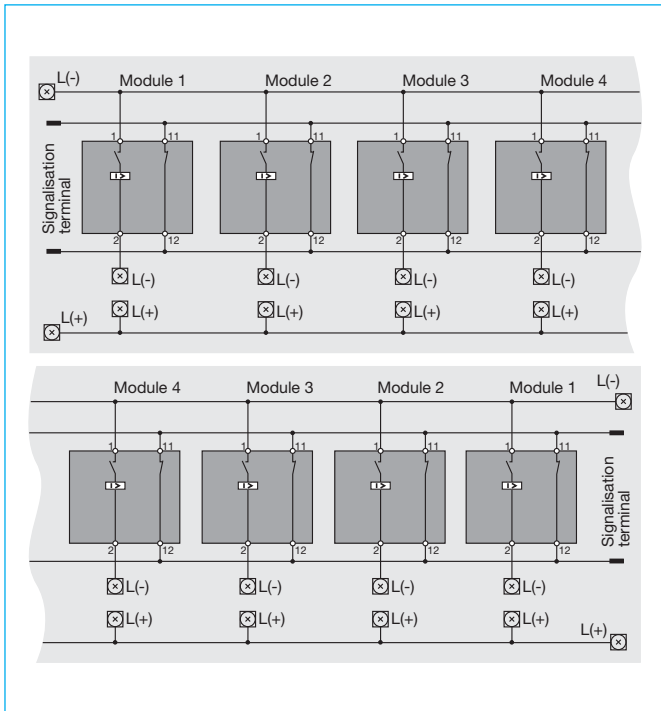
**Schematic diagram X8340-S02 (Economy)**



**Schematic diagram X8340-SZ4 (Economy)**



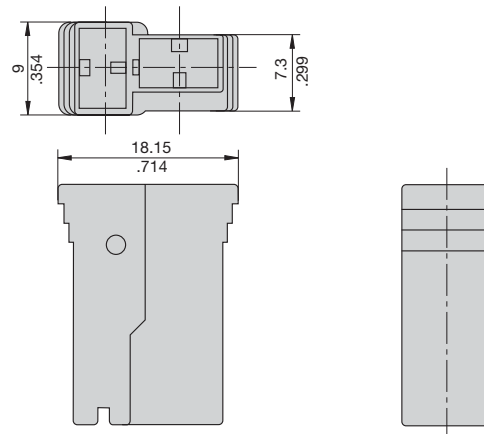
**Schematic diagram X8345-D01 (High Power)**



**Accessories**

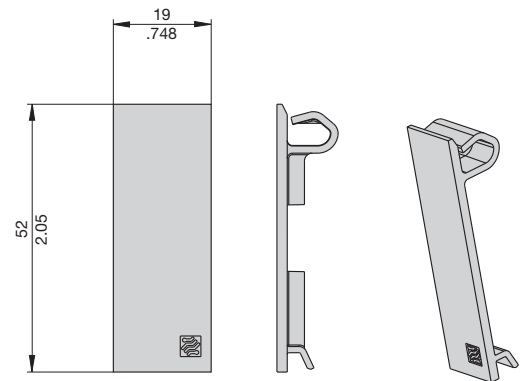
**Load output terminal protected against reverse polarity**  
(set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm)

- X 222 847 01** for cable cross section 0.7...2.0 mm<sup>2</sup>
- X 222 625 01** for cable cross section 2.5...4.0 mm<sup>2</sup>
- X 222 848 01** for cable cross section 4.0...6.0 mm<sup>2</sup>



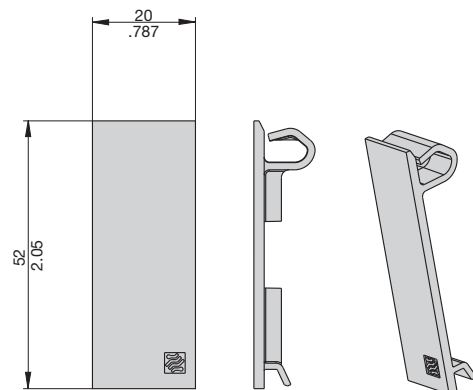
**Blanking piece for Power-D-Box**  
(circuit breaker types 8340, 8345)

**Y 308 563 11**



**Blanking piece for Power-D-Box**  
(circuit breaker types 8340, 8345-D01)

**Y 308 563 21**



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

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## Description

E-T-A rails distribute electrical power in telecommunications, automation, data and control systems. They have been designed to industry standard requirements and are suitable for mounting in ETSI control cabinets. These distribution rails are supplied with mounting bracket, cover, 6 blanks and withdrawal tool.

Live parts in terminal areas are protected against brush contact (VDE 106, part 100).

## Typical applications

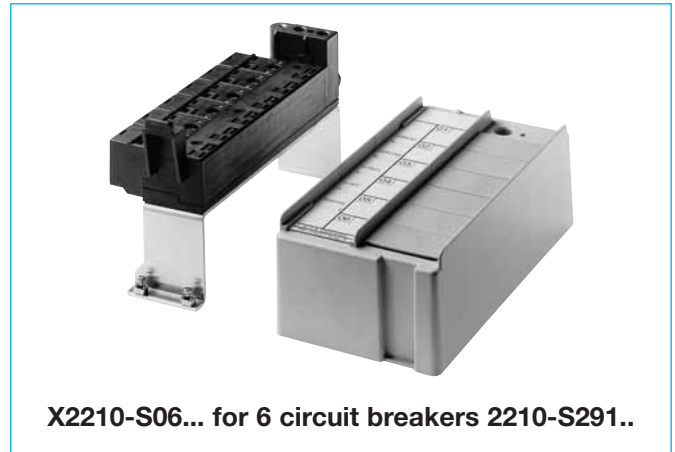
Telecommunications systems using ETSI racks; process control, measuring and control systems.

## Ordering information

Type No.	
<b>X2210</b>	Module for circuit breaker type 2210-S291-...
<b>Version</b>	
<b>S</b>	distribution rail
<b>Identification number</b>	
<b>06</b>	6 positions
<b>Terminal block (intermediate element) (fitted)</b>	
<b>00</b>	without
<b>01</b>	1 x
<b>02</b>	2 x
<b>03</b>	3 x
<b>04</b>	4 x
<b>05</b>	5 x
<b>06</b>	6 x
<b>Accessories (fitted)</b>	
<b>G</b>	without
<b>H</b>	with mounting bracket
<b>J</b>	with mounting bracket, cover and 6 blanks
<b>R</b>	without mounting bracket, with cover and 6 blanks
<b>X2210 - S 06 06 J</b>	ordering example

## Accessories

Terminal block	X 211 019 01
Withdrawal tool	X 211 018 01

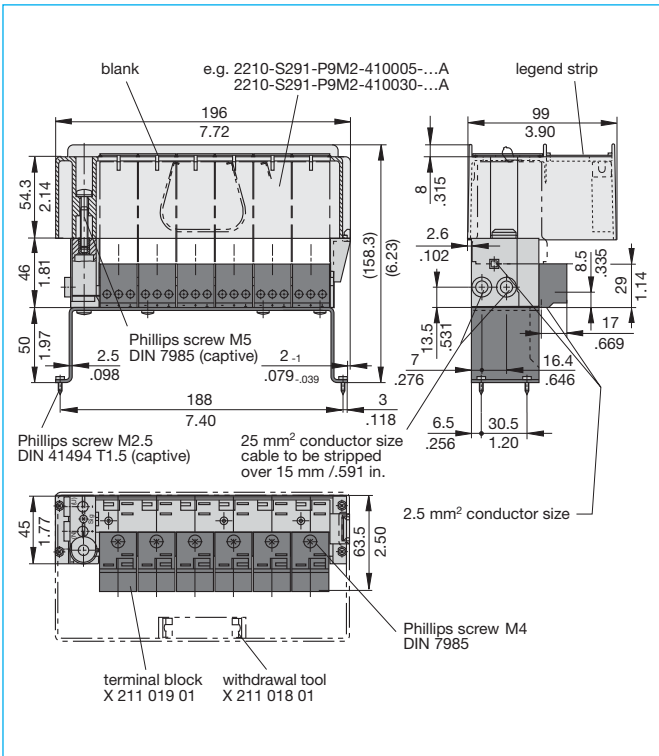


**X2210-S06... for 6 circuit breakers 2210-S291..**

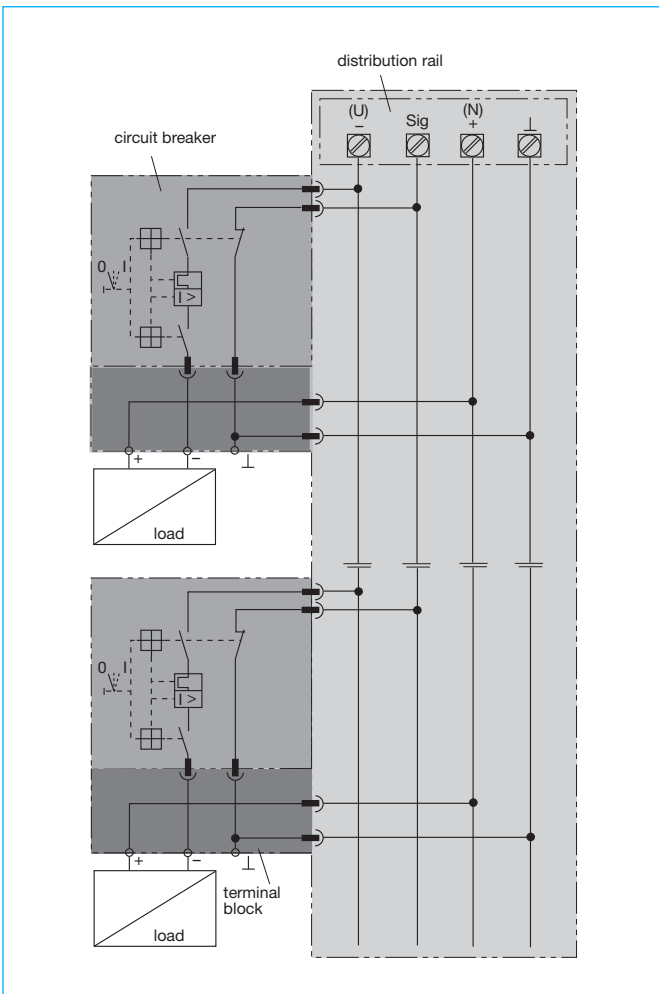
## Technical data

Circuit breakers to be fitted	2210-S291-P9M2-410005 2210-S291-P9M2-410033	
Voltage rating	AC 250 V; DC 65 V	
Load	max. 25 A per position max. 80 A for complete unit	
Signalisation (N/C contact)	AC 240 V / DC 65 V max. 1 A per position	
Insulation co-ordination (IEC 60664 and 60664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardance (IEC 60695, part 2-2)	self-extinguishing	
Terminal design	input output	clamp-type terminal 2.5 to 25 mm <sup>2</sup> flexible clamp-type terminal 0.5 to 2.5 mm <sup>2</sup> flexible
Typical volume resistances in main circuit		
input terminal B + (N) to output terminal + (N)	< 1.5x10 <sup>-3</sup> Ω	
input terminal B - (U) to female contact 2 (k)	< 1.5x10 <sup>-3</sup> Ω	
input terminal B-Sig to female contact 12	< 2x10 <sup>-3</sup> Ω	
output terminal - (U) to female contact 1	< 1.5x10 <sup>-3</sup> Ω	
output terminal - ⊥ to female contact 11	< 2x10 <sup>-3</sup> Ω	
Mass X2210-S0606J	660 g	

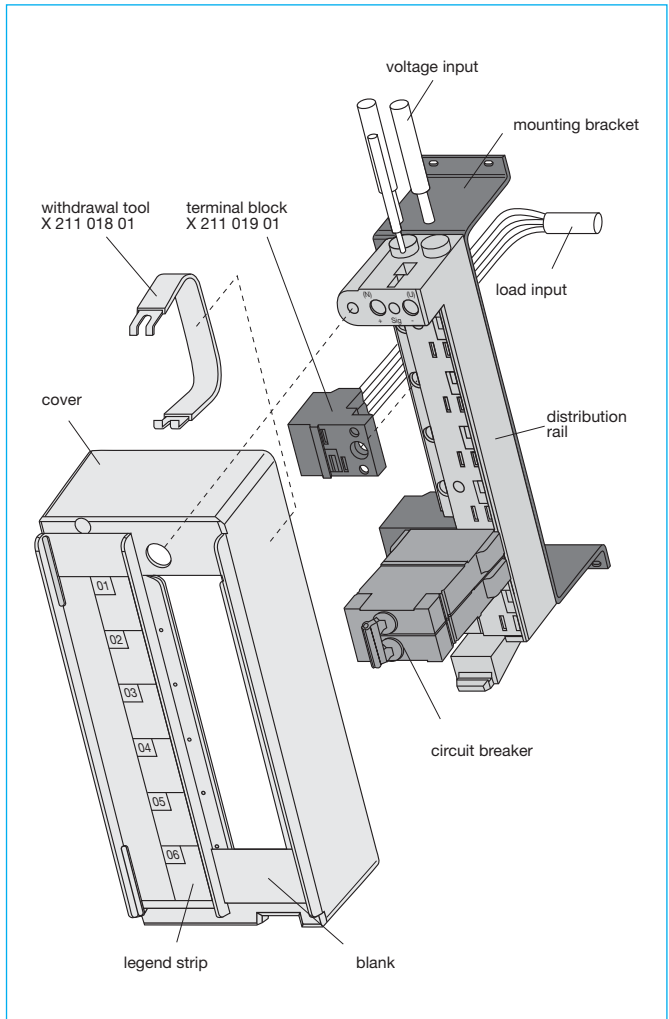
## Dimensions



## Internal connection diagram



## Installation example



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

Thermal-magnetic circuit breaker mounted on Euro Card for 19" rack mounting, with one Euro Card accommodating one or two single pole, double pole or three pole circuit breakers. Convenient toggle actuation enables series 2210 additionally to be used as an ON/OFF switch. A red LED is located in the front frame of the Euro Card, indicating the switching status of the circuit breaker (via the auxiliary circuit).

## Typical applications

Process control, measuring and control systems, telecommunications



**E2210-...**

## Technical data

### Circuit breaker

Main circuit:

voltage rating	3 AC 433 V (50/60 Hz); AC 250 V (50/60 Hz); DC 65 V						
current rating range	0.1...16 A						
standard current ratings	0.1	0.2	0.3	0.4	0.5	0.6	0.8 A
	1	1.5	2	2.5	3	4	5 A
	6	8	10	12	16 A		

Auxiliary circuit:

voltage rating	AC 240 V; DC 65 V
current rating	1 A

Other data see type 2210-S2..

