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Circuit Breakers and Control Products

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An Introduction to E-T-A Circuit Protection

E-T-A Protection and Safety

E-T-A were pioneers in the development of precision performance circuit breakers with characteristics specifically designed to protect equipment, sub-systems and components against the potentially catastrophic effects of electrical overload and short circuits.

Today we offer one of the widest product ranges of its type on the market including high performance models for aerospace, defence, and other applications whose requirements for performance, safety and reliability are uncompromising.

We also manufacture battery isolation switches; door lock relays; solid state controllers with current limiting characteristics for use in electronic power management systems; and a comprehensive range of electronic control products and instrumentation.

Older methods of protecting electrical and electronic systems from overloads and short circuits are no longer sufficient. Problems of large current rating steps, wide performance bands and premature ageing can cause serious difficulties in safety critical systems and equipment; furthermore, multi-phase circuitry requires disconnection of all poles. If fuses are used, comprehensive stocks of replacements are required to cover every eventuality.

Professionals have long recognised the advantages of circuit breaker technology. Overcurrent protection ensures safe performance of all components, while circuit breakers offer convenience in operation and can confidently be reset by inexperienced personnel.

E-T-A circuit breakers are far and away the preferred choice.

E-T-A Total Quality

Circuit breakers are safety-critical items. The same E-T-A products may be required to operate just occasionally or very often during the life of the equipment they are protecting. Either way, operation must be totally dependable immediately a fault occurs. Any failure to perform could have disastrous consequences - endangering people and property.

We have been designing and manufacturing circuit protection products since 1948 and have responded to the performance requirements across a wide range of industries. Most importantly, we have gained expertise on the long term needs of circuit protection; the impact of ageing equipment, corrosion, deterioration of wiring insulation and loosening of connectors. All these place additional demands on circuit protection devices.

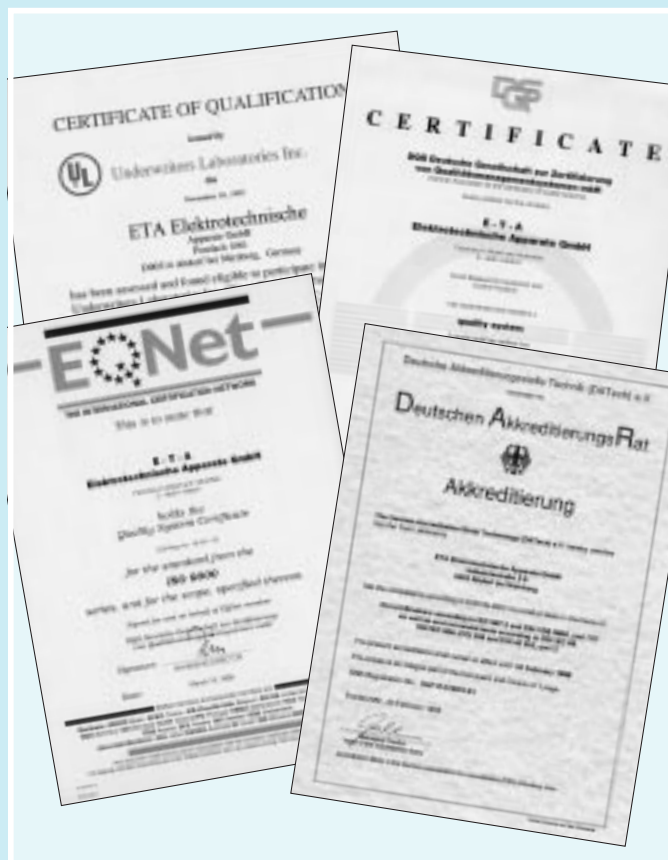
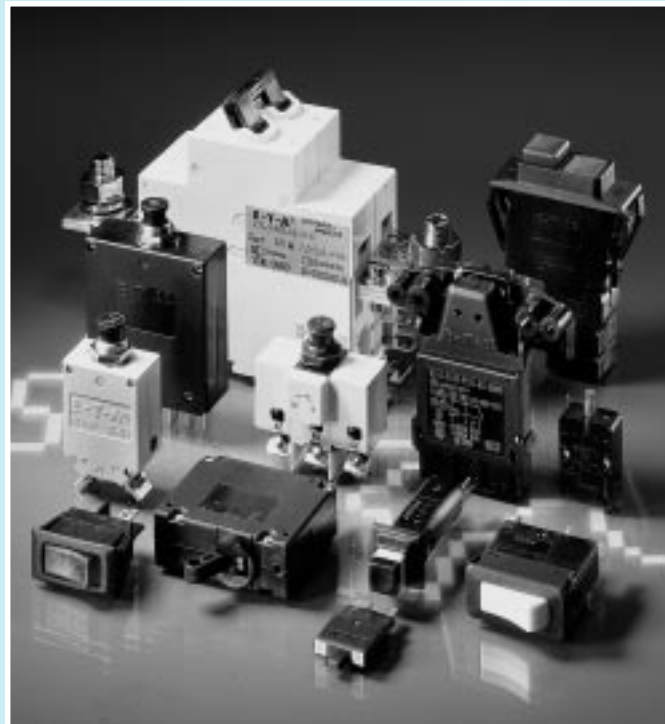
Meeting these needs, E-T-A products are designed and manufactured for world class quality, to the most stringent standards. Quality is built-in at every stage of the manufacturing process and is verified by the latest automatic test equipment and SPC techniques.

Our quality management system is accredited to ISO 9001/EN29001 and has been independently audited by many of the world's leading manufacturers.

E-T-A Support

Our test laboratories are equipped to conduct comprehensive electrical and environmental qualification programmes and are approved for low voltage switchgear to EN 45000 requirements.

Our substantial investment in research and development ensures that we remain at the forefront of technology. Our international standards committee work, covering many different industries, enables us to give up-to-the-minute advice on legislative demands and safety trends worldwide.

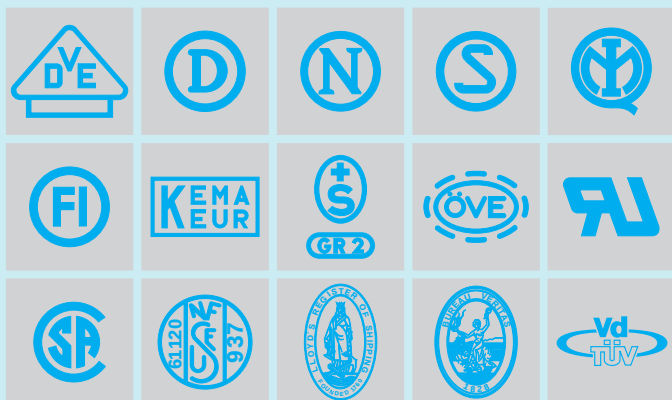


E-T-A® An Introduction to E-T-A Circuit Protection

E-T-A Approvals

E-T-A circuit protection products are designed according to IEC requirements for CBEs (IEC 934, EN 60934) - defined as circuit breakers for equipment where unrestricted short circuits either cannot occur or are limited by back-up protection elsewhere in the system.

Most E-T-A models are fully approved by leading authorities including VDE, CSA and UL (supplementary protectors in accordance with UL 1077). Furthermore approvals are also held from specialised agencies such as the UK Civil Aviation Authority, Lloyds Register of Shipping, Bureau Veritas and the American Bureau of Shipping.



CE Mark

Those products from the E-T-A programme which are subject to the European Union EMC Directive have been CE marked since early 1996 to demonstrate compliance. Declarations of conformity contain the necessary supporting evidence.

In addition, from January 1997, models covered by the Low Voltage Directive have also been CE marked.

CE marking is the responsibility of individual manufacturers and should not be confused with formal approval logos, the use of which is administered by recognised test authorities.

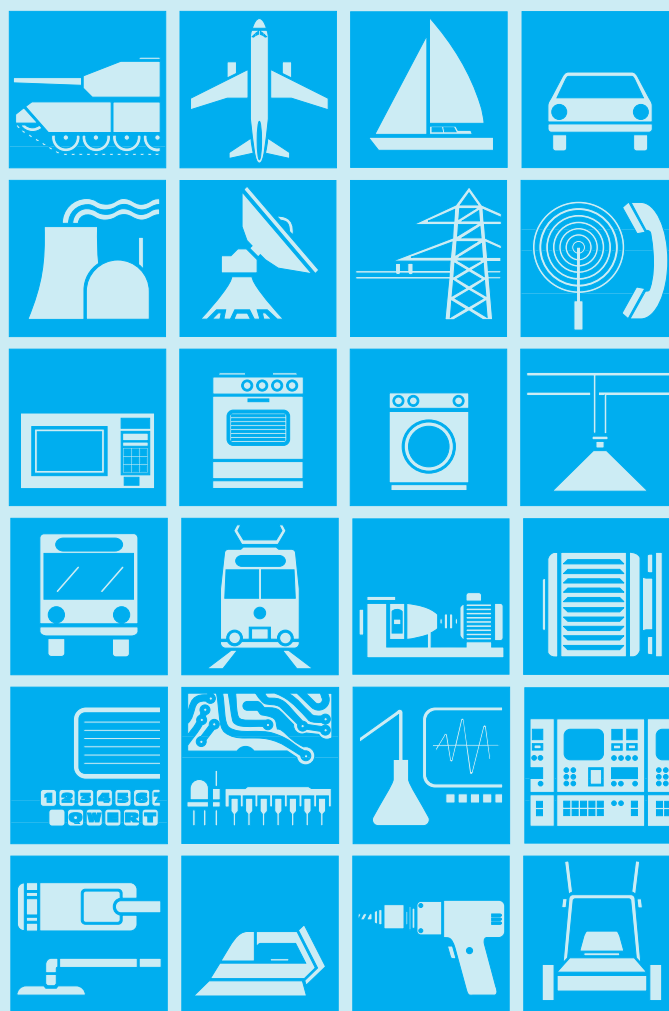


E-T-A Reliable Protection for Demanding Applications

E-T-A circuit breakers are designed for equipment, component and low voltage wiring protection. Their precision performance characteristics are ideally suited to applications for which other methods of protection are generally inadequate. These include:

motors
transformers
solenoids
printed circuit boards
power supplies
test equipment
control instrumentation
computers
communications systems
factory automation

aircraft
automotive systems
military vehicles
boats
semi-conductors
domestic/household appliances
commercial equipment
business machines
medical equipment
... and many others

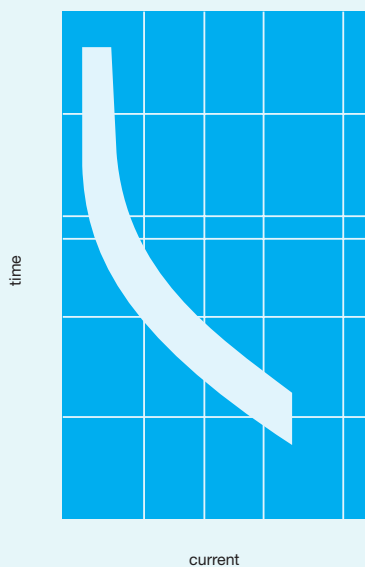


Current Ratings and Time/Current Characteristic Curves

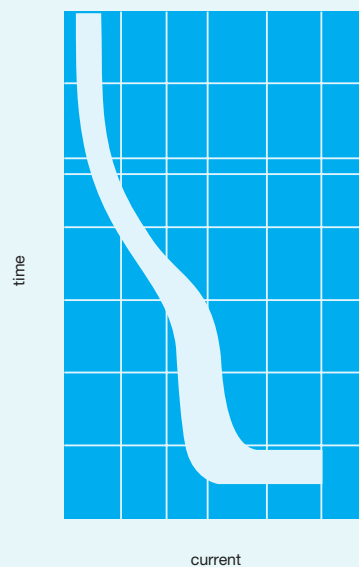
Key selection criteria are the trip time zones determined at 23 °C which are shown graphically for each E-T-A product on the relevant data sheet. Upper and lower curves show minimum and maximum adjustment tolerances. Unless otherwise stated, all thermal and thermal-magnetic

circuit breakers will carry 100 % rated current continuously and trip within one hour at 140 % rating. Adjustment to closer tolerances is available to special order.

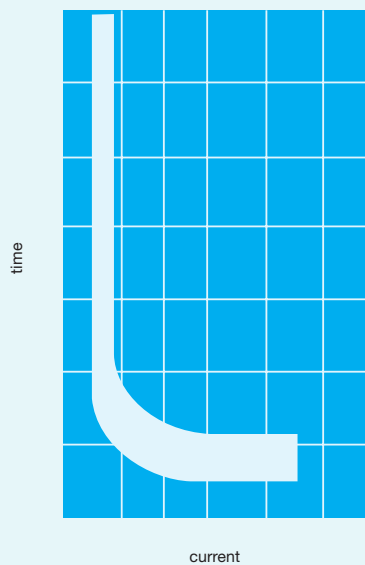
thermal



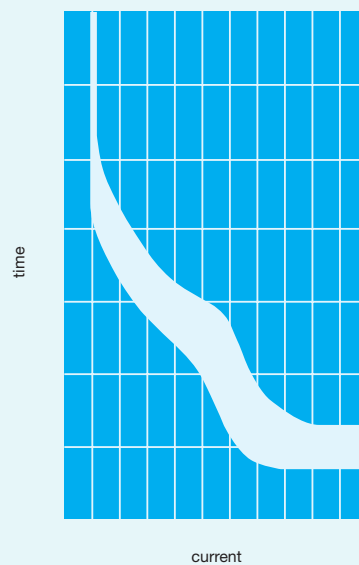
thermal/magnetic



magnetic (no delay)
(delayed magnetic curves available)



magnetic-hydraulic



E-T-A Catalogue

The E-T-A catalogue describes the largest product range of its type, providing solutions to almost any requirement. It is divided into the following sections:

Introduction
Thermal circuit breakers
Thermal-magnetic circuit breakers
Hydraulic-magnetic and magnetic circuit breakers
High performance circuit breakers and battery switches
Door lock, time delay and motor protection controls
Solid State Remote Power Controllers (SSRPCs)
Electronic products
Approvals

Each product section includes a quick selector chart and short form presentation of the range, followed by detailed specifications for individual product types or groups.

Please contact us if you have any difficulty in matching a product to your requirements or have a special application - we have the flexibility to develop custom solutions tailored to specific needs: products that are both solution-oriented and cost effective.

A separate catalogue fully describes E-T-A electronic sensors, control products and instrumentation.

E-T-A Choice – Circuit Breakers to Ensure the Best Protection

A number of factors arise in choosing a circuit breaker to protect against overloads and short circuits. E-T-A specialists can advise on your requirement, according to the specific field application.

Four types of tripping operation cover most situations.

1. Thermal Circuit Breakers (TO)

The tripping mechanism comprises a thermal actuator and mechanical latch, designed to discriminate between in-rush/temporary current surges and prolonged overloads to ensure effective overcurrent protection. Applications include motors, transformers, solenoids and low voltage wiring.

2. Thermal-Magnetic Circuit Breakers (TM)

Combining a solenoid in series with a bimetal thermal actuator, these provide time current characteristics with two distinct steps. A high overcurrent value causes the solenoid to trigger the release mechanism rapidly, the thermal mechanism responds to prolonged low value overloads. These circuit breakers are well suited to telecommunications, process control, and similar applications requiring precision performance.

3. Magnetic Circuit breakers (MO or HM)

A well-proven design of solenoid coil with optional hydraulic delay provides tripping that is highly tolerant of changes in ambient temperature. A wide range of performance characteristics is available in single, double and three pole configurations.

Series 808 and 809 are fast acting magnetic devices sensitive to small overload currents. Typical applications include printed circuit board and power semi-conductor protection.

4. High Performance Circuit Breakers

Where ultimate operation under adverse conditions is required, E-T-A high performance circuit breakers provide high interrupting capacity and excellent environmental specifications. Available in thermal and thermal-magnetic versions, they offer current ratings up to 500 A. Special models are designed for aerospace, defence and similar heavy-duty applications.

Interrupting Capacity I_{cn}

Overload and maximum interrupting capacities are specified for each series, defined as the maximum current levels that can be switched safely for a minimum of 40 operations, and a minimum of 3 operations respectively. For thermal circuit breakers back-up protection is advised if higher currents are possible. Please contact us for further advice on specific applications.

IEC 934/EN 60934 defines interrupting capacity as the rated conditional short circuit current performance. According to category PC1, this is the value of rated conditional short circuit current (interrupting capacity) for which the prescribed conditions do not include fitness of the CBE for its further use. PC2 is defined as the value of rated conditional short circuit current for which the prescribed conditions do include fitness of the CBE for its further use.

Switching Sequence

The switching sequence for short circuit tests is normally abbreviated as follows, according to relevant international CBE standards.

o: Break operation (open)

The circuit breaker in the closed position is caused to open through a short circuit current applied by means of a separate switch. Referenced as co (closed open) in earlier specifications.

co: Make operation with subsequent break operation (close open)

The circuit breaker in the open condition is closed onto a sustained short circuit and must immediately re-open. This operating mode requires the circuit breaker to be fail-safe as the actuator cannot be released as quickly as the circuit breaker mechanism will open. Referenced as oco (open close open) in earlier specifications.

t: Time period between switching operations

Normally 3 minutes, or the period required before the circuit breaker can be re-set.

Solderability of Silver-Plated Terminals

E-T-A products with silver-plated terminals will not be adversely affected (e.g. by sulphur induced corrosion) by the packaging material. However, the solderability of silver-plated terminals can deteriorate with time. Provided these products are stored, solderability will be guaranteed for a period of six months from the date of delivery. If they are not required immediately, it is recommended that these products are packed and stored in polythene bags. No drying agents should be used as they may contain silicate gel which can impair solderability. Flux should be non-halogenous.

E-T-A Advantages

Snap-Action Mechanism

The snap-action mechanism featured in many E-T-A models ensures that the contact closing speed is independent of the speed of operation of the actuator (push button, rocker, toggle etc.). The moving contact is retained until the actuator causes a defined force to act in the closing direction of the contacts. Once this force is exceeded, the mechanical retention is overcome allowing the contacts to snap closed (tease free mechanism.) The closing speed is a function of this force alone. Snap-action mechanisms eliminate contact welding upon switching on to sustained short-circuits and minimise the risk of contact wear over the circuit breakers' life.

Trip Free Mechanism



E-T-A circuit breakers cannot be held closed against an overload. This is achieved through the use of positively trip free designs in accordance with IEC 934/EN 60934 (with the exception of models 1610, 1658, 808 and 809 which are designed for specialised applications).

Manual Trip / On-Off Switches

Many models are available with a manual trip feature, either standard or as an option.

Others are specifically designed as combined switch/circuit breakers with rocker, push button, or toggle actuation, styled for front panel mounting. Rocker types are available with illumination as an option. According to IEC 934/EN 60934:

R = manual reset only

M = with manual release but not intended for frequent use as a switch

S = combined switch/CBE function

Terminals

Most models are offered with either quick connect (also suitable for soldering) or screw terminals. Models with printed circuit board pins are also available.



Auxiliary Contacts

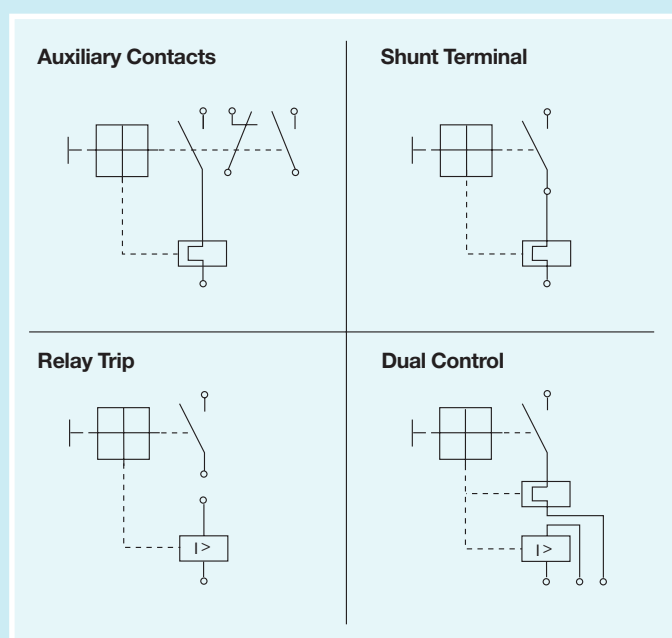
Electrically separate low current contacts can be included for use with alarm and control switching circuits.

N/C (Si1) = Normally closed contacts are open when the main contacts are closed (break or b-contact).

N/O (Si 2) = Normally open contacts are closed when the main contacts are closed (make or a-contact).

Shunt Terminal

Also available on some models: an additional, unprotected circuit tap, switched through the main contacts.



Relay Trip

An overload sensing circuit electrically separate from the switching contacts is a further possibility on some models.

Dual Control

Thermal-magnetic circuit breakers inherently have two separate protection elements: the thermal circuit for overload sensing and the magnetic coil for abnormal conditions such as short circuits. The main contacts are in series. Electrical separation of the thermal and the magnetic elements enables independent monitoring of two separate signals – Dual Control – by just one single pole circuit breaker.

E-T-A Circuit Breakers with Advanced Features

- Nuisance-free operation when subject to high in-rush currents or transients, allowing ratings to be closely matched to the needs of the system and enabling the most efficient sizing of wiring and components.
- Wide selection of time/current operating characteristics ensure tailoring to many different applications.
- Quality design ensures resistance to premature failure through corrosion, fatigue, shock or vibration.
- Unlike fuses, no need for spares. Risks of using temporary inappropriate substitutes are eliminated, and warranty costs are reduced.
- Convenient resetting reduces down-time and service repair costs.
- Many types also function as on/off switches, simplifying installation - fewer components result in higher overall reliability.
- Internationally approved, avoiding the need for different models for different national standards.
- Positive physical interruption of the circuit is ensured. There is no risk of equipment remaining live. Low leakage currents are eliminated.
- Fail-safe if operated beyond specified performance limits. Unlike PTC devices, such as resettable fuses, which may arc and flame; also they require power to be removed before they can be reset.

E-T-A International

E-T-A is an international company, successful in world markets and with offices and support personnel strategically placed around the globe. Our product specialists will be happy to assist with the selection of suitable products based upon a thorough evaluation of your engineering and commercial objectives.



Ambient Temperature Influence

To ensure optimum matching of circuit breaker performance to the system requirements, E-T-A thermal and thermal-magnetic circuit breakers are not normally compensated for fluctuations in ambient temperature. The circuit breaker is usually subjected to the same heat source as the system so will automatically track its protective requirements.

However, some applications require the circuit breaker to operate continuously in either high or low temperatures. The following table shows the correction factors that typically should be applied. The performance of magnetic circuit breakers and type 1410 is not affected significantly within this temperature range.

Ambient temperature °C	Multiplication factor
-20	0.76
-10	0.84
0	0.92
+23	1.00
+40	1.08
+50	1.16
+60	1.24

Specification Notes

Close Mounting of CBEs

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.

Horizontal installation is preferable.

Plug-in Mounted E-T-A Devices

The continuous rating capability of E-T-A sockets for plug-in circuit breakers is a function of the total number of circuit breakers fitted and the individual ratings of each. Please enquire with details of your application.

Degrees of Environmental Protection for Electrical Equipment

Terms such as drip-proof, water splash protection, waterproof and dustproof are all in common usage but may be misleading unless standard definitions are applied. The IEC has developed a standard coding system defined in IEC 529.

Protection categories are identified by the prefix letters „IP“ followed by 2 digits, the first of which refers to the level of protection provided against access by solid foreign objects and to hazardous parts; the second digit shows the level of protection against water ingress.

Degrees of protection of electrical equipment according to IEC 529

Example: IP 4 4
 Code letters ————
 First characteristic digit ————
 Second characteristic digit ————

First characteristic digit: Degree of protection against access to hazardous parts and against solid foreign objects

	Designation	Description
0	Non-protected	No specific protection of persons against accidental access to live or moving parts. No protection of the equipment against solid foreign objects.
1	Protected against solid foreign objects of ≥ 50 mm	Protection against accidental access to live or internal moving parts, e.g. with the back of a hand, but no protection against intended access to these parts. Protection against the ingress of solid foreign objects of 50 mm dia. and greater.
2	Protected against medium-sized foreign objects ≥ 12 mm	Protection against finger access to live or internal moving parts. Protection against the ingress of solid foreign objects of 12 mm dia. and greater.
3	Protected against small solid foreign objects ≥ 2.5 mm	Protection against access to live or internal moving parts with a tool, or wires etc. of a thickness of > 2.5 mm. Protection against the ingress of solid foreign objects of 2.5 mm dia. and greater.
4	Protected against granular foreign objects ≥ 1 mm	Protection against access of live or internal moving parts with a tool, or wires etc. of a thickness of > 1 mm. Protection against the ingress of solid foreign objects of 1 mm dia. and greater.
5	Dust-protected	Protection against access to live or internal moving parts. Protection against harmful dust deposits. Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the equipment.
6	Dust-proof	Full protection against access to live or internal moving parts. No ingress of dust.

Second characteristic digit: Degrees of protection against ingress of water

	Designation	Description
0	non-protected	No specific protection
1	Protected against water drops falling vertically	Drops falling vertically shall have no harmful effects.
2	Protected against water drops falling vertically when enclosure is tilted up to 15°	Drops falling vertically shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical.
3	Protected against water spray	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects.
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects.
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects.
6	Protected against high-pressure water jets	Water protected in powerful jets against the enclosure from any direction shall have no harmful effects. *)
7	Protected against the effects of temporary immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under specified conditions of pressure and time. *)
8	Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under specified conditions of pressure and time. *)

*) Certain equipment does not allow any ingress of water. If applicable, this is included in the relevant equipment specification.

Preferred degrees of protection

Protection against access to hazardous parts and against solid foreign objects	Protection against ingress of water						
Code letters and first characteristic digit	Second characteristic digit						
	0	1	2	3	4	5	6
IP 0	IP 00						
IP 2	IP 20	IP 21	IP 22	IP 23			
IP 3	IP 30	IP 31	IP 32	IP 33			
IP 5					IP 54		
IP 6						IP 65	IP 66

Protection degree IP 54 may apply to products with a splashcover, for example for front of panel protection whereas the terminals (IP 00) will be in an enclosed area.

Cable ratings to EN 60934

EN 60934:1994 + A1 : issue 1994
Standard current ratings as assigned to different cable cross sectional areas (stranded copper cable).

Size mm ²	1	1.5	2.5	4	6	10	16	25	35	50
Current rating (A)	to 6	>6 to 13	>13 to 20	>20 to 25	>25 to 32	>32 to 50	>50 to 63	>63 to 80	>80 to 100	>100 to 125

Cable ratings and sizes for aerospace applications

Current rating (A)	AWG cable sizes				AWG	mm ²
	EN 2350	MS 3320	Airbus	Boeing BPS-C-144		
0.5	20	22	24		24	0.21
1	20	22	24	20	22	0.33
2	18	22	24	18	20	0.52
2.5	18	22	24	18	18	0.82
3	18	22	24	18	16	1.31
4	18	22	24	18	14	2.08
5	18	22	24	18	12	3.31
7.5	16	22	22	16	10	5.26
10	16	20	20	16	AWG = American Wire Gauge	
15	14	18	16	14		
20	12	16	14	12		
25	10		12	10		

Representation of operating status

In accordance with DIN 40719, part 3, issue April 1997, the operating status of switching elements should be represented as follows:

● Telecommunications

The representation of the **ready** status as used by the telecommunications industry - Fuses and circuit breakers are shown in the **closed** position.

● Power engineering

The representation of the **open** position is used by the power, installation, control and data processing industries.

Equipment is represented in the **de-energized** condition and without the effect of an operating force.

Power switches, disconnectors, circuit breakers etc. are shown in the **open** condition, which is the **normal position**.

Following these definitions, **E-T-A products are generally shown in the de-energized condition.**

Definition of make contact and break contact

The definition of IEC Publication 50 (441), 1974 issue, applies.

make contact

a-contact

N/O (Si2) contact

A control or auxiliary contact which is closed when the main contacts of the mechanical switching device are closed and open when they are open.

Example:



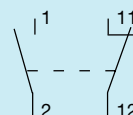
break contact

b-contact

N/C (Si1) contact

A control or auxiliary contact which is open when the main contacts of the mechanical switching device are closed and closed when they are open.

Example:



Note:

The common terminal of change over contacts is often shown as C (common).

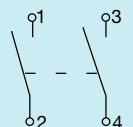
Terminal identification

The following identifications are in conformance with DIN EN 5005 July 1977. However, the diagrams for the examples have been adjusted to DIN 40900 1988 (equivalent to IEC 617 of 1983).

Main circuit

One-digit numerals - one pair of subsequent numerals per main switching element

Example

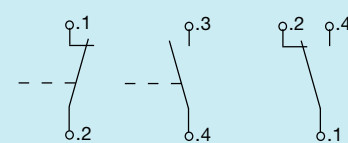


2 main switching elements

Auxiliary circuits

Two-digit numbers - Second digit function numeral
b-contact 1 and 2
a-contact 3 and 4
change over contact 1, 2 and 4
b-contact 7 and 8, delayed change over contact with special functions 5, 6 and 8
- First digit, ordinal number switching elements with identical function and belonging together

Examples:



b-contact a-contact change over contact

Graphical symbols in accordance with DIN 40900/IEC 617

Description	DIN 40900/IEC 617	ANSI/CSA
Operated by electromagnetic actuator	02-13-23	
Operated by electromagnetic overcurrent protection	02-13-24	
Operated by thermal actuator, for example thermal relay, thermal overcurrent protection	02-13-25	
Manually operated control, general case	02-13-01	
Operated by pulling	02-13-03	
Operated by pushing	02-13-05	
Operated by turning	02-13-04	
Operated by stored mechanical energy	02-13-20	
Latching mechanism with mechanical release	102-05-04	
Control by fluid level	02-14-01	
Control by flow	02-14-03	
Pressure sensor, making		
Operating device, general symbol, relay coil	07-15-01	
Operating device with one effective winding		
Relay coil of a slow-operating relay	07-15-08	
Relay coil of a slow-releasing relay	07-15-07	
Actuating device of a thermal relay	07-15-21	
Electro-magnetic overcurrent protection		
Electro-magnetic undervoltage release (undervoltage release module)		
Relay coil of a polarized relay	07-15-15	

Description	DIN 40900/IEC 617	ANSI/CSA
Make contact	07-02-01 07-02-02 	
Break contact	07-02-03	
Change-over break before make contact	07-02-04	
Two-way contact with centre-off position	07-02-05	
Circuit breaker	07-13-05	
Disconnecter (isolator)	07-13-06	
Switch-disconnector (on-load isolating switch)	07-13-08	
Manually operated switch, general symbol	07-07-01	
Push-button switch with detent, non-automatic return (push/push)		
Three-position switch, manually operated, positions 2 and 3 are locked positions	107-03-02	
Pull-switch (non locking)	07-07-03	
Turn-switch (locking)	07-07-04	
Contactor (contact open in the unoperated position)	07-13-02	
Contactor or relay with three make contacts		
3 pole contactor with three electrothermal overcurrent releases		
3 pole disconnecter		
Single pole disconnecter with detent, manually operated, 1 break contact and 1 make contact		
Single pole disconnecter with 2 parallel contacts, manually operated, with detent and remote trip coil (FA) - type 921		
3 pole circuit breaker		
3 pole circuit breaker with latching mechanism, electrothermal and electro-magnetic overcurrent releases		

E-T-A® Thermal Overcurrent Circuit Breakers

**Single and multi pole
thermal circuit breakers (CBEs)
with and without auxiliary contacts**

Max. voltage ratings 3 AC 415 V,
AC 250 V, DC 50 V

Current ratings 0.05 ... 30 A



With simple operation through the heating effect of current, thermal circuit breakers offer one of the most reliable and cost effective forms of protection device available. As a result they are ideally suited to the protection of a broad range of components and systems - from motors and transformer windings, through printed circuit boards, to the low voltage power distribution circuits of road vehicles, boats, and battery powered machines.

Such applications all require the ability to discriminate between safe switch-on surges or transients on the one hand, and harmful sustained overloads on the other. Thermal circuit breakers can withstand high level surges, which arise from lamp loads or motor starting, for example. At the same time they afford protection against the effects of genuine failure such as motor locked rotors. The characteristics of thermal CBE's can be matched closely to the ratings of the component or system they are protecting, eliminating the need for over-sizing of wiring and connectors, whilst offering dependable protection - even under low level overcurrent conditions which cannot be adequately provided for by other methods of circuit protection.

E-T-A thermal circuit breakers utilise one of three different mechanisms optimised for their range of operation

- a snap action disc type bimetal and contact assembly
- a bimetal with a mechanical latch and separate spring loaded contact
- a hot wire design with extremely fast switching time

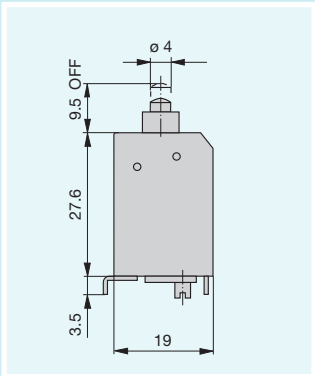
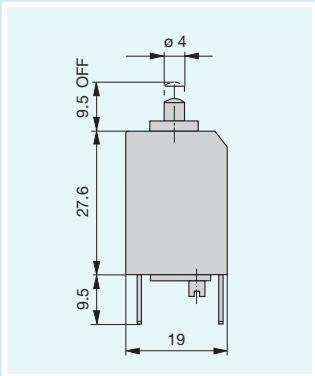
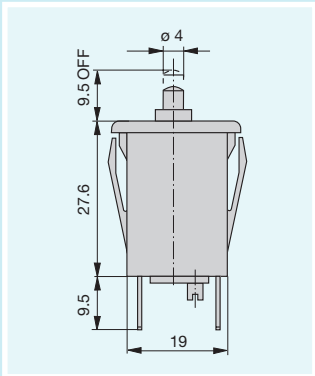
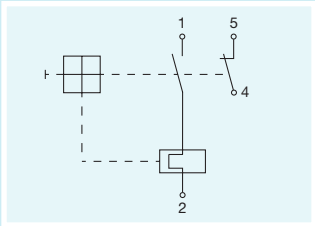
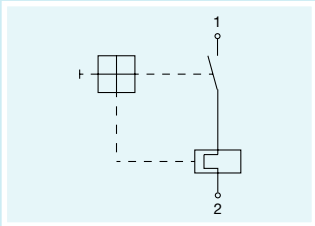
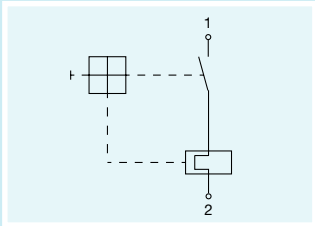
All are individually calibrated in the factory to ensure safe, predictable performance under a wide range of conditions.

The E-T-A thermal circuit breakers in this catalogue section are manually resettable enabling the power supply to be restored after operation. Several models combine the functions of circuit breaker protection and on/off switching in a single component. There is a choice of rocker, toggle or push button actuation according to user preference.

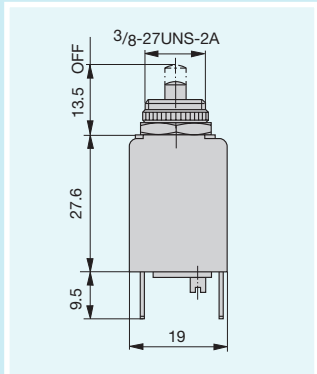
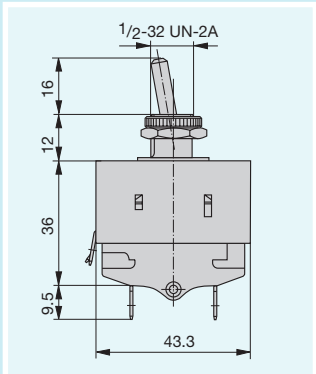
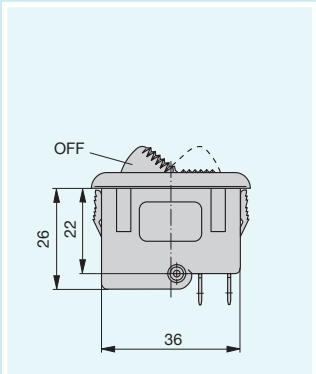
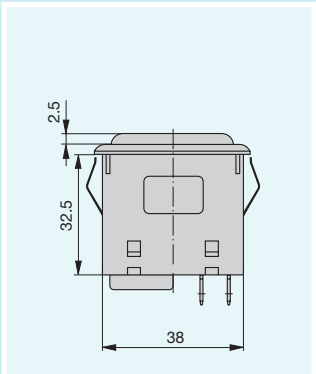
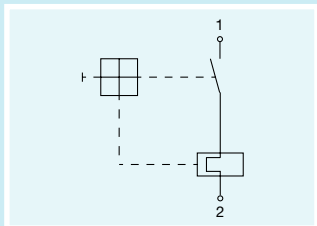
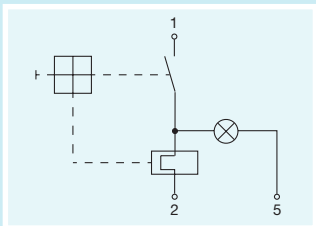
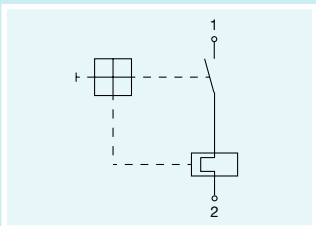
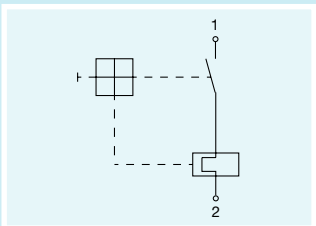
E-T-A's wide range of models enables the designer to make optimal selections according to specific performance, installation and styling needs.

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.

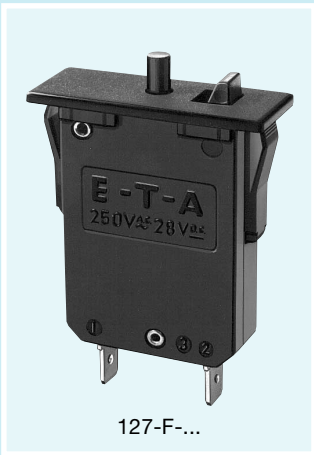
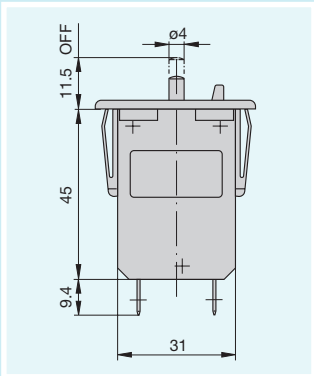
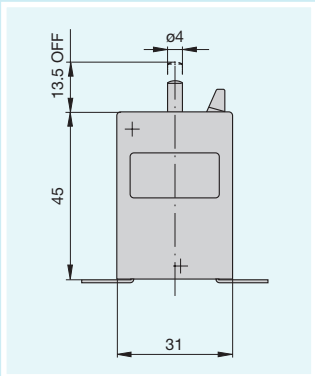
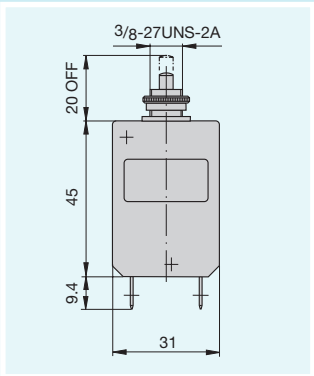
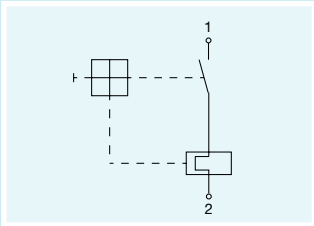
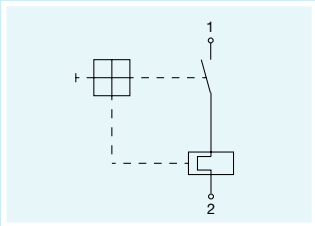
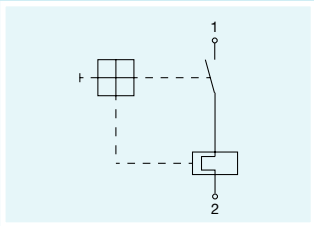
ETA® Thermal Overcurrent Circuit Breakers

Type No.	104-PR-...	104-...	105-...
			
Description	PCB mounting	integral type	snap-in panel mounting
Max. voltage rating	AC 250 V; DC 48 V	AC 250 V; DC 48 V	AC 250 V; DC 48 V
Current ratings	0.05...10 A	0.05...10 A	0.05...10 A
Aux. contact rating	0.5 A, AC 250 V; DC 28 V	0.5 A, AC 250 V; DC 28 V	
Typical life / contact rating	0.05...5 A 3000 operations at 2 x I _N 6 ...8 A 500 operations at 2 x I _N 10 A 50 operations at 2 x I _N	0.05...5 A 3000 operations at 2 x I _N 6 ...8 A 500 operations at 2 x I _N 10 A 50 operations at 2 x I _N	0.05...5 A 3000 operations at 2 x I _N 6 ...8 A 500 operations at 2 x I _N 10 A 50 operations at 2 x I _N
Interrupting capacity I _{cn}	0.05...2 A 6 x rated current 2.5...10 A 5 x rated current	0.05...2 A 6 x rated current 2.5...10 A 5 x rated current	0.05...2 A 6 x rated current 2.5...10 A 5 x rated current
Approvals	VDE, Demko, SEV, ÖVE, CSA, UL, Semko, Nemko, Fimko, Kema	VDE, Demko, SEV, ÖVE, CSA, UL, Semko, Nemko, Fimko, Kema	VDE, Demko, SEV, ÖVE, CSA, UL, Semko, Nemko, Fimko, Kema
Available options	see pages 23 - 26	see pages 23 - 26	pages 23 - 26
Dimensions			
Internal connection diagrams			

Thermal Overcurrent Circuit Breakers

106-...	110/111-P10-G10..	120-...	124-...
			
threadneck panel mounting	toggle switch/circuit breaker	rocker switch/circuit breaker	push/push switch/circuit breaker
AC 250 V; DC 48 V	AC 250 V; DC 28 V	DC 28 V	DC 28 V
0.05...10 A	0.1...20 A (type 110) 0.1...16 A (type 111)	3...20 A	3...20 A
0.05...5 A 3000 operations at $2 \times I_N$ 6 ...8 A 500 operations at $2 \times I_N$ 10 A 50 operations at $2 \times I_N$	30,000 operations at $1 \times I_N$ 5,000 operations at $2 \times I_N$	10,000 operations at $1 \times I_N$	10,000 operations at $1 \times I_N$
0.05...2 A 6 x rated current 2.5...10 A 5 x rated current	10 x rated current	160 A	160 A
VDE, Demko, SEV, ÖVE, CSA, UL, Semko, Nemko, Fimko, Kema	VDE, CSA, UL, LRoS	CSA	
see pages 23 - 26	see pages 27 - 28	see pages 29 - 30	see pages 29 - 30
			
			

E-T-A® Thermal Overcurrent Circuit Breakers

Type No.	127-F.../T...	129-L11-H-KF	157/158-...
			
	127-F-...		157-...
Description	plug-in, integral, or snap-in panel mounting (-F), or rail (-T), with manual release option	base mounting with manual release	threadneck panel mounting
Max. voltage rating	AC 250 V; DC 28 V (type -F) DC 28 V (type -T)	DC 28 V	AC 250 V; DC 28 V
Current ratings	0.05...25 A	3...25 A	0.05...25 A
Aux. contact rating			
Typical life / contact rating	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N
Interrupting capacity I_{cn}	Type -F/-T: 0.05...2.5 A 8 x I _N 3 ... 5 A 20 x I _N Type -F: 6 ...12 A 200 A 13 ...25 A 400 A Type -T: 6 ...25 A 400 A	3...5 A 20 x rated current 6...25 A 400 A	0.05... 2.5 A 8 x I _N 3 ... 5 A 20 x I _N 6 ...12 A 200 A 13 ...25 A 400 A
Approvals	VDE, CSA, UL, LRoS, Semko	CSA, LRoS, BWB (VG 95345 part 9)	VDE, CSA, UL, LRoS, Semko
Available options	see pages 31 - 33	see pages 35 - 36	see pages 37 - 39
Dimensions			
Internal connection diagrams			

Thermal Overcurrent Circuit Breakers

1110-...



snap-in panel mounting,
push/push
switch/circuit breaker

1140-E...



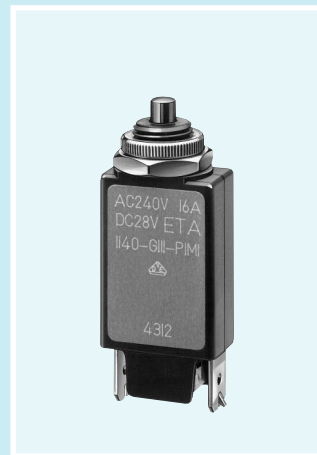
integral type

1140-F...



snap-in panel mounting

1140-G...



threadneck panel mounting

AC 250 V; DC 28 V
(DC 50 V UL/CSA)

AC 240 V; DC 48 V

AC 240 V; DC 48 V

AC 240 V; DC 48 V

0.05...16 A

3.5...16 A

3.5...16 A

3.5...16 A

0.05...4 A 10,000 operations at $1xI_N$
5... 16 A 6,000 operations at $1xI_N$

3.5... 8 A 1000 operations at $2xI_N$
10...16 A 50 operations at $2xI_N$

3.5... 8 A 1000 operations at $2xI_N$
10...16 A 50 operations at $2xI_N$

3.5... 8 A 1000 operations at $2xI_N$
10...16 A 50 operations at $2xI_N$

AC 250 V: 0.05...16 A $8 \times I_N$
DC 28 V: 0.05... 6 A $10 \times I_N$
7...10 A 200 A
12...16 A 300 A

3.5... 8 A $8 \times I_N$
10...16 A 120 A

3.5... 8 A $8 \times I_N$
10...16 A 120 A

3.5... 8 A $8 \times I_N$
10...16 A 120 A

VDE, CSA, UL, BV, LRoS,
Semko

VDE, CSA, UL, Semko, Kema

VDE, CSA, UL, Semko, Kema

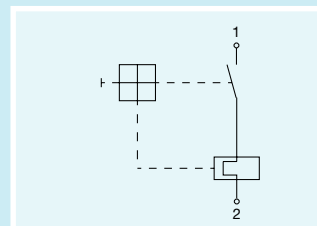
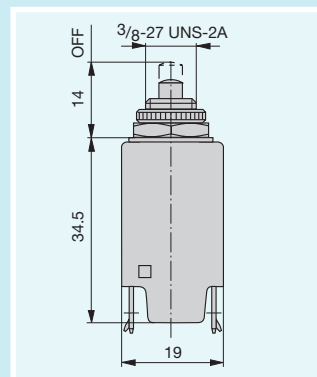
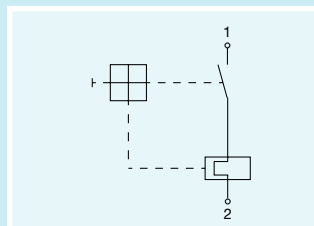
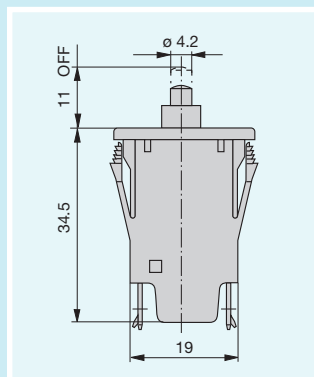
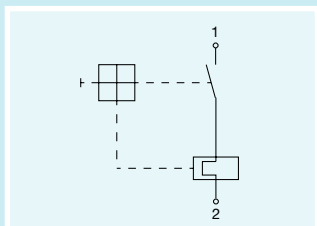
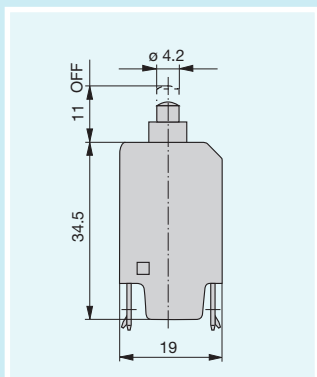
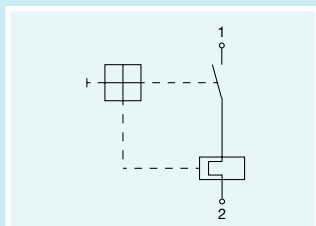
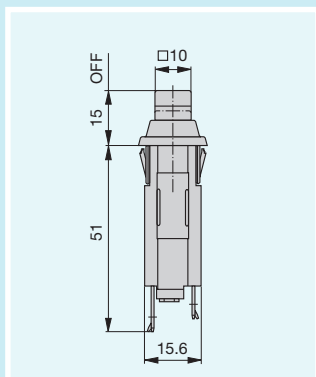
VDE, CSA, UL, Semko, Kema

see pages 41 - 42

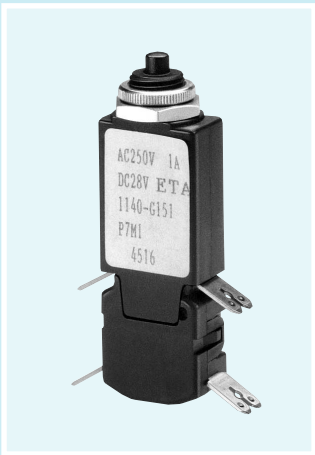
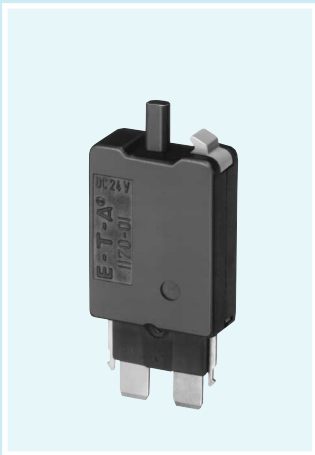
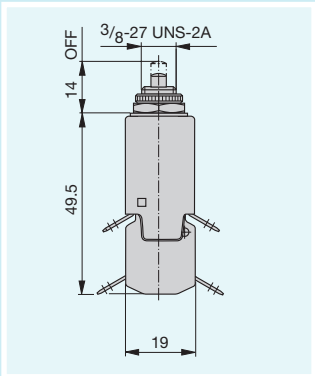
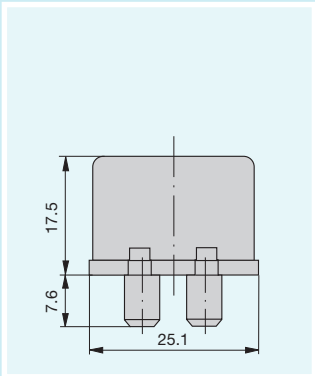
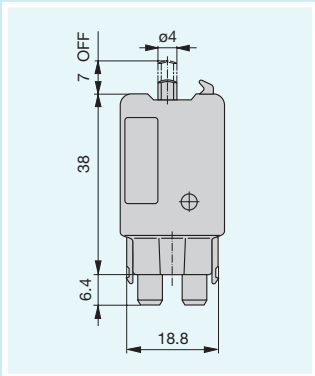
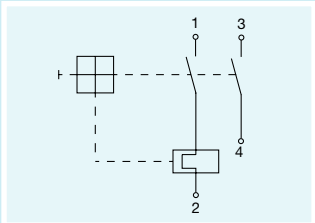
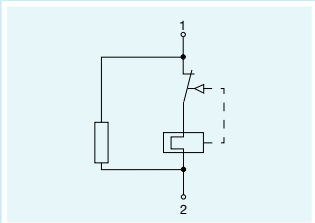
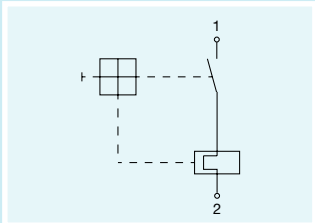
see pages 43 - 44

see pages 43 - 44

see pages 43 - 44



Thermal Overcurrent Circuit Breakers

Type No.	1140-G.5.	1160-...	1170-...
			
Description	threadneck panel mounting, double pole, thermally protected on one pole	automotive circuit breaker controlled reset operation	automotive circuit breaker plug in mounting, manual release
Max. voltage rating	AC 240 V; DC 48 V	DC 12 V	DC 28 V
Current ratings	0.05...16 A	12...30 A	5...25 A
Aux. contact rating			
Typical life / contact rating	0.05...3 A 3,000 operations at 2 x I _N 3.5 ...8 A 1,000 operations at 2 x I _N 10 ...16 A 50 operations at 2 x I _N	300 operations at 2 x I _N	6,000 operations at 1 x I _N 3,000 operations at 2 x I _N ≤ 20 A 1,000 operations at 2 x I _N 25 A
Interrupting capacity I_{cn}	0.05...3 A 6 x I _N 3.5 ...8 A 8 x I _N 10 ...16 A 120 A	200 A, L/R = 2.5 ms	5...15 A 200 A 20...25 A 400 A
Approvals	VDE, CSA, UL, Kema		
Available options	see pages 45 - 46	see pages 47 - 48	see pages 49 - 51
Dimensions			
Internal connection diagrams			

E-T-A® Thermal Overcurrent Circuit Breakers

1410-F1..



miniaturized rocker switch/circuit breaker, snap-in panel mounting, fast acting

AC 240 V; DC 28 V
(DC 48 V UL/CSA)

0.63...10 A

30,000 operations $I_N \leq 6.3$ A
10,000 operations $I_N > 6.3$ A AC
3,000 operations $I_N > 6.3$ A DC
300 operations at $2 \times I_N$

0.63...2.5 A $12 \times I_N$
3.15...10 A $8 \times I_N$ AC max. 70 A
3.15...10 A $10 \times I_N$ DC

CSA, UL, SEV

see pages 53 - 54

1410-L1...



miniaturized PCB mounting type, fast acting

AC 240 V; DC 28 V
(DC 48 V UL/CSA)

0.63...10 A

500 operations at $2 \times I_N$

0.63...2.5 A $12 \times I_N$
3.15...10 A $8 \times I_N$ max. 70 A

VDE, CSA, UL

see pages 55 - 56

1410-L2...



miniaturized PCB mounting type, fast acting

AC 240 V; DC 28 V
(DC 48 V UL/CSA)

0.63...10 A

0.2 x I_N , max. 1 A

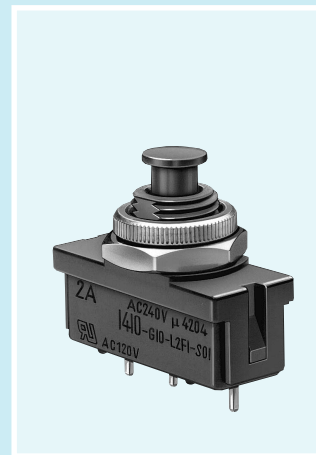
300 operations at $2 \times I_N$

0.63...2.5 A $12 \times I_N$
3.15...10 A $8 \times I_N$ max. 70 A

VDE, CSA, UL

see pages 55 - 56

1410-G1...



threadneck panel mounting, fast acting

AC 240 V; DC 28 V
(DC 48 V UL/CSA)

0.63...10 A

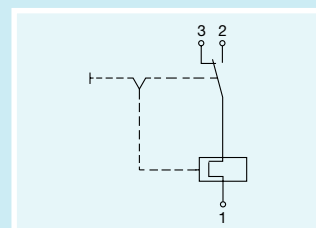
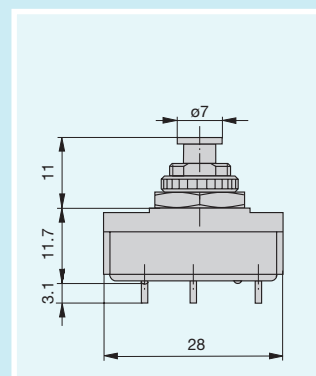
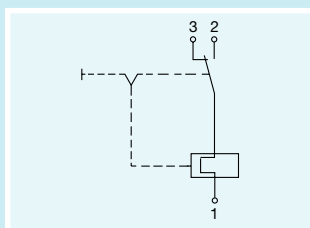
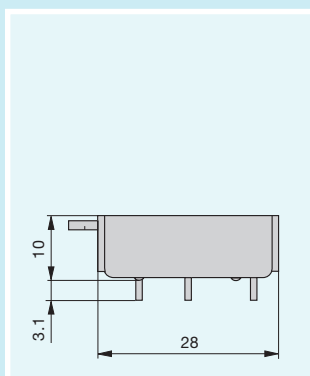
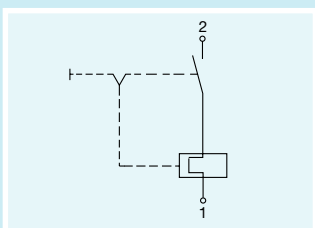
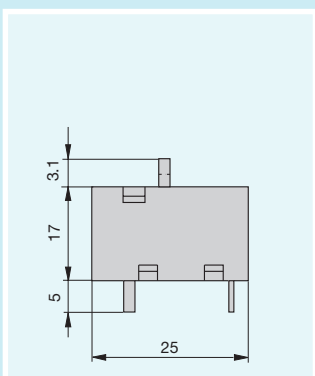
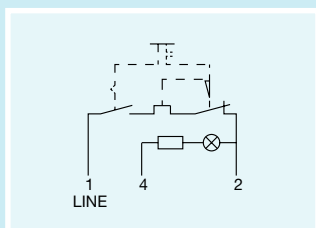
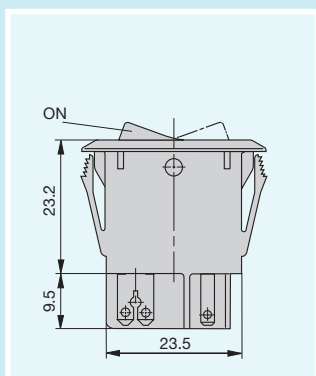
0.2 x I_N , max. 1 A

500 operations at $2 \times I_N$

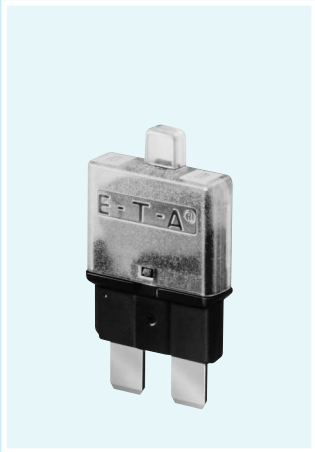
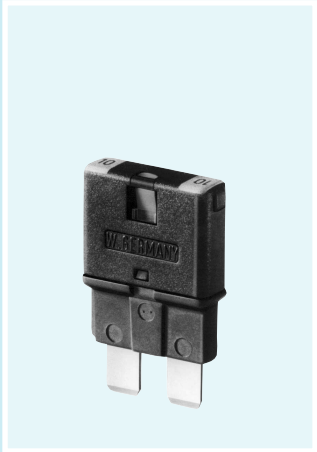
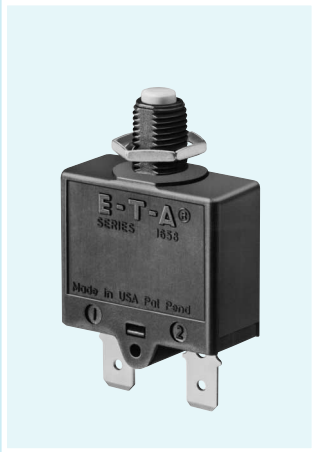
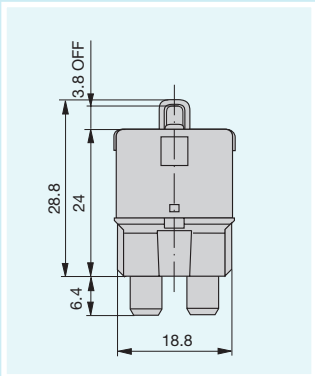
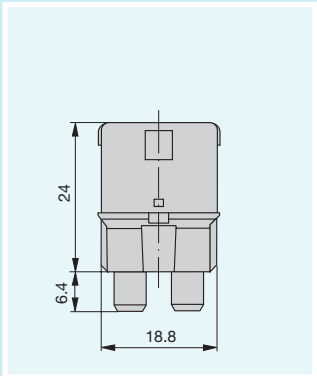
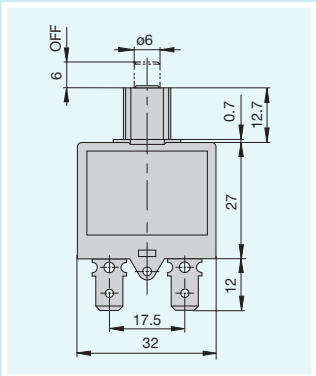
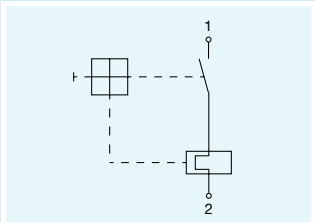
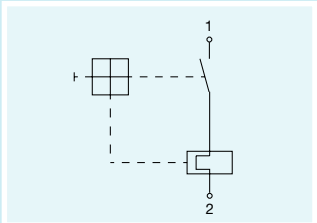
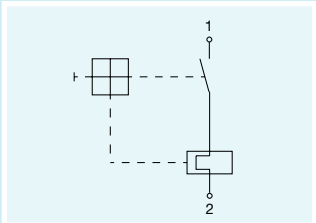
0.63...2.5 A $12 \times I_N$
3.15...10 A $8 \times I_N$ max. 70 A

VDE, CSA, UL

see pages 55 - 56



E-T-A® Thermal Overcurrent Circuit Breakers

Type No.	1610-21	1610-22	1658-...
			
Description	automotive circuit breaker standard fuseblock mounting	automotive circuit breaker standard fuseblock mounting with manual release option	threadneck panel mounting disc bimetal operation
Max. voltage rating	DC 24 V	DC 12 V	AC 250 V; DC 28 V
Current ratings	6...25 A	6...25 A	5...25 A
Aux. contact rating			
Typical life / contact rating	300 operations at ≤ 50 A	500 operations at ≤ 50 A	1,000 operations at ≤ 50 A
Interrupting capacity I_{cn}	≥ 3 operations at ≤ 150 A ≥ 1 operation at ≤ 2000 A	≥ 3 operations at ≤ 200 A ≥ 1 operation at ≤ 2000 A	200 A
Approvals	VDE, CSA, UL		
Available options	see pages 57 - 59	see pages 57 - 59	see pages 61 - 63
Dimensions			
Internal connection diagrams			

E-T-A® Thermal Overcurrent Circuit Breakers

3120-F...



rocker switch/circuit breaker,
single and double pole,
snap-in panel mounting

3120-F...



push button switch/circuit breaker,
single and double pole
(press-to-reset only) with single
or two button operation

3130-F...



1, 2 or 3 pole switch/circuit
breaker,
snap-in panel mounting

2-4100-...



threadneck panel mounting
breaker

AC 250 V; DC 50 V

AC 250 V; DC 50 V

3 AC 415 V; AC 240 V;
DC 50 V

AC 250 V; DC 28 V

0.1...20 A

0.1...20 A

0.1...20 A 1 pole
0.1...16 A 2 and 3 pole

0.05...10 A

50,000 operations at $I_N \leq 16A$ 2 pole
30,000 operations at $I_N \leq 16A$ 1 pole
10,000 operations at $I_N > 16 A$

50,000 operations at $I_N \leq 16A$ 2 pole
30,000 operations at $I_N \leq 16A$ 1 pole
10,000 operations at $I_N > 16 A$

30,000 operations 1 and 3 pole
50,000 operations 2 pole

2,000 operations at $2 \times I_N$

0.1...2 A 10 x rated current
2.5...20 A 150 A (1 pole)
2.5...20 A 250 A (2 pole)

0.1...2 A 10 x rated current
2.5...20 A 150 A (1 pole)
2.5...20 A 250 A (2 pole)

0.1...2 A 10 x rated current
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)

0.05...2 A 10 x rated current
2.5 ...6 A 8 x rated current
7 ...10 A 6 x rated current

VDE, CSA, UL, LRoS, BV,
Semko

VDE, CSA, UL, LRoS, BV,
Semko

VDE, UL, CSA, Semko

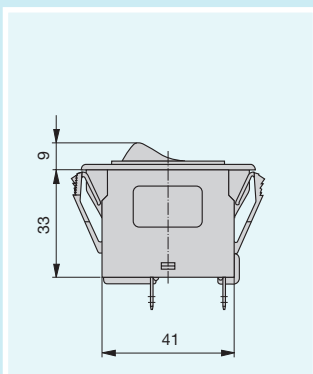
VDE, CSA, UL, Semko

see pages 65 - 76

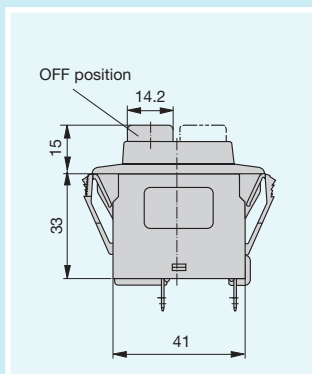
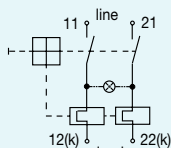
see pages 65 - 76

see pages 77 - 80

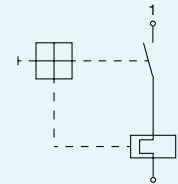
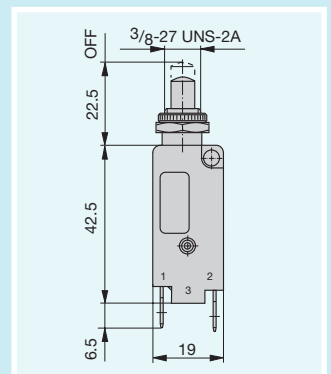
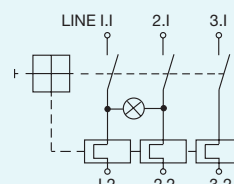
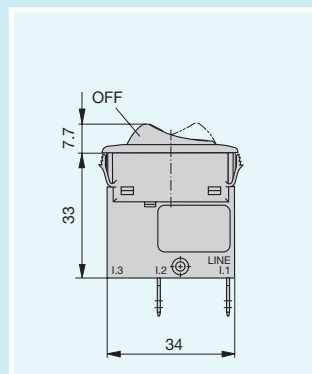
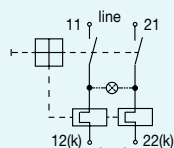
see pages 81 - 82



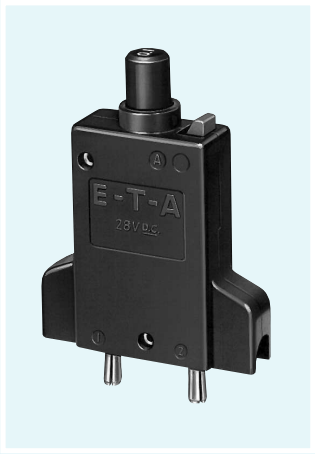
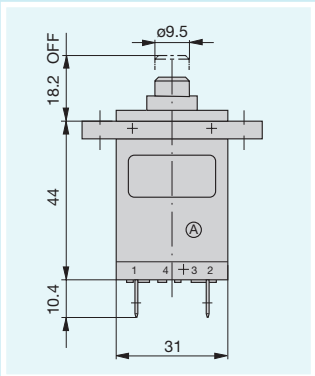
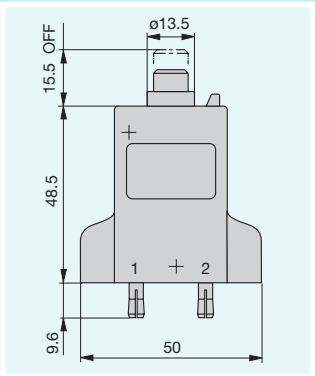
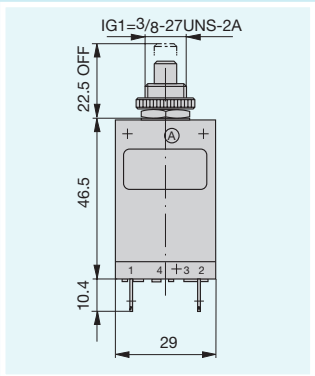
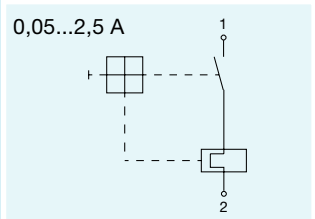
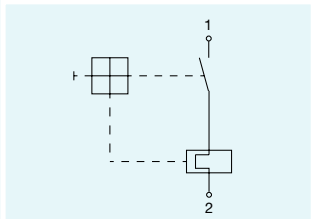
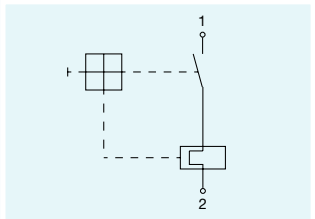
2 pole
thermally protected



2 pole
thermally protected



E-T-A® Thermal Overcurrent Circuit Breakers

Type No.	2-5000-...	2-5200-...	2-5700-...
			