### Front plate

Dimensions

(1 module = 5.08 mm, 1 U = 44.45 mm)

Width:	one single pole circuit breaker	4 modules
	one double pole circuit breaker	6 modules
	one three pole circuit breaker	9 modules
	two single pole circuit breakers	4 modules
	two double pole circuit breakers	10 modules
	two three pole circuit breakers	12 modules

Height: 3 U

Material aluminium, anodized

### LED

Voltage rating DC 24 V / DC 60 V

## Ordering information

Type No.  
E2210

### Mounting style

- 1 1 x single pole, central mounting (standard)
- 2 1 x single pole, top mounting
- 3 1 x single pole, bottom mounting
- 4 1 x double pole, central mounting (standard)
- 5 1 x three pole, central mounting (standard)
- 6 2 x single pole, symmetrical mounting (standard)
- 7 2 x double pole, symmetrical mounting (standard)
- 8 2 x three pole, symmetrical mounting (standard)

### Front plate

- 1 aluminium (standard)
- 2 moulded (Intermas)

### LED

- 1 red, DC 24 V (standard)
- 2 red, DC 60 V
- 3 green, DC 24 V
- 4 green, DC 60 V

### Circuit breaker

#### Mounting

- S panel mounting

#### Actuator design

- 2 short toggle

#### Number of poles

- 1 1-pole protected
- 2 2-pole protected
- 3 3-pole protected
- 5 2-pole, protected on one pole only

#### Panel mounting

- 1 with M3 thread

#### Terminal design (main contacts)\*\*

- P1 blade terminals 6.3-0.8 (standard)

#### Characteristic curve\*\*

- 01 **F1** fast acting: therm.  $1.01-1.4 \times I_N$ ; magn.  $2-4 \times I_N$  DC (DC only)
- 02 **M1** standard delay: therm.  $1.01-1.4 \times I_N$ ; magn.  $6-12 \times I_N$  AC;  $7.8-15.6 \times I_N$  DC
- 03 **T1** delayed: therm.  $1.01-1.4 \times I_N$ ; magn.  $10-20 \times I_N$  AC
- 04 **T2** thermal only,  $1.01-1.4 \times I_N$
- 05 **M3** standard delay, low resistance: therm.  $1.4-1.8 \times I_N$  AC; magn.  $6-12 \times I_N$  AC;  $7.8-15.6 \times I_N$  DC
- F2 fast acting: therm.  $1.1-1.4 \times I_N$  magn.  $3.5-6.5 \times I_N$  AC/DC
- XX different curves for multipole versions to order\*

#### Intermediate position\*\*

- H without intermediate position (standard)
- Z with intermediate position

#### Auxiliary contacts\*\*

- 1 with auxiliary contacts (only with 1x1-pole, 2x1-pole)
- 5 with auxiliary contact only in the last unit of multipole versions

#### Auxiliary contact function\*\*

- 1 1 N/C, 1 N/O (standard)
- 2 1 N/O (23/24)
- 3 1 N/C (11/12)
- 4 1 N/O contact, closed in the intermediate and ON position (-Z only)

#### Auxiliary contact-terminal design

- 1 same as main terminals\*\*

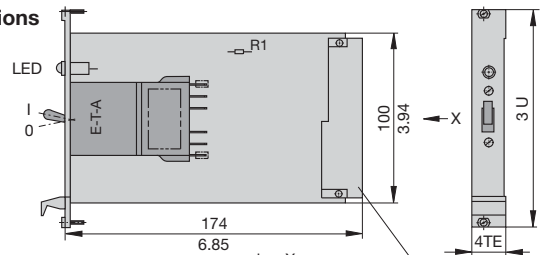
#### Current ratings\*\*\*

0.1...16 A

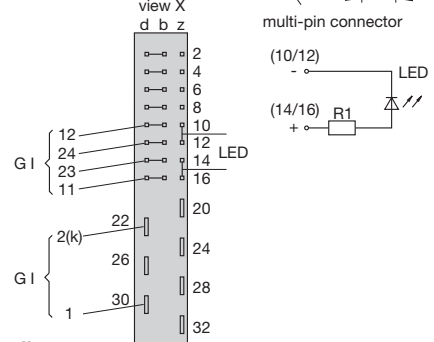
E2210 - 6 1 1 - S 2 1 1 - 02 - H 1 1 1 - 0.1 A  
 XX 0.1/0.2 A  
 only with 2x1-pole/2x2-pole/2x3-pole

## One single pole circuit breaker

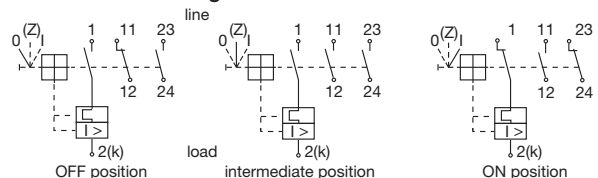
### Dimensions



### Terminal selection

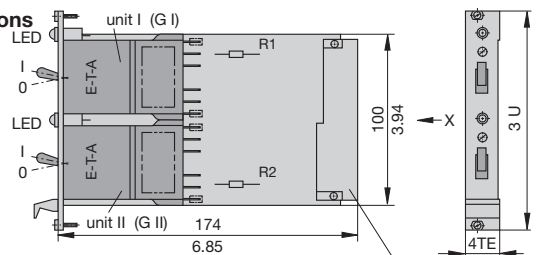


### Internal connection diagram

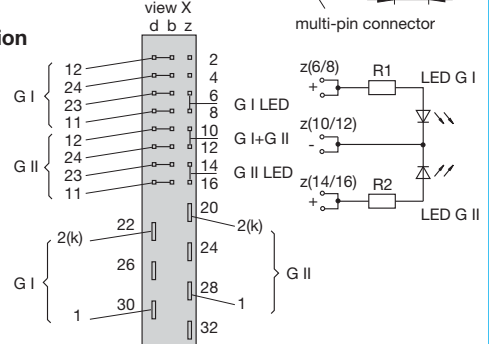


## Two single pole circuit breakers

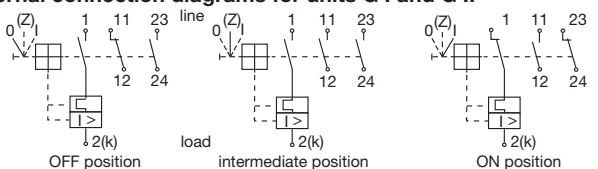
### Dimensions



### Terminal selection



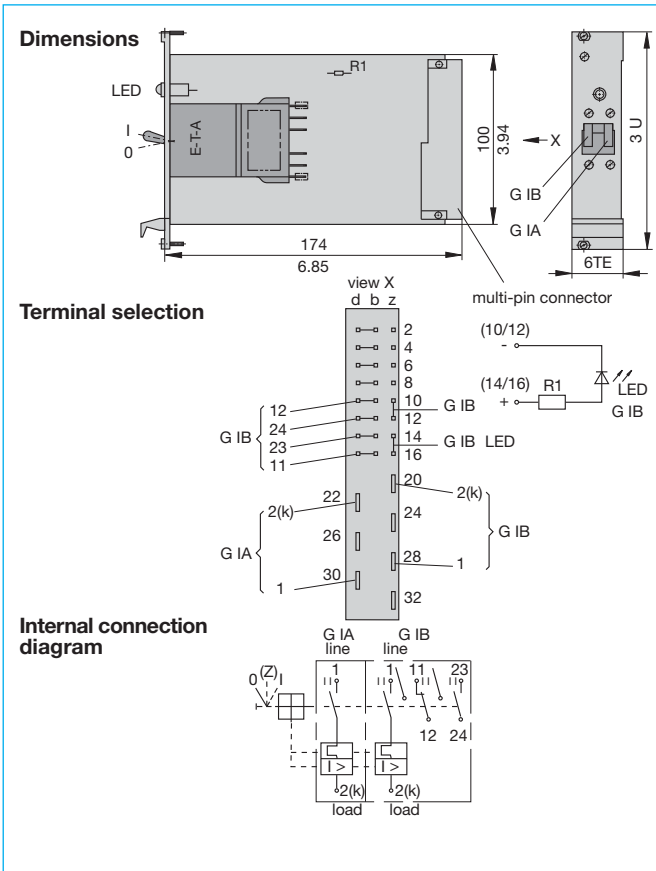
### Internal connection diagrams for units G I and G II



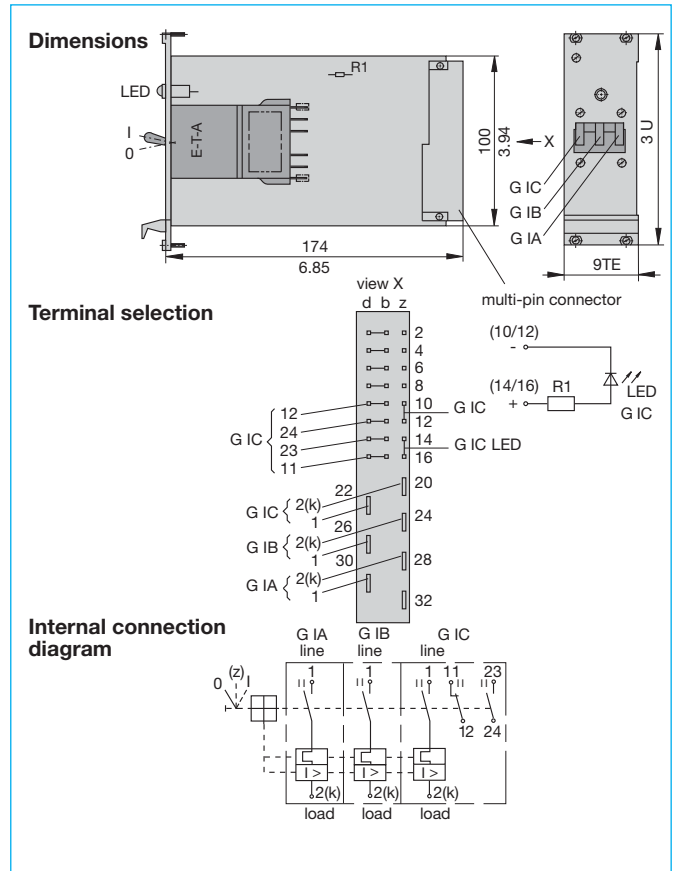
This is a metric design and millimeter dimensions take precedence (mm/inch)

\*) Clearly add the desired specifications.  
 \*\*) With mounting styles 6, 7 and 8: both circuit breakers must have the same characteristics.  
 \*\*\*) It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

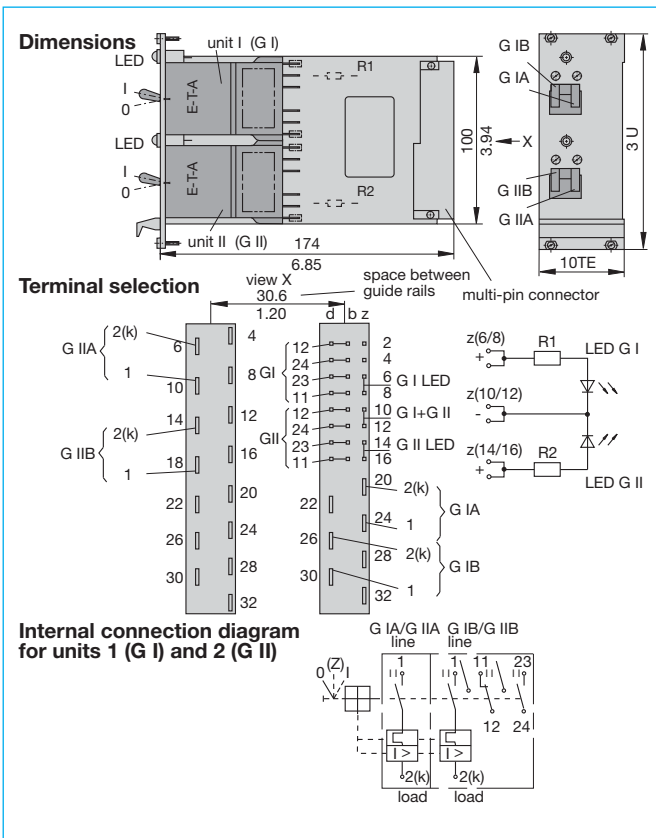
## One double pole circuit breaker



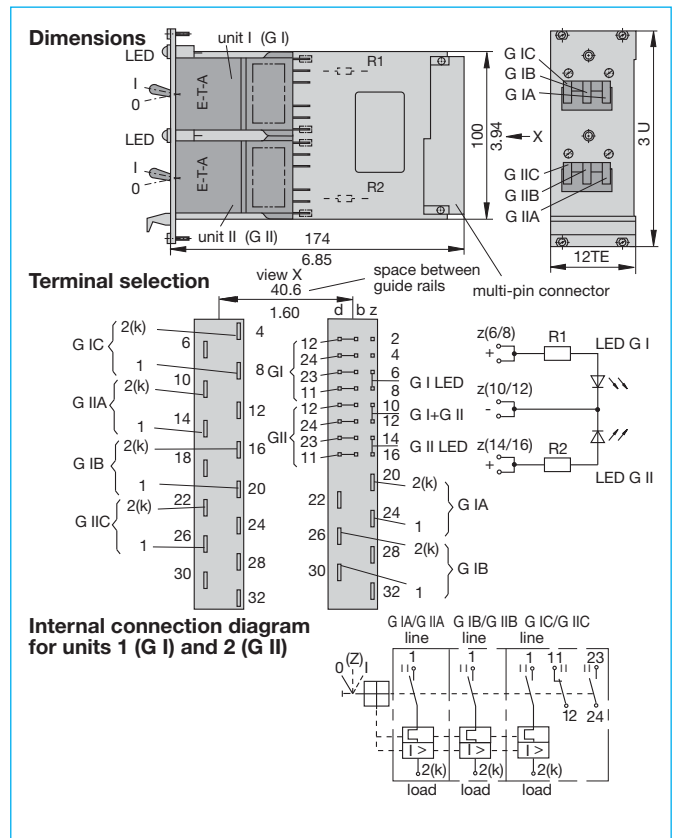
## One three-pole circuit breaker



## Two double pole circuit breakers



## Two three-pole circuit breakers



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

## Sockets for Euro Cards

### Description

The following sockets may be used with single pole circuit breakers:

#### OZ041Z000004

24/7-pole mixed socket to DIN 41612 - form M.  
Connection: 7-pole for 6.3x0.8 mm connectors and 24-pole midi-wire wrap posts (1 x 1 mm).

#### OZ041Z000007

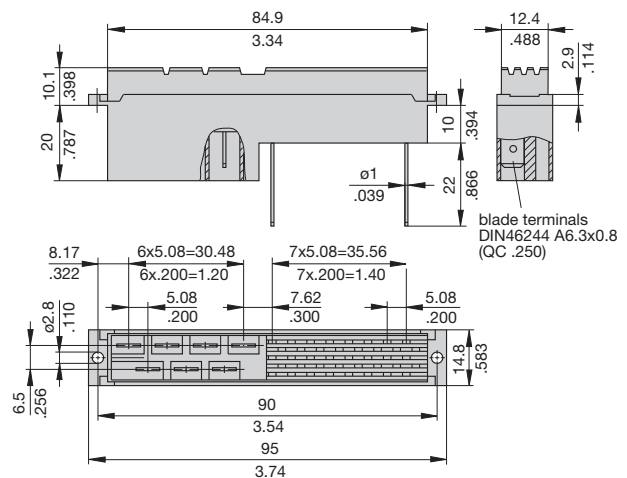
24/7-pole mixed socket to DIN 41612 - form M.  
Connection: 7-pole for 6.3x0.8 mm connectors and 24-pole for 2.8x0.8 mm connectors.