Description	flange mounting, with manual release option	plug-in type, with manual release option. Specially suited to automotive and marine applications	threadneck panel mounting, with optional push/push switch actuation
Max. voltage rating	AC 250 V; DC 28 V	DC 28 V AC 250 V to special order	AC 250 V; DC 28 V
Current ratings	0.05...25 A	0.05...16 A up to 25 A to special order	0.05...25 A
Aux. contact rating			
Typical life / contact rating	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N
Interrupting capacity I _{cn}	0.05...2.5 A 8 x rated current 3 ...5 A 20 x rated current 6 ...12 A 200 A 13 ...25 A 400 A	0.05...2.5 A 8 x rated current 3 ...5 A 20 x rated current 6 ...16 A 400 A	0.05...2.5 A 8 x rated current 3 ...5 A 20 x rated current 6 ...12 A 200 A 13 ...25 A 400 A
Approvals	VDE, CSA, UL, Semko, SEV, LROs, Nemko	Semko, LROs	VDE, CSA, UL, Semko, SEV, LROs, BV, Nemko
Available options	see pages 83 - 86	see pages 87 - 88	see pages 83 - 86
Dimensions			
Internal connection diagrams	0,05...2,5 A 		

E-T-A® Thermal Overcurrent Circuit Breakers

2-6200-...



flange mounting, with auxiliary contacts, with manual release option

2-6400-...



threadneck panel mounting, with auxiliary contacts

AC 250 V; DC 28 V

AC 250 V; DC 28 V

0.05...16 A

0.05...16 A

1A, AC 250 V; DC 28 V

1A, AC 250 V; DC 28 V

5,000 operations at $2 \times I_N$

5,000 operations at $2 \times I_N$

10 x rated current

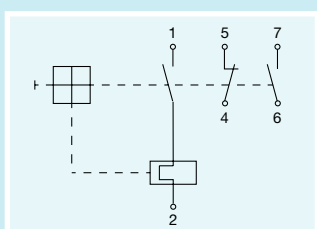
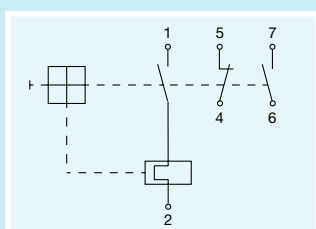
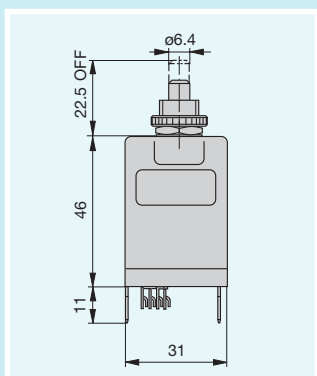
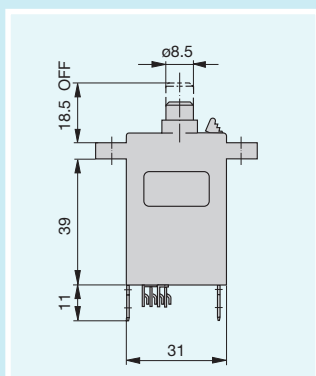
10 x rated current

VDE, CSA, UL, Demko, Semko

VDE, CSA, UL, Demko, Semko

see pages 89 - 92

see pages 89-92



Thermal Overcurrent Circuit Breakers - Selector Chart

Type	Mounting method			Main terminal design				Auxiliary contacts	Manual trip facility	Water splash cover	Number of poles		Illumination	Max. ratings		
	Threadcheck	Flange	Socket	Blade terminals	Solder terminals	Screw terminals	Shunt terminal				single pole	multi pole		AC (V)	DC (V)	MAX I _N (A)
104				●	●		○	○			●			250	48	10
105		●		●			○				●			250	48	10
106	●			●			○			○	●			250	48	10
110/111	●			●			○		●	○	●		○	250	28	20
120		●		●			○		●		●				28	20
124		●		●			○		●		●				28	20
127		●	●	●		●			○		●			250	28	25
129			●			●			●		●				28	25
157	●			●		●					●			250	28	25
158			●	●		●					●			250	28	25
1110		●		●					●	○	●			250	28(50)	16
1140	●	●		●						○	●	○		240	48	16
1160			●	●							●				12	30
1170			●	●					●		●				28	25
1410	●	●		●	●			●	●		●		○	250	28(48)	10
1610			●	●					○		●				24	25
1658	●			●		○					●			250	28	25
3120		●		●		○	○	○	●	○	●	●	○	250	50	20
3130		●		●		○	○		●	○	●	●	○	415	50	20
2-4100	●			●	●		○			○	●			250	28	10
2-5000		●		●		●	○		○	○	●			250	28	25
2-5200			●	plug-in pins					○		●			250	28	25
2-5700	●			●		●	○		○	○	●			250	28	25
2-6200		●		●	●		○	●	○		●			250	28	16
2-6400	●			●	●		○	●		○	●			250	28	16

● = standard

○ = optional

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

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. Approved to CBE standard EN 60934 (IEC 934). For higher current ratings see type 1140.

Typical applications

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

Accessories

X 201 285 01 Water splashcover/knurled nut assembly for type 106.

Ordering information

Type No.	
104	PCB mounting type (-PR), or integral type (-P30/P10)
105	snap-in panel mounting
106	threadneck panel mounting with hex and knurled nut *
106-M1	threadneck mounting for standard fuseholder cutout *
Terminal design	
P10	blade terminals A6.3-0.8
P30	blade terminals A2.8-0.8
PR	solder terminal pins for PCB mounting (type 104 only)
Shunt terminal (optional)	
A3	same as main terminals (up to I_N 6 A/3 A max. load)
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.

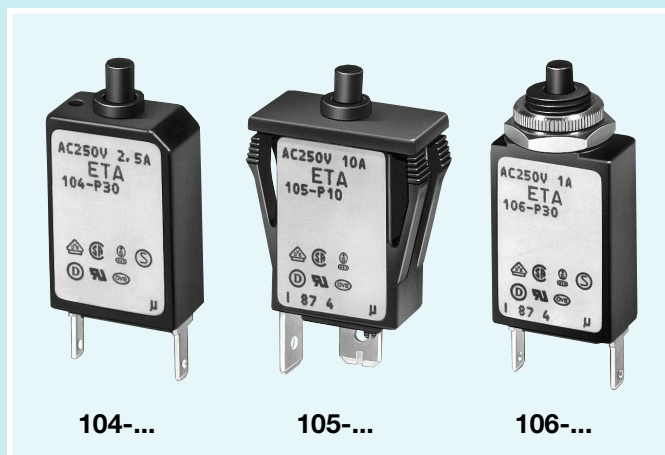
* mounting hardware bulk shipped

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		

Approvals

Authority	Voltage ratings	Current ratings
VDE, Demko,	AC 250 V, DC 28 V	0.05...10 A
SEV, ÖVE	AC 250 V, DC 28 V	0.05...10 A
CSA, UL	AC 250 V, DC 48 V	0.05...10 A
Semko	AC 250 V, DC 48 V	0.1...10 A
Nemko	AC 250 V	0.05...10 A
Fimko	AC 250 V	0.1...10 A
Kema (EN 60934)	AC 240 V, DC 48 V	0.05...10 A
Circuit breakers with -Si51 not approved		

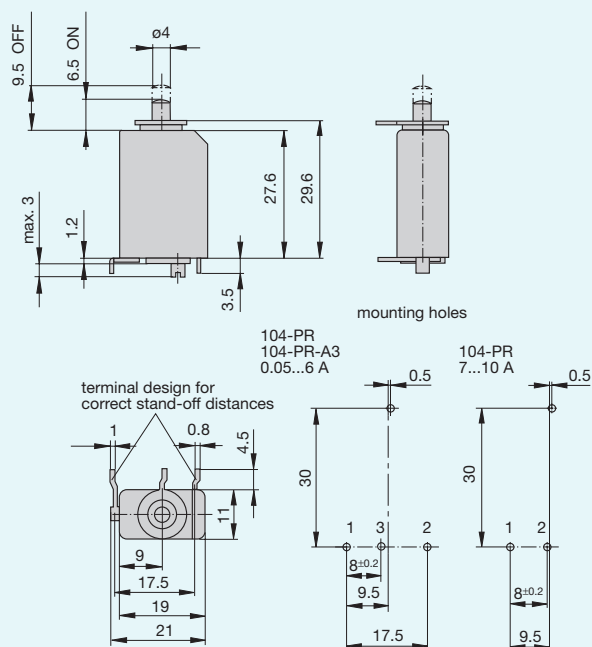


Technical data

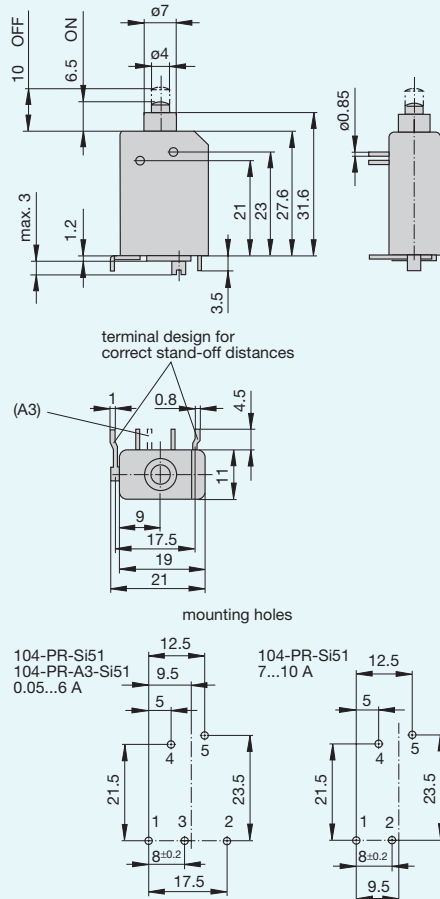
Voltage rating	AC 250 V; DC 48 V		
Current ratings	0.05...10 A		
Auxiliary circuit	0.5 A, AC 250 V, DC 28 V		
Typical life	0.05...5 A: 3000 operations at 2 x I _N 6 ...8 A: 500 operations at 2 x I _N 10 A 50 operations at 2 x I _N		
Ambient temperature	-20...+60 °C (T 60)		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.05 ... 2 A 2.5 ...10 A	6 x I _N 5 x I _N	
Interrupting capacity (UL 1077)	I _N 0.05...4.5 A 5 A 6...10 A 0.05...10 A	U _N AC 250 V AC 250 V AC 250 V DC 48 V	200 A 1000 A 2000 A 200 A
Degree of protection (IEC 529/DIN 40050)	operating area terminal area	IP 40 IP 00	
Vibration	10 g (57-500 Hz),±0.76 mm (10-57 Hz), to IEC 68-2-6, test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH, to IEC 68-2-3, test Ca		
Mass	approx. 10 g		

Dimensions

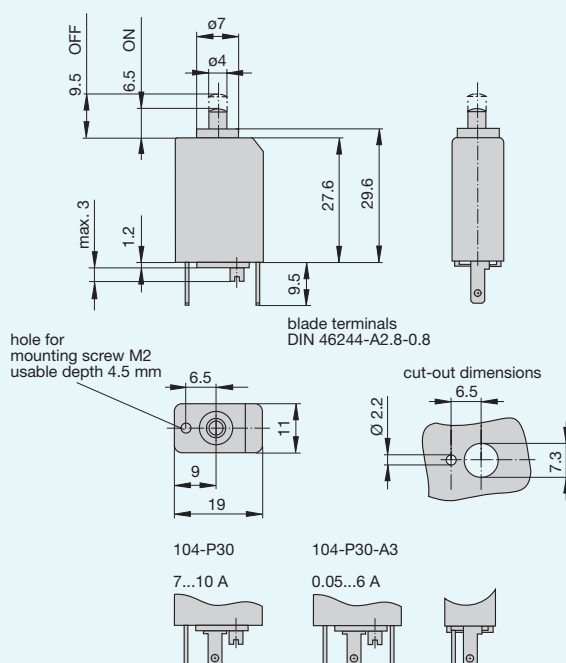
104-PR



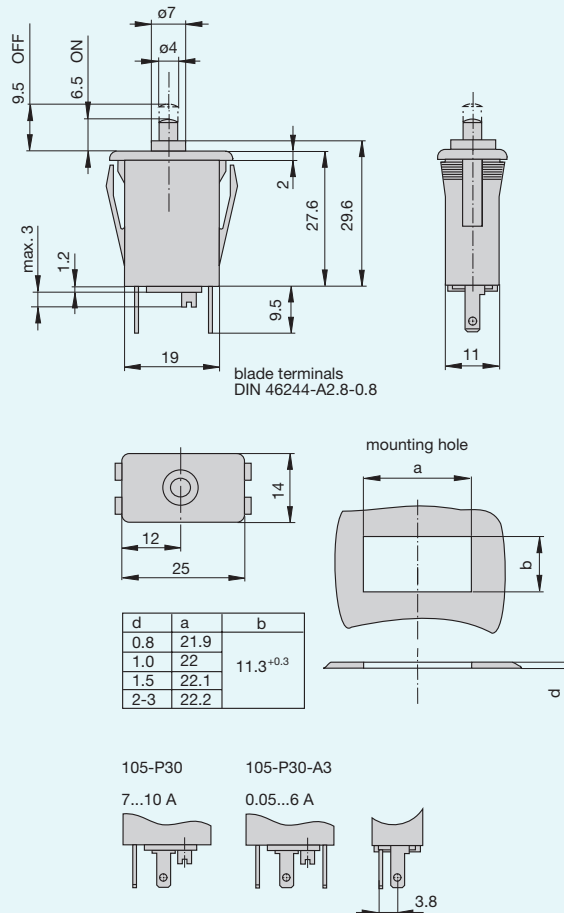
104-PR-(A3)-Si51



104-P30



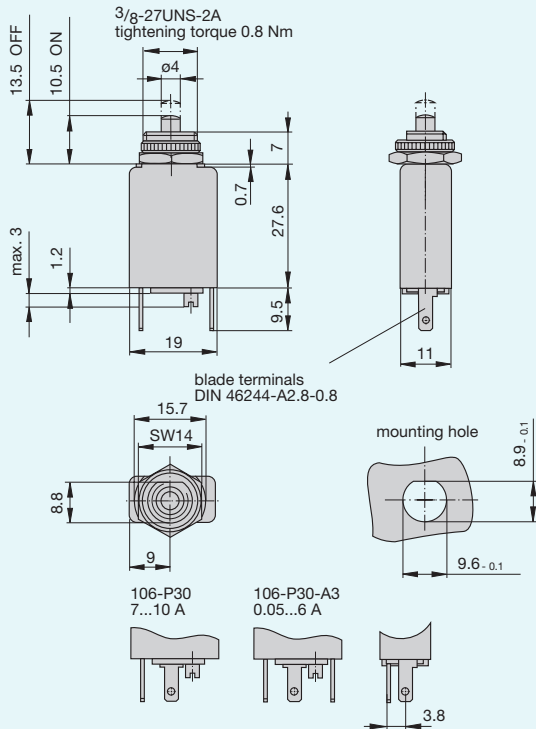
105-P30



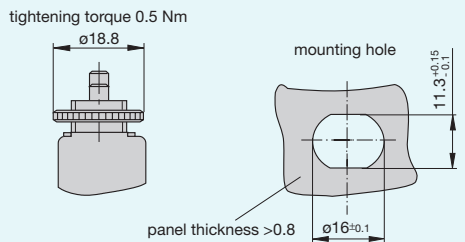
ET-A Thermal Overcurrent Circuit Breakers 104/105/106-...

Dimensions

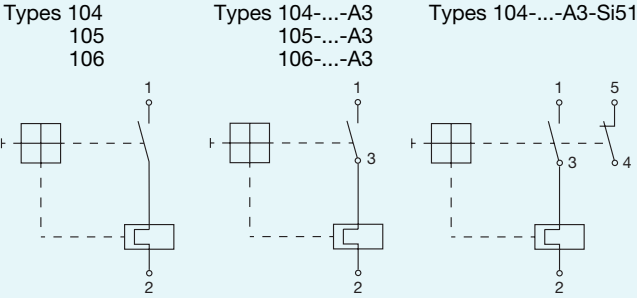
106-P30



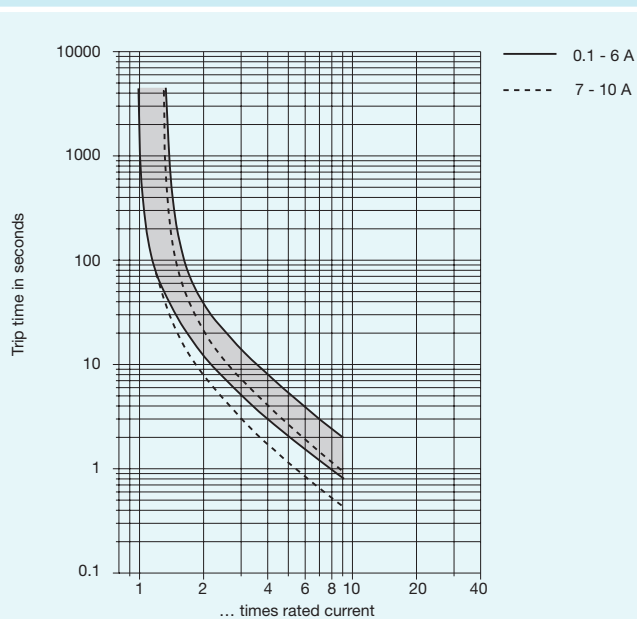
106-M1



Internal connection diagrams



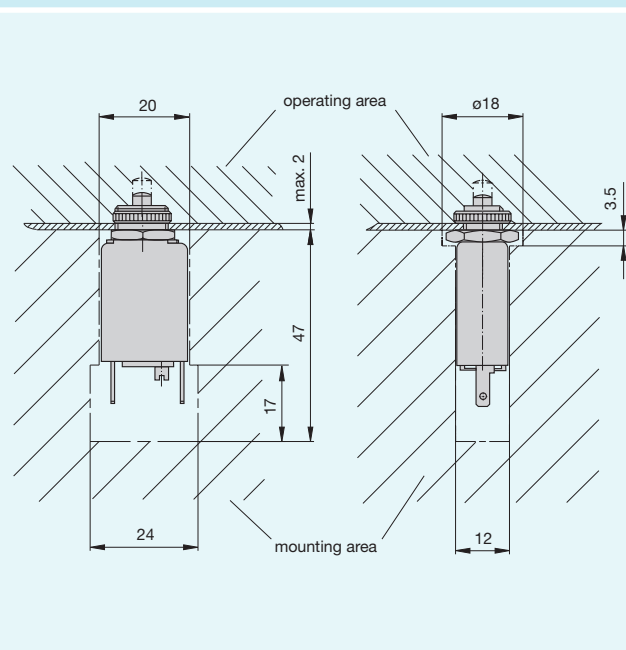
Typical time/current characteristics at 23°C



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

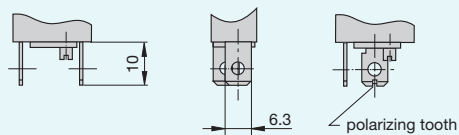
Installation drawing for type 106



Terminal design

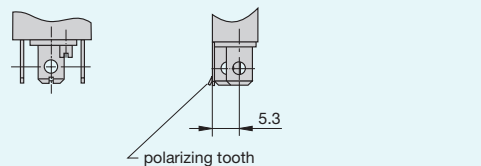
104/105/106-P10

0.05...6 A



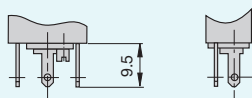
104/105/106-P10-A3

0.05...6 A



104/105/106-P30-A3

0.05...6 A

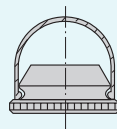


Accessories

Water splash cover (transparent)/knurled nut assembly
(type 106-... only)

X 201 285 01

Degree of protection IP 64



ET-A Thermal Overcurrent Circuit Breakers 110/111-P10-G10

Description

Single pole toggle switch/thermal circuit breakers (S-type TO CBE to EN 60934) for threadneck panel mounting. Available with optional neon illumination (filament bulb for low voltages) to indicate the ON position. Fitted with toggle or baton style actuator in a range of colours - translucent for illuminated version. Under overload the actuator returns to the OFF position.

Typical applications

Motors, transformers, solenoids, extra-low voltage wiring systems, power supplies.

Ordering information

Type No.	
110	non illuminated
111	illuminated (please specify voltage)
Terminal design	
P10 blade terminals A6.3-0.8	
Shunt terminal (optional)	
A3 shunt terminal, max. load 5 A	
Mounting	
G10 threadneck panel mounting, 1/2-32 UN-2A *	
Switch style options	
OB baton	
WB baton - water splash protected (IP 54)	
OT toggle	
WT toggle - water splash protected (IP 54)	
Switch colour designation	
opaque	translucent
01 black	14 red
02 white	15 orange
04 red	17 transparent
06 blue	
08 grey	
09 green	
Current ratings	
0.1 ...20 A (type 110)	
0.1 ...16 A (type 111)	
Illumination (type 111 only)	
12 V DC	10 to 14 V
24 V DC	20 to 28 V
115 V AC	90 to 140 V
220 V AC	185 to 275 V

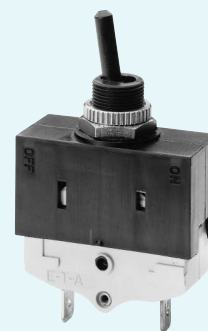
111 - P10 - [] - G10 - OB 14 - 5A - 12 V ordering example

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)
0.1	97.6	2.5	0.2
0.2	22.4	3	0.1
0.3	10.9	3.5	0.09
0.4	6.1	4	0.05
0.5	4.0	5	0.04
0.6	2.7	6	0.03
0.7	1.8	8	< 0.02
0.8	1.6	10	< 0.02
1	1.07	12	< 0.02
1.2	0.66	15	< 0.02
1.5	0.50	16	< 0.02
1.8	0.33	18	< 0.02
2	0.27	20	< 0.02



110-P10-G10
111-P10-G10 (illuminated)

Technical data

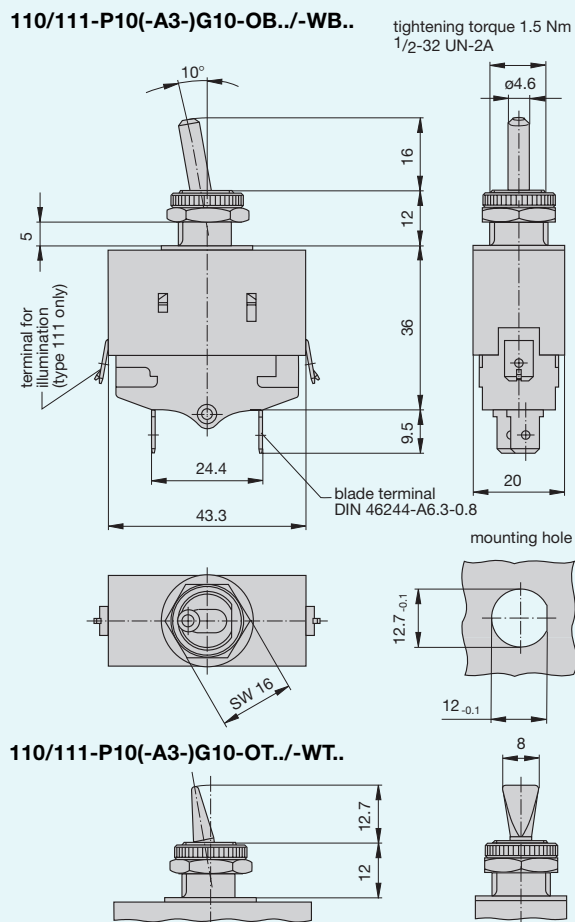
Voltage rating	AC 250 V; DC 28 V		
Current ratings	0.1...20 A (type 110) 0.1...16 A (type 111)		
Typical life	30,000 operations at 1xI _N or 5,000 operations at 2xI _N		
Ambient temperature	-30 ... +60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	10 x I _N		
Interrupting capacity (UL 1077)	I _N 0.1...16 A 18...20 A	U _N AC 250 V AC 115 V	2,000 A 2,000 A
Degree of protection (IEC 529/DIN 40 050)	operating area IP 40 terminal area IP 00		
Vibration	4 g (57-500 Hz) ±0.3 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	48 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 30 g		

Approvals

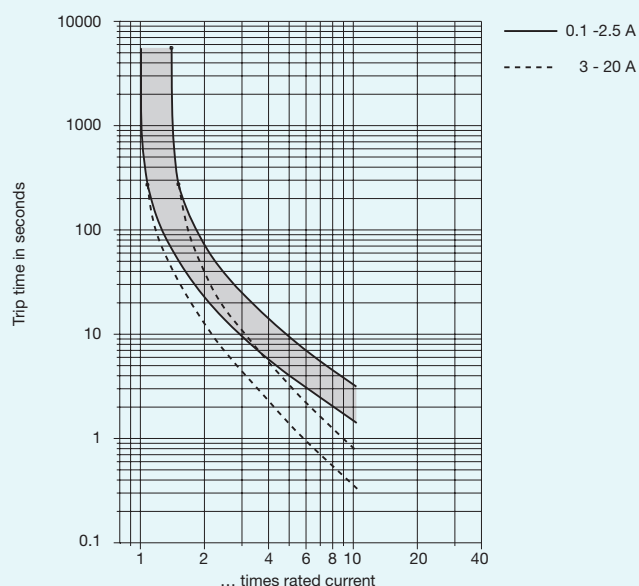
Authority	Voltage ratings	Current ratings
VDE	AC 250 V, DC 28 V	0.1...20 A
LROs	AC 250 V, DC 28 V	0.1...16 A
CSA / UL	AC 250V, DC 28 V	0.1...16 A
	AC 115 V, DC 28 V	18 ...20 A

ET-A Thermal Overcurrent Circuit Breakers 110/111-P10-G10

Dimensions 110/111-P10-G10-...



Typical time/current characteristics at 23 °C

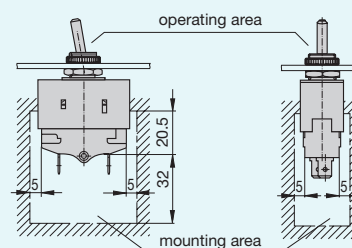


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

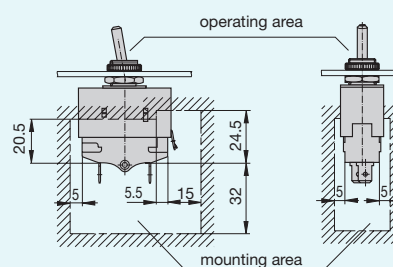
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Installation drawings

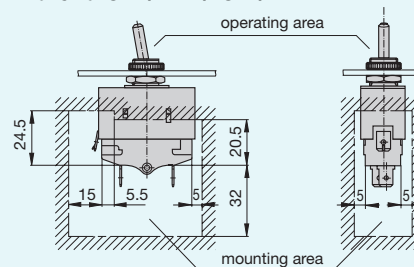
110-P10-G10-OB../WB../-OT../WT-...



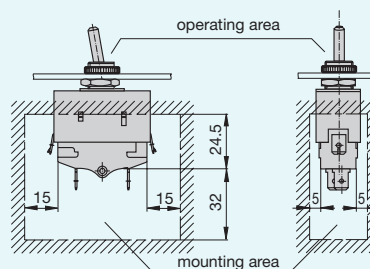
110-P10-A3-G10-OB../WB../-OT../WT-...



111-P10-G10-OB../WB../-OT../WT-...

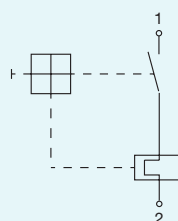


111-P10-A3-G10-OB../WB../-OT../WT-...

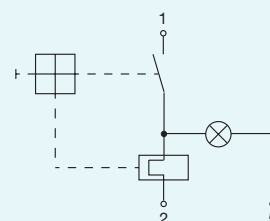


Internal connection diagrams

110-P10-...



111-P10-...



E-T-A® Thermal Overcurrent Circuit Breakers 120-P50/124-...

Description

Single pole switch/thermal circuit breaker (S-type TO CBE to EN 60934) for snap-in panel mounting. Available in rocker (120-P50) or push/push (124-P50) switch versions. Under overload the actuator returns to the OFF position.

Typical applications

Extra low voltage automotive and marine wiring systems.

Ordering information

Type No.	
120	snap-in panel mounting type with rocker operation
124	snap-in panel mounting type with push/push button
Mounting (type 124 only)	
F10	mounting depth 36.5 mm
F20	mounting depth 38 mm
Terminal design	
P50	blade terminals 4.8x0.8 mm
Shunt terminal (optional)	
A3	blade terminal 4.8x0.8
Current ratings	
3...20 A	

124 - F10 - P50 - A3 - 4A 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)x10 ⁻³	Current rating (A)	Internal resistance (Ω)x10 ⁻³
3	67	10	< 20
3.5	67	12	< 20
4	67	15	< 20
4.5	49	16	< 20
5	38	20	< 20
7.5	26		

Approvals (type 120)

Authority	Voltage ratings	Current ratings
CSA	DC 28 V	3...15 A

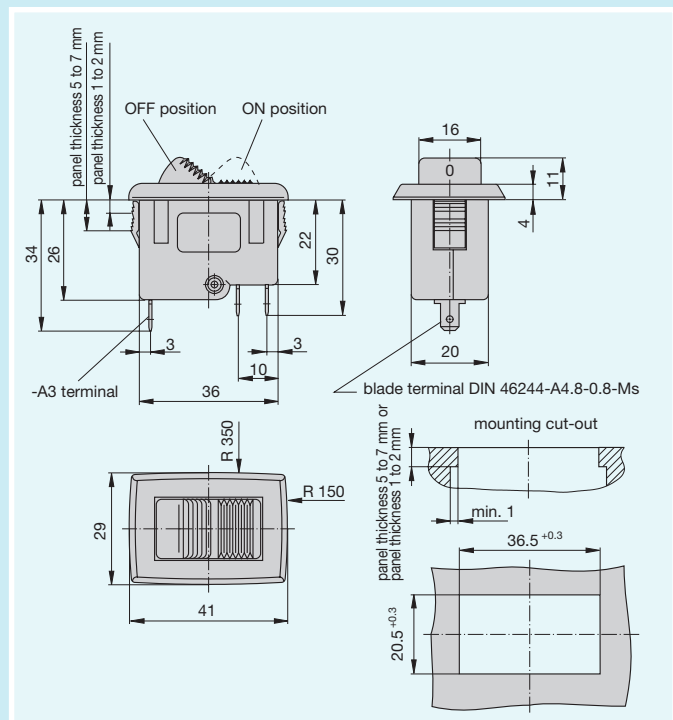


Technical data

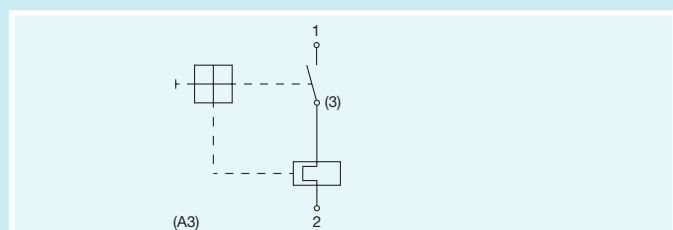
Voltage rating	DC 28 V	
Current ratings	3...20 A	
Typical life	10,000 operations at I _N	
Ambient temperature	-30 ... +80 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 500 V	
Interrupting capacity I _{cn}	160 A	
Vibration	120: 10 g (57-500 Hz) ±0.76 mm (10-57 Hz) 124: 8 g (57-500 Hz) ±0.61 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	40 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	168 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	144 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	120: approx. 23 g 124: approx. 27 g	

ET-A Thermal Overcurrent Circuit Breakers 120-P50/124-...

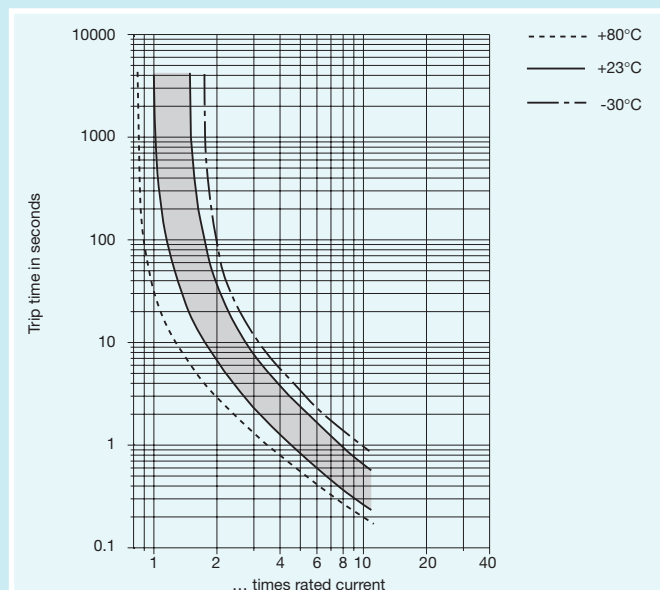
Dimensions 120-P50



Internal connection diagram



Typical time/current characteristics

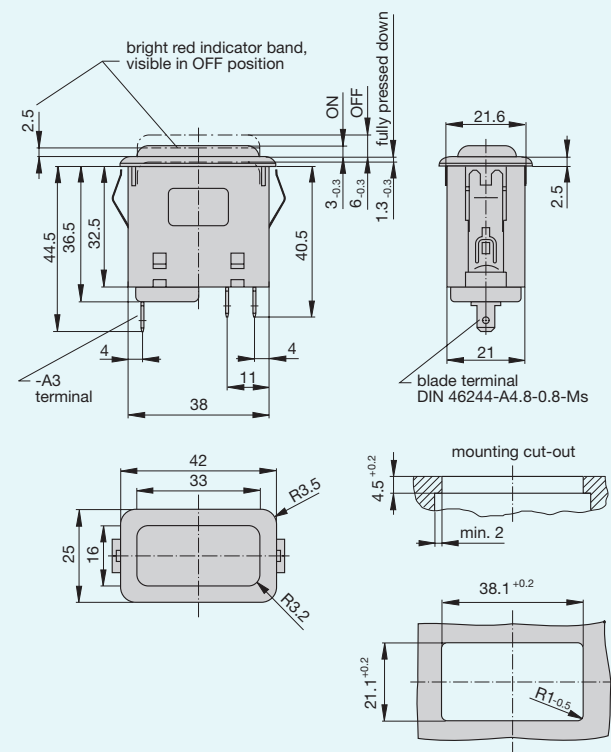


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

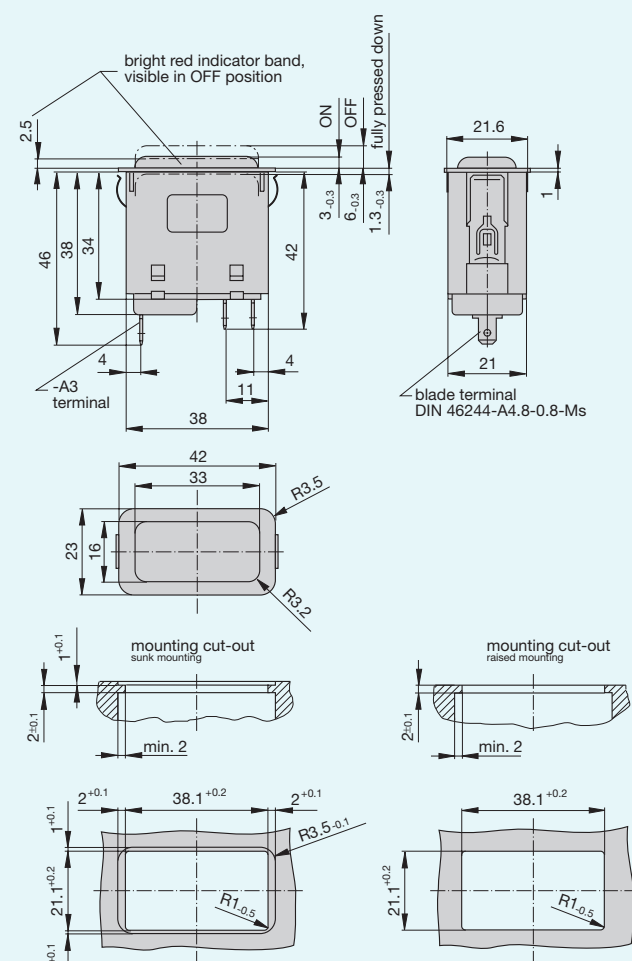
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Dimensions 124-...

124-F10-P50



124-F20-P50



E-T-A® Thermal Overcurrent Circuit Breaker 127-...

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 934).

Typical applications

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

Accessories

10F-P10	Modular snap-together surface mounted sockets, each accommodating two plug-in circuit breakers. With push-on terminals.
10F-K10	As above but with screw terminals.
10F-A10	As above but with a combination of screw and push-on terminals.
Y 301 166 02	Two-way brass connecting/bus bar links for type 10F-K10/-A10 sockets.
Y 301 166 01	Four-way brass connecting/bus bar links.
X 210 589 01	Fifty-way 1.5mm ² cable links with pre-fitted connection lugs for type 10F-K10/-A10 sockets.
X 210 589 02	As above but with 2.5mm ² cable links.
X 210 588 01	100-way 1.5mm ² cable links with pre-fitted push-on connectors for type 10F-P10 sockets, brown
X 210 588 02	As above, but with 2.5mm ² cable links, black.
X 210 588 03	As above, but with 2.5mm ² cable links, red.
X 210 588 04	As above, but with 2.5mm ² cable links, blue.

Ordering information

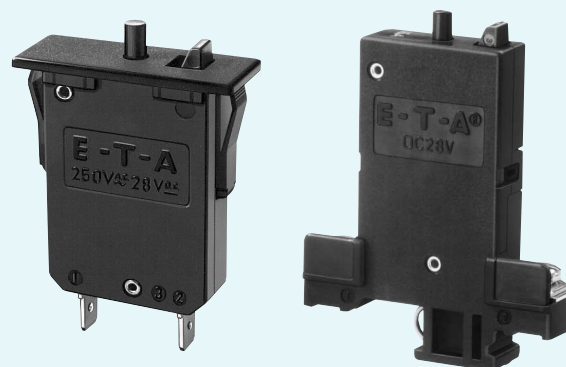
Type No.
127
Mounting options
leave blank for integral/plug-in option
F for snap-in mounting
T11 track mounting with captive stud terminals
T12 track mounting with screw terminals
Terminal design (for use with and without flange -F)
P10 blade terminals A6.3-0.8
K10 screw terminals M4x6
Manual release (optional)
H manual release facility
Special housing (optional)
KF for tropical and high humidity conditions
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



127-F-...

127-T11-...

Technical data

Voltage rating	AC 250 V; DC 28 V (type -F)	
	DC 28 V (type -T)	
Current ratings	0.05...25 A	
Typical life	5,000 operations at 2 x I _N	
Ambient temperature	-20...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	type -F: 0.05 ...2.5 A 3... 5 A 6...12 A 13...25 A	8 x I _N 20 x I _N 200 A 400 A
	type -T: 0.05...2.5 A 3... 5 A 6...25 A	8 x I _N 20 x I _N 400 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Db	
Mass	127-F-...: approx. 24 g 127-T-...: approx. 35 g	

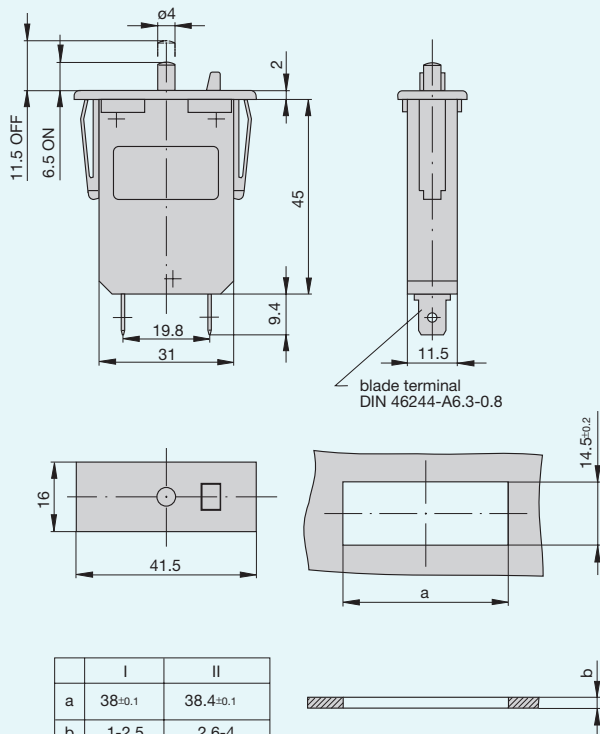
Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
CSA, UL	AC 250 V	0.1...16 A
LRoS	AC 250 V; DC 28 V	0.2...25 A
Semko (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
Type 127-T-... approvals N/A		

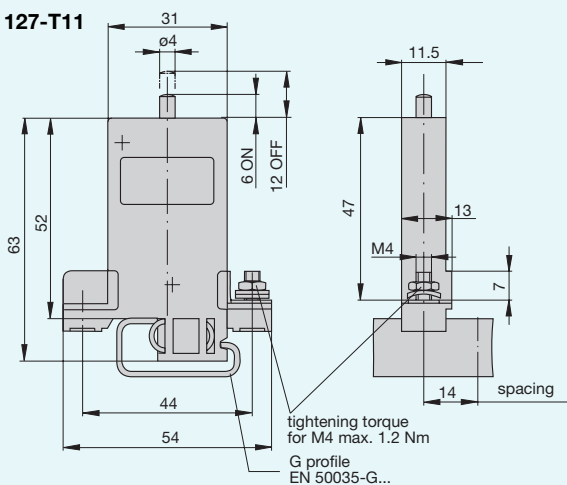
ET-A® Thermal Overcurrent Circuit Breaker 127-...

Dimensions

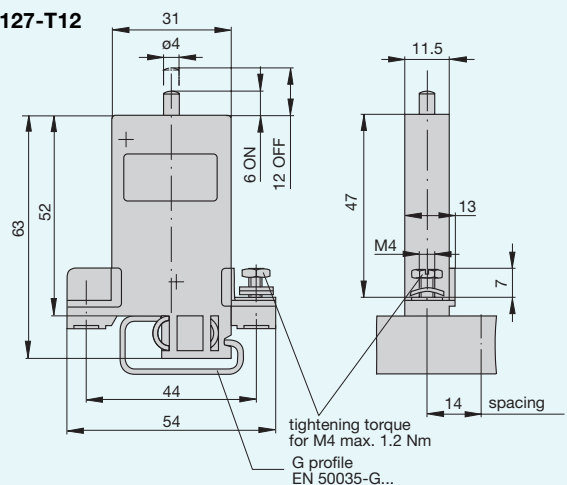
127-F-P10-H



127-T11

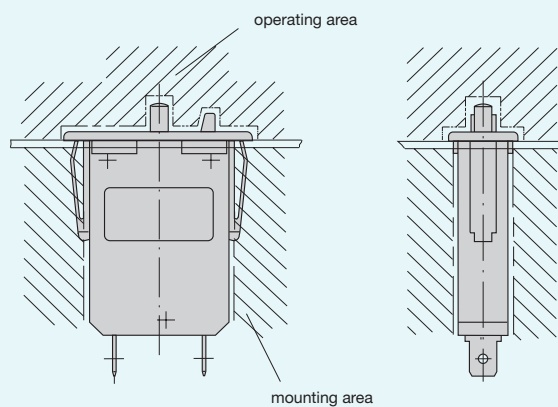


127-T12

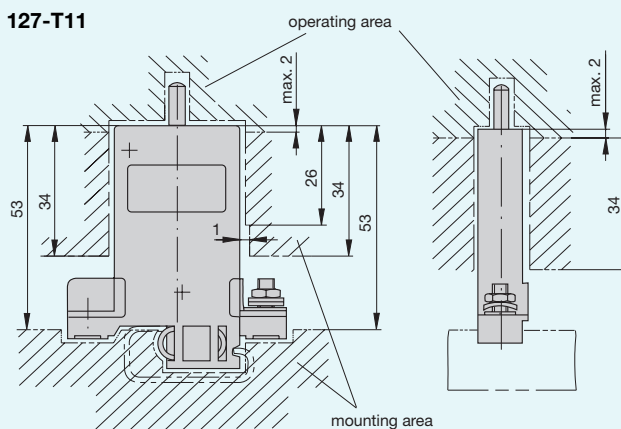


Installation drawings

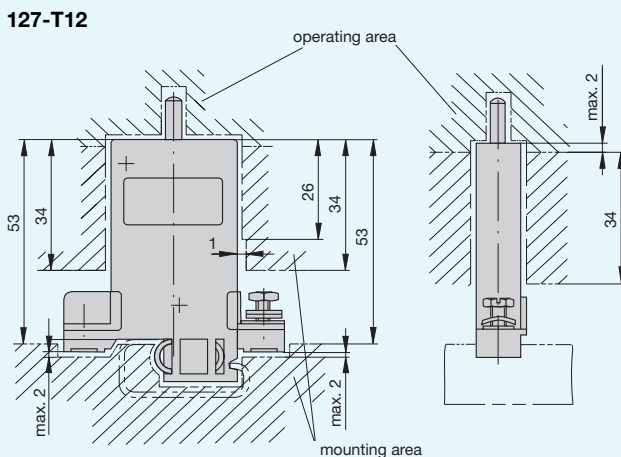
127-F



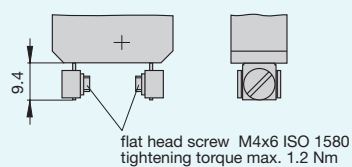
127-T11



127-T12



Terminal design 127-F-K10



E-T-A® Thermal Automotive Circuit Breaker 129-L11-H-KF

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. The special housing (-KF) supplied as standard, is particularly suited to high humidity and other damp conditions.

Typical applications

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

Accessories

83-P10 Surface mounted terminal blocks, each accommodating six bolt-on circuit breakers. Fitted with terminals for push-on connectors.

Ordering information

Type No.
129 base mounting and connection
Terminal design
L11
Manual release
H manual release facility
Housing
KF for tropical and high humidity conditions
Current ratings
3...25 A

129 - L11 - H - KF - ...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	DC 28 V	3...25 A
LRoS	DC 28 V	3...25 A
BWB (VG 95345 part 9)	DC 28 V	6...25 A

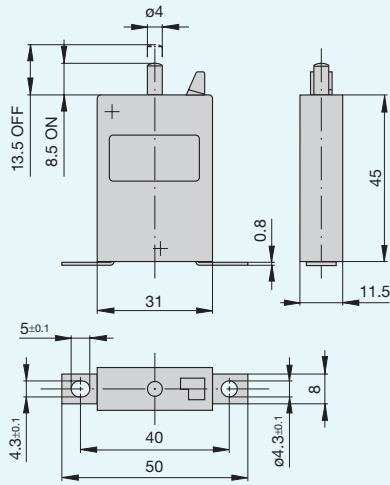


129-L11-H-KF

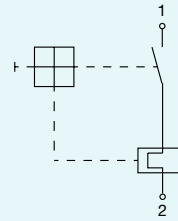
Technical data

Voltage rating	DC 28 V	
Current ratings	3...25 A	
Typical life	5,000 operations at $2 \times I_N$	
Ambient temperature	-40... +75 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I_N	3... 5 A $20 \times I_N$ 6...25 A 400 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 32 terminal area IP 00	
Vibration	10 g (55-2000 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	

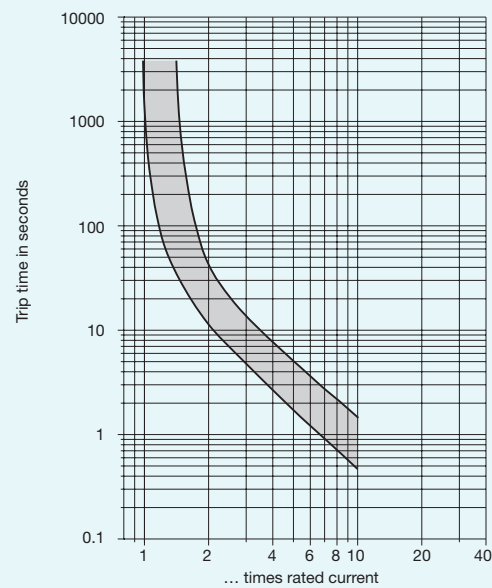
Dimensions



Internal connection diagram



Typical time/current characteristics at 23 °C

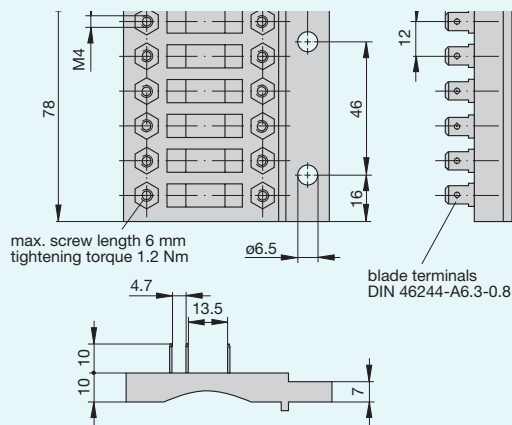


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Accessories

Mounting block 83-P10



E-T-A® Thermal Overcurrent Circuit Breakers 157/158-...

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 934).

Typical applications

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

Accessories

See series 127.

- Also
- X 200 799 02 Water splash cover/knurled nut assembly for type 157.
- X 200 799 01 As above with the cover bonded to the nut for extra retention.
- X 200 798 01/02 As X 200 799 02 and 01 above but featuring a slotted knurled ring for wrench front of panel tightening.
- X 210 739 01 Water splashcover/hex nut assembly for type 157. The concertina design is extended when the button trips to the OFF position.

Ordering information

Type No.	
157	threadneck panel mounting *
158	integral or plug-in mounting
Terminal design	
P10	blade terminals A6.3-0.8
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	0.4	20	< 0.02
2	0.3	22	< 0.02
2.5	0.2	25	< 0.02



157-...

158-...

Technical data

Voltage rating	AC 250 V; DC 28 V	
Current ratings	0.05...25 A	
Typical life	5,000 operations at 2 x I _N	
Ambient temperature	-20...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.05...2.5 A 8 x I _N 3 ... 5 A 20 x I _N 6 ...12 A 200 A 13...25 A 400 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca	
Mass	approx. 24 g	

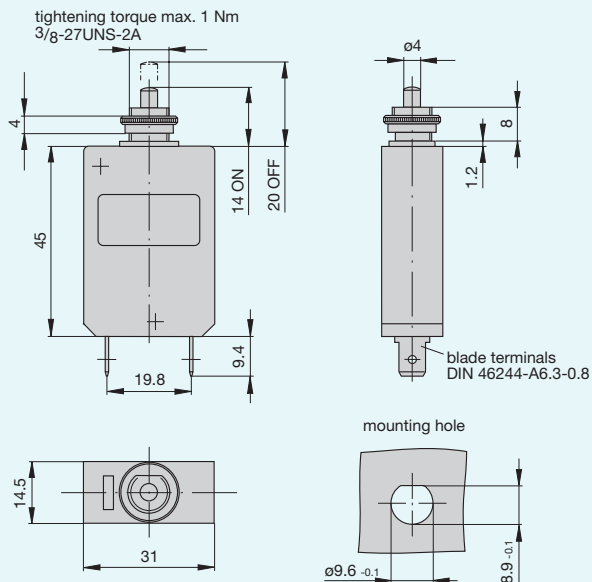
Approvals

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
LRoS	AC 250 V; DC 28 V	0.2...25 A
Semko (EN 60934)	AC 250 V; DC 28 V	0.05...25 A

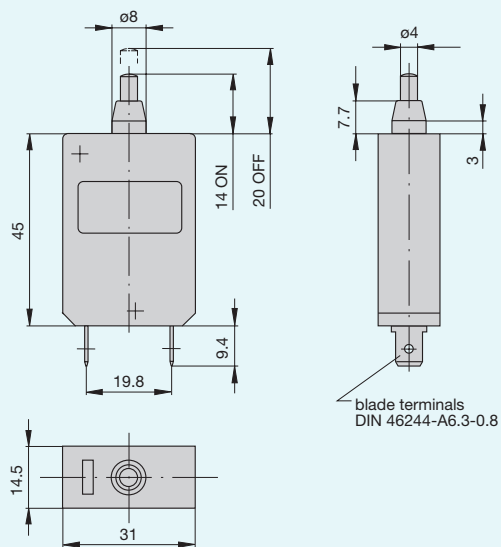
ET-A Thermal Overcurrent Circuit Breakers 157/158-...

Dimensions

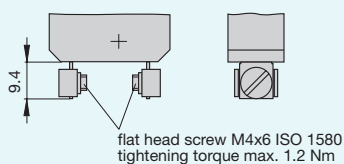
157-P10



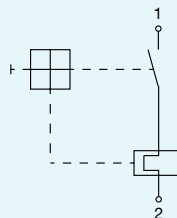
158-P10



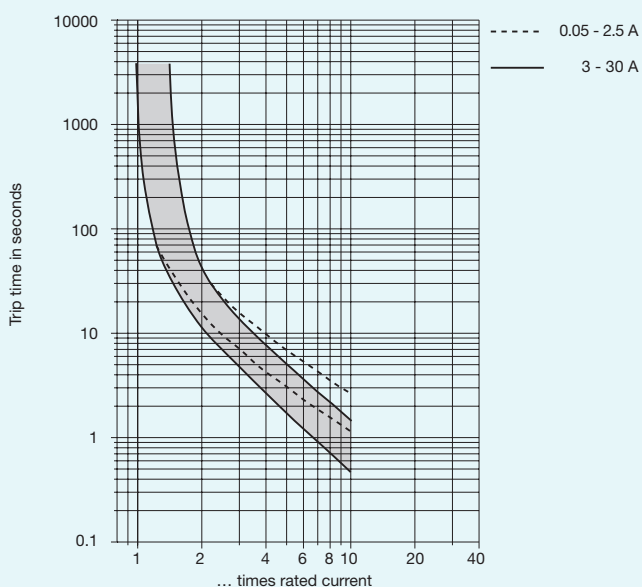
157/158-K10



Internal connection diagram



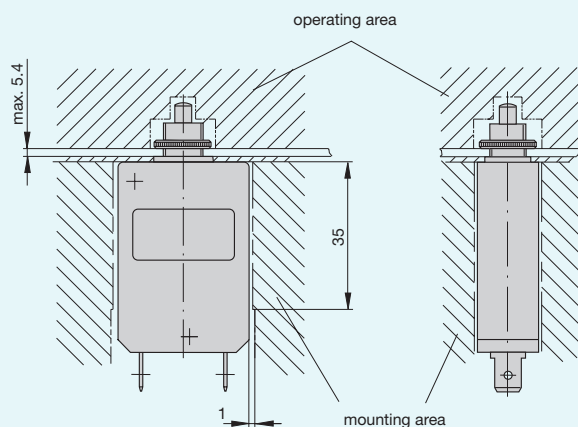
Typical time/current characteristics at 23 °C



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

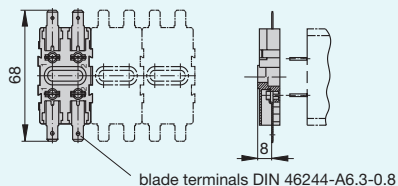
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Installation drawings

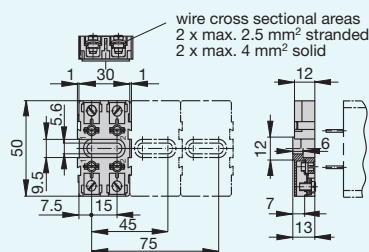


Accessories

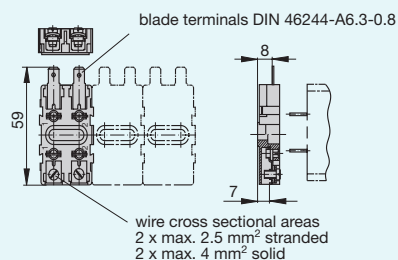
Mounting sockets 10F-P10



10F-K10



10F-A10



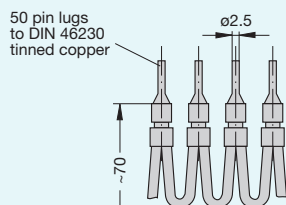
Accessories for sockets

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



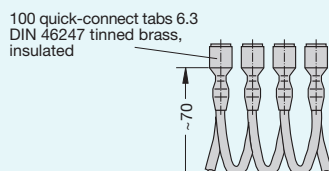
Connector bus links -K10

X 210 589 01/2.5mm² (black)
X 210 589 02/1.5mm² (brown)



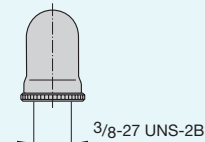
Connector bus links -P10

X 210 588 01/1.5 mm² (brown)
X 210 588 02/2.5 mm² (black)
X 210 588 03/2.5 mm² (red)
X 210 588 04/2.5 mm² (blue)

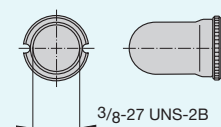


Accessories for type 157-...

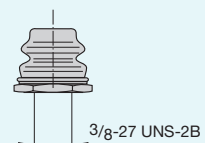
Front panel water splash cover, transparent, **Y 300 538 01**
and knurled nut **Y 300 628 01**
X 200 799 02 (IP64)
X 200 799 01 (bonded to nut) (IP64)



Front panel water splash cover, transparent
with special knurled nut
X 200 798 01 (IP64)
X 200 798 02 (bonded to nut) (IP64)



Splash cover (black) with hex nut,
without O-ring (IP64)
X 210 739 01



ET-A Thermal Overcurrent Circuit Breaker 1110-...

Description

Single pole switch/thermal circuit breaker (M-type TO CBE to EN 60934) with tease-free, trip-free, snap action mechanism. Designed for snap-in panel mounting utilising keyed 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. Available with square or circular bezels. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Accessories

Y 304 745 01 Water splash cover for use with square bezels
Y 305 602 01 Terminal shroud, for insulation or dust protection

Ordering information

Type No.	
1110	snap in panel mounting
Mounting	
F1	panel thickness 0.8...1.6 mm
F2	panel thickness 1.8...3 mm
F3	with location pin; panel thickness 0.8...1.6 mm
F4	with location pin, panel thickness 1.8...3 mm
Number of poles	
1	1 pole protected
Actuator style	
2	black push button/white indicator ring, standard
Other indicator ring colours are available to special order	
Terminal design	
P1	blade terminals A6.3-0.8
Characteristic curve	
M1	medium delay
Current ratings	
0.05...16 A	

1110 - F1 1 2 - P1 M1 - 0.5 A ordering example

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	442	2	0.25
0.08	123	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

Voltage rating	AC 250 V; DC 28 V (DC 50 V to special order)		
Current ratings	0.05...16 A		
Typical life	0.05...4 A: 10,000 operations at 1 x I _N 5 ...16 A: 6,000 operations at 1 x I _N		
Ambient temperature	-20...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	AC 250 V: 0.05...16 A 8 x I _N DC 28 V: 0.05... 6 A 10 x I _N 7 ...10 A 200 A 12 ...16 A 300 A		
Interrupting capacity (UL 1077/EN60934 PC 1)	I _N	U _N	
	0.05... 6 A	AC 250 V	1000 A
	7 ...16 A	AC 125 V	1000 A
	0.05...16 A	DC 50 V	200 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	8 g (57-500 Hz)±0.61 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 12 g		

Approvals

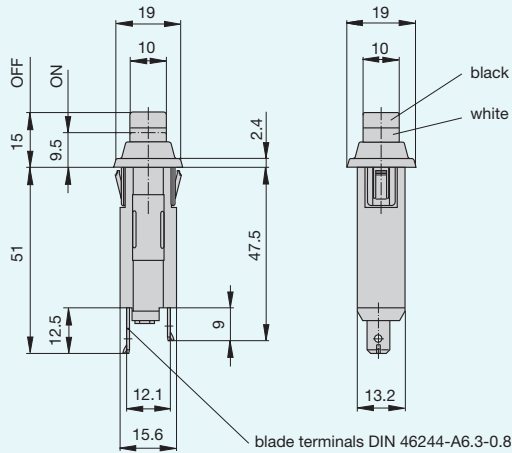
Authority	Voltage ratings	Current ratings
VDE	AC 250 V; DC 28 V	0.05...16 A
UL	AC 250 V	0.05... 6 A
	AC 125 V	7 ...16 A
	DC 50 V	0.05...16 A
CSA	AC 250 V; DC 50 V	0.05...16 A
LROs, BV	AC 250 V; DC 28 V	0.5 ...16 A
Semko (EN 60934)	AC 250 V	0.05...10 A

ET-A Thermal Overcurrent Circuit Breaker 1110-...

Dimensions

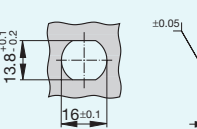
1110-F1.. / -F2.. / -F3.. / -F4..

When installing the circuit breaker apply pressure on bezel only

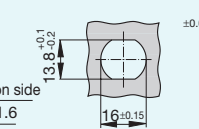


Panel cut out

1110-F1..-P.M1-...A

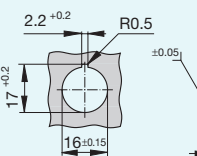


1110-F2..-P.M1-...A

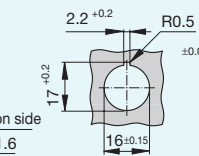


insertion force ≤ 20 N, removal force ≥ 120 N insertion force ≤ 20 N, removal force ≥ 120 N

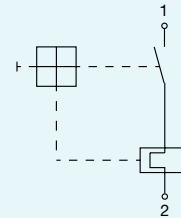
1110-F3..-P.M1-...A



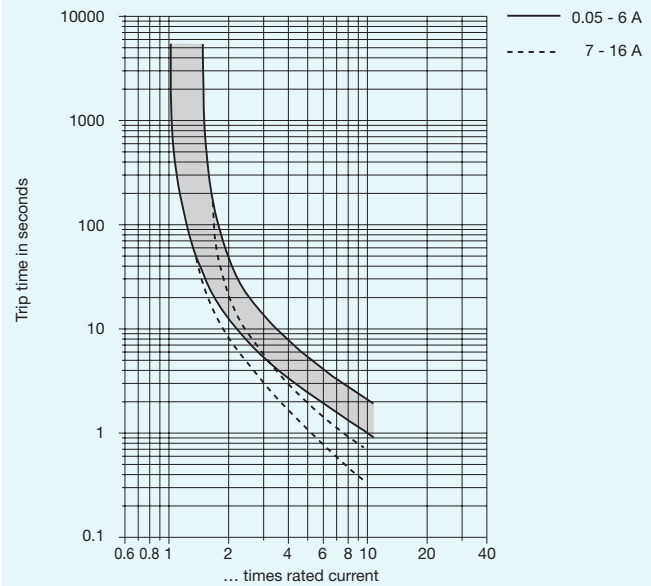
1110-F4..-P.M1-...A



Internal connection diagram



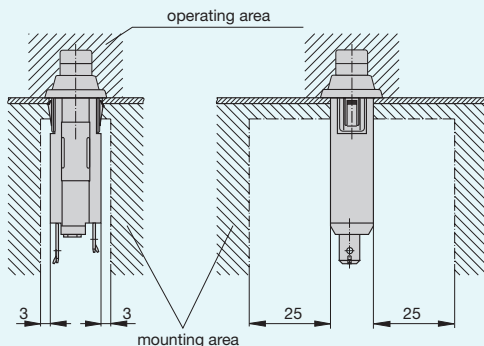
Typical time/current characteristics at 23 °C



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

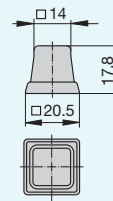
Installation drawing



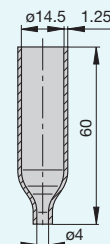
Accessories - Water splashcovers (transparent)

Push button splash cover Y 304 745 01 (IP 54)

When using splashcover please note that the max. panel thickness is reduced by 0.5mm



Terminal shroud Y 305 602 01



ETA® Thermal Overcurrent Circuit Breaker 1140-...

Description

Miniaturised single pole thermal circuit breaker with push-to-reset tease-free, trip-free, snap action mechanism (R-type TO CBE to EN 60934). Available in versions for panel mounting, snap-in or threadneck, or as an integral type. For lower current ratings see types 104, 105, 106. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Accessories

X 201 285 01 Water splash cover/knurled nut assembly for type 1140-G.

Ordering information

Type No.	
1140	single pole thermal circuit breaker
Mounting	
E2	integral mounting
F1	snap-in panel mounting
G0	threadneck panel mounting without mounting hardware
G1	threadneck panel mounting, with hex nut and knurled nut *
G2	threadneck panel mounting, for standard fuseholder cut-out *
G4	threadneck panel mounting with metal knurled nut*
Number of poles	
1	1 pole protected
Actuator style	
1	black push button
Terminal design	
P1	blade terminals A6.3-0.8
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

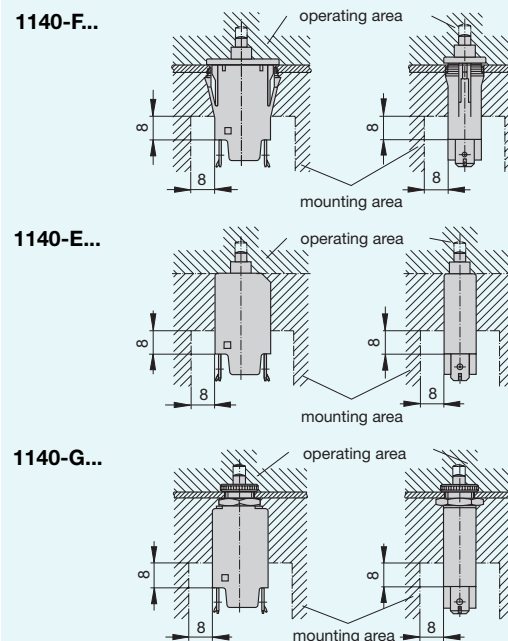
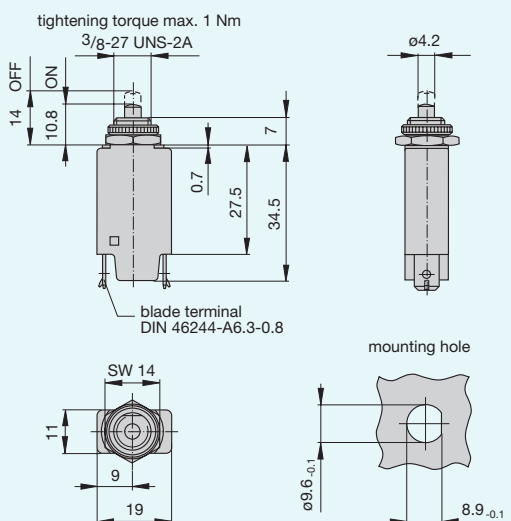
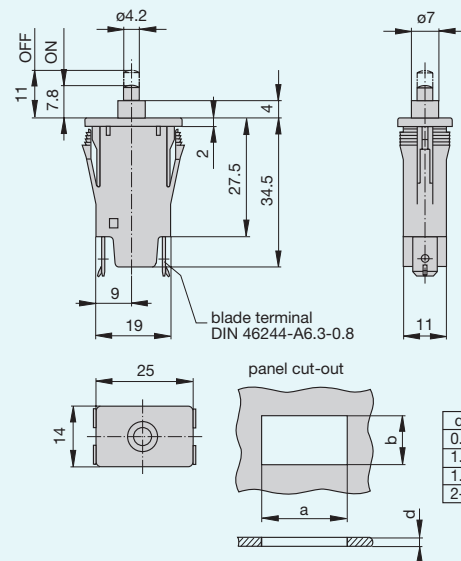
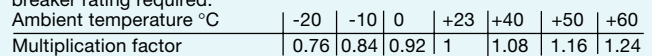
Authority	Voltage ratings	Current ratings
VDE	AC 240 V; DC 28 V	7 ...16 A
CSA	AC 250 V, DC 50 V	3.5...16 A UL
AC 250 V; DC 50 V	3.5...16 A	
Semko	AC 240 V	7 ...16 A
Kema (EN 60934)	AC 240 V; DC 48 V	3.5...16 A



Technical data

Voltage rating	AC 240 V; DC 48 V (DC 50 V UL/CSA)		
Current ratings	3.5...16 A		
Typical life	3.5...8 A 1000 operations at 2 x I _N 10...16 A 50 operations at 2 x I _N		
Ambient temperature	-20...+60 °C (T 60)		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	3.5... 8 A 8 x I _N 10...16 A 120 A		
Interrupting capacity (UL 10777)	I _N 3.5...16 A 3.5 ... 7A 8 ...16 A	U _N DC 50 V AC 250 V AC 250 V	200 A 1000 A 2000 A
Degree of protection (IEC 529/DIN 40 050)	operating area IP 40 terminal area IP 00		
Vibration	10 g (57-500 Hz) ±0.76 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 10 g		

Accessory



ETA® Thermal Overcurrent Circuit Breaker 1140-... (2 pole)

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 934).

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.

Accessories

X 201 285 01 Water splash cover/knurled nut assembly.

Ordering information

Type No.	
1140	double pole threadneck panel mounting
Mounting	
G0	threadneck panel mounting without mounting hardware
G1	threadneck panel mounting with hex nut and knurled nut *
G2	threadneck panel mounting for standard fuseholder cut-out *
G4	threadneck panel mounting with metal knurled nut*
Number of poles	
5	double pole, 1 pole protected
Actuator style	
1	black push button
Terminal design	
P7	blade terminals DIN 46244-C
Characteristic curve	
M1	medium delay
Current ratings	
0.05...16 A	

1140 - G1 5 1 - P7 M1 - 16 A ordering example

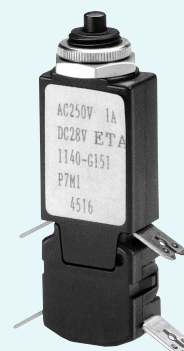
*mounting hardware bulk shipped

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	0.06
0.3	9.9	4	0.04
0.4	5.9	5	0.03
0.5	3.7	6	0.02
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 28 V	0.05...16 A
UL, CSA	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.