#### OZ041Z000005

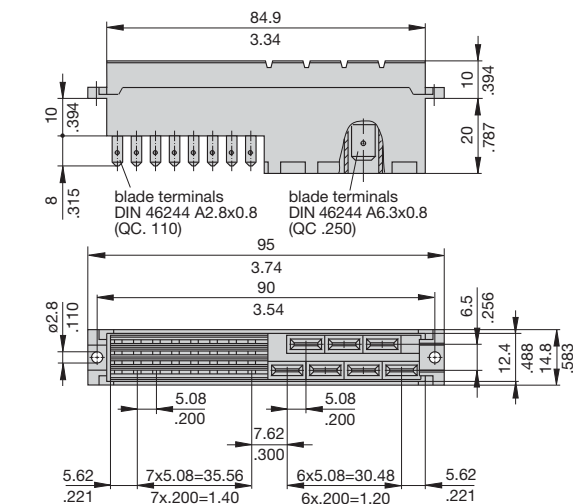
A 15-pole socket to DIN 41612, form H, for 6.3x0.8 mm connectors is required in addition to the socket mentioned above, if two double pole or two three pole circuit breakers are fitted on one Euro Card.

## Dimensions of sockets for Euro Cards

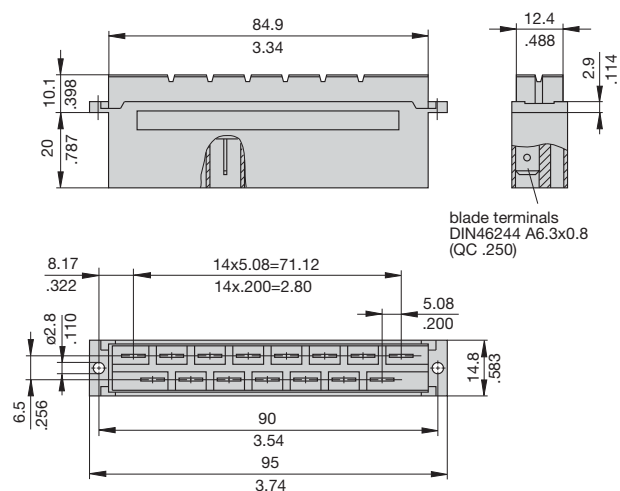
### OZ041Z000004



### OZ041Z000007



### OZ041Z000005



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

Thermal-magnetic circuit breaker mounted on Euro Card for 19" rack mounting, with one Euro Card accommodating up to three circuit breakers. Convenient toggle actuation enables series 2215 additionally to be used as an ON/OFF switch. A red LED is located in the front frame of the Euro Card, indicating the switching status of the circuit breaker (via the auxiliary circuit).

## Typical applications

Process control, measuring and control systems, telecommunications

## Ordering information for circuit breakers only

Type No.  
E2215

### Mounting

- 1 3 x 1-pole, mounted symmetrically (standard)
- 2 2 x 1-pole, mounted centrally above and below
- 3 2 x 1-pole, mounted above and below
- 4 2 x 1-pole, mounted below and centrally
- 5 1 x 1-pole, mounted above
- 6 1 x 1-pole, mounted centrally
- 7 1 x 1-pole, mounted below

### Handle

- 1 aluminium handle (standard)

### LED

- 1 red LED, DC 24 V (standard)

### Circuit breaker

#### Actuator design

- L2 moulded toggle

#### Number of poles

- 1 single pole protected

#### Accessories

- 0 without

#### Terminal design

- P1 blade terminals A6.3-0.8 (standard)

#### Characteristic curve

- 01 F1 fast acting: therm.  $1.01 \times 1.4 I_N$ ; magn.  $2-4 \times I_N$  DC (DC only)
- 02 M1 standard delay: therm.  $1.01-1.4 \times I_N$ ; magn.  $5-10 \times I_N$  DC; magn.  $3.5-8 \times I_N$  DC
- 03 T1 delayed: therm.  $1.01-1.4 \times I_N$ ; magn.  $6-13 \times I_N$  AC
- 07 T3 delayed: therm.  $1.01-1.4 \times I_N$ ; magn.  $9.5-15.5 \times I_N$  AC

#### Auxiliary contacts

- S1 with auxiliary contacts (change over)

#### Auxiliary contact - terminal design

- 1 same as main terminals

#### Current ratings

- 0.05...10 A

E2215 3 1 1 - L2 1 0 - 02 - S1 1 - 0.1 A ordering example



E2215-...

## Technical data

### Circuit Breaker

Main circuit:																			
voltage rating	AC 250 V (50/60 Hz); DC 48 V																		
current rating range	0.05...10 A																		
standard current ratings	<table border="1"> <tr> <td>0.1</td><td>0.2</td><td>0.3</td><td>0.4</td><td>0.5</td><td>0.6 A</td> </tr> <tr> <td>0.8</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3 A</td> </tr> <tr> <td>4</td><td>5</td><td>6</td><td>8</td><td>10 A</td><td></td> </tr> </table>	0.1	0.2	0.3	0.4	0.5	0.6 A	0.8	1	1.5	2	2.5	3 A	4	5	6	8	10 A	
0.1	0.2	0.3	0.4	0.5	0.6 A														
0.8	1	1.5	2	2.5	3 A														
4	5	6	8	10 A															
Auxiliary circuit:																			
voltage rating	AC 250 V/DC 28 V																		
current rating	1 A																		
Other data	see type 2215																		

### Front plate

Dimensions:	
width	4 modules (1 module = 5.08 mm)
height	3 U (1 U = 44.45 mm)
Material	aluminium, anodized

### LED

Max. voltage rating	DC 24 V
---------------------	---------

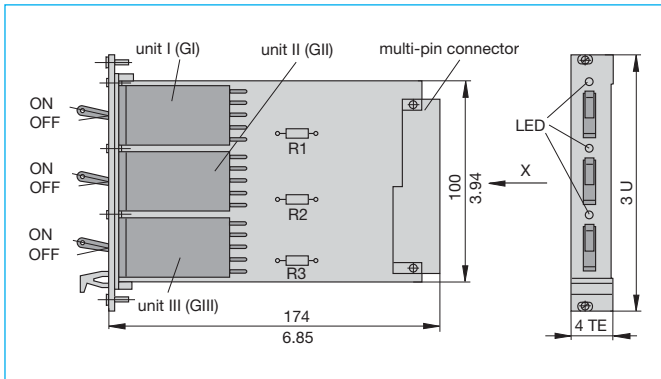
Select the circuit breakers to above ordering information. For further information please refer to group 2.

It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

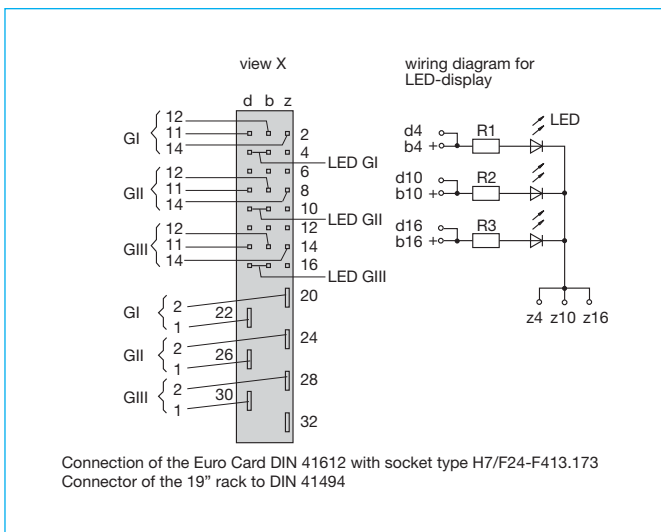
Please add "Circuit breakers to be mounted on Euro Card" to the circuit breaker designation when ordering so that the applicable suffix number for the special version (E2215-...-L2..) can be determined .

19" racks may also be fitted with one or two circuit breakers by the customer, using industry standard components such as base plates, front plates with handle, sockets. Connection by means of blade terminals 6.3x0.8 mm.

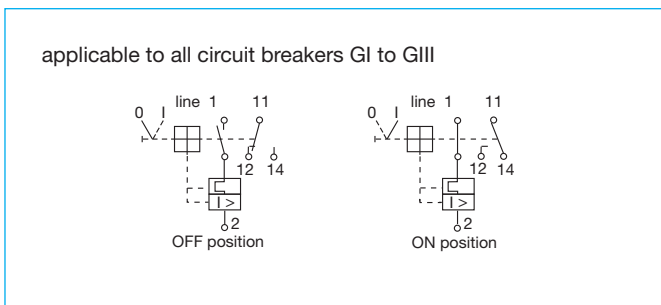
## Dimensions



## Terminal selection



## Internal connection diagrams



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

Modular distribution rail, each module accommodating 2 magnetic or hydraulic-magnetic circuit breakers type 8340-F... and associated load terminals. Circuit breaker status indication (group signalisation) is via 2 busbars. Power supply is via right- or left-side terminal block. Live parts in the plug-in and supply feed terminal areas are protected against brush contact. Circuit breakers may be replaced with power on.

## Typical applications

Telecommunications and cellular communication systems

## Ordering information

<b>Type No.</b>	
<b>X8340</b>	Distribution rail for circuit breaker type 8340
<b>Version</b>	
<b>S</b>	rail
<b>Identification number</b>	
<b>02</b>	modular, for 2 circuit breakers
<b>Power supply</b>	
<b>L</b>	left-side
<b>R</b>	right-side
<b>Modules with power supply</b>	
<b>1</b>	1 module, 2-way
<b>2</b>	2 modules, 2-way each
<b>3</b>	3 modules, 2-way each
<b>4</b>	4 modules, 2-way each
<b>5</b>	5 modules, 2-way each
..	...
<b>Signalisation</b>	
<b>0</b>	without signalisation
<b>1</b>	group signalisation
<b>2</b>	group signalisation, through-connected for right- or left-side power supply (main current path separated)
<b>3</b>	single signalisation
<b>Accessories</b>	
<b>00</b>	without
<b>01</b>	cover per module
<b>02</b>	ground bridge in first module
<b>03</b>	M4 mounting screw per module
<b>04</b>	cover per module + mounting screw M4 (bulk shipped)
<b>05</b>	cover per module + ground bridge in first module
<b>06</b>	ground bridge in first module + mounting screw M4 (bulk shipped)
<b>07</b>	cover + ground bridge + M4 mounting screw (bulk shipped)
<b>08</b>	cover per module + ground bridge in first module + mounting screw M4 (bulk shipped) + ground stud M6
<b>09</b>	mounting screw M4 (bulk shipped) + ground stud M6
<b>10</b>	cover per module + mounting screw M4 (bulk shipped) + ground stud M6
<b>Terminal marking</b>	
<b>B</b>	+ and - reversed
<b>X8340 - S 02 L 5 - 1 01 B</b>	ordering example

## Approvals

Authority	Voltage ratings	Current ratings
UL 1801	AC 250 V; DC 80 V	100 A



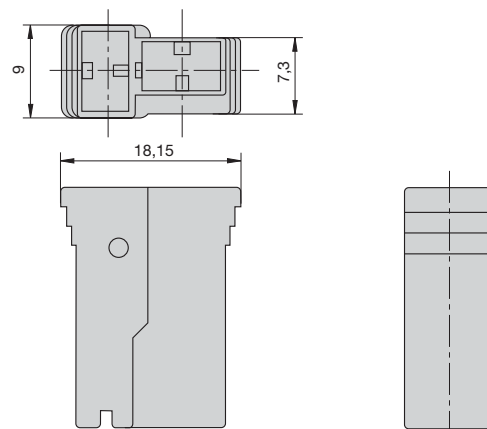
**X8340-S02**

## Technical data

For circuit breaker type	8340-F.10-P1..-H...	
Voltage rating	AC 230 V; DC 80 V	
Load	25 A per position (30 A upon request) 132 A for complete unit	
Signalisation (N/C)	6 A, AC 230 V 1 A, DC 80 V per position	
Insulation co-ordination (IEC 60664 and 60664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardance (IEC 60695, part 2-2)	self-extinguishing	
Supply terminal design (terminal socket)	recessed screw/pressure plate 6...50 mm <sup>2</sup> , stranded feed-in 6...35 mm <sup>2</sup> with connector sleeve additional blade terminals 6.3x0.8	
load (module)	blade terminals 6.3x0.8 load output terminal protected against reverse polarity	
signalisation (module)	blade terminals 4.8x0.8	
Mass	terminal block	144 g
	power distribution module	96 g
	cover	12 g

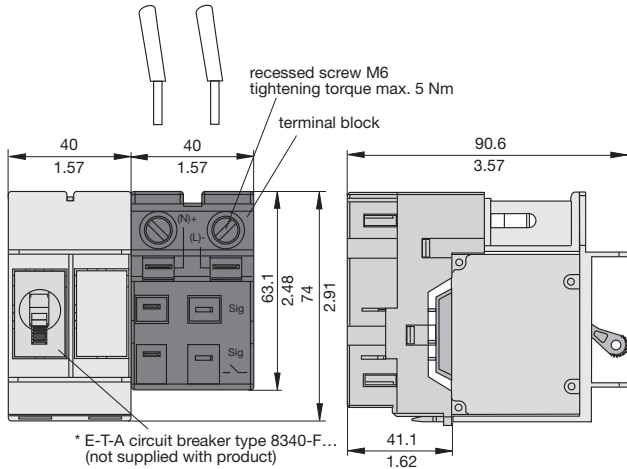
## Internal connection diagrams

**Load output terminal protected against reverse polarity**  
(set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm)  
**X 222 847 01** for cable cross section 0.7...2.0 mm<sup>2</sup>  
**X 222 625 01** for cable cross section 2.5...4.0 mm<sup>2</sup>  
**X 222 848 01** for cable cross section 4.0...6.0 mm<sup>2</sup>

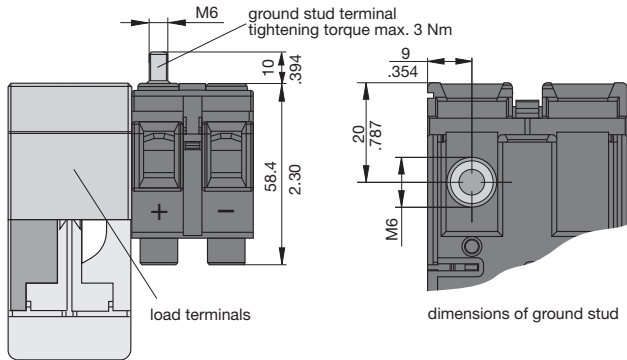


**Dimensions**

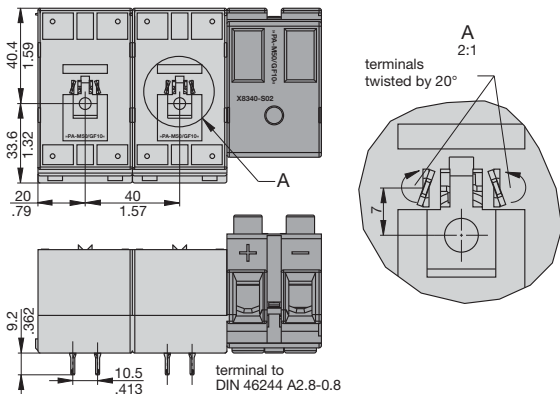
**Distribution rail, shown with power supply right-side X8340-S02R-...**