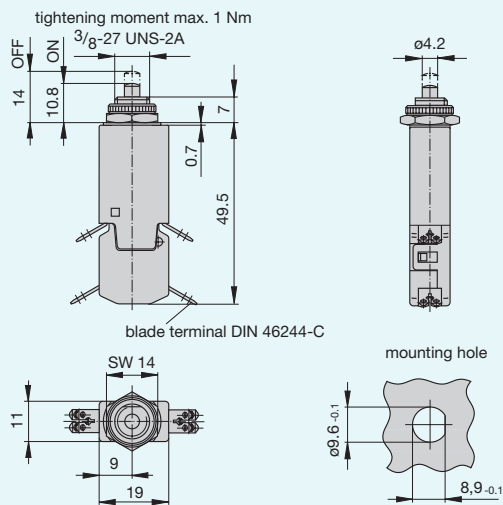
Technical data

Voltage rating	AC 240 V; DC 48 V (DC 50 V UL/CSA)		
Current ratings	0.05...16 A		
Typical life	0.05...3 A	3000 operations at 2 x I _N	
	3.5... 8 A	1000 operations at 2 x I _N	
	10... 16 A	50 operations at 2 x I _N	
Ambient temperature	-20...+60 °C (T 60)		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage	Pollution degree	
	2.5 kV	2	
	reinforced insulation in operating area		
Dielectric strength (IEC 664 and 664A) operating area pole/pole	Test voltage		
	AC 3000 V		
	AC 1500 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.05...3 A	6 x I _N	
	3.5... 8 A	8 x I _N	
	10... 16 A	120 A	
Interrupting capacity (UL 1077)	I _N	U _N	
	0.05...16 A	DC 50 V	200 A
	0.05...7 A	AC 250 V	1000 A
	8...16 A	AC 250 V	2000 A
Degree of protection (IEC 529/DIN 40 050)	operating area IP 40 terminal area IP 00		
Vibration	10 g (57-500 Hz) ±0.76 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 13 g		

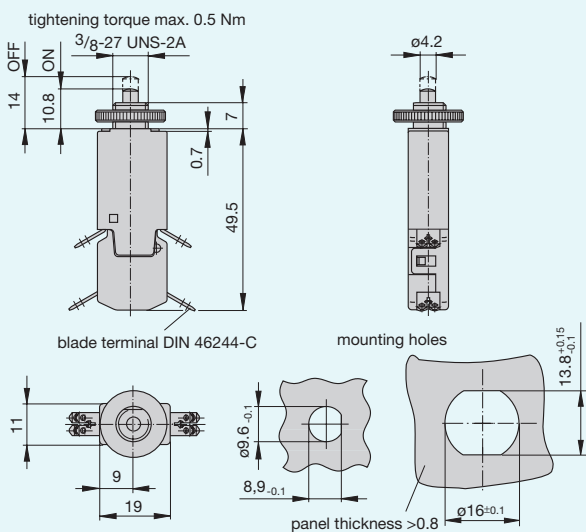
Thermal Overcurrent Circuit Breaker 1140-... (2 pole)

Dimensions

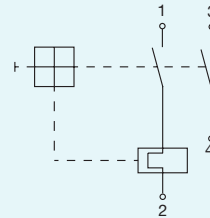
1140-G15...



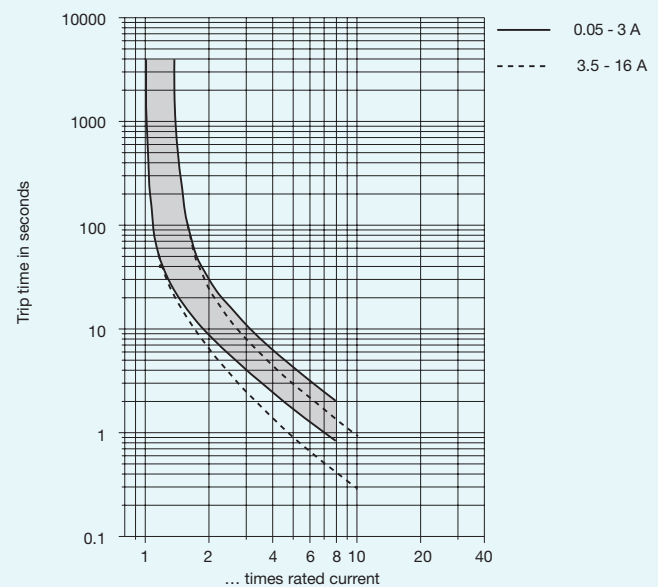
1140-G25...



Internal connection diagram



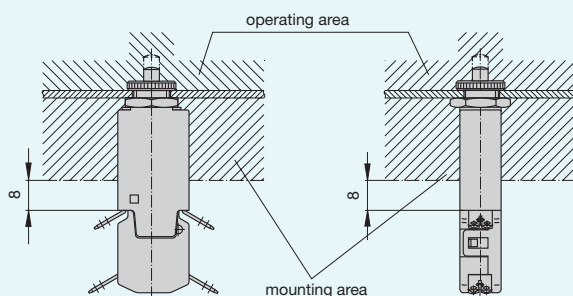
Typical time/current characteristics



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

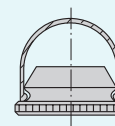
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Installation drawing



Accessories

Water splash cover/knurled nut assembly, transparent
X 201 285 01 (IP 64)



E-T-A® Thermal Automotive Circuit Breaker 1160-...

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.

Typical applications

Automotive and marine extra low voltage wiring systems and components.

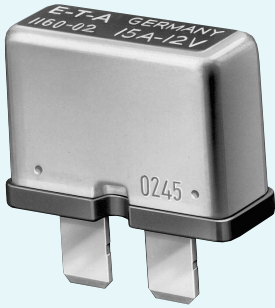
Ordering information

Type No.	
1160	single pole plug-in type
Design standard	
02	standard version 12 V
Current ratings	
12, 15, 20, 30 A	

1160 - 02 - 12A ordering example

Standard current ratings and typical voltage drop values

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

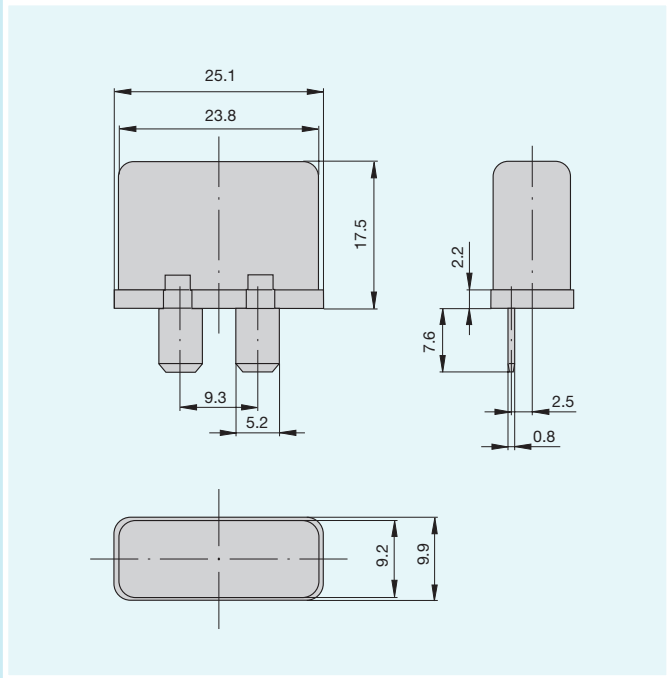


1160-...

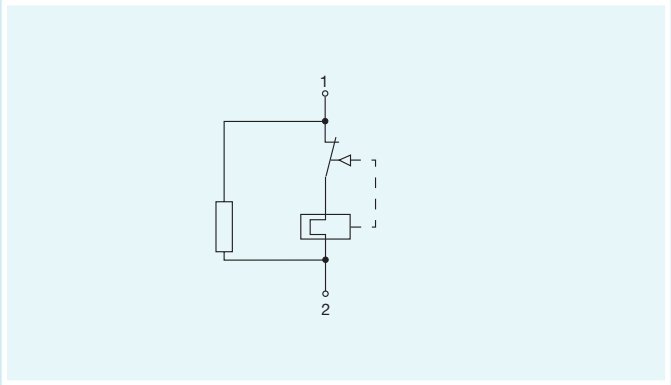
Technical data

Voltage rating	DC 12 V
Current ratings	12...30 A
Typical life	300 operations at 2 x I _N
Ambient temperature	-30...+60 °C
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 529/DIN 40050)	operating area IP 54 terminal area IP 00
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis
Shock	25 g (11 ms) to IEC 68-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca
Mass	approx. 6 g

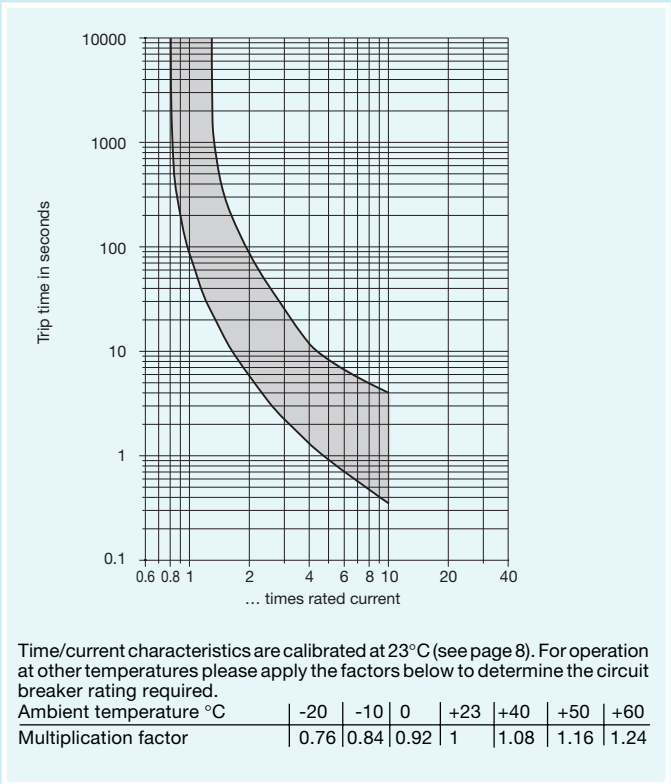
Dimensions



Internal connection diagram



Typical time/current characteristics at 23 °C



Accessories

Sockets available to special order.

ET-A Thermal Automotive Circuit Breaker 1170-...

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.

Typical applications

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

Accessories

12-J20	single mounting socket with screw terminals for DIN rail mounting
12-P10	single mounting socket with .250 quick connect terminals for DIN rail mounting
12-P10-20	2-way mounting socket
12-P10-30	3-way mounting socket
12-P10-40	4-way mounting socket
12-P10-60	6-way mounting socket
X 210 588 01	100-way 1.5mm ² /AWG 16 cable links with pre-fitted push-on connectors for type 12-P10 mounting socket as above, but with 2.5mm ² /AWG 14 cable links
X 210 588 02	as above, but with 2.5mm ² /AWG 14 cable links
X 211 157 01	Bus bar with terminal
X 211 157 02	Bus bar without terminal

Ordering information

Type No.	
1170	plug-in
Design standard	
01	blade terminals for automotive fuse blocks (standard) with retaining clips
02	blade terminals for automotive fuse blocks, without retaining clips
21	as design 01 but with higher interrupting capacity
22	as design 02 but with higher interrupting capacity
31	blade terminals for automotive fuse blocks with retaining clips and ribs for higher pull-out force
Current ratings	
5...25 A	
1170	- 01 - 15 A ordering example

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

Current rating (A)	Voltage drop (mV)	Actuator colour
5	< 150	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)*
* = off-white (without dye) with ultradur		



1170-...

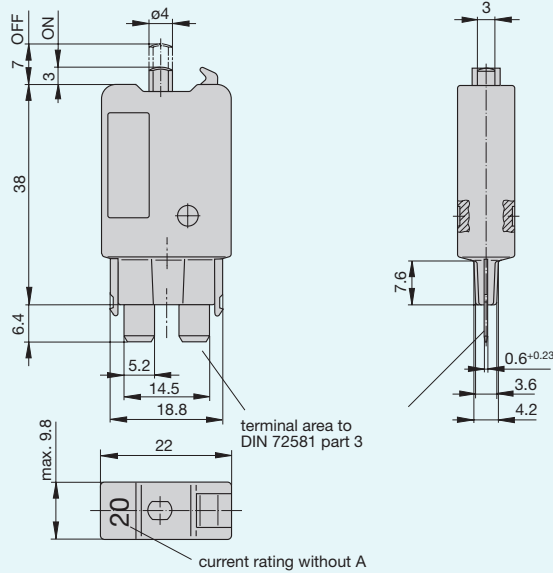
Technical data

Voltage rating	DC 28 V (AC to special order)
Current ratings	5...25 A
Typical life	6,000 operations at I_N 3,000 operations at $2 \times I_N \leq 20$ A 1,000 operations at $2 \times I_N \geq 25$ A
Ambient temperature	-30...+60 °C
Interrupting capacity I_{cn}	5...15 A 200 A (1170-01/-02/-31) 5...15 A 400 A (1170-21/-22) (higher capacity to special order) 20...25 A 400 A
Ultimate short-circuit breaking capacity	≥ 1 break operation at 2000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00
Vibration	10 g (57-500 Hz) ± 0.76 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis
Shock	50 g (11 ms) to IEC 68-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca
Mass	approx. 13 g

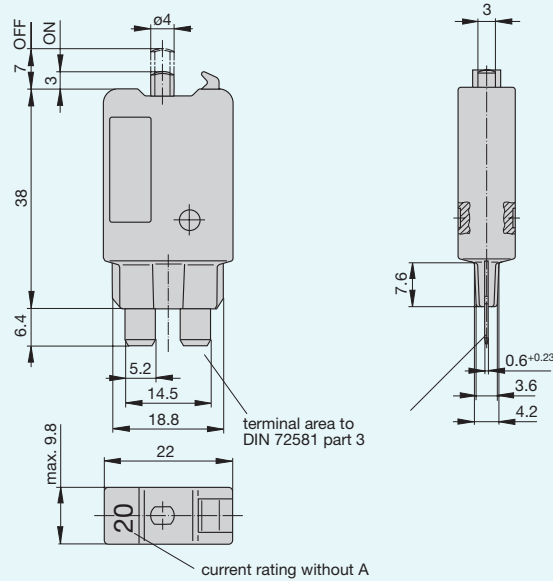
ET-A Thermal Automotive Circuit Breaker 1170-...

Dimensions

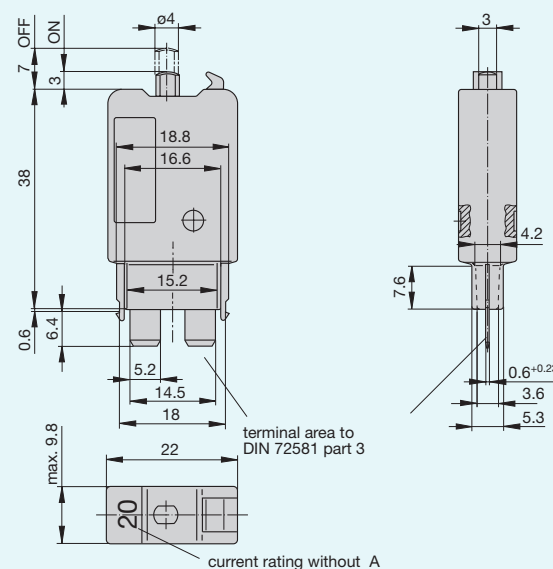
1170-01/-21



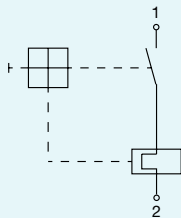
1170-02/-22



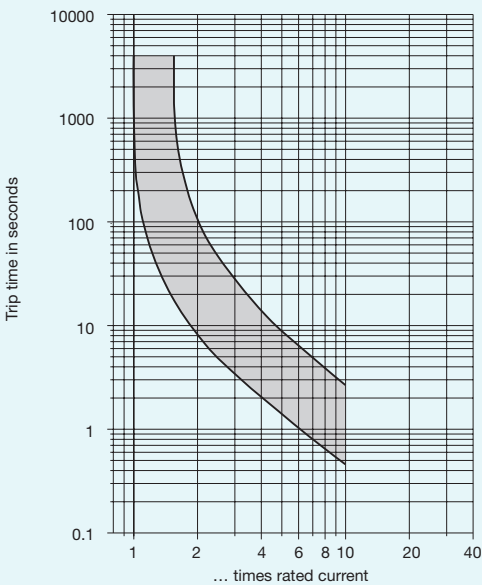
1170-31



Internal connection diagram



Typical time/current characteristics at 23 °C



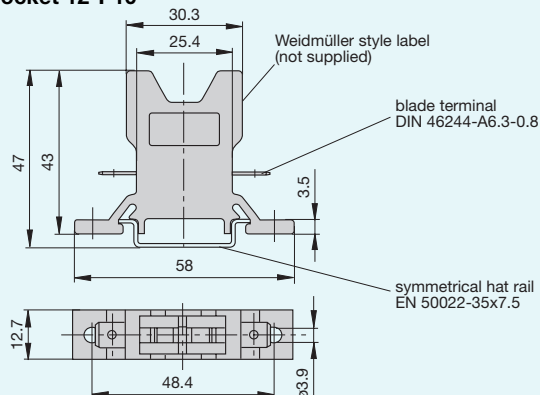
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.84	0.88	0.92	1	1.08	1.16	1.24

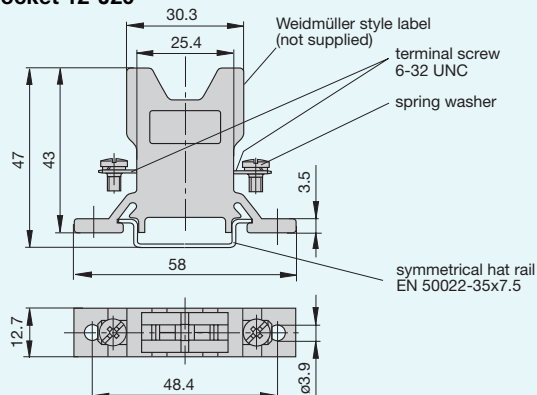
Thermal Automotive Circuit Breaker 1170-...

Accessories

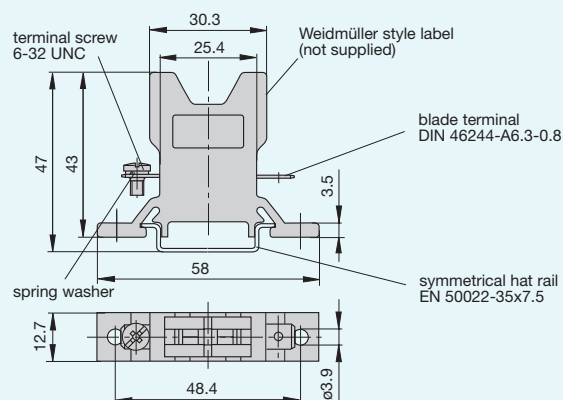
Socket 12-P10



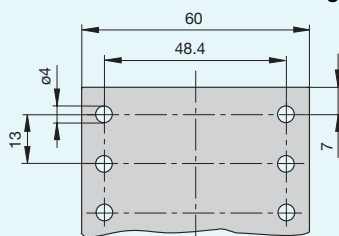
Socket 12-J20



Socket 12-A10



Dimensions for surface mounting



Other sockets available to special order

Labels: Weidmüller, D-33102 Paderborn

Ordering information Mounting socket 12

Type No.	
12	Mounting socket
Terminal design	
P10	blade terminals A 6.3-0.8
J20	screw terminals 6-32 UNC
A10	1 blade terminal A6.3-0.8 / 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

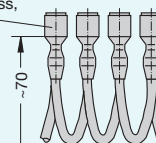
Accessories for mounting socket 12

Connector bus links -P10

X 210 588 01/1.5 mm² (brown)

X 210 588 02/2.5 mm² (black)

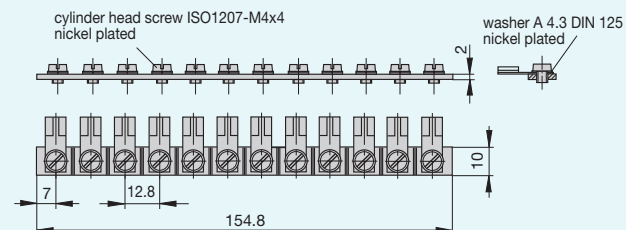
100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



Bus bar

X 211 157 01 with terminal

X 211 157 02 without terminal



E-T-A® Thermal Overcurrent Circuit Breaker 1410-F1...

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. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Ordering information

Type No.	
1410	snap-in panel mounting type
Mounting	
F	snap-in panel mounting
Size of frame	
1	to fit mounting cut-out 28 x 12.7 mm
Number of poles	
1	single pole, thermally protected
Accessories	
0	without accessories
Terminal design	
P1	blade terminals 2.8-0.8
Characteristic curve	
F1	fast acting
Actuator style	
W	rocker, rounded profile
Actuator colour	
14	red translucent
Actuator markings	
Q	I and 0
Trip/ON illumination (optional)	
B	illuminated when tripped
E	illuminated when ON
Voltage range (optional)	
2	20-28V marked 24V 35mA
3	90-140V marked 115V <1mA
4	185-275V marked 230V <1mA
Current ratings	
	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	1.05	3.15	< 0.1
0.8	1.0	4	< 0.1
1	< 1	5	< 0.1
1.5	< 1	6.3	< 0.1
1.8	< 0.8	8	< 0.1
2	< 0.8	10	< 0.1
2.5	< 0.12		



1410-F1..

Technical data

Voltage rating	AC 240 V; DC 28 V (DC 48 UL/CSA)	
Current rating range	0.63...10 A	
Typical life circuit 1-3	30,000 operations for $I_N \leq 6.3$ A AC/DC 10,000 operations for $I_N > 6.3$ A AC 3,000 operations for $I_N > 6.3$ A DC	
protection circuit 1-2	300 operations at $2 \times I_N$	
Ambient temperature	-20 ... +60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I_{cn}	0.63...2.5 A $12 \times I_N$ 3.15 ...10 A $8 \times I_N$ AC, max. 70 A 3.15 ...10 A $10 \times I_N$ DC or to UL 1077 at AC 125V/DC 48 V: 200 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00	
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	20 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	96 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 9 g	

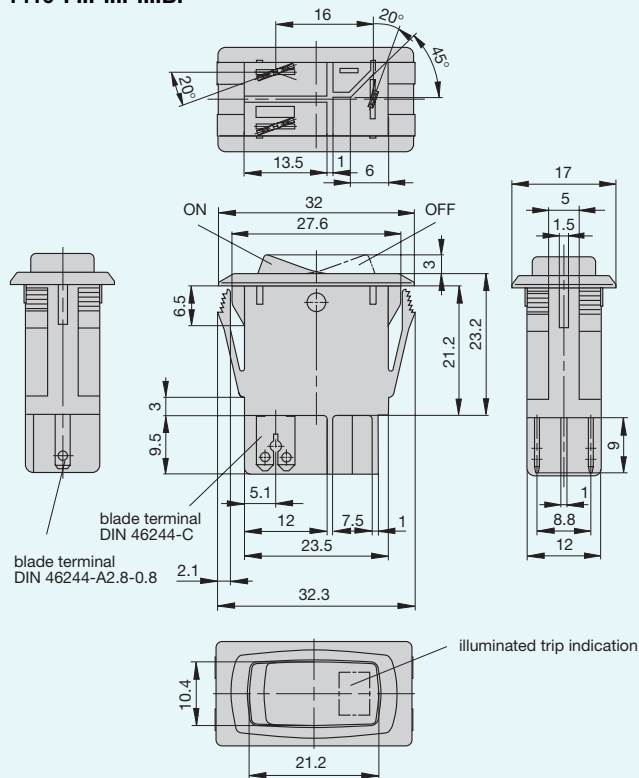
Approvals

Authority	Voltage ratings	Current ratings
SEV (EN 60934)	AC 240 V	0.63... 4 A
	DC 28 V	0.63... 8 A
CSA, UL	AC 125 V	0.63...10 A
	DC 48 V	0.63... 8 A

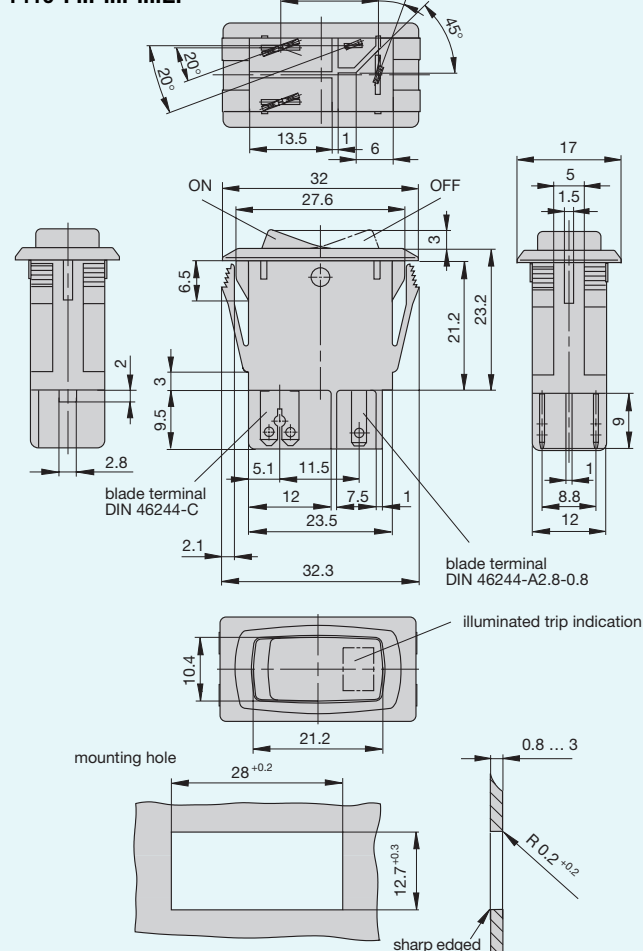
ET-A® Thermal Overcurrent Circuit Breaker 1410-F1...

Dimensions

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

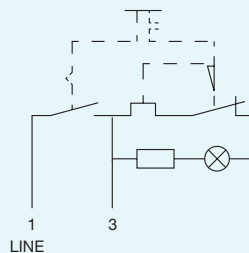


1410-F...-...-...E.

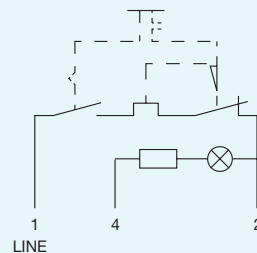


Internal connection diagram

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

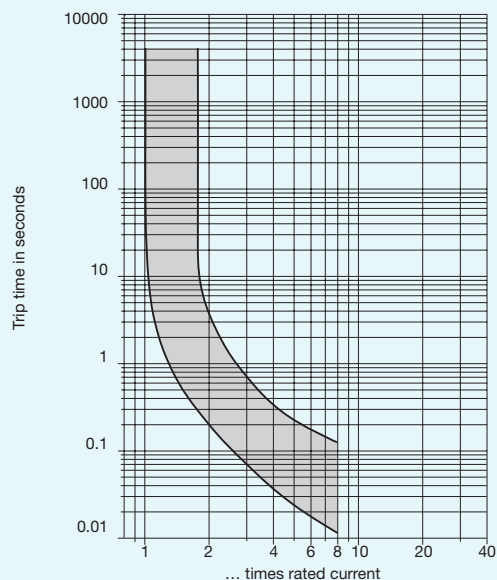


1410-F...-...-...E.

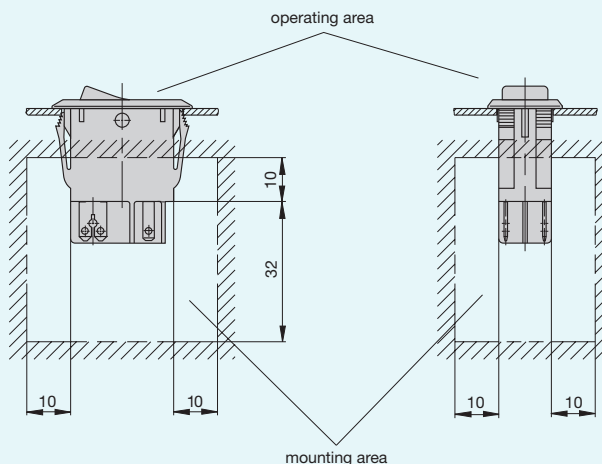


N.B.
When the circuit breaker trips electrically
terminal 2 (and 3) remain live (illumination voltage).

Typical time/current characteristics at 23 °C



Installation drawing



E-T-A® Thermal Overcurrent Circuit Breaker 1410-L/-G...

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.

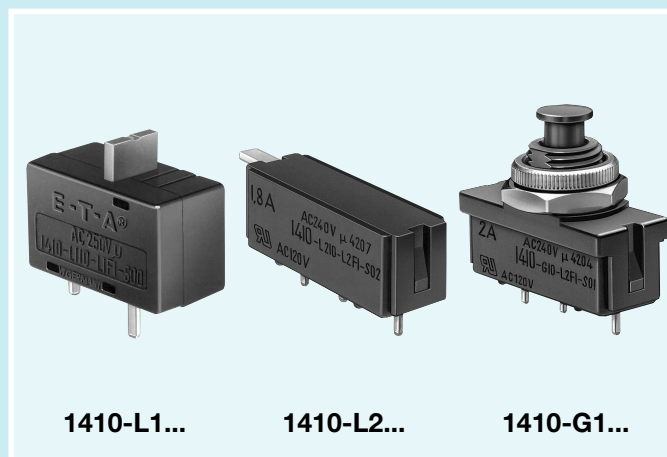
Ordering information

Type No.	
1410	single pole circuit breaker
Configuration	
L	PCB mounting
G	threadneck panel mounting
Mounting	
1	threadneck 3/8-27 UNS-2A (1410-G)
1	PCB 16.3x4.6 grid (1410-L)
2	PCB 10.15x7.62 grid (1410-L)
Number of poles	
1	1 pole, thermally protected
Hardware	
0	without
1	with hex nut and knurled nut (1410-G only) bulk shipped
Terminal design	
L1	solder pins 1.8x0.8 silver-plated (-L1 only)
L2	solder pins 1x0.8 silver-plated (-L2 and -G1 only)
P2	blade terminals A2.8-0.8 silver-plated (-G1 only)
Characteristic curve	
F1	fast acting
Actuator	
S	manual re-set
Actuator colour	
01	black (for -G1.. and -L1..)
02	white (for -L2..)
Current ratings	
0.63 ... 10 A	

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

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.63	1.2	3.15	< 0.1
0.8	1.0	4	< 0.1
1	0.7	4.5	< 0.1
1.25	< 0.8	5	< 0.1
1.5	< 0.8	6.3	< 0.1
1.8	< 0.8	8	< 0.1
2	< 0.8	10	< 0.1
2.5	< 0.5		



Technical data

Voltage rating	AC 240 V; DC 28 V (DC 48 V UL/CSA)	
Current rating range 1-2	0.63...10 A	
Auxiliary circuit 1-3	0.2 x I _N max. 1 A, AC 250 V style -L2 and -G1 only	
Typical life	300 operations at 2 x I _N (-L2...) 500 operations at 2 x I _N (-L1../-G1..)	
Ambient temperature	-20...+100 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity (o-o-o)	0.63...2.5 A 12 x I _N 3.15...10 A 8 x I _N AC, max. 70 3.15...10 A 10 x I _N DC or to UL 1077 at AC 125/DC 48 V: 200 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	20 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	96 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 5 g	

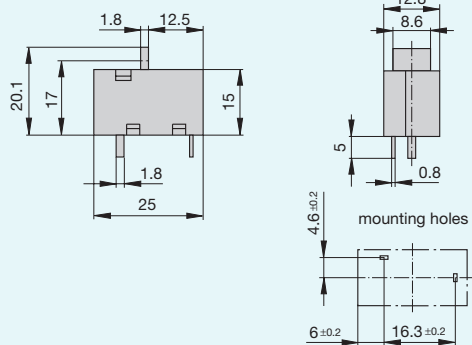
Approvals

Authority	Voltage rating	Current ratings
VDE	AC 250 V; DC 28 V	0.63... 8 A
UL, CSA	AC 125 V; DC 48 V	0.63... 8 A (-L2/-G1)
	DC 50 V	0.63...10 A (-L1)

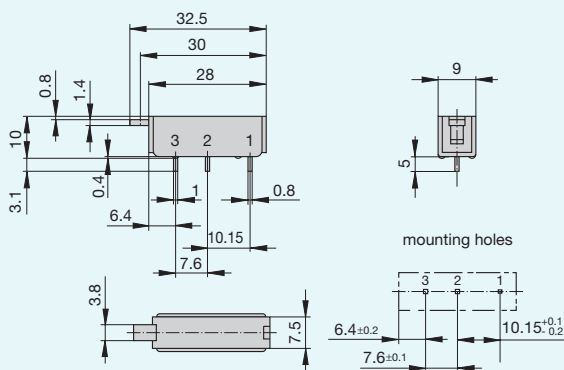
ET-A® Thermal Overcurrent Circuit Breaker 1410-L/-G...

Dimensions

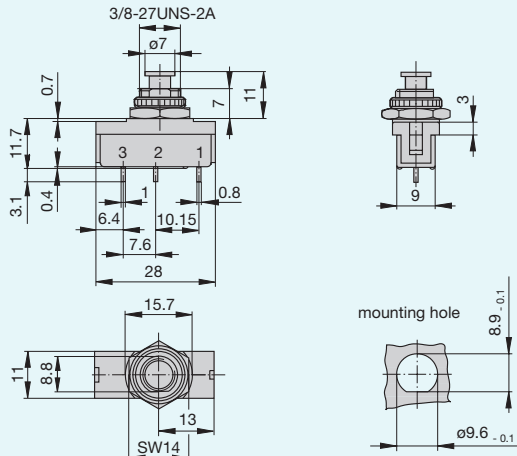
1410-L110-L1F1-S01



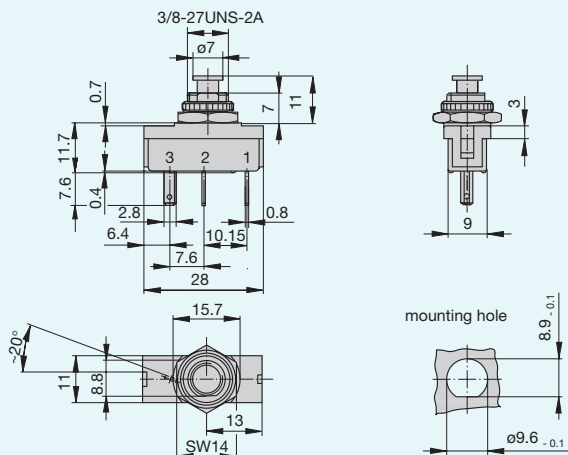
1410-L210-L2F1-S02



1410-G111-L2F1-S01

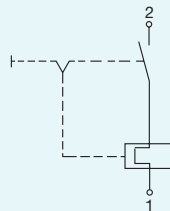


1410-G111-P2F1-S01

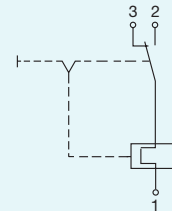


Internal connection diagrams

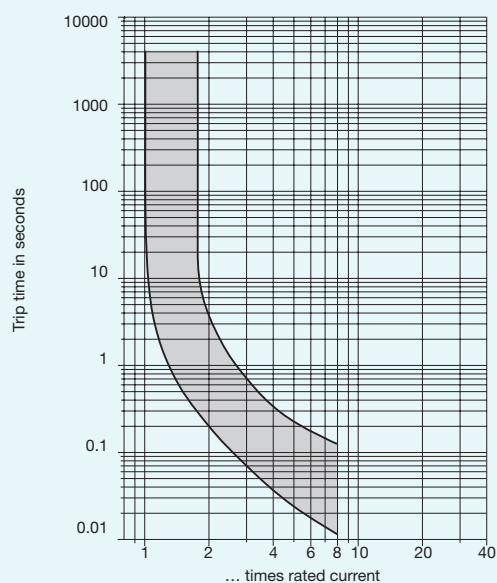
1410-L11...



1410-L21... 1410-G11...