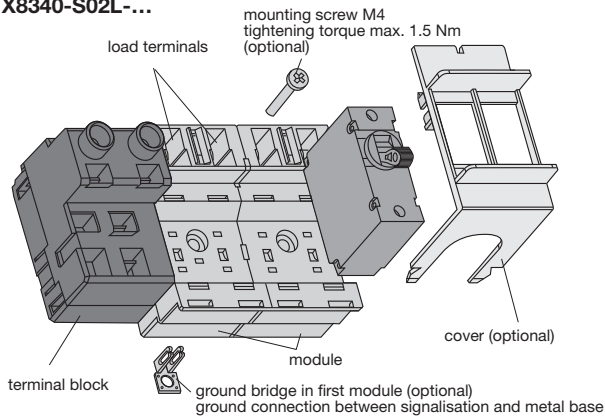
**Distribution rail, ground stud M6 (optional)**



**Distribution rail, single signalisation**

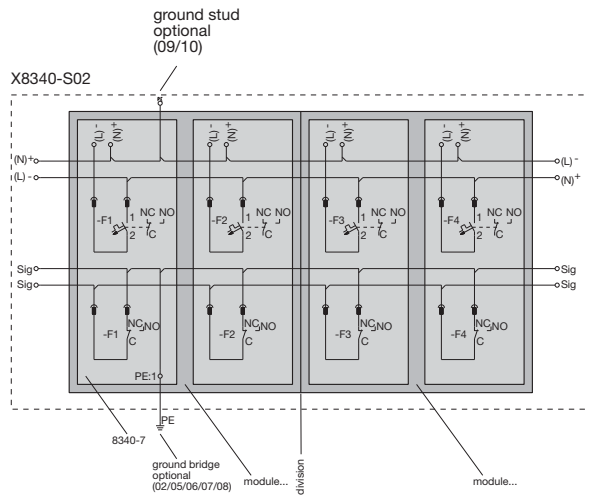


**Distribution rail, shown with power supply left-side X8340-S02L-...**

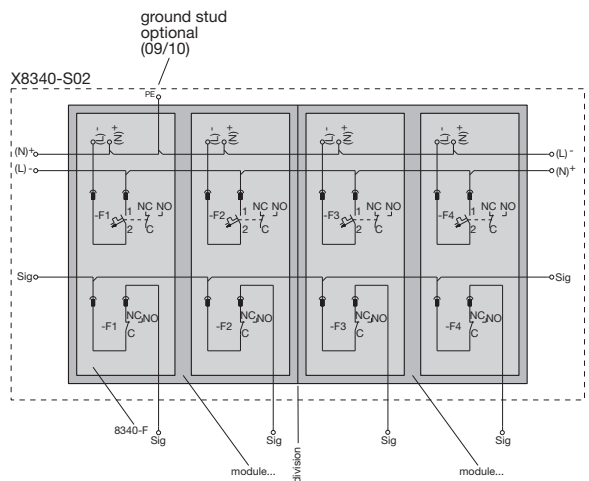


**Internal connection diagram**

**Group signalisation**



**Single signalisation**



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

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## Description

Distribution rail for one or two modules suitable for ETSI control cabinet and similar applications. One module comprises 4 positions for magnetic or hydraulic-magnetic circuit breakers type 8340-F... and associated line and load terminals. Circuit breaker status indication (group signalisation) is via two busbars. The modular design facilitates the operation of a single distribution rail at two different voltages. Live parts in the plug-in and supply feed terminal areas are protected against brush contact. Expansion or circuit breaker replacement is possible with power on.

## Typical applications

Telecommunications, measuring and control systems

## Ordering information

<b>Type No.</b>	
<b>X8340</b>	Distribution rail for circuit breaker type 8340-F
<b>Version</b>	
<b>S</b>	rail
<b>Identification number</b>	
<b>04</b>	modular, for 4 circuit breakers
<b>Modules with power supply</b>	
<b>1</b>	1 module, 4-way
<b>2</b>	2 modules, 4-way each
<b>Accessories</b>	
<b>0</b>	without
<b>1</b>	mounting bracket, 2 modules + mounting screw
<b>2</b>	mounting bracket, 2 modules + cover + mounting screw
<b>3</b>	cover
<b>4</b>	mounting bracket, 1 module + cover + mounting screw
<b>5</b>	cover + mounting screw
<b>6</b>	mounting screw
<b>Signalisation</b>	
<b>0</b>	without
<b>1</b>	group signalisation + ground connection
<b>2</b>	group signalisation
<b>X8340 - S 04 2 1 - 1</b>	ordering example



**X8340-S04**

## Technical data

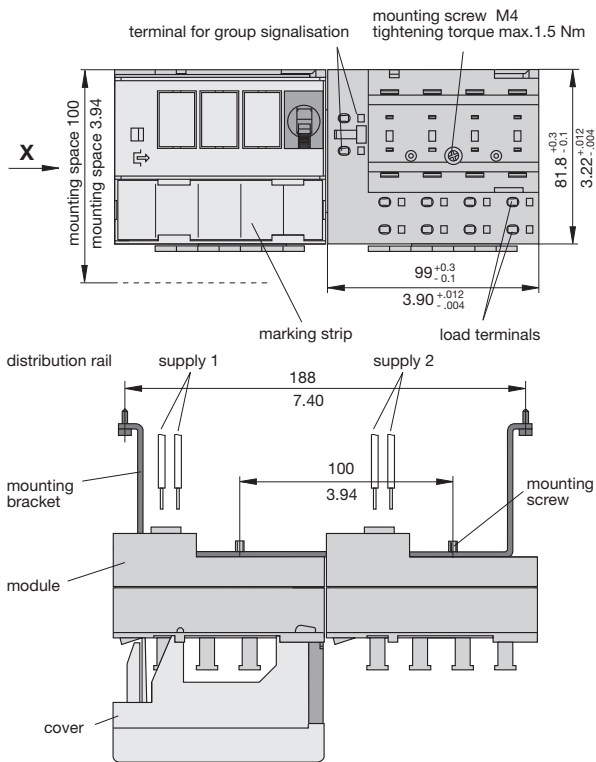
For circuit breakers	8340-F.10-P1...-H...	
Voltage rating	AC 230 V; DC 80 V	
Load	20 A per position 80 A for module	
Signalisation (N/C)	6 A, AC 230 V 1 A, DC 80 V per position	
Insulation co-ordination (IEC 60664 and 60664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardance (IEC 60695, part 2-2)	self-extinguishing	
Supply terminal design	recessed screw/pressure plate feed 6...25 mm <sup>2</sup> , stranded or 6...16 mm <sup>2</sup> with connector sleeve	
load and signalisation	screw-less connectors 0.5...2.5 mm <sup>2</sup> , stranded, with connector sleeve	
Mass		
module	220 g	
cover	35 g	
bracket	145 g	

## Approvals

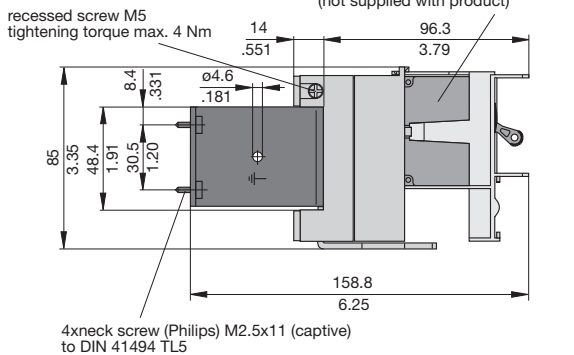
Authority	Voltage ratings	Current ratings
UL 1801	AC 250 V; DC 80 V	80 A

**Dimensions**

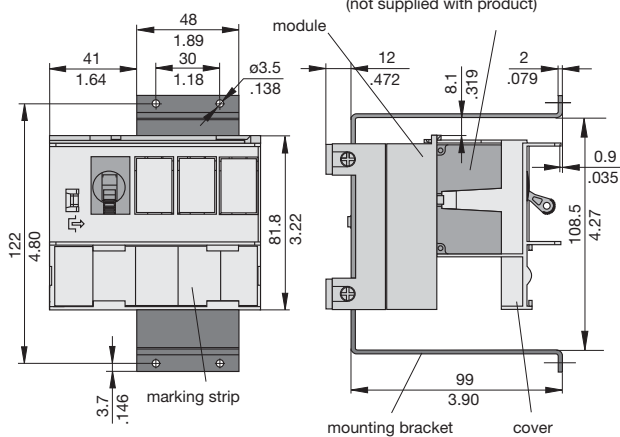
**X8340-S0422 (right cover not represented)**



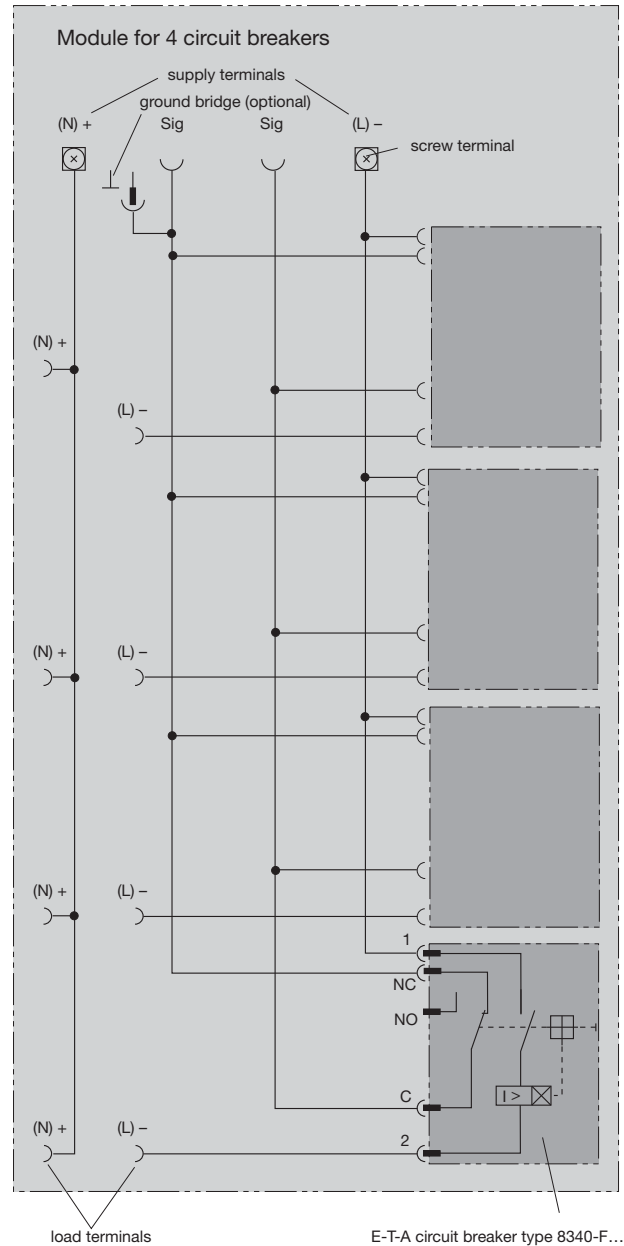
**View X**



**X8340-S0414**



**Internal connection diagram**



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

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

7

## Description

Distribution rail with modules connected in series. One module provides 4 positions for magnetic or magnetic-hydraulic circuit breakers type 8340-F... and the pertinent line and load terminals on the front and rear side of the rail. Supply feed is either on the right or left side with copper busbars. Trip indication of the circuit breakers (group signalisation) is possible via two signal busbars.

Live parts in the plug-in area of the load terminals are protected against brush contact. Circuit breaker replacement is possible with power on.

## Typical applications

Telecommunications, measuring and control systems

## Ordering information

<b>Type No.</b>	
<b>X8340</b>	Distribution rail for circuit breaker type 8340-F
<b>Version</b>	
<b>S</b>	rail
<b>Identification number</b>	
<b>Z4</b>	module accommodating 4 circuit breakers (smallest unit)
<b>Terminal (supply feed)</b>	
<b>L</b>	left side
<b>R</b>	right side
<b>Power distribution modules</b>	
<b>1</b>	1 module
<b>2</b>	2 modules
<b>3</b>	3 modules
<b>4</b>	4 modules
<b>5</b>	5 modules
<b>Signalisation</b>	
<b>0</b>	without
<b>1</b>	group signalisation
<b>Accessories / variations</b>	
<b>00</b>	none
<b>01</b>	mounting screw M4 / module bulk shipped
<b>A1</b>	terminals twisted by 180°
<b>Additional configuration</b>	
<b>00</b>	neutral
<b>01</b>	customer specified marking
<b>X8340 - S Z4 R 3 - 1 00 - 00</b> ordering example	

## Approvals

Authority	Voltage ratings	Current ratings
UL 1059	AC 250 V; DC 80 V	150 A



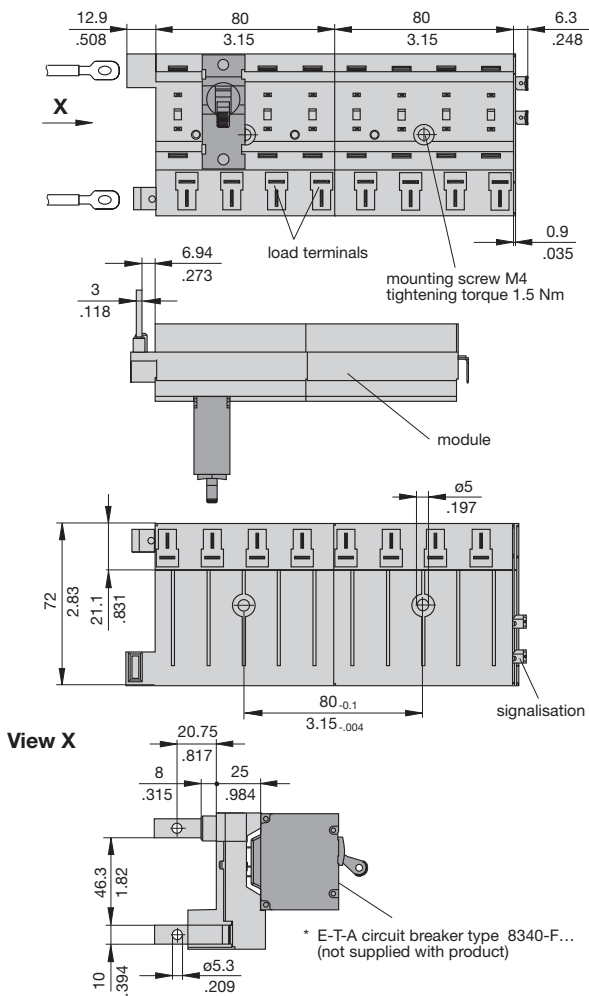
**X8340-SZ4**

## Technical data

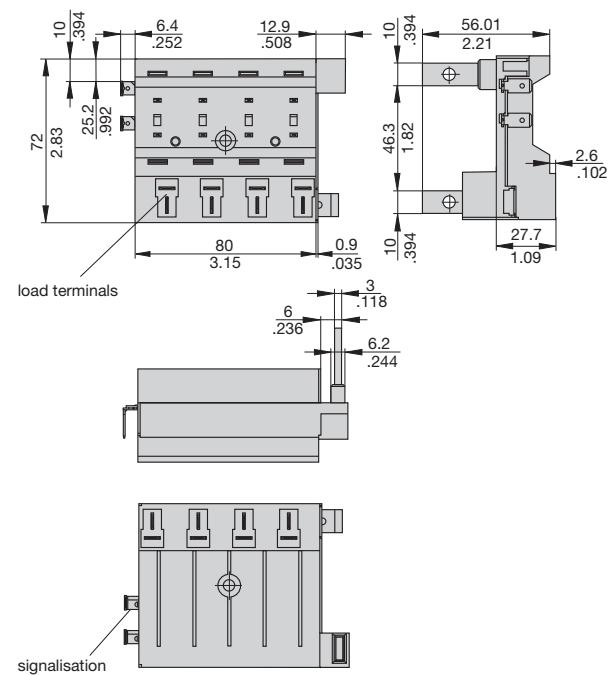
Plug-in type circuit breakers	8340-F110-P1...-..H...	
Voltage rating	AC 230 V; DC 80 V	
Load	25 A per position (30 A upon request) 150 A for the rail	
Signalisation (N/C contact)	6 A, AC 230 V 1 A, DC 80 V per position	
Insulation co-ordination (IEC 60664)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardance (IEC 60695, part 2-2)	self-extinguishing	
Terminal design	copper busbar 10x3 mm with hole ø 5.3 mm dia. current supply from the rear side (left or right)	
loads	blade terminals DIN 46244-A6.3x0.8mm load output terminal protected against reverse polarity on front and rear side	
signalisation	blade terminals DIN 46244-A6.3x0.8mm plug-in direction as circuit breakers, opposite to the main terminal side	
Mass		
module	200 g	
every additional module	145 g	

**Dimensions**

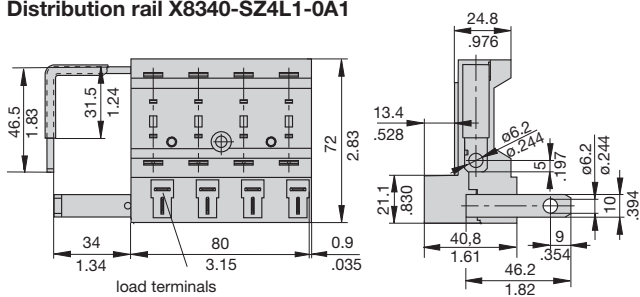
**Distribution rail. Power supply left-side**



**Distribution rail. Power supply right-side**



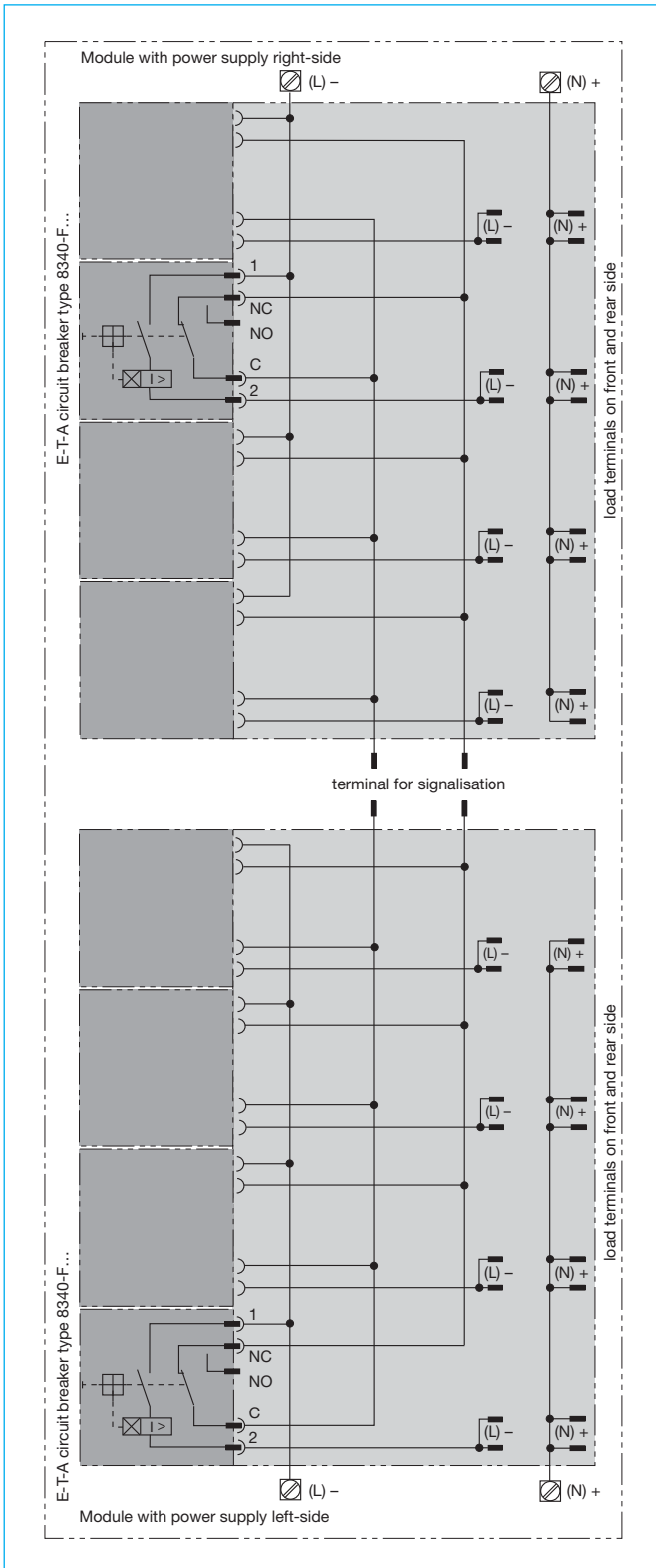
**Distribution rail X8340-SZ4L1-0A1**



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

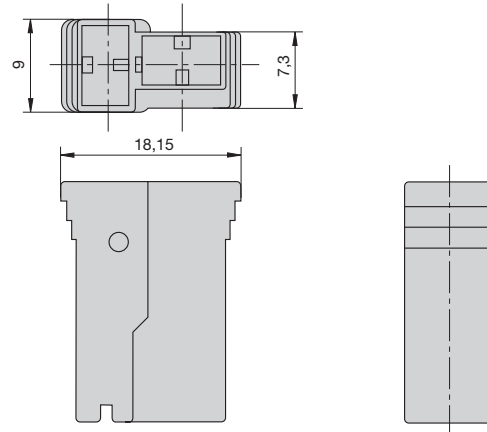


**Internal connection diagram**



**Internal connection diagrams**

**Load output terminal protected against reverse polarity**  
 (set: 4 moulded sleeves, 8 blade terminals 6.3 x 0.8 mm)  
**X 222 847 01** for cable cross section 0.7...2.0 mm<sup>2</sup>  
**X 222 625 01** for cable cross section 2.5...4.0 mm<sup>2</sup>  
**X 222 848 01** for cable cross section 4.0...6.0 mm<sup>2</sup>



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

Distribution rail comprising series connected circuit breaker mounting modules. Each module accommodates one magnetic or magnetic-hydraulic circuit breaker type 8345 and the associated line and load terminals on the rear side of the rail. Supply feed is either on the right or left side with copper busbars. Trip indication of the circuit breakers (group signalisation) is possible via two signal busbars. Live parts in the plug-in area of the load terminals are protected against brush contact (IP20). Replacement of circuit breakers (switched off) is possible with power on.

## Typical applications

Telecommunications, measuring and control systems

## Ordering information

<b>Type No.</b>	
<b>X8345</b>	Distribution rail for circuit breaker type 8345
<b>Version</b>	
<b>D</b>	rail
<b>Identification number</b>	
<b>01</b>	module for 1 circuit breaker
<b>Terminal (supply feed)</b>	
<b>L</b>	left side
<b>R</b>	right side
<b>Power distribution modules</b>	
<b>02</b>	2 modules
<b>03</b>	3 modules
<b>04</b>	4 modules
<b>05</b>	5 modules
<b>06</b>	6 modules
<b>07</b>	7 modules
<b>08</b>	8 modules
<b>09</b>	9 modules
<b>10</b>	10 modules
<b>Signalisation</b>	
<b>0</b>	without
<b>1</b>	group signalisation parallel connection
<b>Terminal design of main circuitry</b>	
<b>01</b>	2xM12 hexagon head screws for single-hole cable lug
<b>03</b>	2xM12 bent, hexagon head screws for double-hole cable lug (300 A)
<b>Terminal design of circuit breaker module</b>	
<b>01</b>	hexagon head screw M6 for single-hole cable lug
<b>07</b>	hexagon head screw M6 for single-hole cable lug, with barrier
<b>Accessories</b>	
<b>00</b>	without
<b>01</b>	19" mounting bar and screws M5, for module and frame, bulk shipped (length = 431.4 mm)
<b>02</b>	mounting bar (length = 153.8 mm)
<b>Marking</b>	
<b>A</b>	standard without marking
<b>X8345 - D 01 L 05 - 1 - 01 01 - 01 A</b> ordering example	



**X8345-D01**

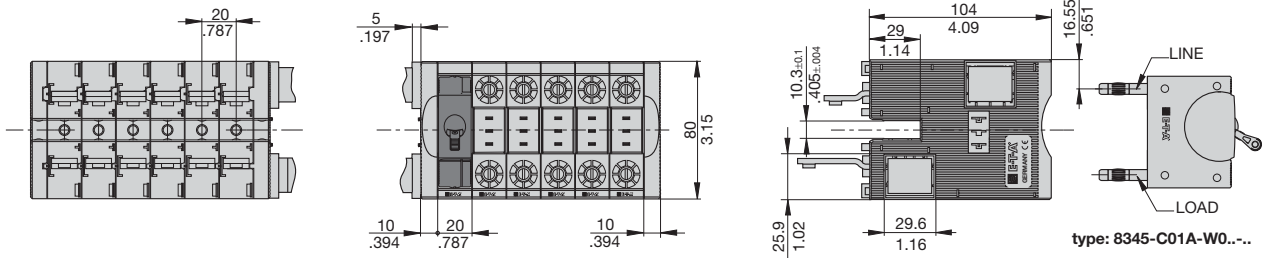
## Technical data

Plug-in type circuit breakers	8345-.01.-W0..-D.... and auxiliary contact module X8345-S01KW102-M	
Voltage rating	DC 110 V other ratings upon request	
Max. load	125 A per position (total 160 A for the two neighbouring positions when a breaker rated > 80 A is used), 600 A per complete module	
Ambient temperature	-30...+60 °C	
Signalisation (N/C contact)	DC 80 V 0.5 A per position	
Insulation co-ordination (IEC 60664)	Rated impulse withstand voltage	Pollution degree
	2.5 kV	2
Flame retardance (IEC 60695, part 2-2)	self-extinguishing	
Terminal design	copper bar 20x25 mm with M10 thread current supply from the rear side (left or right) (tightening torque max. 15 Nm)	
supply feed	screw terminals M6 (tightening torque max. 7 Nm) on rear side	
load	2 blade terminals DIN 46244-A6.3x0.8mm	
signalisation		
Mass	approx. 320 g	
module		

## Approvals

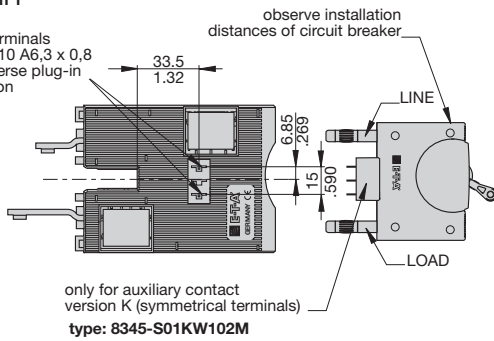
Authority	Voltage ratings	Current ratings
UL 60950	AC 277 V; DC 110 V	600 A

**Dimensions**



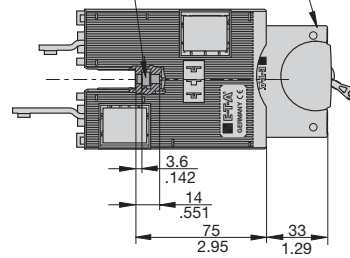
**Signalisation 1**

blade terminals  
IEC 61210 A6.3 x 0,8  
with reverse plug-in  
protection



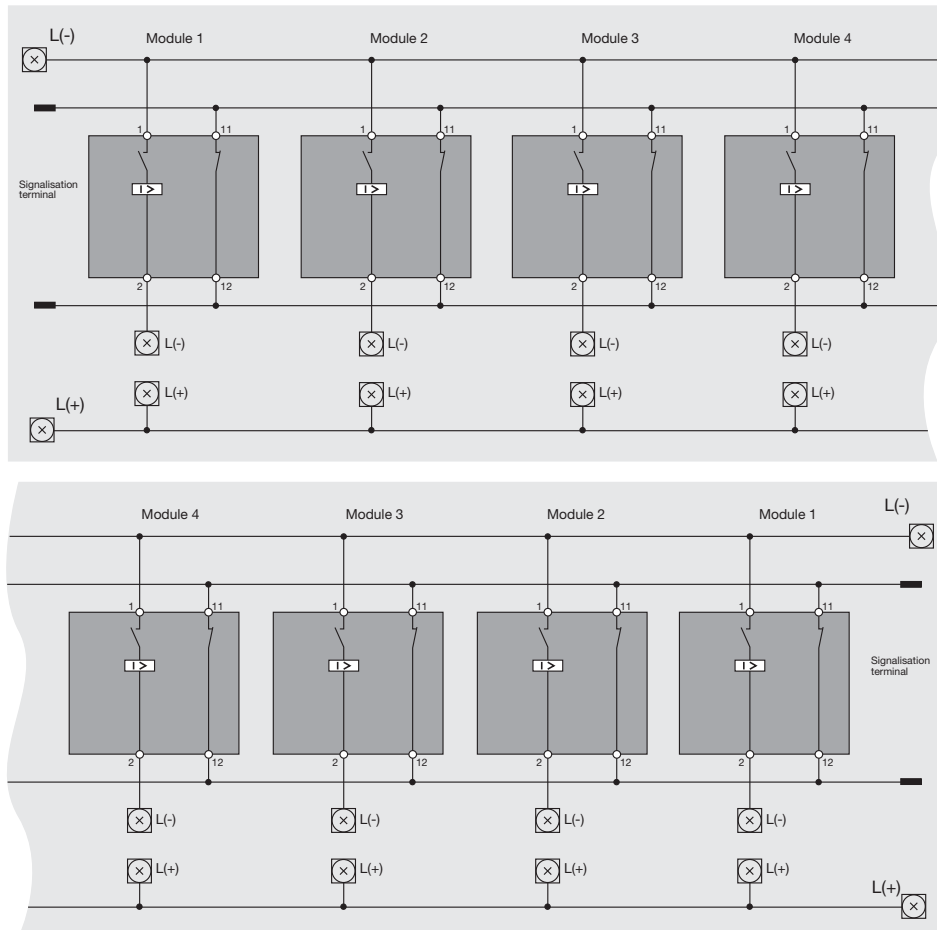
observe installation distances of circuit breaker

hexnut  
DIN EN ISO 4032 - M5 - 8 - AOP  
tightening torque for  
mounting screw M5 max. 3.0 Nm