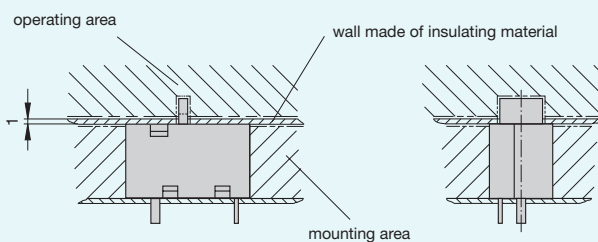


Typical time/current characteristics at 23°C

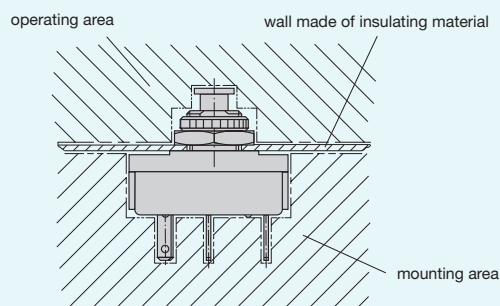


Installation drawings

1410-L11...



1410-G...



E-T-A® Thermal Automotive Circuit Breaker 1610-...

Description

Miniaturised single pole press-to-reset thermal circuit breaker designed for automotive fuse block installation. Extends the benefits of circuit breaker performance and convenience to applications which are cost critical.

Typical applications

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

Accessories

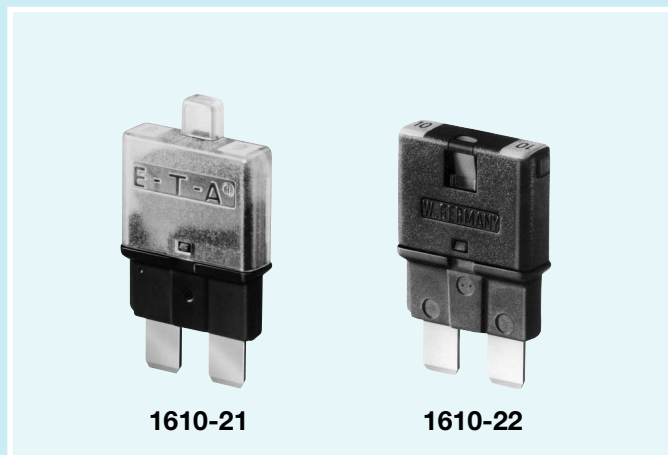
12-J20	single mounting socket with screw terminals for DIN rail mounting
12-P10	single mounting socket with .250 quick connect terminals for DIN rail mounting
12-P10-20	2-way mounting socket
12-P10-30	3-way mounting socket
12-P10-40	4-way mounting socket
12-P10-60	6-way mounting socket
X 210 588 01	100-way 1.5mm ² /AWG 16 cable links with pre-fitted push-on connectors for type 12-P10 mounting socket
X 210 588 02	as above, but with 2.5mm ² /AWG 14 cable links
X 211 157 01	Bus bar with terminal
X 211 157 02	Bus bar without terminal

Ordering information

Type No.	
1610	single pole automotive circuit breaker
	Voltage rating
21	DC 24 V
22	DC 12 V
H1	DC 12 V, with manual release facility
	Current ratings
	6 8 10 15 20 25 A
1610 - 21 - 8 A	ordering example

Current ratings, typical voltage drop values and actuator colours

Current rating (A)	Voltage drop (mV)	Actuator colour (manual release)
6	< 200	mossy-green (approximating RAL 6005)
8	< 200	honey (approximating RAL 1005)
10	< 200	red (approximating RAL 3020)
15	< 200	blue (approximating RAL 5012)
20	< 200	yellow (approximating RAL 1018)
25	< 200	pearl (approximating RAL 1013)*
* = off-white (without dye) with ultradur		



Technical data

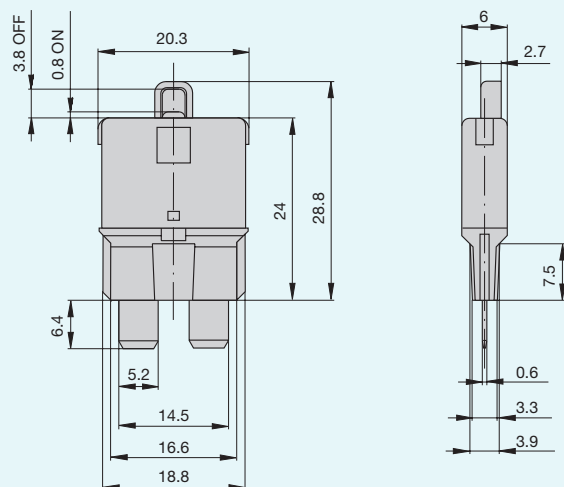
Voltage rating	1610-21: DC 24 V 1610-22: DC 12 V
Current ratings	6...25 A
Service short-circuit breaking capacity	1610-21: 300 operations at ≤ 50 A 1610-22: 500 operations at ≤ 50 A
Ambient temperature	-30...+60 °C
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00
Ultimate short-circuit breaking capacity	1610-21: ≥ 3 break operations at 150 A, or ≥ 1 break operation at 2000 A 1610-22: ≥ 3 break operations at 200 A, or ≥ 1 break operation at 2000 A
Vibration (with mounting socket)	5 g (57-500 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis
Shock (with mounting socket)	25 g (11 ms) to IEC 68-2-27, Test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca
Mass	approx. 5 g

N.B.

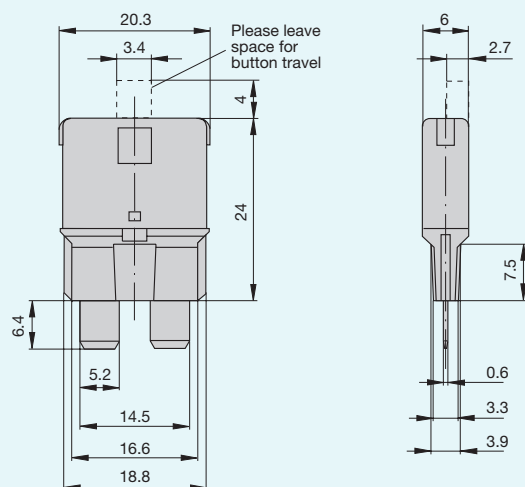
It is good practice to switch off the vehicle's ignition system before re-setting the circuit breaker.
Free travel of the actuator must be ensured.

Dimensions

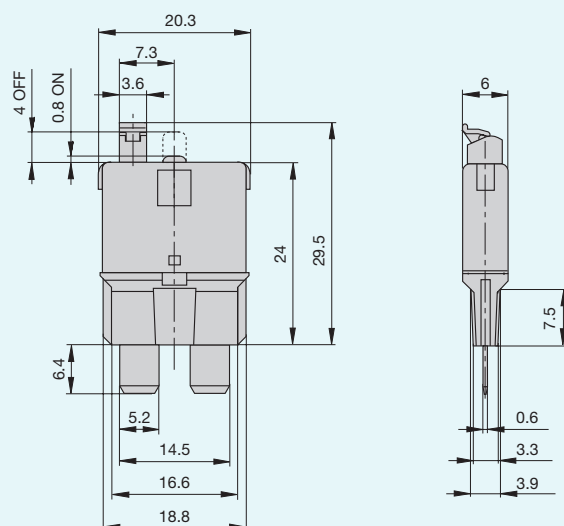
1610-21



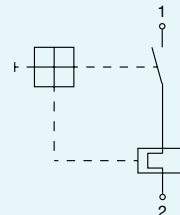
1610-22



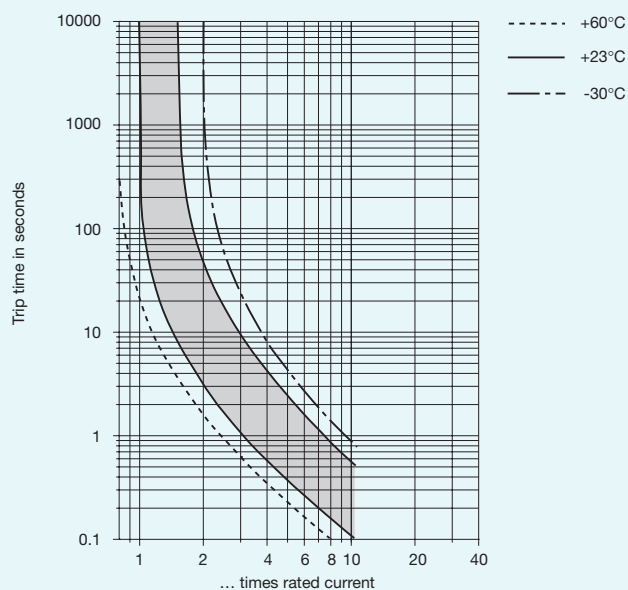
1610-H1



Internal connection diagram



Typical time/current characteristic curve

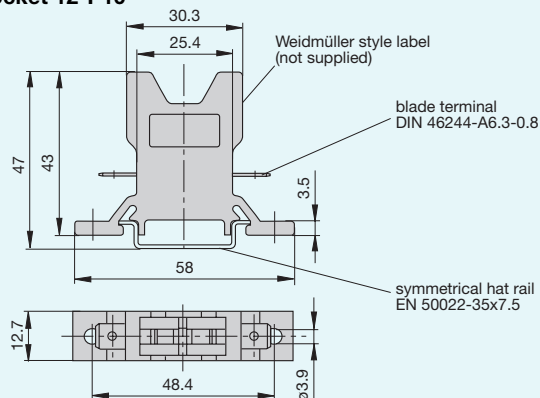


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

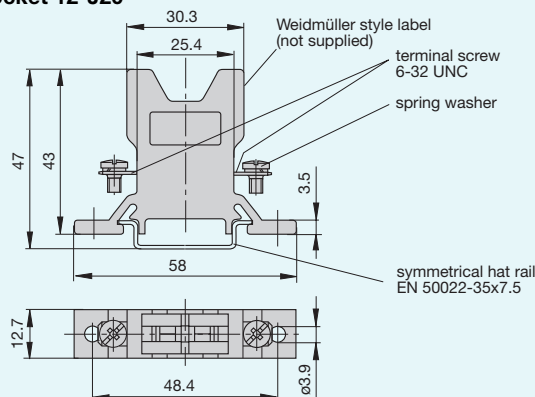
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Accessories

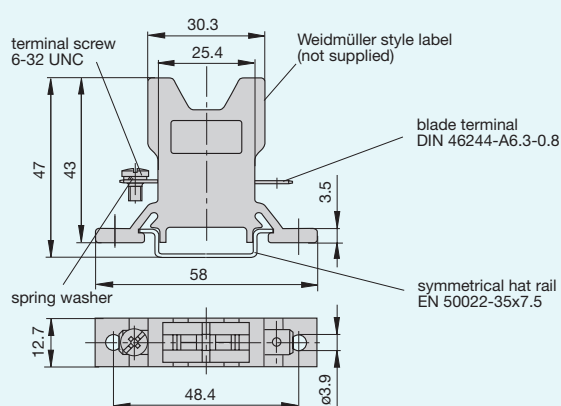
Socket 12-P10



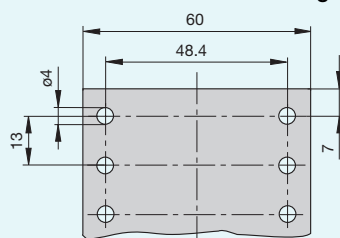
Socket 12-J20



Socket 12-A10



Dimensions for surface mounting



Other sockets available to special order

Labels: Weidmüller, D-33102 Paderborn

Ordering information Mounting socket 12

Type No.	
12	Mounting socket
Terminal design	
P10	blade terminals A 6.3-0.8
J20	screw terminals 6-32 UNC
A10	1 blade terminal A6.3-0.8 / 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

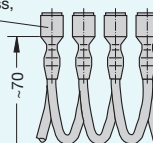
Accessories for mounting socket 12

Connector bus links -P10

X 210 588 01/1.5 mm² (brown)

X 210 588 02/2.5 mm² (black)

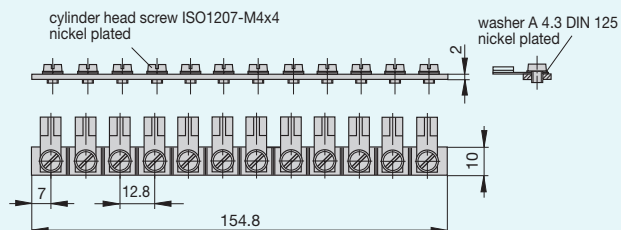
100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



Bus bar

X 211 157 01 with terminal

X 211 157 02 without terminal



E-T-A® Thermal Overcurrent Circuit Breaker 1658-...

Description

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

- Manual reset, trip free mechanism
- Extremely small and lightweight
- UL, CSA, VDE approved

Typical applications

Battery chargers, consumer products, power supplies, motors.

Accessories

Y 306 671 01	Mounting nut 3/8", 27-thread
Y 303 200 01	Mounting nut 7/16", 28-thread
Y 300 190 03	Knurled nut 3/8", 27-thread
Y 302 294 03	Knurled nut 7/16" - 28-thread
Y 300 192 01	Hex nut 3/8", 27-thread
Y 302 295 01	Hex nut 7/16", 28-thread
Y 301 059 02	Press to Reset Plate for 3/8", 27-thread, aluminium
Y 302 732 01	Press to Reset Plate for 7/16", 28-thread, aluminium
Y 303 051 01	Black Plastic Knurled Nut for 3/8", 27-thread
X 200 799 01	Reset Button Seal - long
X 201 285 01	Reset Button Seal - short

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"-32 threadneck
A21	auto reset type, 3/8"-27 threadneck
A41	auto reset type, 7/16"-32 threadneck
A00	auto reset type, without threadneck
Hardware	
00	no hardware
01	one hex nut, bulk
02	one hex nut, one hex nut, bulk
03	one hex nut mounted
04	one hex nut, one hex nut, mounted
05	one hex nut, knurled nut, bulk
06	one knurled nut, bulk
07	one knurled nut, mounted
08	two hex nuts, bulk
Terminals	
P10	blade terminals A6.3-0.8
P13	blade terminals A6.3-0.8, 90°
S80	straight screw terminals*
S83	90° bent screw terminals*
Current ratings	
5 ... 25 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	10	≤ 140
6	≤ 150	12	≤ 140
7	≤ 150	15	≤ 240
8	≤ 150	20	≤ 240
9	≤ 150	25	≤ 240



1658-...

Technical data

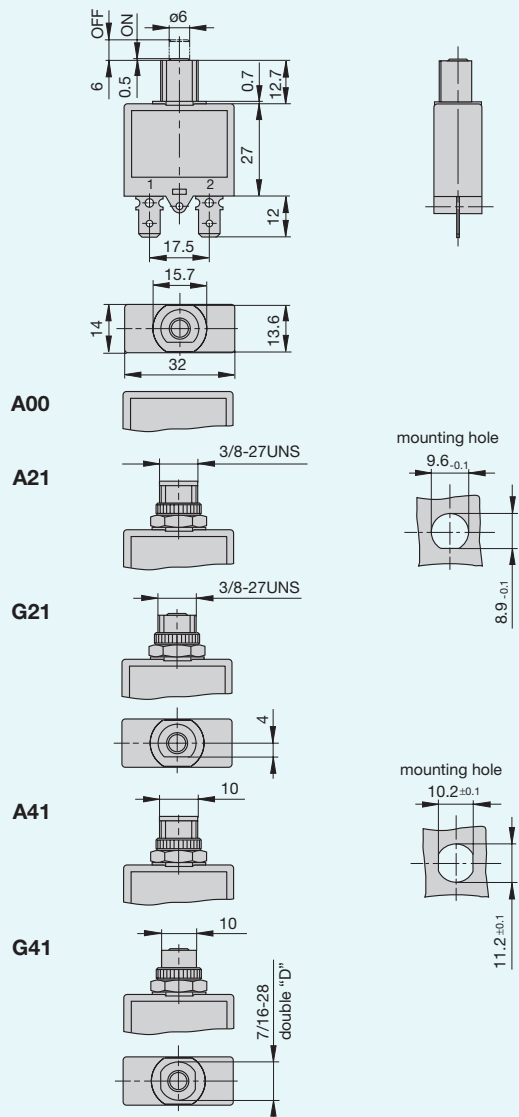
Voltage rating	AC 250 V; DC 28 V		
Current ratings	5...25 A		
Typical life	1000 operations at 2 x I _N		
Ambient temperature	-20...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	200 A		
Interrupting capacity (UL 1077/EN 60934 PC1)	I _N 5...15 A 20...25 A	U _N AC 250 V AC 125 V	2000 A 2000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 16 g		

Approvals

Authority	Voltage rating	Current ratings	
VDE	AC 250 V; DC 28 V	5...25 A	
UL, CSA	AC 250 V	5...15 A	1658-G...
	AC 125 V	20...25 A	1658-G...
	AC 125 V	5...25 A	1658-A...

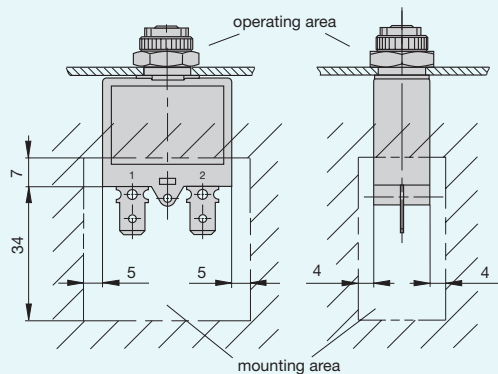
ET-A® Thermal Overcurrent Circuit Breaker 1658-...

Dimensions

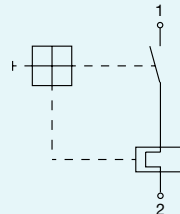


See ordering information for mounting hardware

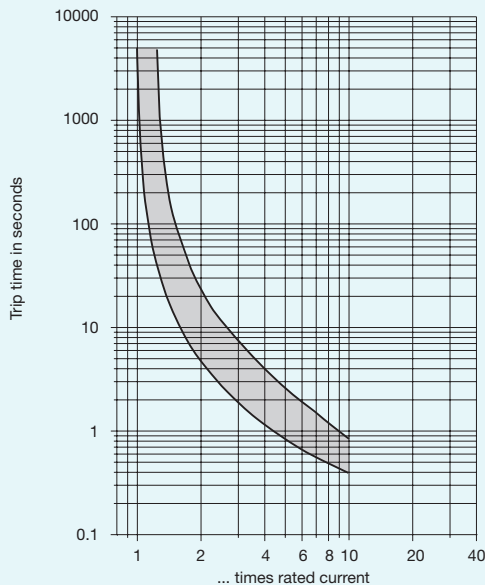
Installation drawing



Internal connection diagram



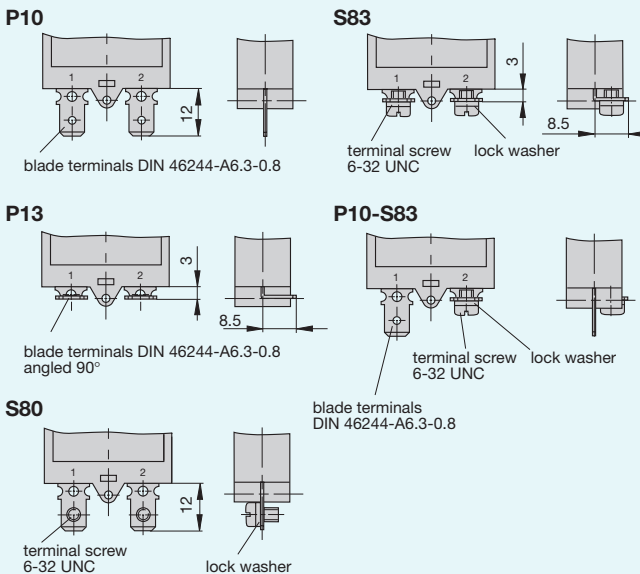
Typical time/current characteristics at 23°C



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

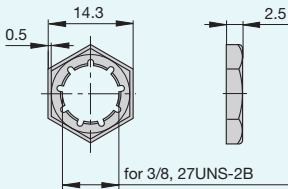
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Terminal design

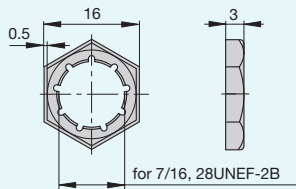


Accessories

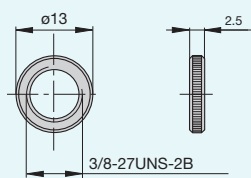
Mounting nut 3/8", 27-thread
Y 306 671 01



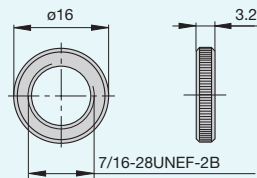
Mounting nut 7/16", 28-thread
Y 303 200 01



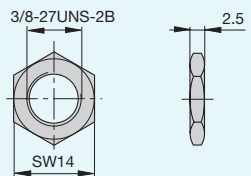
Knurled nut 3/8", 27-thread
nickel-plated brass
Y 300 190 03



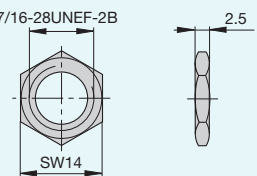
Knurled nut 7/16", 28-thread
nickel-plated brass
Y 302 294 03



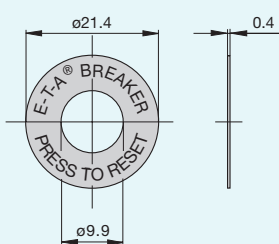
Hex nut 3/8", 27-thread
nickel-plated brass
Y 300 192 01



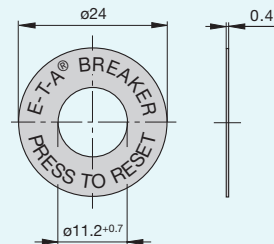
Hex nut 7/16", 28-thread
nickel-plated brass
Y 302 295 01



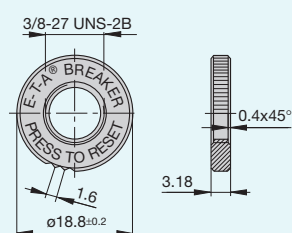
Press to Reset Plate for 3/8", 27-thread, aluminium
Y 301 059 02



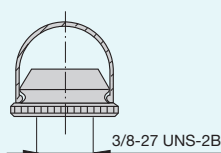
Press to Reset Plate for 7/16", 28-thread, aluminium
Y 302 732 01



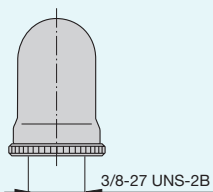
Press to Reset Plate for 3/8", 27-thread
plastic
Y 303 051 01



Reset button seal for 3/8", 27-thread
short
X 201 285 01



long
X 200 799 01



Version with 7/16", 28-thread to special order

E-T-A® Thermal Overcurrent Circuit Breaker 3120-F...

Description

An extremely versatile range of rocker switch/thermal circuit breakers (S-type TO CBE to EN 60934) 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. Neon illumination is optional (filament bulb for low voltages) and there is a range of colours and markings for the rocker. 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 934).

Typical applications

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

Accessories

Y 303 068 01	Insulated cover, snap-fitted to the exposed areas of the two incoming terminals (when terminal screws are not specified) to provide brush contact protection.
Y 303 862 01	Terminal adapter to convert screw terminals to push on connections when factory fitted under voltage release module is specified (two adapters required per unit).
Y 303 675 01	Retaining clip for -F3 mounting frame for panel thickness under 2 mm.
Y 303 675 02	As above for panel thickness under 4 mm.
Y 303 676 01	As above, for -F5 mounting frame.
Y 303 885 31	Blanking piece in -F3 size mounting frame.
Y 304 275 01	Rear terminal shroud.
X 221 619 01	Separate water splash cover for use with -F4 and -F5 size mounting frames.

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	0.0565
0.2	24	4	0.0435
0.3	12	4.5	0.0435
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	0.0165
1	0.9	10	<0.02
1.2	0.80	12	<0.02
1.5	0.45	14	<0.02
2	0.27	16	<0.02
2.5	0.0785	18	< 0.02
3	0.0595	20	< 0.02

Approvals

Authority	Voltage ratings	Current ratings
VDE, Semko (EN 60934)	AC 240 V, DC 28 V DC 50 V DC 50 V	0.1...20 A 0.1...20 A double pole 0.1...10 A single pole
BV, LRoS	AC 250 V, DC 28 V	0.1...20 A
UL, CSA	AC 250 V, DC 50 V	0.1...20 A



3120-F...

Technical data

Voltage rating	AC 250 V; DC 50 V		
Current ratings	0.1...20 A (up to 30 A to special order)		
Typical life	50,000 operations for I _N ≤16 A double pole 30,000 operations for I _N ≤16 A single pole, 10,000 operations for I _N >16 A		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area between poles (2 pole)	Test voltage AC 3000 V AC 1500 V		
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.1...2 A 2.5...20 A	10 x I _N 250 A 2 pole, or 150 A 1 pole	
Interrupting capacity (UL 1077)	I _N 0.1... 2 A 2.5... 3 A 3.5... 8 A 9 ... 16 A 18... 20 A 0.1...20 A	U _N AC 250 V AC 250 V AC 250 V AC 250 V AC 250 V DC 50 V	2 pole 200 A 1000 A 2000 A 3500 A 5000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 (IP 54 with water splash protection) terminal area IP 00		
Vibration	8 g (57-500 Hz), ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca		
Mass	approx. 33 g (double pole) approx. 27 g (single pole)		

ET-A Thermal Overcurrent Circuit Breaker 3120-F..

Ordering information

Type No.	
3120	rocker switch/circuit breaker
Mounting	
F	snap in frame
Size of frame	
3	to fit mounting cut-out 50.5x21.5 mm
4	to fit mounting cut-out 44.5x22 mm
5	to fit mounting cut-out 44.5x 22 mm
6	to fit mounting cut-out 45x33.7 mm
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, 12l)
6	1 pole, unprotected, switch only
Mounting frame design	
1	collar height 1 mm
3	collar height 9 mm
4	collar height 2 mm with water splash protection (IP 54), not with -F6...
Terminal configuration	
P7	blade terminals 2x2.8x0.8 mm (terminals 12(k), 22(k), 11, 21), not for under voltage module, not for switch
H7	12(k), 22(k): blade terminals 2x2.8x0.8 mm
N7	as P7, but including shunt terminals 12(i) and 22 (i) as blade terminals 2x2.8x0.8 mm
G7	as H7, but including shunt terminals 12(i) and 22 (i) as blade terminals 2x2.8x0.8 mm
Characteristic curve	
T1	thermal, 1.01-1.4 x I _N
Q1	switch only
Actuator style	
W	rocker
Switch colour designation	
opaque	translucent
	(for illuminated versions)
01 black	12 white
02 white	14 red
04 red	15 orange
	19 green
Rocker markings	
A	
B	
C	
E	
F	
X	
Rocker illumination (optional)	
B	filament/neon AC/DC
G	green LED, AC/DC
Y	yellow LED, AC/DC
R	red LED, AC/DC
Illumination voltage range/ power consumption	
0	4 - 7 V marked 6 V 80mA (B,G,Y,R)
1	10 -14V marked 12V 75 mA (B,G,Y,R)
2	20 -28V marked 24V 35 mA (B,G,Y,R)
3	90-140V marked 115V <1 mA (B)
4	185-275V marked 230V <1 mA (B)
5	42-54V marked 48V 35 mA (B,Y,R)
Current ratings	
0.1...20 A	

3120 - F 3 2 1 - N7 T1 - W 14 A B 4 - 5 A ordering example
 3120 - F . 0 . - N7 Q1 - W - 20 A (switch only)

N.B.

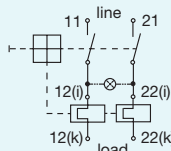
Switch only versions must be specified with -N7 or -G7 terminals.
 Terminals 12(k) and 22(k) are not fitted.

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

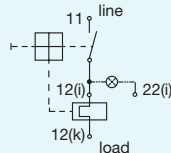
Ambient temperature °C	-30	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.8	0.84	0.88	0.92	1	1.08	1.14	1.23

Internal connection diagrams

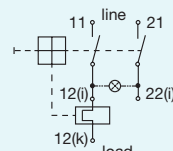
2 pole,
thermally protected on both poles



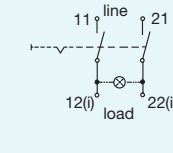
1 pole,
thermally protected



2 pole,
thermally protected on one pole only



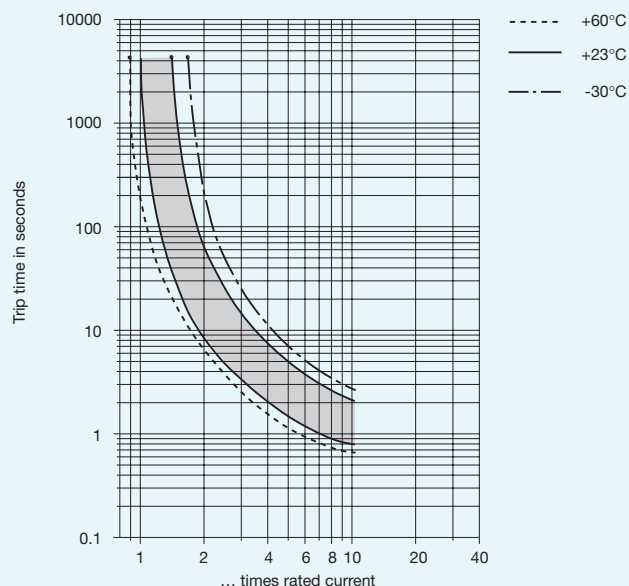
2 pole,
unprotected



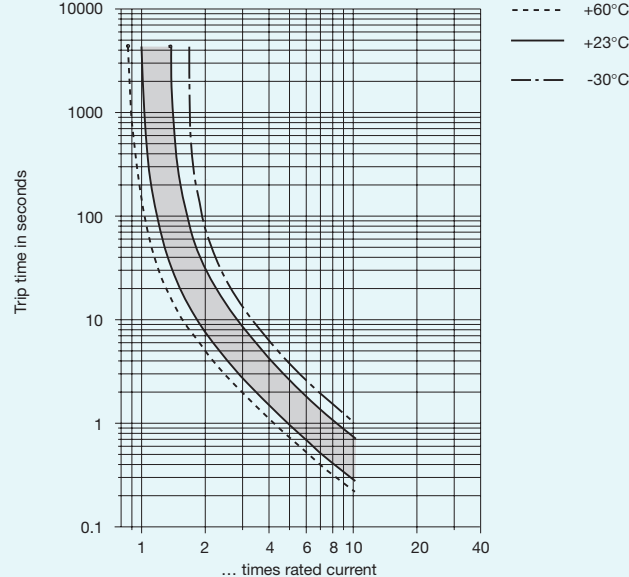
Typical time/current characteristics

Single or double pole load

0.1...2 A



2.5...20 A

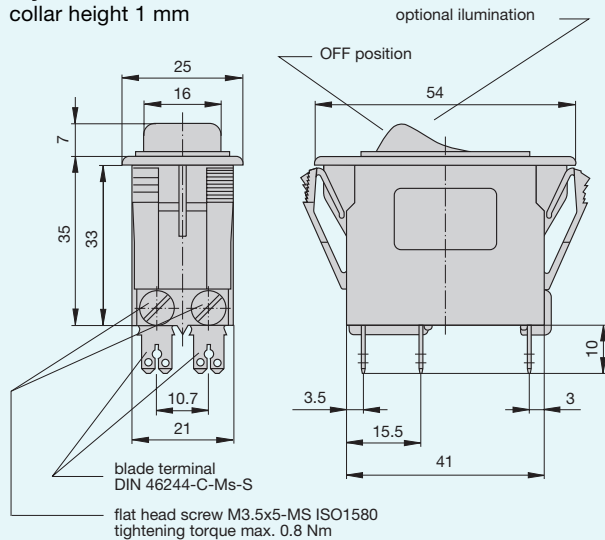


ET-A® Thermal Overcurrent Circuit Breaker 3120-F...

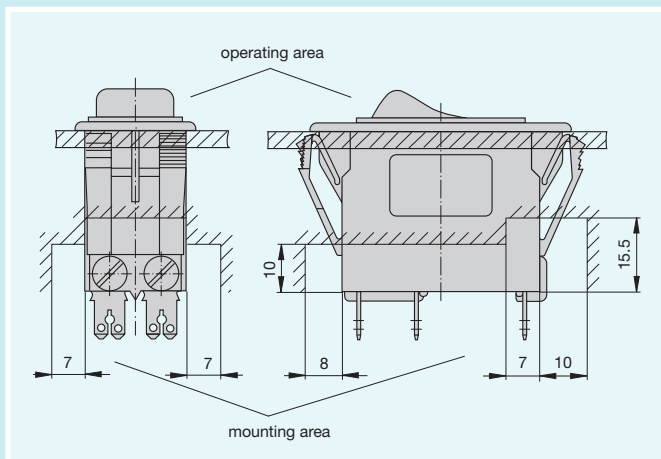
Dimensions

Style F3.1

collar height 1 mm

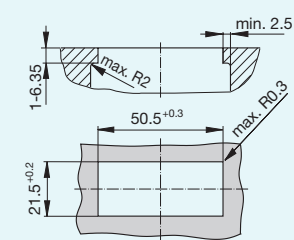


Installation drawing

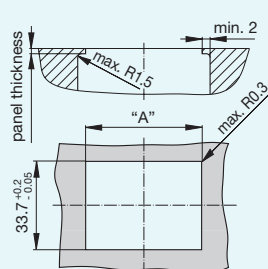


Cut-out dimensions

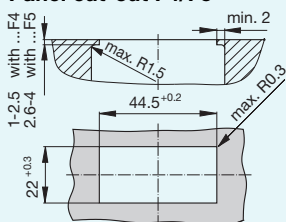
Panel cut-out F3



Panel cut-out F6



Panel cut-out F4/F5

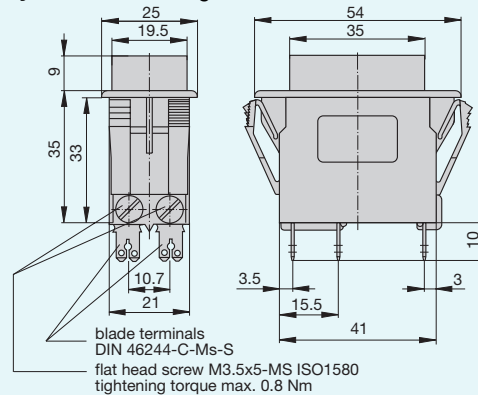


panel thickness	1.2 ^{+0.4}	1.6 ^{+0.8}	2.4 ⁺¹
dimension "A"	45 ^{+0.2} _{-0.05}	45 ^{+1.1} _{-0.05}	45 ^{+2.2} _{-0.05}

Edges of working parts: DIN 6784

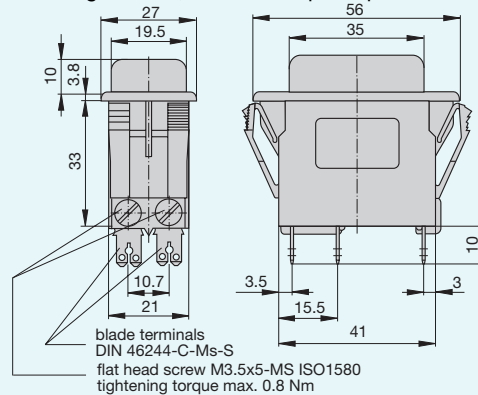
Mounting style variants

Style F3.3 collar height 9 mm

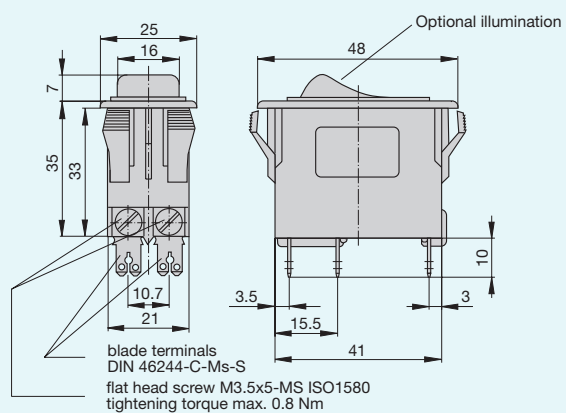


Style F3.4

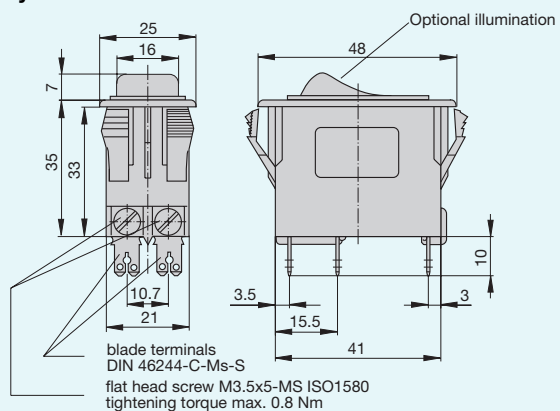
collar height 2 mm, with water splash protection



Style F 4.1



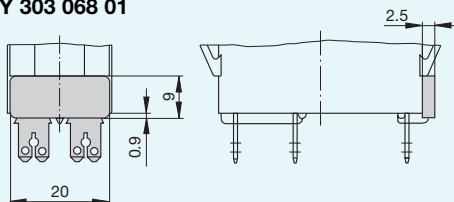
Style F 5.1



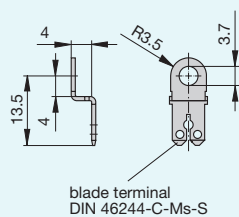
Dimension diagram for style F6 is available on request.

Accessories

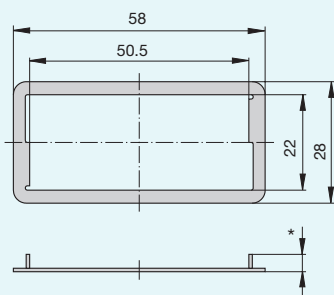
Insulated cover
Y 303 068 01



Terminal adapter
Y 303 862 01

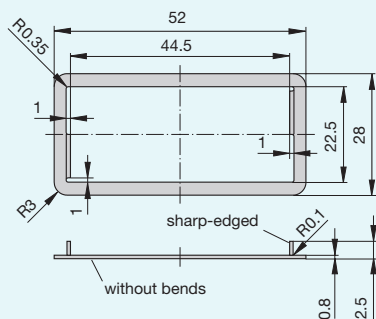


Retaining clip for 3120-F3...
Ref. Y 303 675 01/02

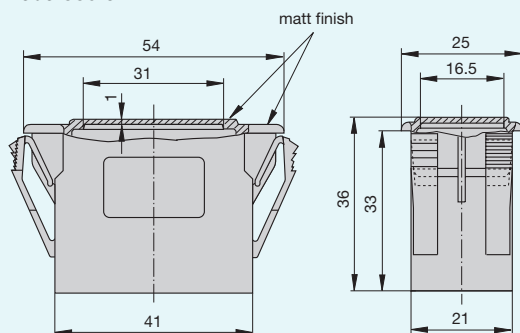


Y 303 675 01 suitable for
panel thickness < 2 mm
Y 303 675 02 suitable for
panel thickness < 4 mm

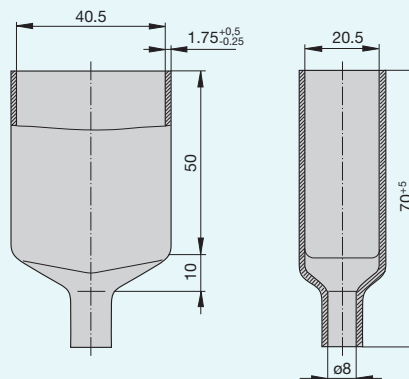
Retaining clip for 3120-F5...
Ref. Y 303 676 01



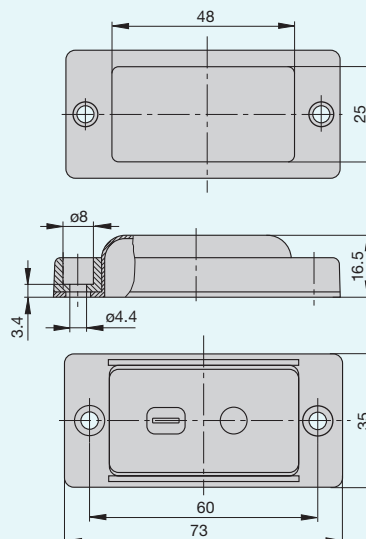
Blanking piece in -F3 frame
Y 303 885 31



Rear terminal shroud black
Y 304 275 01 (IP64)



Water splash cover, transparent (IP66)
for styles -F4../-F5...
X 221 619 01



E-T-A® Thermal Overcurrent Circuit Breaker 3120-F...

Description

Switch/thermal 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 neon illumination (filament bulb for low voltages) 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 - see page 113.
- Magnetic trip coil for remote relay trip.
- Auxiliary contacts for status signalling.
- Mechanical slide interlock.

Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Accessories

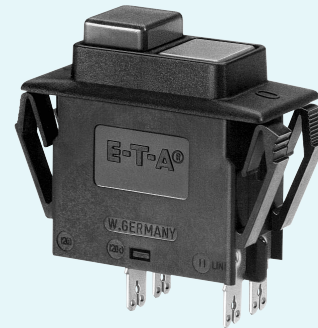
- Y 303 068 01 Insulated cover, snap-fitted to the exposed areas of the two incoming terminals (when terminal screws are not specified) to provide brush contact protection.
- Y 303 862 01 Terminal adapter to convert screw terminals to push on connections when factory fitted under voltage release module is specified (two adapters required per unit).
- Y 303 675 01 Retaining clip for -F3 mounting frame for panel thickness under 2 mm.
- Y 303 675 02 As above for panel thickness under 4 mm.
- Y 303 885 31 Blanking piece in -F3 size mounting frame.
- Y 304 275 01 Rear terminal shroud.
- Y 306 001 01 Water splash cover for use with -F2 size mounting frame.
- Y 306 551 01 Retaining clip for -F2 mounting frame.

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	0.0565
0.2	24	4	0.0435
0.3	12	4.5	0.0435
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	0.0165
1	0.9	10	<0.02
1.2	0.80	12	<0.02
1.5	0.45	14	<0.02
2	0.27	16	<0.02
2.5	0.0785	18	< 0.02
3	0.0595	20	< 0.02

Approvals

Authority	Voltage ratings	Current ratings
VDE, Semko (EN 60934)	AC 250 V, DC 28 V DC 50 V DC 50 V	0.1...20 A 0.1...20 A double pole 0.1...10 A single pole
BV, LRoS	AC 250 V, DC 28 V	0.1...20 A
UL, CSA	AC 250 V, DC 50 V	0.1...20 A



3120-F...

Technical data

Voltage rating	AC 250 V; DC 50 V		
Current ratings	0.1...20 A (up to 30 A to special order)		
Typical life	50,000 operations for I _N ≤16 A double pole 30,000 operations for I _N ≤16 A single pole, 10,000 operations for I _N >16 A		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area between poles (2 pole)	Test voltage AC 3000 V AC 1500 V		
Insulation resistance	>100 M Ω (DC 500 V)		
Interrupting capacity I _{cn}	0.1...2 A 2.5...20 A	10 x I _N 250 A 2 pole, or 150 A 1 pole	
Interrupting capacity (UL 1077)	I _N 0.1... 2 A 2.5... 3 A 3.5... 8 A 9 ... 16 A 18... 20 A 0.1...20 A	U _N AC 250 V AC 250 V AC 250 V AC 250 V AC 250 V DC 50 V	2 pole 200 A 1000 A 2000 A 3500 A 5000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	8 g (57-500 Hz), ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca		
Mass	approx. 33 g (double pole) approx. 27 g (single pole)		

ET-A Thermal Overcurrent Circuit Breaker 3120-F...

Ordering information

Type No.									
3120	-	F	3	2	F	-	N7	T1	-
Mounting									
F	-								
Size of frame									
2	-								
3	-								
Number of poles									
0	-								
1	-								
2	-								
5	-								
6	-								
Mounting frame design									
F	-								
G	-								
Terminal configuration									
P7	-								
H7	-								
N7	-								
G7	-								
Characteristic curve									
T1	-								
Q1	-								
Switch style/colour									
D	-								
01X	-								
04X	-								
12X	-								
19X	-								
S	-								
GRX	-								
WRX	-								
WBX	-								
Push button illumination (optional)									
B	-								
L	-								
G	-								
Y	-								
R	-								
Illumination voltage range									
0	-								
1	-								
2	-								
3	-								
4	-								
5	-								
Current ratings									
0.1...20 A	-								

3120	-	F	3	2	F	-	N7	T1	-	S	GRX	L	4	-	10 A	ordering example
3120	-	F	3	0	F	-	N7	Q1	-	S	...	.	.	-	20 A	switch only

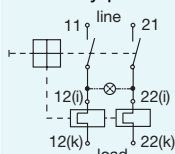
N.B.
Switch only versions must be specified with -N7 or -G7 terminals.
Terminals 12(k) and 22 (k) are not fitted.

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

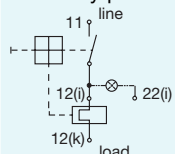
Ambient temperature °C	-30	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.8	0.84	0.88	0.92	1	1.08	1.14	1.23

Internal connection diagrams

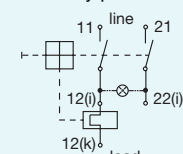
2 pole, thermally protected



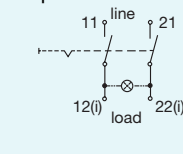
1 pole, thermally protected



2 pole, thermally protected on one pole only

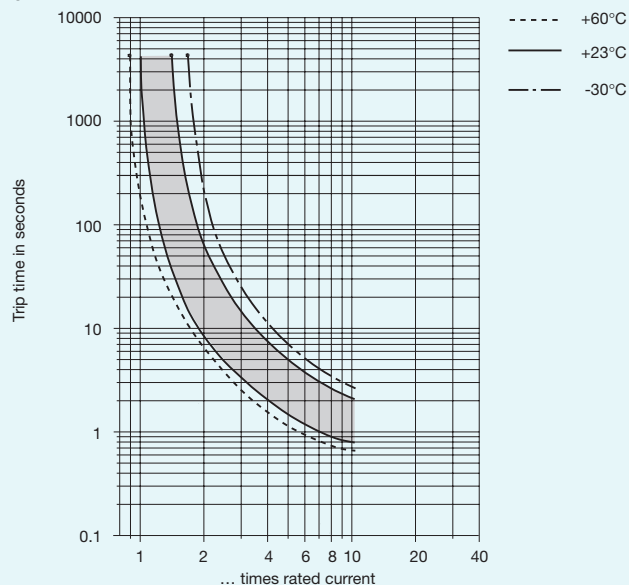


2 pole, unprotected

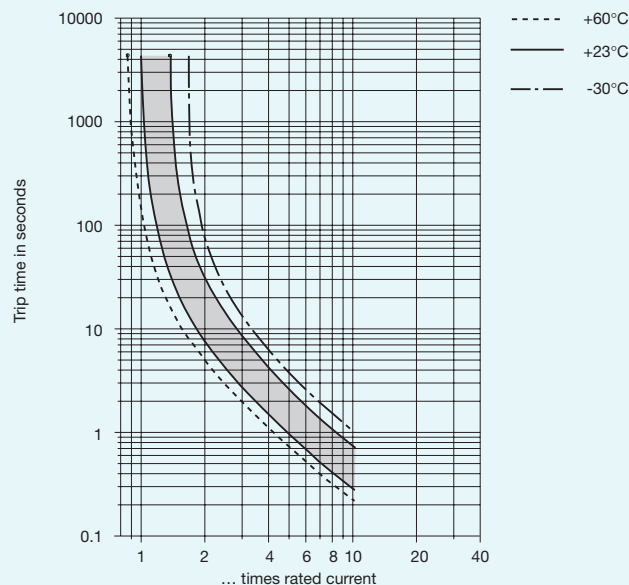


Typical time/current characteristics

1 or 2 pole load
0.1...2 A



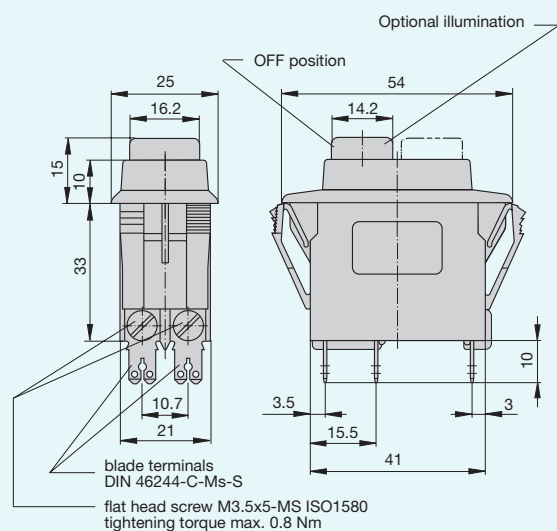
2.5...20 A



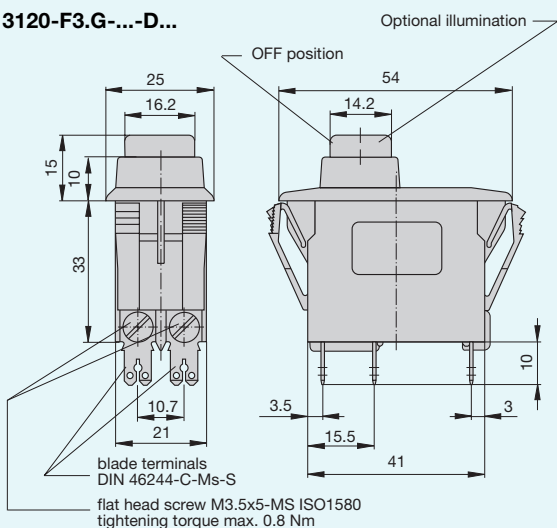
Thermal Overcurrent Circuit Breaker 3120-F...

Dimensions

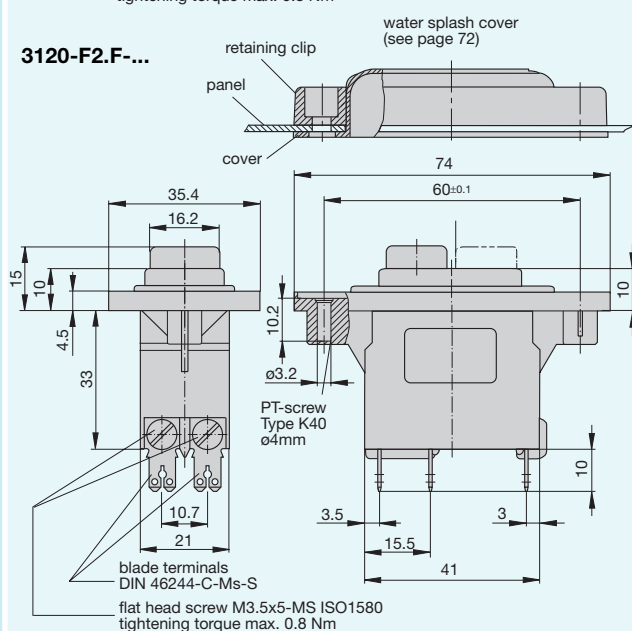
3120-F3.F-...-S...



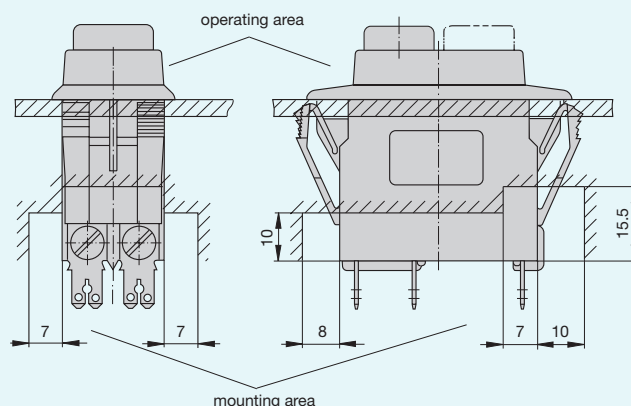
3120-F3.G-...-D...



3120-F2.F-...

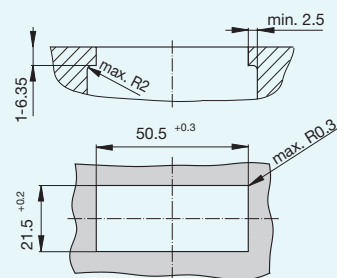


Installation drawing

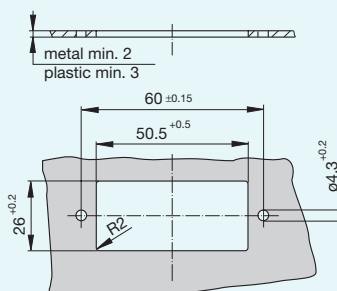


Panel cut-out

3120-F3...



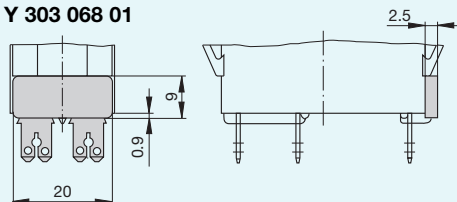
3120-F2...



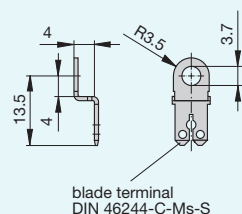
Edges of working parts: DIN 6784

Accessories

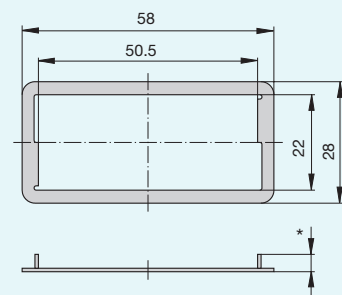
Insulated cover
Y 303 068 01



Terminal adapter
Y 303 862 01

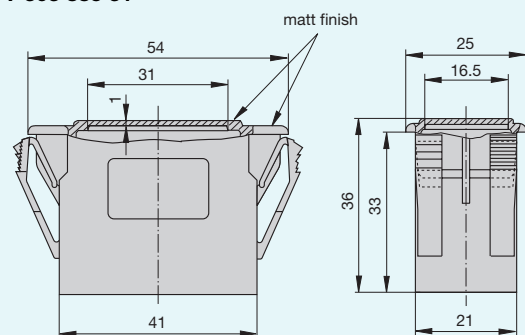


Retaining clip for 3120-F3...
Ref. Y 303 675 01/02

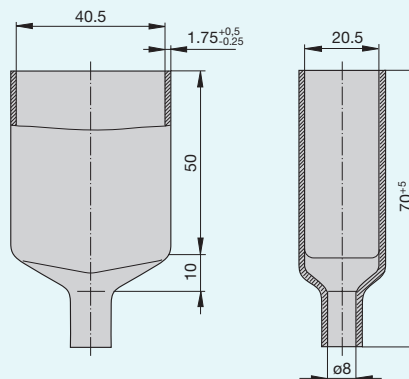


Y 303 675 01 suitable for
panel thickness < 2 mm
Y 303 675 02 suitable for
panel thickness < 4 mm

Blanking piece in -F3 frame
Y 303 885 31



Rear terminal shroud black
Y 304 275 01 (IP64)

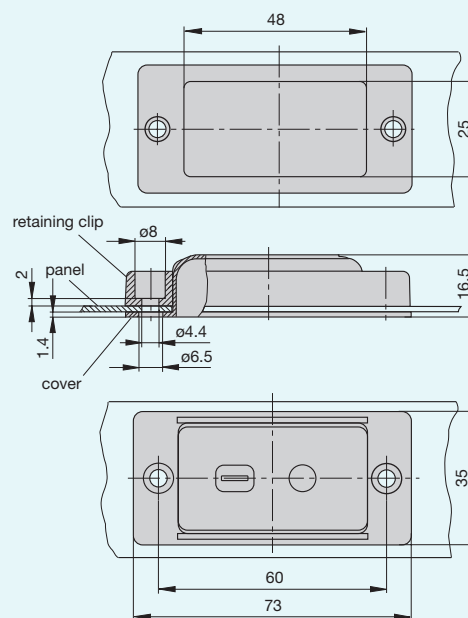


Water splash cover, transparent (IP66)
for style 3120-F2.F-...

X 221 619 01

Consisting of

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



Auxiliary Contact Module X3120-S for circuit breaker 3120-F...

Description

A module supplied factory fitted to type 3120 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

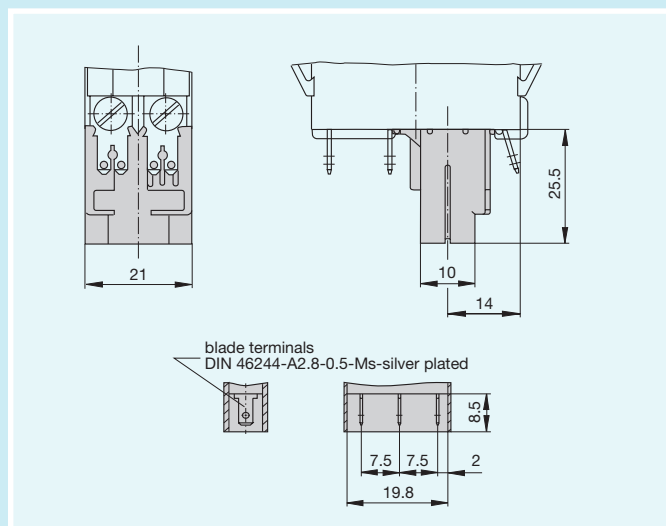
Type No.	
X3120	Module for type 3120
Function	
S	auxiliary contact module
Contact configuration	
0	change-over contact
Terminal design	
1	blade terminals 2.8 x 0.5, silver plated
Contact rating	
AC	
Voltage rating	Current rating
A 10-250 V	0.1...4 A
DC	
Voltage rating	Current rating
12 V	0.1...4 A
24 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 5-250 V	0.05...1 A
5 V-250 V	0.05...1 A
M	module mounted to circuit breaker 3120-...

X3120 - S 0 1 A M ordering example

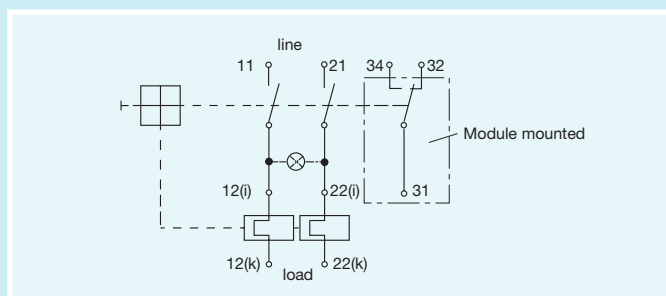
Approvals (complete circuit breaker/module assembly)

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

Dimensions



Internal connection diagram



Technical data

Voltage rating	AC 250 V; DC 220 V
Current rating	4 (1) A
Typical life	50,000 operations
Ambient temperature	-30...+60 °C
Dielectric strength (IEC 664 and 664A) between main and auxiliary circuit	Test voltage AC 3000 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 68-2-6, 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 68-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 68-2-30, test Ca
Mass	approx. 38 g (complete assembly)

ET-A® Undervoltage Release Module X3120-U...for circuit breaker 3120-F...

Description

A module suitable for all double pole versions of type 3120 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 (EU Machinery Directive)

Ordering information

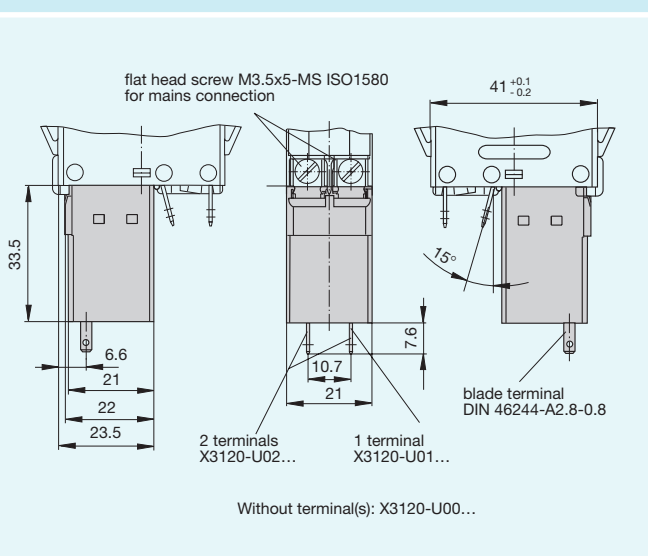
Type No.	
X3120	Module for type 3120
Function	
U	undervoltage release module
Terminal design	
00	standard (without separate connections)
01	1 blade terminal 2.8x0.8
02	2 blade terminals 2.8x0.8
Voltage ratings	
00	230/240 V AC 50/60 Hz
01	120 V AC 50/60 Hz
02	100 V AC 50/60 Hz
03	24 V DC
M	module mounted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

X3120 - U 00 00 M ordering example

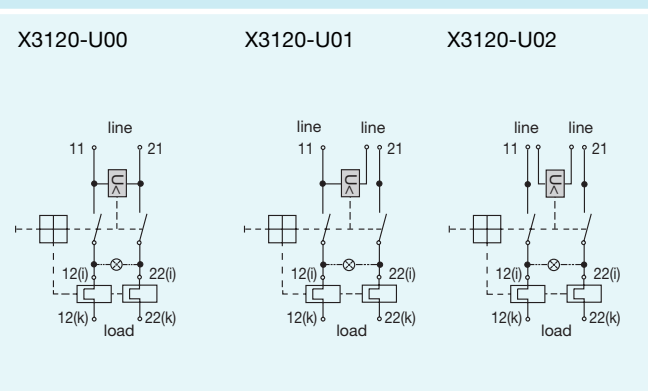
Approvals (complete circuit breaker/module assembly)

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

Dimensions



Internal connection diagrams



Technical data

Voltage ratings	AC 100, 120 V, 230/240 V 50/60 Hz DC 24 V
Release values	20 to 70 % U_N (at a rated voltage of AC 100 V the device may release at 70 V and must release at 20 V)
Release delay	$t < 20$ ms
Latch-in values	> 85 % U_N
Ambient temperature	-30...+60 °C
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis
Shock	30 g (11 ms) to IEC 68-2-27, test Ea
Corrosion	48 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95% RH to IEC 68-2-30, test Ca
Mass	approx. 53 g (complete assembly)

Remote Trip Module X3120-M... for circuit breaker 3120-F...

Description

A module which adds remote trip capability to all versions of type 3120. 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

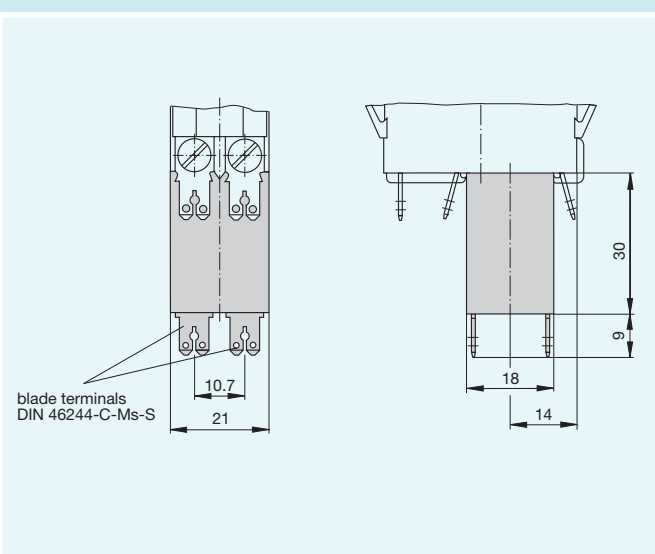
Type No.	
X3120	Module for type 3120
Function	
M	magnetic relay trip module
Style	
2	magnetic remote trip coil
Terminal design	
P7	blade terminals 2 x 2.8 x 0.8 tin plated
M	module mounted to the circuit breaker
Voltage ratings	
AC 12/24/48/60/120/220/230/240 V	
DC 12/24 V	

X3120 - M 2 P7 M - 12 V ordering example

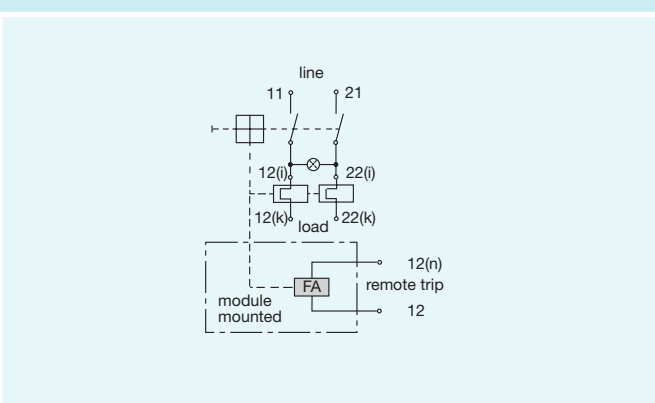
Approvals (complete circuit breaker/module assembly)

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 _{ON} < 100 ms / t _{OFF} > 10 sec
Release delay	t < 20 ms
Typical life	50,000 operations at U _N
Ambient temperature	-30...+60 °C
Dielectric strength (IEC 664 and 664A) between main circuit and trip coil circuit	Test voltage AC 3000 V
Insulation resistance	>100 MΩ (DC 500 V)
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis
Shock	30 g (11 ms) to IEC 68-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 68-2-30, test Ca
Mass	approx. 53 g (complete assembly)

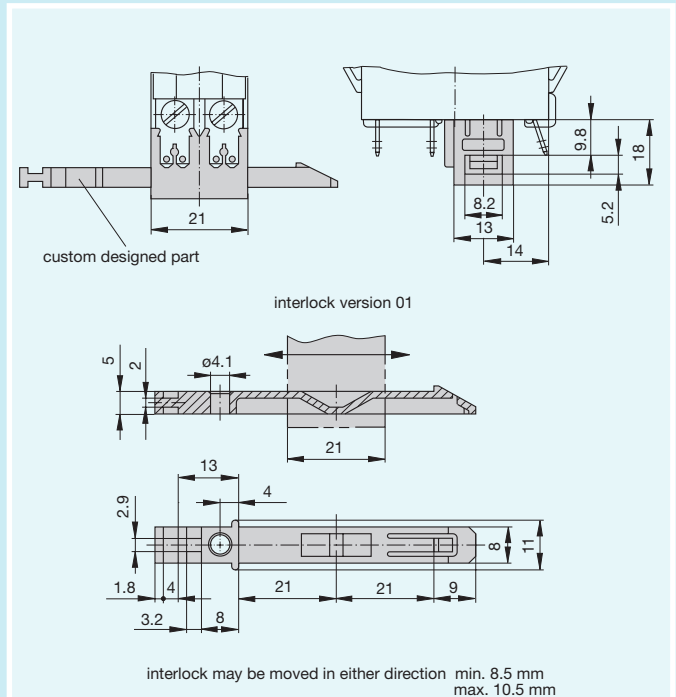
Description

Suitable for use with all type 3120 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

Dimensions



Ordering information

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

X3120 - V 1 00 O 0 M ordering example

E-T-A® Thermal Overcurrent Circuit Breaker 3130

Description

Single, two and three pole rocker switch/thermal 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. Neon illumination is optional (filament bulb for low voltages) and there is a choice of rocker colours.

Approved to CBE standard EN 60934 (IEC 934)

Typical applications

Motors, transformers, solenoids, household and office machines, hand tools.