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

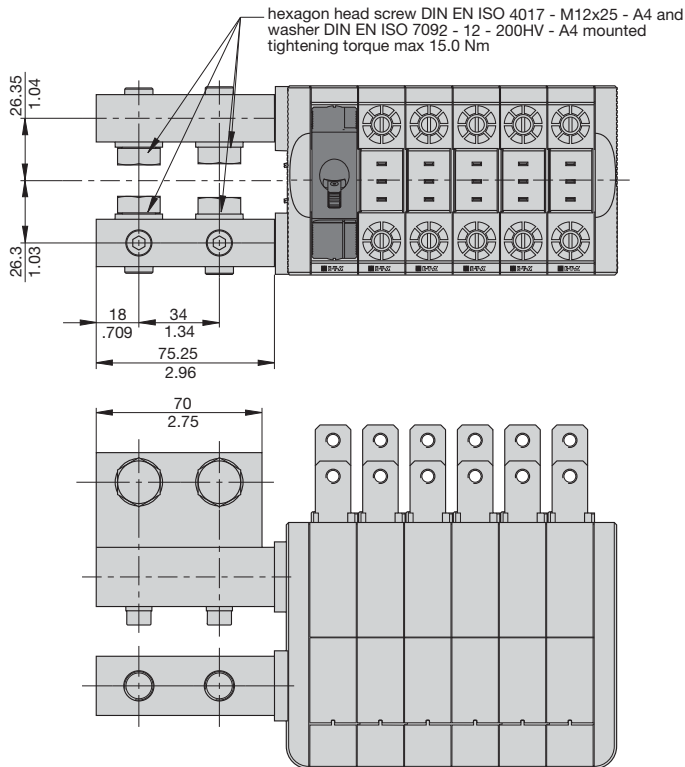
**Internal connection diagrams**



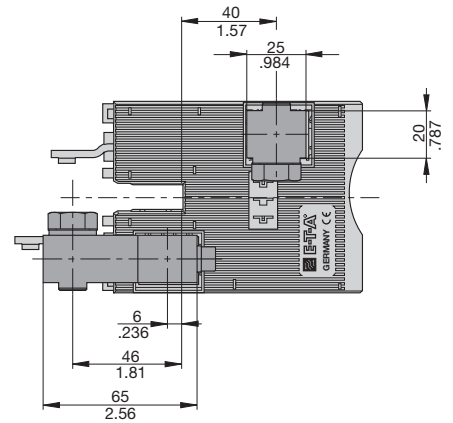
7

## Terminal design

### Main circuit 01

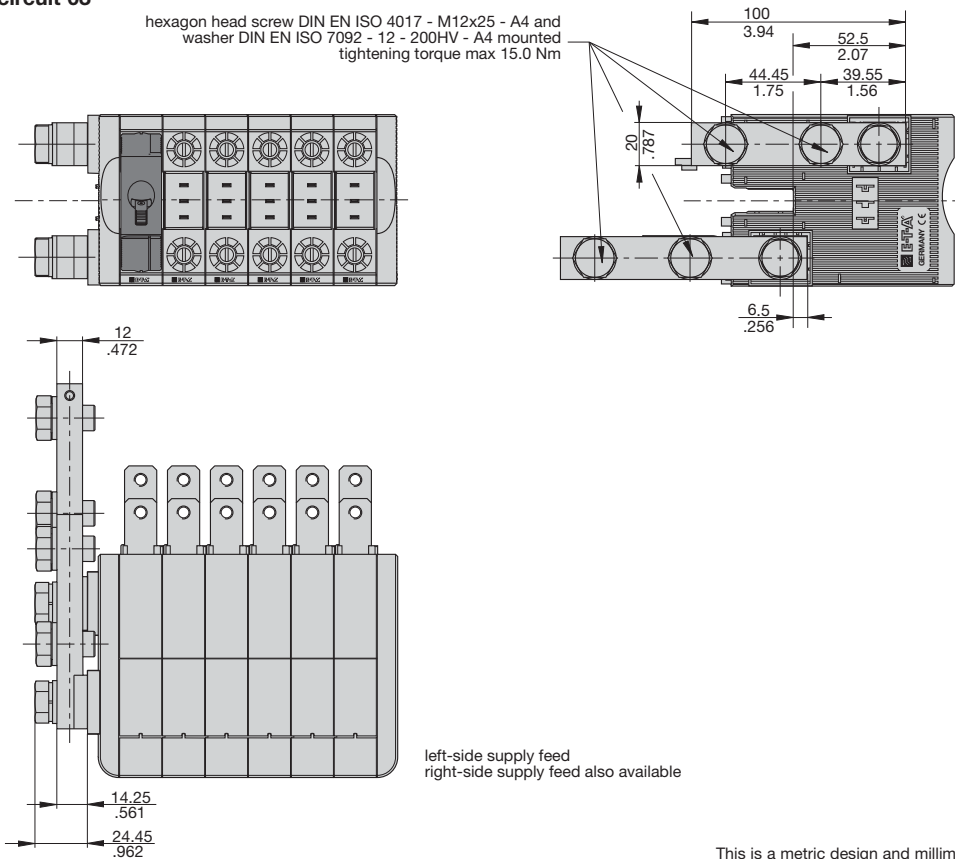


left-side supply feed  
right-side supply feed also available



### Main circuit 03

hexagon head screw DIN EN ISO 4017 - M12x25 - A4 and washer DIN EN ISO 7092 - 12 - 200HV - A4 mounted tightening torque max 15.0 Nm

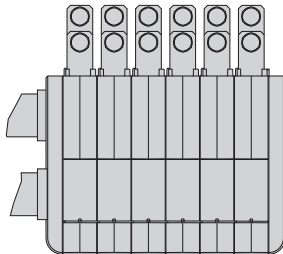


left-side supply feed  
right-side supply feed also available

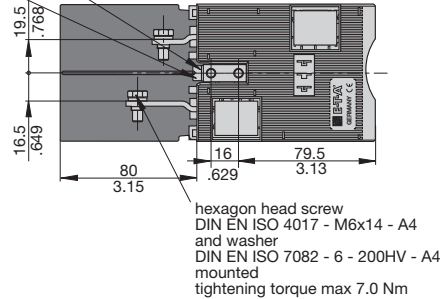
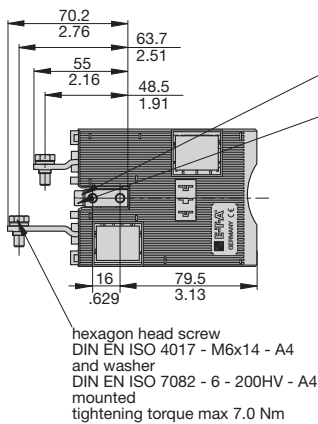
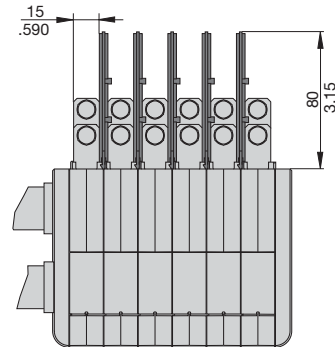
This is a metric design and millimeter dimensions take precedence ( $\frac{\text{mm}}{\text{inch}}$ )

**Terminal design**

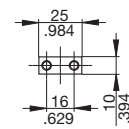
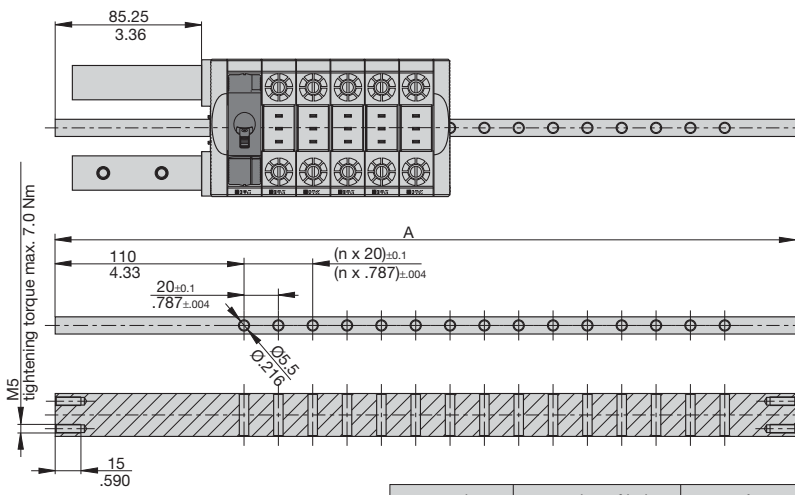
**Circuit breaker module 01**  
without barrier



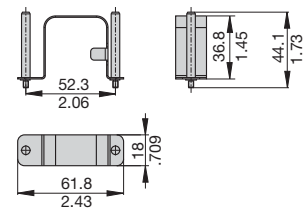
**Circuit breaker module 07**  
with barrier



**Accessories**



**Withdrawal tool**  
**X 222 547 02**



left-side supply feed mounting bar suitable for left- and right-side supply feed

part number	n = number of holes	A
Y 307 873 01	15	431.4 ± 0.2 16.98 ± .007
Y 307 873 02	2	153.8 ± 0.2 6.05 ± .007

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

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

## Description

The E-T-A Zero Current Monitor comprises a monitoring circuit with a current transformer and an opto decoupled output circuit with a triac (with AC output circuit) or transistor (with DC output circuit). The current transformer in the monitoring circuit does not only supply the input signal but also the very low power consumption of the Monitor. Zero current monitors are generally used to monitor circuits for wire breakage. The E-T-A Zero Current Monitor E-1076-SR may also be used to switch on an elapsed-hour meter. In this case the opto decoupled triac or transistor output will provide the control signal for the meter as soon as the load to be monitored is switched on. The E-T-A Zero Current Monitor is supplied in a compact moulded housing with screw terminals for mounting on DIN EN 50022 and DIN EN 50035 rails.

## Typical applications

- Wire break monitoring
- Control of elapsed-hour meters
- Life testing (e. g. lamps)
- Monitoring of heater elements (e. g. in furnaces)

## Features

- No auxiliary voltage required
- Compact design
- Expandable by external current transformers
- operation of **monitoring circuit > AC 250 V** only via additional external current transformer

## Ordering information

Type No.	
E-1076-SR	Zero Current Monitor
	<b>Monitoring range</b>
	<b>AC 20 A</b> load current 0.2 to 20 A
	<b>Output circuit</b>
	<b>AC 250 V</b> AC 12...250 V
	<b>DC 60 V</b> DC 2...60 V
E-1076-SR - AC 20 A AC 250 V	ordering example



**E-1076-SR**

## Technical data

### Monitoring circuit

Max. current rating	AC 20 A
Load current $I_{min.}$ red LED <u>lights</u> when $I_{load}$ is	$\geq 500$ mA (E-1076-SR-AC 20 A-AC 250 V) $\geq 200$ mA (E-1076-SR-AC 20 A-DC 60 V)
Zero current (wire break) red LED does <u>not light</u> when $I_{load}$ is	$< 50$ mA
Load current $I_{max.}$ at +25 °C ambient temp. (derating)	20 A
Voltage rating $U_N$	0 - 250 V AC

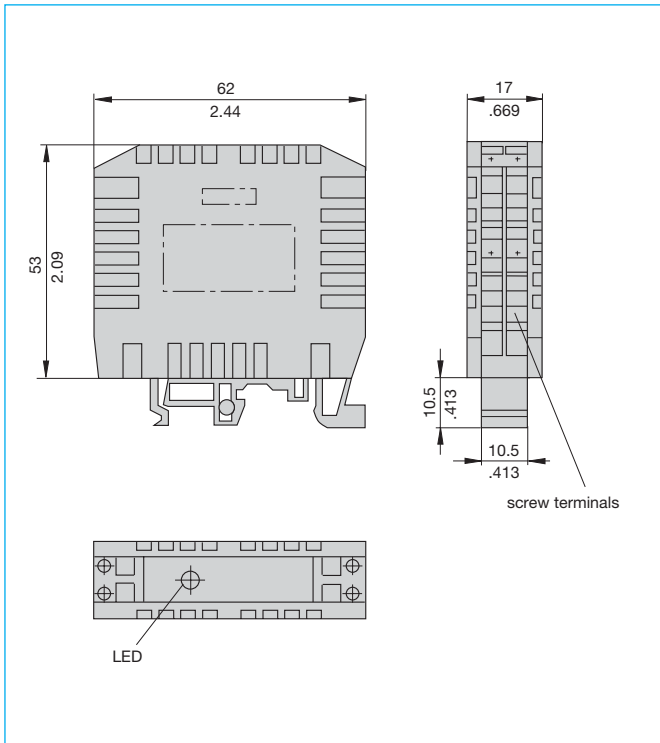
### Output circuit (conductive at $I_{load} > I_{min}$ )

Voltage rating $U_N$	AC 12...250 V	DC 2...60 V
Output current $I_{Amax}$	200 mA	50 mA

### General data

Insulation resistance	10 M $\Omega$ at 500 V DC
Dielectric strength	control circuit to output circuit: 1 kV
Mounting	rail DIN EN 50022-35x7.5, or rail DIN EN 50035-G32
Temperature range	0...+60 °C
Degree of protection:	IP20 housing DIN 40050 IP20 terminals DIN 40050
Terminals	screw terminals
Cable size	1 x 2.5 mm <sup>2</sup> each (AWG 14)
Housing dimensions	17 x 63 x 64 mm (width x height x depth)

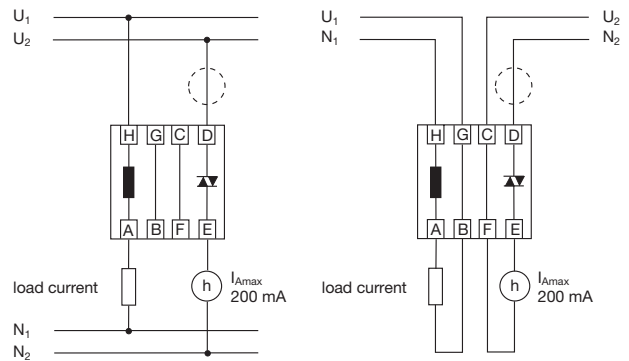
## Dimensions



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

## Connection diagrams

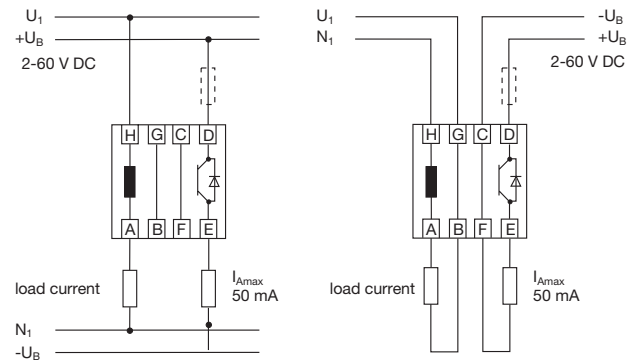
### Output circuit AC 250 V



If no physical isolation is required, the monitoring circuit and the output circuit may be fed by the same power supply. The elapsed-hour meter may be installed either before, or after, the triac.

### Output circuit DC 60 V

(e.g. check-back signalling for PLC systems)



Check-back signalling may be tapped either before, or after, the transistor.

## Description

The E-T-A Current Protector is designed to monitor the primary current of low-voltage transformers for halogen fittings.

After system installation, the admissible current range can be stored by operating the storage button. If the admissible range is exceeded (e. g. by overloads or short-circuit), the Protector will immediately disconnect the system. Underload (e. g. through defective terminal connections) will also cause system disconnection.

Fault conditions are indicated by the integral LED. The system can be reconnected by turning the light switch on again once the cause of failure has been remedied.

## Typical applications

- Low-voltage halogen lighting systems
- Can generally be used with sensor touch dimmers (please enquire)
- In sub-distribution
- Low-voltage transformers (no electronic transformers)

## Features

- Eliminating fire hazard
- Storage of actual lamp load by push button
- LED fault indication
- Suitable for lighting systems with dimmers
- Passive relay for long use
- Mounting on symmetric rail
- Unaffected by inrush currents

## Ordering information

Type No.	
<b>E-1078-4</b>	Current Protector for low voltage lighting systems
<b>Version</b>	
<b>2</b>	with storage button, capacity up to 400 W
<b>3</b>	with storage button, capacity up to 600 W
<b>Housing</b>	
<b>1</b>	track-mountable housing
<b>Voltage rating</b>	
<b>AC 230 V</b>	voltage rating AC 230 V
<b>Rated load</b>	
<b>60-300 W</b>	lamp capacity 60...300 W
<b>100-400 W</b>	lamp capacity 100...400 W
<b>300-600 W</b>	lamp capacity 300...600 W
<b>E-1078-4 2 1 - AC 230 V - 100-400 W</b>	ordering example



E-1078-421-...

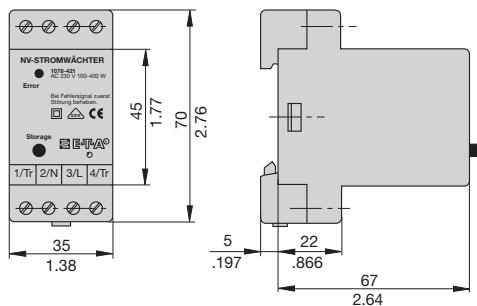
## Technical data

Protective function	short-circuit, overload, underload
Lamp load	60...300 W 100...400 W 300...600 W
Monitoring window	typically: $\pm 40$ W
Response times typ.:	overload 200 ms...2 s (depending on overload) short-circuit 200 ms underload 3 s
Voltage rating	AC 230 V $\pm 10$ %, 50 Hz
Interrupting capacity	relay contact 8 A
Dimmer operation	between 35 and 100 % of the rated load stored
Temperature range	0...+45 °C
Degree of protection:	IP20 housing DIN 40050 IP20 terminals DIN 40050
Housing	track-mountable housing (for DIN rails)
Connection	screw terminals
VDE approval	Reg. Nr. 8319 to VDE 0160



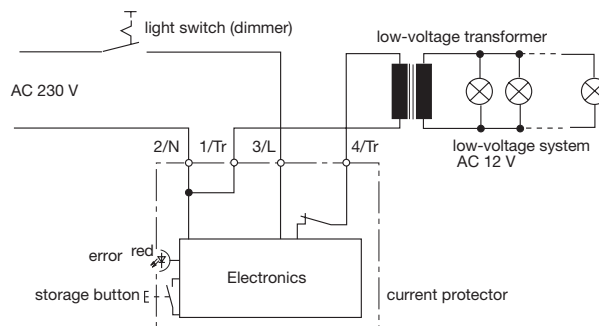
## Dimensions

E-1078-421-...



Housing for DIN rail mounting

## Basic circuit diagram



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

## Instructions for installation and adjustment

For correct performance, the E-T-A Current Protector shall be used on the primary side before the low-voltage transformer. It should be connected behind the light switch and the dimmer, if any, into the line to the transformer.

### Caution: Installation by skilled personnel only!

- Install the low-voltage system with the desired rated capacity.
- Set dimmer, if any, at the maximum value (turn button to right-side stop).
- Switch the light on.
- Keep storage button on the Protector pressed for approx. 5 sec to store the lamp load installed.
- The stored value will be maintained even when the lighting is switched off.
- A new rated load can be set by pressing the storage button again.

### Caution:

- Observe max. transformer capacity!
- Eliminate unsymmetrical load on the power feed caused by half-wave operation.
- Use separate power cables when several low-voltage systems are operated in parallel.

### Protective functions

Immediate disconnection upon short-circuit and overloads when additional lamps (loads) are connected. Underload disconnection when lamps (loads) are removed or upon defective terminal connections.

### Action in the event of faults:

Switch the lighting system off by means of the light switch. Remedy cause of failure (call in skilled personnel, if necessary!).

### Possible faults:

- defective lamps
- loose or broken terminals or screw connections
- short-circuit
- additional lamps

### Reset function

- provided when the lighting is reconnected by switching the light switch on. The lamp load is not re-stored.
- If the load conditions have changed after remedying the fault, the Protector will switch off within max. 3 sec after reconnection. To re-store the lamp load, keep the button pressed for approx. 5 sec.

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

## Description

The E-T-A Current Protector is designed to monitor the primary current of low-voltage transformers for halogen fittings. After system installation, the admissible current range can be stored by operating the storage button (or light switch, with type E-1078-482-...). If the admissible range is exceeded (e. g. by overloads or short-circuit), the Protector will immediately disconnect the system. Underload (e. g. through defective terminal connections) will also cause system disconnection. Fault conditions are indicated by the integral LED. The system can be reconnected by turning the light switch on again once the cause of failure has been remedied.

## Typical applications

- Low-voltage halogen lighting systems
- Can generally be used with sensor touch dimmers (please enquire)
- Suitable for installation in transformer housing or close to transformer (in inaccessible areas, E-1078-482-...)
- Low-voltage transformers (no electronic transformers)

## Features

- Eliminating fire hazard
- Storage of actual lamp load by button (or light switch, with type E-1078-482-...)
- Reset function by light switch
- LED fault indication
- Suitable for lighting systems with dimmers
- Passive relay for long use
- Housing for surface mounting
- Unaffected by inrush currents

## Ordering information

Type No.	
<b>E-1078-4</b>	Current Protector for low voltage lighting systems
<b>Version</b>	
<b>2</b>	with storage button, capacity up to 400 W
<b>3</b>	with storage button, capacity up to 600 W
<b>8</b>	load storage by light switch, capacity up to 600 W
<b>Housing</b>	
<b>2</b>	housing for surface mounting
<b>3</b>	without housing (without VDE logo)
<b>Voltage rating</b>	
<b>AC 230 V</b>	voltage rating AC 230 V
<b>AC 120 V</b>	voltage rating AC 120 V (please enquire)
<b>Rated load</b>	
<b>60-300 W</b>	lamp capacity 60...300 W (AC 230 V only)
<b>100-300 W</b>	lamp capacity 100...300 W (AC 120 V only)
<b>100-400 W</b>	lamp capacity 100...400 W (AC 230 V only)
<b>300-600 W</b>	lamp capacity 300...600 W (AC 230 V only)
<b>E-1078-4 2 2 - AC 230 V - 100-400 W</b>	ordering example

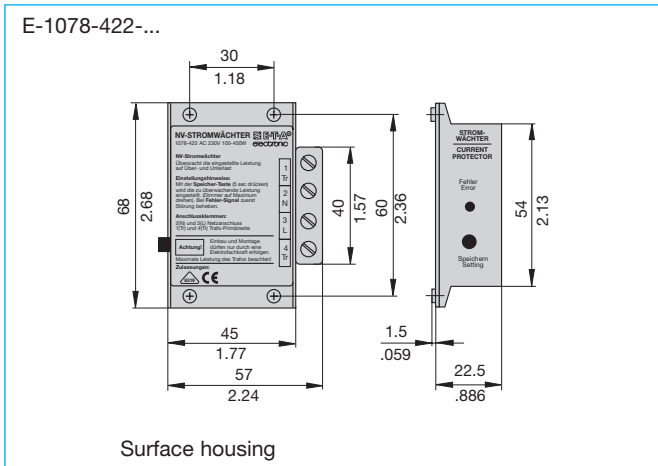


E-1078-422-...

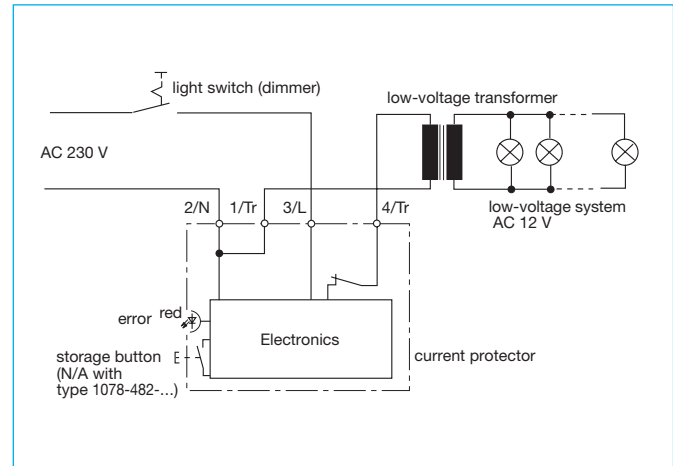
## Technical data

Protective function	short-circuit, overload, underload
Lamp load	60...300 W (AC 230 V only) 100...300 W (AC 120 V only) 100...400 W (AC 230 V only) 300...600 W (AC 230 V only)
Monitoring window	typically: $\pm 40$ W
Response times typ.:	overload 200 ms...2 s (depending on overload) short-circuit 200 ms underload 3 s
Voltage rating	AC 230 V $\pm 10$ %, 50 Hz AC 120 V $\pm 10$ %, 60 Hz
Interrupting capacity	relay contact 8 A
Dimmer operation	between 35 and 100 % of the rated load stored
Temperature range	0...+60 °C
Housing	surface mounted type
Degree of protection:	IP20 housing DIN 40050 IP20 terminals DIN 40050
Connection	screw terminals
VDE approval	Reg. Nr. 8319 to VDE 0160
UL-approval	AC 120 V, 300 W, 60 Hz, to UL 1077

## Dimensions



## Basic circuit diagram



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

## Instructions for installation and adjustment

For correct performance, the E-T-A Current Protector must be used on the primary side before the low-voltage transformer. It should be connected behind the light switch and the dimmer, if any, into the line to the transformer.

### Caution: Installation by qualified personnel only!

- Install the low-voltage system with the desired rated capacity.
- Set dimmer, if any, at the maximum value (turn knob fully clockwise).
- Switch on light.
- Storage of lamp load:
  - With version -422/-432 (with storage button):  
Keep storage button pressed for approx. 5 s to store lamp load installed.
  - With version -482 (storage by light switch):
    - The lighting will be on for a short time and will go out after max. 0.2 sec (the Protector which has not yet been set senses an overload and disconnects the system).
    - Turn light switch OFF and ON within 0.5 s to store the actual rated load. Storage takes approx. 20 s; do not switch off the lighting during this period!
    - A new rated load can only be set after the Protector has responded to a fault.
- The stored value will be maintained even when the lighting is switched off.

### Caution:

- Observe max. transformer capacity!
- Eliminate any unsymmetrical loading of the power feed caused by half-wave operation.
- Use separate power cables when several low-voltage systems are operated in parallel.

### Protective functions

Immediate disconnection upon short-circuit and overload when additional lamps (loads) are connected.  
Underload disconnection when lamps are removed or in the event of defective terminal connections.

### Action in the event of faults:

- Switch off the lighting system by means of the light switch.
- Remedy cause of failure (call in qualified personnel, if necessary!).

### Possible faults:

- defective lamps
- loose or broken terminals or screw connectors
- short-circuit
- additional lamps

### Reset function of the Protector:

- provided when the lighting is reconnected by switching the light switch on. The lamp load is not re-stored.
- If the load conditions have changed after remedying the fault, the Protector will disconnect within max. 3 s after reconnection of the lighting system.
- Re-storage of lamp load:

### With version -422/-432 (load storage by storage button):

Keep the storage button pressed for approx. 5 sec.

### With version -482 (load storage by light switch)

Turn light switch OFF and ON within 0.5 s. Re-storage takes approx. 20 s; do not switch off the lighting system during this period as this will interrupt the storage process.

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

## Description

The Combi Safety Protection E-1078-911 allows the simultaneous connection of a washing machine and dryer (for example) without overloading the circuit. The dryer is disconnected during the heating cycle of the washing machine and automatically reconnected when the current consumption of the washing machine drops.

Other equipment combinations such as a dishwasher and a hot-water heater are also made possible, provided that one of the loads connected has an operating mode with a current consumption of less than 2 A (= reconnection threshold).

## Typical applications

- Household
- Commercial premises (e. g. medical practices)
- Recreational vehicles

For the first time it is possible to simultaneously connect to the same socket two large appliances such as a washing machine and a hot-water heater and to leave them unattended, without the danger and inconvenience of overloading the supply.

There is no need for a second line with socket and circuit breaker.

## Features

- Reliable current monitoring when two large appliances are operated simultaneously.

## Ordering information

### Type No.

E-1078-911 Combi Safety Protection

E-1078-911



E-1078-911..

## Technical data

Voltage rating	AC 230 V $\pm 10\%$ , 50 Hz
Supply current	16 A
Load capacity	3,700 VA
Socket outlets with earthing contact to DIN 49440	
Cable	H05W-F3G 1.0 mm <sup>2</sup> , approx. 1.4 m long with moulded earthing-pin plug
Upper response threshold	typically 15.5 $\pm$ 1 A
Lower response threshold	typically 2.0 A $\pm$ 1 A
Hysteresis	typically 13.5 A
Temperature range	0...+45 °C
Environmental duty	suitable for dry, clean conditions
Socket outlet material	impact-resistant Polypropylene
Housing dimensions	255 mm x 60 mm x 40 mm (LxWxH), with provisions for screw fixings
Mass	approx. 480 g

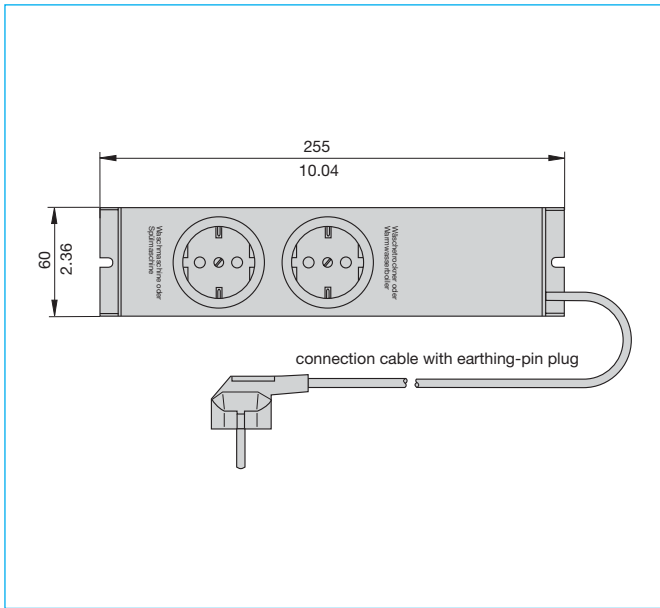
**Caution:** Connect appliances with a program memory that is not protected from supply failure, to the “washing machine” outlet!

## Approvals

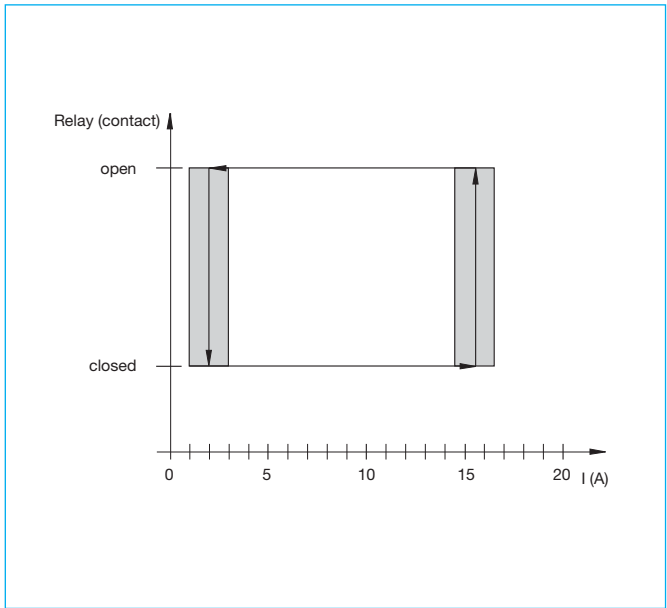


CE mark to demonstrate compliance with applicable directives.

## Dimensions



## Switching curve



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

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

The electronic E-T-A Voltage Monitor E-1079-60. is designed to monitor DC or AC voltages against falling below, or rising above, preset tolerance limits. Two LEDs indicate relay status or overlimits; an opto coupler output provides a physically isolated signal.

The device is available either with a (non-conducting) N/O or a (conducting) N/C contact. It is powered by the measuring signal so that there is no need for an additional power supply.

## Features

- Voltage under and over limit monitoring (tolerance window)
- For DC and AC voltages between 5 V and 230 V
- DC and AC voltage output
- N/O or N/C contact (MOSFET)
- Status indication by red and green LEDs
- No need for separate power supply
- Reverse polarity protection
- Compact design (plug-in housing)
- 12 mm wide housing

## Ordering information

Type No.	
E-1079	Electronic Voltage Monitor
	<b>Output</b>
600	signal output as N/O contact
601	signal output as N/C contact
	<b>Voltage rating</b>
	DC 12 V
	DC 24 V
	DC 48 V
	DC 110 V
	DC 220 V
	AC 115 V
	AC 230 V
E-1079 - 600 - DC 24 V	ordering example



E-1079-600-...

## Technical data

Input voltage $U_E$		
Voltage rating $U_N$	Tolerance	Tolerance range $U_{min}...U_{max}$
DC 12 V	$\pm 25\%$	(9...15 V)
DC 24 V	$\pm 25\%$	(18...30 V)
DC 48 V	$\pm 25\%$	(36...60 V)
DC 110 V	+10 %/-15 %	(93.5...121 V)
DC 220 V	+10 %/-15 %	(187...242 V)
AC 115 V	+10 %/-15 %	(97.8...126.5 V)
AC 230 V	+10 %/-15 %	(195.5...253 V)
Load current	3 mA DC and AC	
Dielectric strength	260 V DC and AC	
Reverse polarity protected		
Output $U_A/I_A$		
MOSFET output		
Max. load current	80 mA DC and AC	
Max. load voltage	250 V DC and AC	
Voltage drop	< 2.0 V with 80 mA load < 0.8 V with 10 mA load	
Free-wheeling diode for non-resistive loads	in-built	
Polarization	optional	
Response time	200 mA	
Signalling		
green LED	> 5 V signal voltage voltage within set tolerance limits	
red LED	voltage outside set tolerance limits	
Accuracy		
Undervoltage	$U_{min} -10\% U_N...U_{min}$	
Overvoltage	$U_{max}...U_{max} +10\% U_N$	
Environmental conditions		
Temperature range	0...60 °C (without condensation)	
Degree of protection to DIN 40050/IEC 529	IP20	
Dielectric strength (IEC 664)	4 kV <sub>rms</sub>	
EMC	to EN50081-1 and prEN50082-2	
Housing	plug-in ultramid housing	
Terminals	6.3 mm blade terminals to DIN 46244 to plug into E-T-A socket 17-P10-Si	
Mounting attitude	optional, no air gap between devices required	
Mass	28 g	

## Function

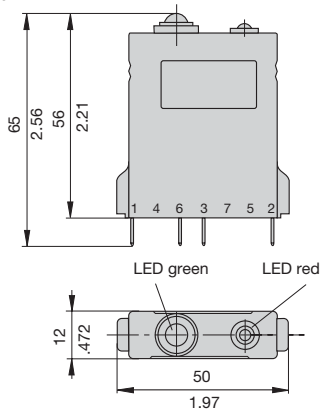
The operating voltage applied at the input terminals is monitored for upper and lower limits. When the input signal is within tolerance limits, the green LED will indicate and the MOSFET of the signal output has the following operating status:

- N/O contact (-600): MOSFET is active
- N/C contact (-601): MOSFET is inactive

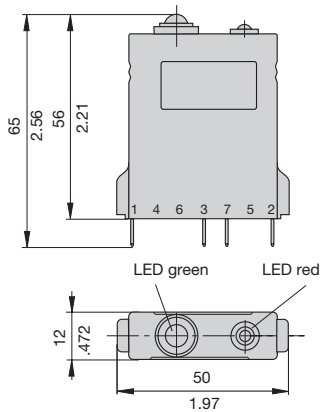
From approx. 5 V to the lower tolerance limit the red LED will indicate. It also indicates when the upper tolerance limit has been exceeded. The output will change its operating status.

## Dimensions

**E-1079-600**

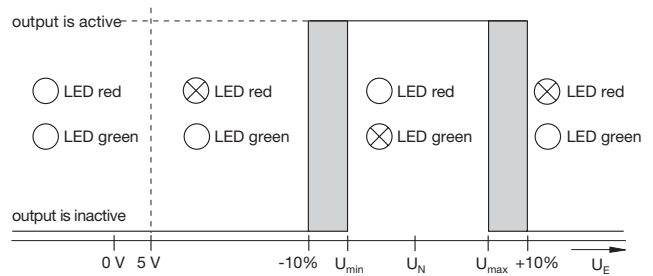


**E-1079-601**

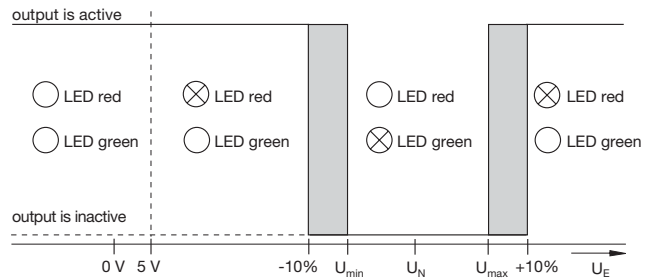


## Functional diagram

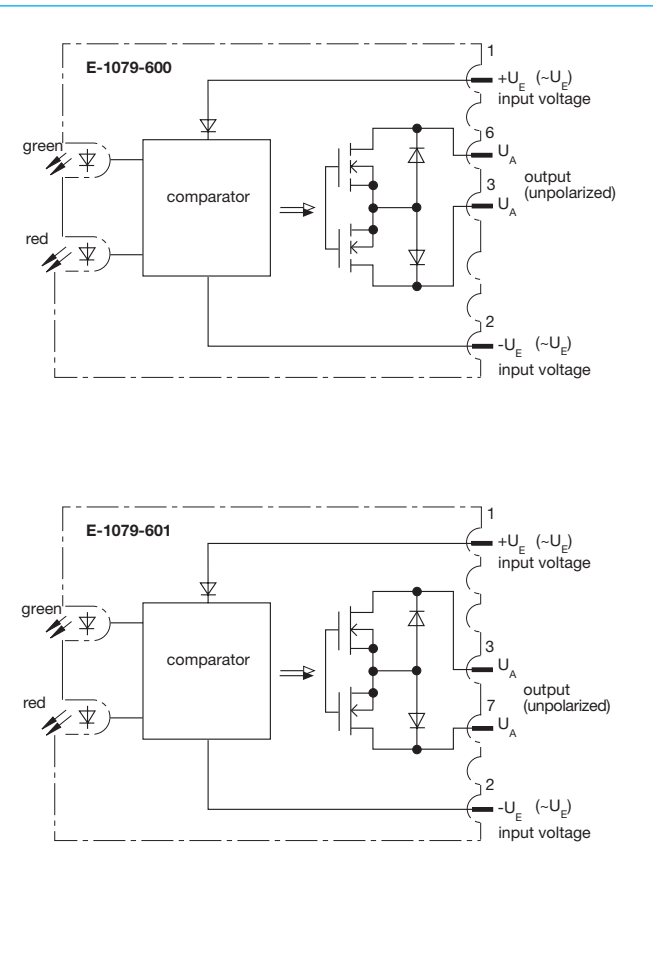
**E-1079-600**



**E-1079-601**



## Connection diagram



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

## Accessories for E-1079-600/601

### Single mounting sockets

(up to 16 A max. load)

**17-P10-Si**

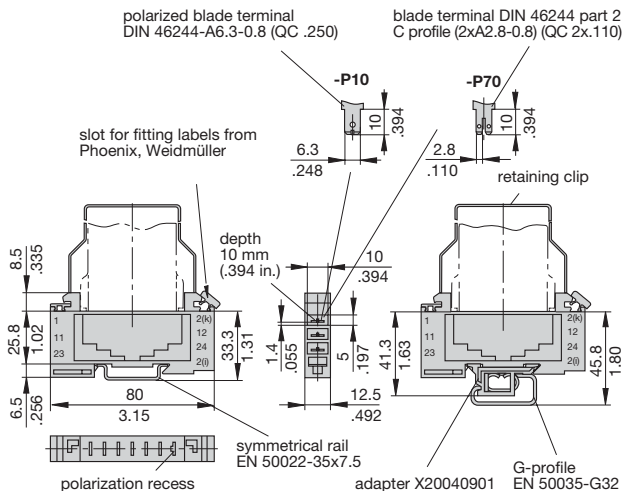
**17-P70-Si**

(retaining clip Y 300 581 11 available on request)

(with adapter)

**17-P10-Si-20025**

**17-P70-Si-20025**



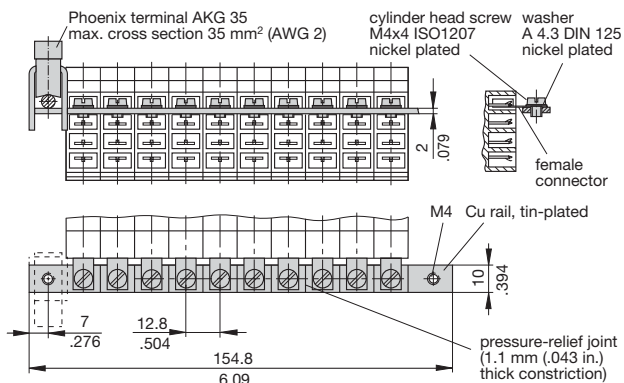
### Busbar (10-way) (supplied as a complete package)

for type 17 socket

(for max. 100 A continuous load),  
more positions available on request

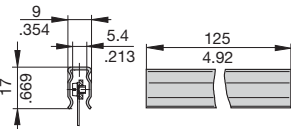
**X 211 157 01** with terminal

**X 211 157 02** without terminal



### Insulating sleeving for busbar (10-way)

**Y 303 824 01**



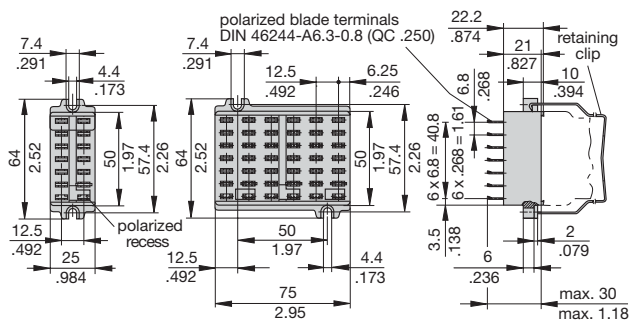
### 2-way mounting socket

**23-P10-Si**

(retaining clip Y 300 581 03 available on request)

### 6-way mounting socket

**63-P10-Si**



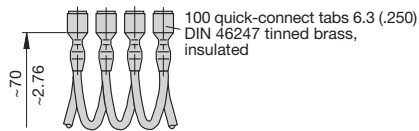
### Connector bus links -P10

**X 210 588 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)

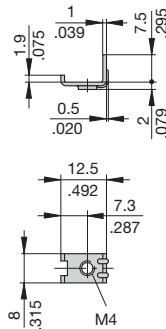
**X 210 588 04/** 2.5 mm<sup>2</sup>, (AWG 14), blue (up to 20 A max. load)



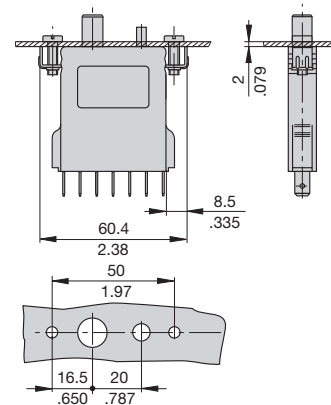
### 2 mounting clips

**Y 300 504 02**

(2 pcs needed per unit)



### Installation drawing with mounting clips Y 300 504 02



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

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.