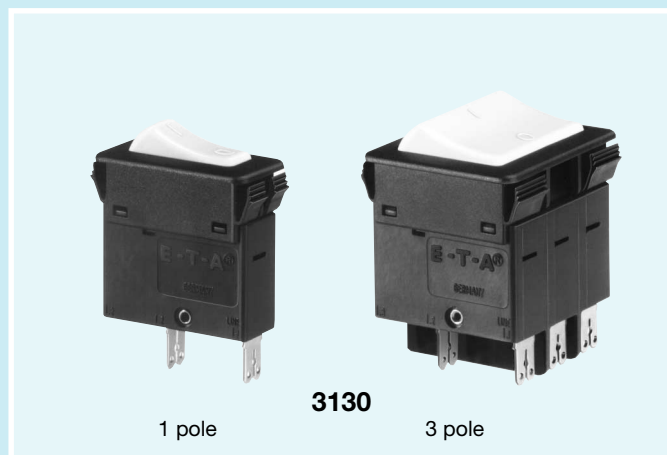
Ordering information

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
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
A	1 pole, unprotected
Frame mounting	
0	panel thickness 1-2.5 mm (only 3130-F1...-...)
1	panel thickness 1.5-3.2 mm (only 3130-F3.1...-...)
Terminal design	
P7	blade terminals DIN 46244-C-MS-S
H7	for terminals 1.1, 2.1 3.1 terminal screws M 3,5 for terminals 1.2, 2.2, 3.1 blade terminals
N7	blade terminals, with shunt terminal
Characteristic curve	
T1	thermal, 1.05-1.4 I _N
Q1	switch, only with terminal design -N7
Switch style	
W	rocker, one-piece, rounded profile
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	
Multi pole versions	
B	filament/neon, AC/DC
G	green LED, DC
R	red LED, DC
Y	yellow LED, DC
Single pole version	
W 12 Q Y	white rocker, yellow LED, AC/DC
W 14 Q R	red rocker, red LED, AC/DC
W 19 Q Y	green rocker, yellow LED, AC/DC
Illumination voltage range*	
1	6 V (4-7 V) B, G, R, Y
2	12 V (10-14 V) B, G, R, Y
3	24 V (20-28 V) B, G, R, Y
4	48 V (42-54 V) B, R, Y
6	115 V (90-140 V) B (R**, Y**)
7	230 V (185-275 V) B (R**, Y**)
8	415 V (320-450 V) B
Current ratings	
0.1...20 A	1 pole
0.1...16 A	2 and 3 pole

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

* N/A for non-illuminated version

** Single pole version only



Technical data

Voltage rating	AC 240 V; 3 AC 415 V; DC 50 V		
Current ratings	0.1...20 A 1 pole 0.1...16 A 2 and 3 pole		
Typical life	30,000 operations at I _N , 1 and 3 pole 50,000 operations at I _N , 2 pole		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area current path/current path	Test voltage AC 3000 V AC 1500 V		
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.1... 2 A 2.5...20 A 2.5...16 A 2.5...12 A 14 + 16 A	10 x I _N 150 A 250 A 150 A 130 A	 1 pole 2 pole 3 pole 3 pole
Interrupting capacity (UL 1077)	I _N 1 + 2 pole 3 pole 1 + 2 pole	0.1...12 A AC 250V/3500A 3AC 250V/5000A DC 50V/2000A	14...16 A AC 250V/3500A DC 50V/2000A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	5 g (57-500 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	1 pole: 25 g (11 ms) 2 + 3 pole: 20 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca		
Mass	approx. 45 g (three pole) approx. 31 g (double pole) approx. 17 g (single pole)		

Approvals

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

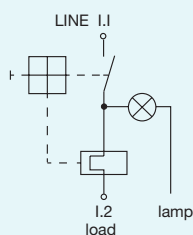
ET-A® Thermal Overcurrent Circuit Breaker 3130

Standard current ratings and typical internal resistance values

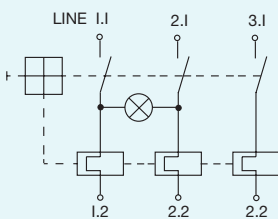
Current rating (A)	Internal resistance per pole (Ω)	Current rating (A)	Internal resistance per pole (Ω)
0.1	94	3.5	0.0565
0.2	24	4	0.0435
0.3	12	5	0.0325
0.4	5.30	6	0.0215
0.5	4.20	7	0.0165
0.8	1.50	8	0.0165
1	0.9	10	<0.02
1.2	0.80	12	<0.02
1.5	0.45	14	<0.02
2	0.27	16	<0.02
2.5	0.0785	18	<0.02
3	0.0595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

Internal connection diagrams

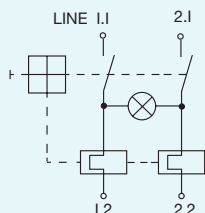
1 pole



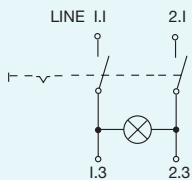
3 pole



2 pole



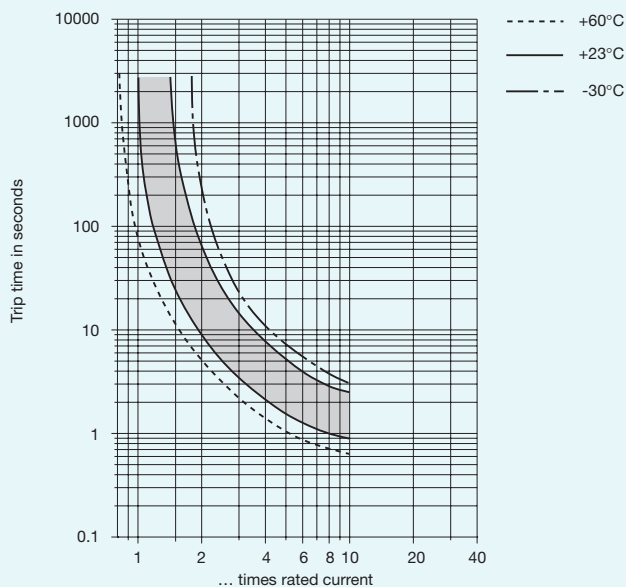
switch



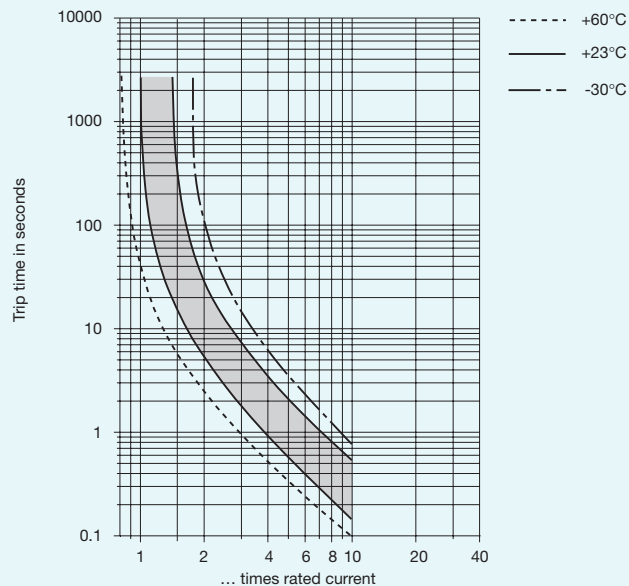
Typical time/current characteristics

Multi-pole 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. $1.6 \times I_N$ with 3 pole devices.

0.1...2 A



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

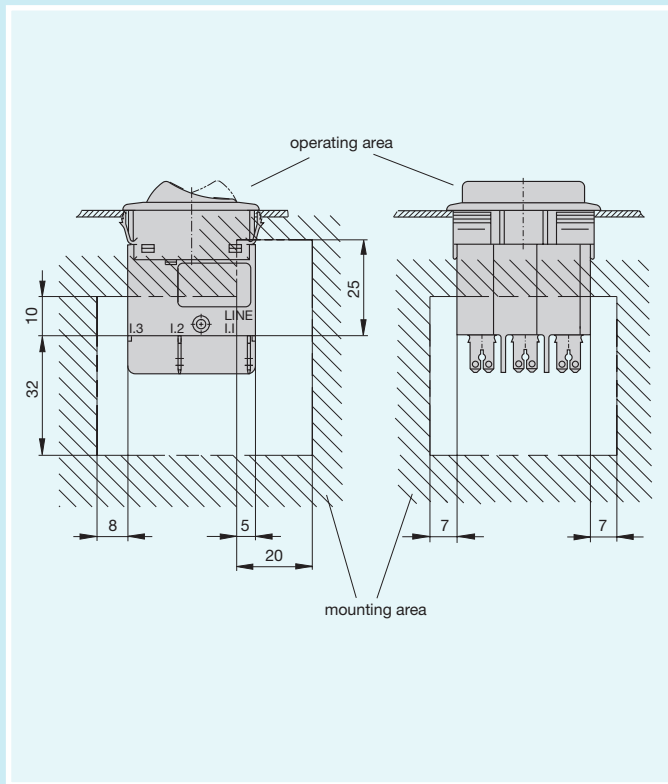


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-30	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.8	0.84	0.88	0.92	1	1.08	1.14	1.23

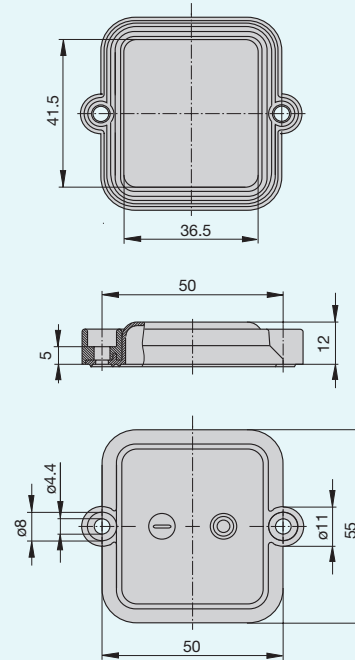
ET-A Thermal Overcurrent Circuit Breaker 3130

Installation drawing



Accessories

Splash cover, transparent, for 3 pole version
X 221 258 01 (IP 54)



ET-A® Thermal Overcurrent Circuit Breaker 2-4100-...

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 934).

Typical applications

Motors, transformers, solenoids, hand tools, appliances.

Accessories

X 200 799 02	Water splash cover/knurled nut assembly for type 2-4100.
X 200 799 01	As above with the cover bonded to the nut for extra retention.
X 200 798 01/02	As X 200 799 02 and 01 above but featuring a slotted knurled ring for wrench front of panel tightening.
X 210 739 01	Water splash cover/hex nut assembly for type 2-4100. The concertina design is extended when the button trips to the OFF position.
X 201 296 03	Water splash cover transparent, with hex nut, without O ring.

Ordering information

Type No.	
2-4100	threadneck panel mounting
	Terminal design
L10	solder terminals
P10	blade terminals A6.3-0.8 mm
P50	blade terminals A4.8-0.8 mm
	Shunt terminal (optional)
A3	shunt terminal (3 A max. load)
	Special housing (optional)
KF	for tropical and high humidity conditions
	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	0.45		



2-4100-...

Technical data

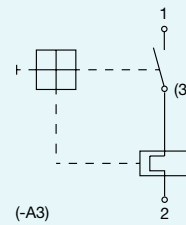
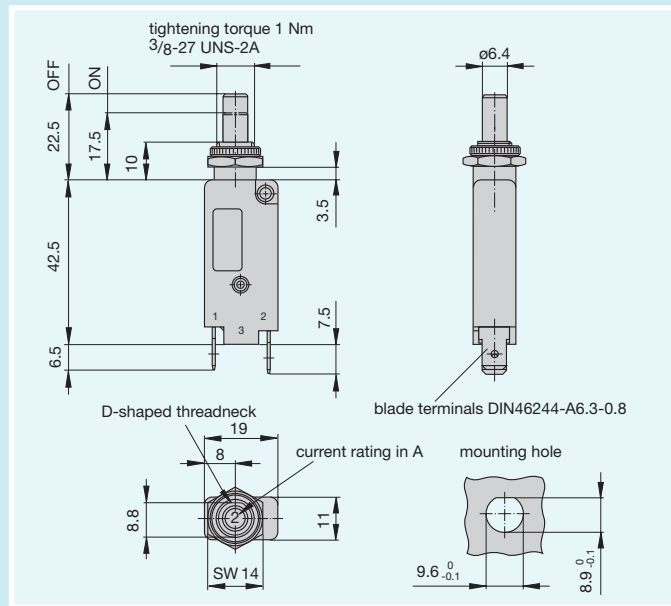
Voltage rating	AC 250 V; DC 28 V		
Current rating range	0.05...10 A		
Typical life	2,000 operations at 2 x I _N		
Ambient temperature	-20...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664 A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.05...2 A 2.5... 6 A 7 ... 10 A	10 x I _N 8 x I _N 6 x I _N	
Interrupting capacity (UL 1077)	I _N 0.05...4.5 A 5 A	U _N AC 250 V AC 250 V	200 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	10 g (57-500 Hz) ±0.76 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 15 g		

Approvals

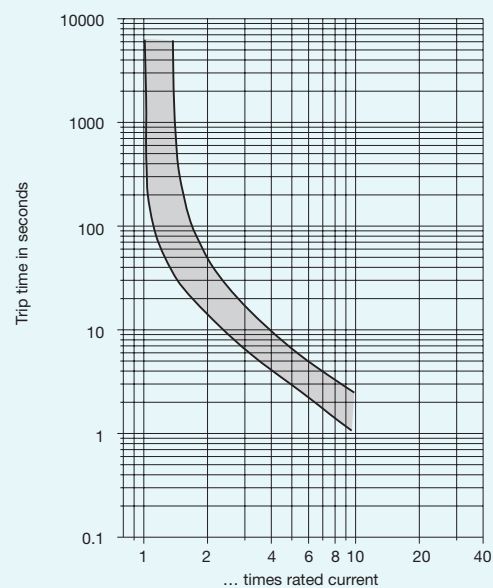
Authority	Voltage rating	Current rating
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...10 A
CSA	AC 250 V	0.05...3.5A
UL	AC 250 V	0.05... 5 A
Semko (EN 60934)	AC 250 V; DC 28 V	0.1...10 A

-A3 versions are not UL approved

Internal connection diagram



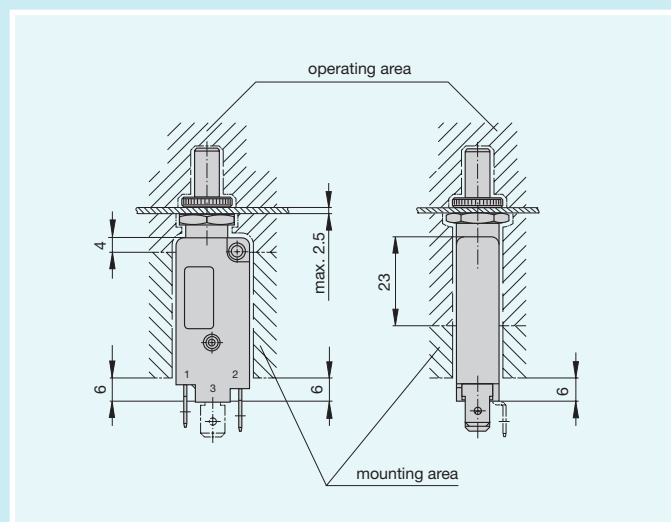
Typical time/current characteristics at 23 °C



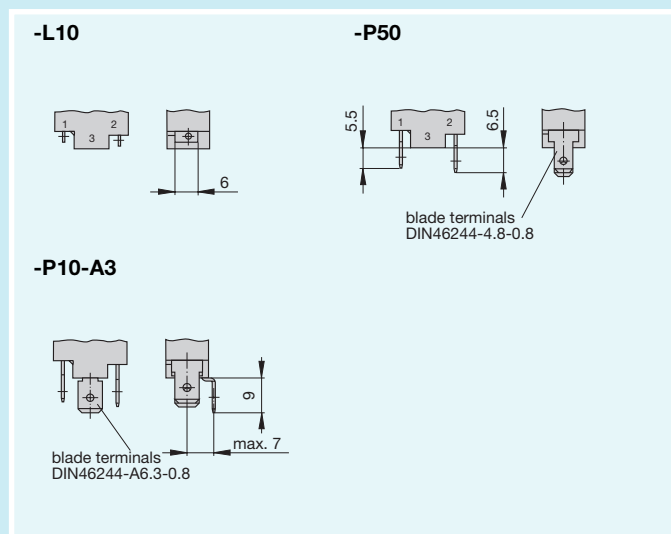
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Installation drawing

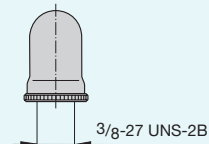


Terminal design

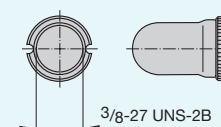


Accessories

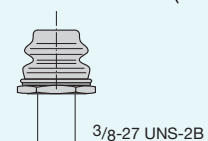
Water splash cover, transparent Y 300 538 01
and knurled nut Y 300 628 01
X 200 799 02 (IP64)
X 200 799 01 bonded to nut (IP64)



Water splash cover, transparent with special knurled nut
X 200 798 01 (IP64)
X 200 798 02 bonded to nut (IP64)



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



E-T-A® Thermal Overcurrent Circuit Breakers 2-5000/2-5700-...

Description

Single pole thermal circuit breaker with press-to-reset, tease-free, trip-free, snap action mechanism. Type 2-5000 is available with optional manual release (-H), type 2-5700 can be supplied as a push-push switch/circuit breaker (R-type TO CBE to EN 60934 in press-to-reset configuration: M-type when fitted with manual release -H; S-type with push-push operation). Fitted with flange or threadneck for panel mounting. Options include an additional unprotected circuit tap (-A3) and -KF housing particularly suited to high humidity and other damp conditions. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Accessories

For types 2-5000 and 2-5700

Y 303 563 01 Ten-way connecting/bus bar for use with circuit breakers with screw terminals.

For type 2-5000

Y 300 728 01 Water splash cover for type 2-5000.

Y 301 056 02 Fixing plate for Y 300 728 01.

Y 300 476 01 Rear terminal shroud.

For type 2-5700 with IG1 threadneck

X 200 799 02 Water splash cover/knurled nut assembly.

X 200 799 01 As above with the cover bonded to the nut for extra retention.

X 200 798 01/02 As X 200 799 02 and 01 above but featuring a slotted knurled ring for wrench front of panel tightening.

X 210 739 01 Water splash cover/hex nut. The concertina design is extended when the button trips to the OFF position.

For type 2-5700 with IG2 threadneck

X 210 663 01 Water splash cover/knurled nut assembly.

X 201 296 01 Water splash cover/hex nut assembly - without 'O'ring.

X 200 801 03 Water splash cover/hex nut assembly - with 'O'ring.

Separate hardware

Y 300 192 01 3/8" hex nut.

Y 300 284 02 3/8" knurled nut.

Y 300 116 02 12 mm hex nut.

Y 300 065 01 12 mm knurled nut.

X 200 801 08 Water splash cover, transparent, with hex nut, with O ring

Ordering information

Type No.	
2-5000	flange mounting
2-5700	threadneck panel mounting
Threadneck design	
IG1	moulded threadneck 3/8"-27UNS-2A (type 2-5700 only)
IG2	moulded threadneck M12x1 (type 2-5700 only)
Terminal design	
P10	blade terminals 6.3-0.8 mm
K10	screw terminals M4x6
Shunt terminal (optional) -P10 only	
A3	shunt terminal (up to I _N 2.5 A/6 A max. load)
Manual release (optional)	
H	manual release facility (type 2-5000 only)
DD	push to release/push to reset (type 2-5700 only)
Special housing (optional)	
KF	for tropical and high humidity conditions
Current ratings	
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.



2-5000-...



2-5700-...

Technical data

Voltage rating	AC 250 V; DC 28 V		
Current rating range	0.05...25 A		
Typical life	5,000 operations at 2 x I _N		
Ambient temperature	-20...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	
reinforced insulation in operating area			
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.05...2.5 A	8 x I _N	
	3... 5 A	20 x I _N	
	6...12 A	200 A	
	(higher interrupting capacity available to special order)		
Interrupting capacity (UL 1077)	13...25 A	400 A	
	I _N	U _N	
	0.05...4.5 A	AC 250 V	200 A
	5... 7 A	AC 250 V	1000 A
	8...16 A	AC 250 V	2000 A
	0.05...16 A	DC 28 V	200 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 29 g		

Standard current ratings and typical internal resistance values

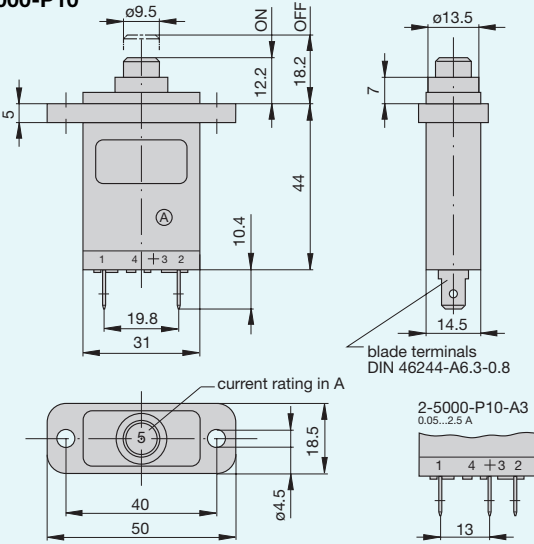
Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	280	3	0.1
0.08	100	3.5	0.065
0.1	110	4	0.065
0.2	29	4.5	0.05
0.3	14	5	0.05
0.4	7	6	0.02
0.5	4.9	7	0.02
0.6	3.4	8	< 0.02
0.7	2.5	10	< 0.02
0.8	1.8	12	< 0.02
1	1.2	13	< 0.02
1.2	0.85	15	< 0.02
1.5	0.6	16	< 0.02
1.8	0.4	20	< 0.02
2	0.3	22	< 0.02
2.5	0.2	25	< 0.02

Approvals

Authority	Voltage ratings	Current ratings
VDE, Semko (EN 60934)	AC 250 V; DC 28 V	0.05...25 A
CSA/ UL	AC 250 V; DC 28 V	0.05...16 A
SEV, Nemko	AC 250 V; DC 28 V	0.05...25 A
LRoS	AC 250 V; DC 28 V	0.1 ...25 A
BV (type 2-5700 only)	AC 250 V; DC 28 V	0.2 ...25 A

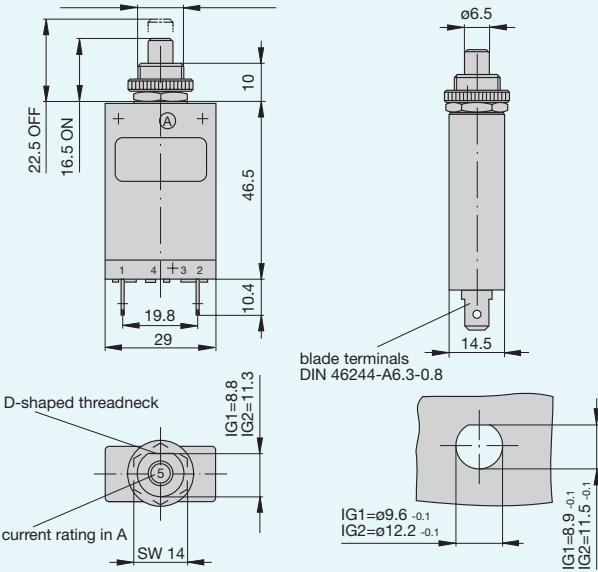
Dimensions

2-5000-P10



2-5700-P10

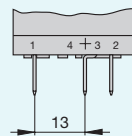
IG1=3/8-27UNS-2A tightening torque max. 1 Nm
IG2=M12x1 tightening torque max. 1.5 Nm



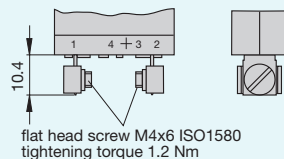
ET-A Thermal Overcurrent Circuit Breakers 2-5000/2-5700-...

Terminal design

-P10-A3
0.05...2.5 A

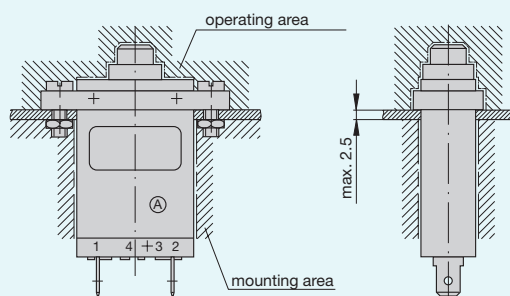


-K10

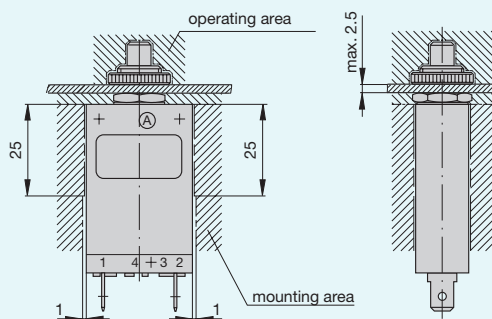


Installation drawings

2-5000-...



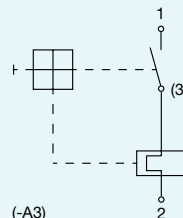
2-5700-...



Internal connection diagrams

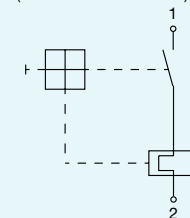
0.05...2.5 A

(with or without shunt terminal)

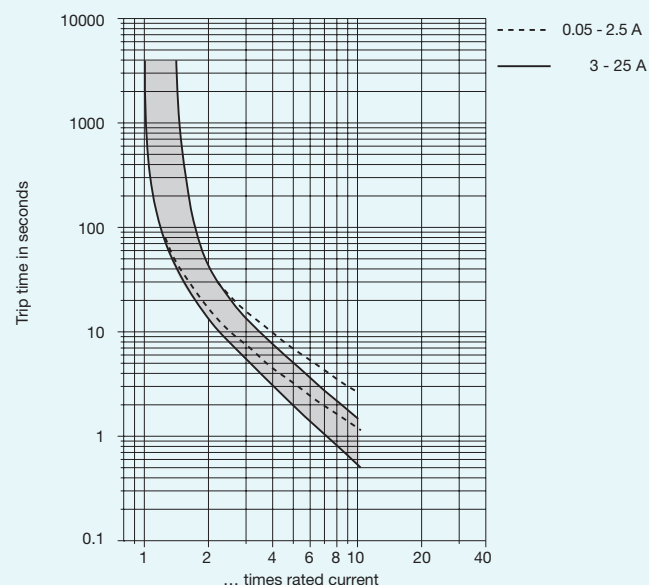


3...25 A

(without shunt terminal)



Typical time/current characteristics at 23 °C

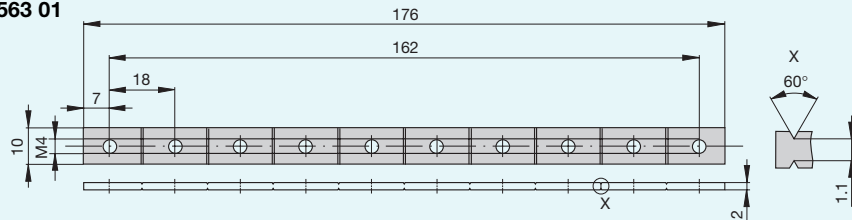


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

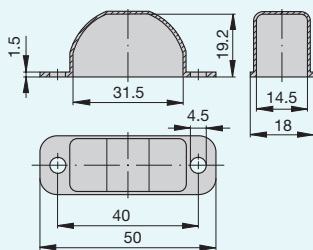
Accessories for types 2-5000 and 2-5700 with screw terminals -K10

Bus bar
Y 303 563 01

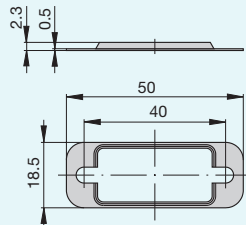


Accessories for type 2-5000-...

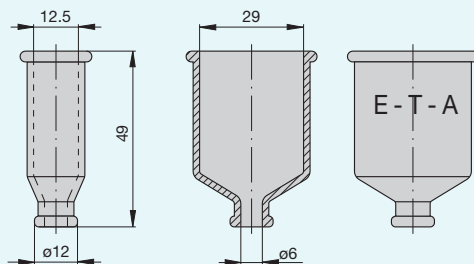
Water splash cover, transparent for push button (IP64)
Y 300 728 01



Fixing plate
Y 301 056 02

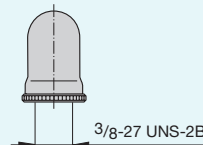


Rear terminal shroud, transparent (IP64)
Y 300 476 01

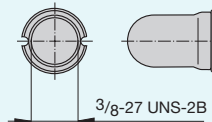


Accessories for type 2-5700-...

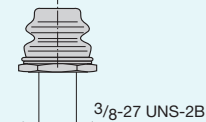
With 3/8" threadneck (-IG1)
Water splash cover, transparent Y 300 538 01
and knurled nut Y 300 628 01
X 200 799 02 (IP64)
X 200 799 01 bonded to nut (IP64)



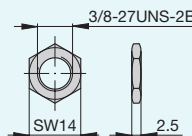
Water splash cover, transparent with special knurled nut
X 200 798 01 (IP64)
X 200 798 02 bonded to nut (IP64)



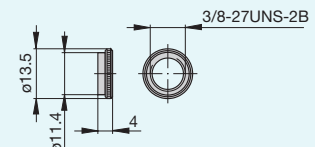
Hex nut with splash cover black
X 210 739 01 (IP64)
transparent splash cover
X 201 296 03 (IP64)



Separate hardware
Hex nut
Y 300 192 01



Knurled nut
Y 300 284 02

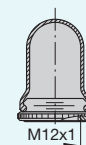


With M12 threadneck (-IG2)

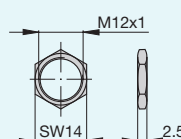
Hex nut with splash cover, black
X 201 296 01 without O ring (IP64)
X 200 801 03 with O ring (IP66)
X 200 801 08 transparent with O ring (IP66)



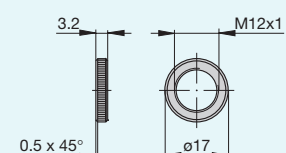
Water splash cover, transparent, with knurled nut
X 210 663 01 (IP64)



Separate hardware
Hex nut
Y 300 116 02



Knurled nut
Y 302 065 01



E-T-A® Thermal Automotive Circuit Breaker 2-5200-...

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. The optional -KF housing is particularly suited to high humidity and other damp conditions.

Typical applications

Extra low voltage wiring systems and components.

Accessories

10R-K10	Modular snap-together surface mounted sockets, each accommodating two plug-in circuit breakers. With screw terminals.
10R-P10	As above but with push-on terminals.
10R-A10	As above but with a combination of screw and push-on terminals.
Y 301 166 02	Two-way brass connecting/bus bar links for type 10 sockets.
Y 301 166 01	Four-way brass connecting/bus bar links for type 10 sockets.
16	Single socket for symmetric EN rail mounting.
X 200 409 01	Adapter for mounting socket type 16 to asymmetric rail (G-profile).
Y 301 477 01	Blanking plug with insulated pins, for sockets 10, 20, 40, 60.

Ordering information

Type No.	
2-5200	plug-in
	Manual release (optional)
H	manual release facility
	Special housing (optional)
KF	for tropical and high humidity conditions
	Special version
051034	Voltage rating AC 250 V
	Current ratings
0.05 ... 16 A	

2-5200 - H - - 051034 - 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		



2-5200-...

Technical data

Voltage rating	DC 28 V (AC 250: suffix 051034)	
Current rating range	0.05...16 A (up to 25 A to special order)	
Typical life	5,000 operations at 2 x I _N	
Ambient temperature	-20...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage	Pollution degree
	2.5 kV	2
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.05...2.5 A	8 x I _N
	3...5 A	20 x I _N
	6...16 A (25 A)	400 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	8 g (57 to 500 Hz/ ±0.61 mm, 10-57 Hz), to IEC 68-2-6, Test Fc,	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 35 g	

Approvals

Authority	Voltage ratings	Current ratings
LRoS	AC 250 V; DC 28 V	0.05...16 A
Semko	AC 250 V; DC 28 V	0.05...16 A

Accessories

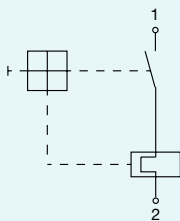


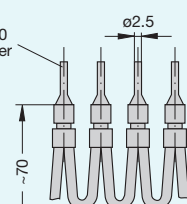
Figure 1 is a log-log plot showing the trip time in seconds (Y-axis, ranging from 0.1 to 10000) versus the times rated current (X-axis, ranging from 1 to 40). The plot displays two curves representing the trip time characteristics for a 100 A MCCB, with a shaded region indicating the operating range.

The legend indicates the current ranges for the curves:

- Dashed line: 0.05 - 2.5 A
- Solid line: 3 - 25 A

The shaded region represents the operating range for the MCCB, bounded by the two curves. The trip time decreases significantly as the times rated current increases, following an inverse relationship.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24



E-T-A® Thermal Overcurrent Circuit Breakers 2-6200/2-6400-...

Description

Single pole thermal circuit breakers with push-to-reset, tease-free, trip-free, snap action mechanism (R type TO CBE to EN 60934; M-type when fitted with manual release features/type 2-6200 only). Featuring auxiliary contacts (1 x N/C; 1 x N/O) as standard. Options include manual release (type 2-6200 only), an additional unprotected circuit tap (-A3), a centre reset position in which all contacts are open (-ZR: type 2-6200-H only), and -KF housing particularly suited to high humidity and other damp conditions. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Accessories

For type 2-6400 with IG1 threadneck

- X 200 799 02 Water splash cover/knurled nut assembly.
X 200 799 01 As above with the cover bonded to the nut for extra retention.
X 200 798 01/02 as X 200 799 02 and 01 above but featuring a slotted knurled ring for wrench front of panel tightening.
X 210 739 01 Water splash cover/hex nut. The concertina design is extended when the button trips to the OFF position.

For type 2-6400 with IG 2 threadneck

- X 210 663 01 Water splash cover/knurled nut assembly.
X 201 296 01 Water splash cover/hex nut assembly - without 'O' ring.

Separate hardware

- Y 300 192 01 3/8" hex nut.
Y 300 284 02 3/8" knurled nut.
Y 300 116 02 12 mm hex nut.
Y 300 065 01 12 mm knurled nut.

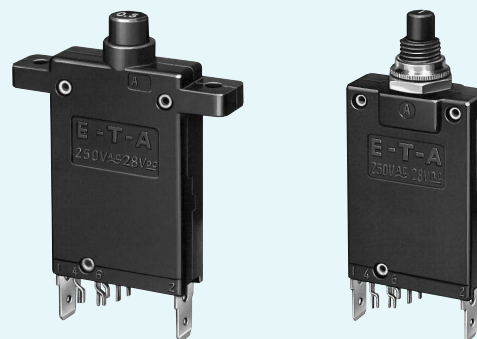
Ordering information

Type No.	
2-6200	flange mounting, with auxiliary contacts
2-6400	threadneck panel mounting, with auxiliary contacts*
Mounting (type 2-6400 only)	
IG1	moulded threadneck 3/8-27UNS-2A
IG2	moulded threadneck M 12 x 1
Terminal design - main circuit	
L10	solder terminals
P10	blade terminals A6.3-0.8 mm
Shunt terminal (optional)	
A3	shunt terminal same as main terminal (up to 7 A/ 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
Special housing (optional)	
KF	for tropical and high humidity condition
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.

*mounting hardware bulk shipped



2-6200-...

2-6400...

Technical data

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	5,000 operations at 2 x I _N		
Ambient temperature	-20...+60 °C		
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage		
	operating area AC 3000 V		
	main circuit to aux. circuit AC 1500 V		
	aux. circuit 4-5 to 6-7 AC 840 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	10 x I _N		
Interrupting capacity (UL 1077)	I _N	U _N	
	0.05...4.5 A	AC 250 V	200 A
	5...7 A	AC 250 V	1000 A
	8...15 A	AC 250 V	2000 A
	16 A	AC 250 V	3500 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	10 g (57-500 Hz) ±0.76 mm (10-57 Hz), to IEC 68-2-6, Test Fc, 10 frequency cycles/axis		
Shock	40 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 25 g		

ET-A® Thermal Overcurrent Circuit Breakers 2-6200/6400-...

Standard current ratings and typical internal resistance values

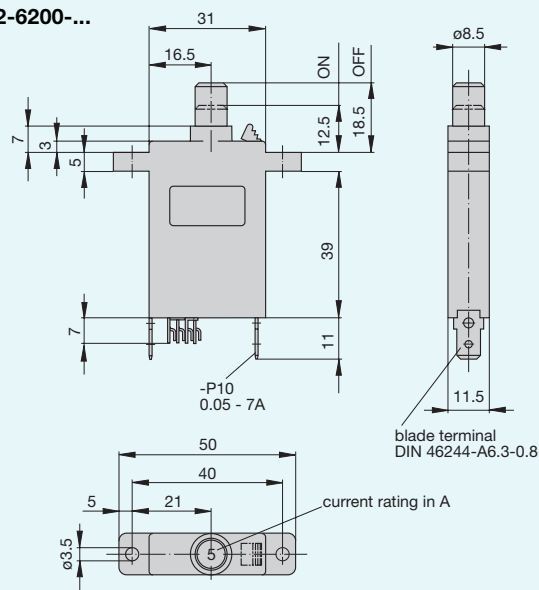
Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.05	257	2	0.30
0.08	138	2.5	0.20
0.1	90	3	0.12
0.2	32.2	3.5	0.10
0.3	14.6	4	0.07
0.4	8.4	4.5	0.056
0.5	5.15	5	0.046
0.6	3.82	6	0.035
0.7	2.80	7	0.03
0.8	2.15	8	< 0.02
1	1.42	10	< 0.02
1.2	0.96	12	< 0.02
1.5	0.51	15	< 0.02
1.8	0.40	16	< 0.02

Approvals

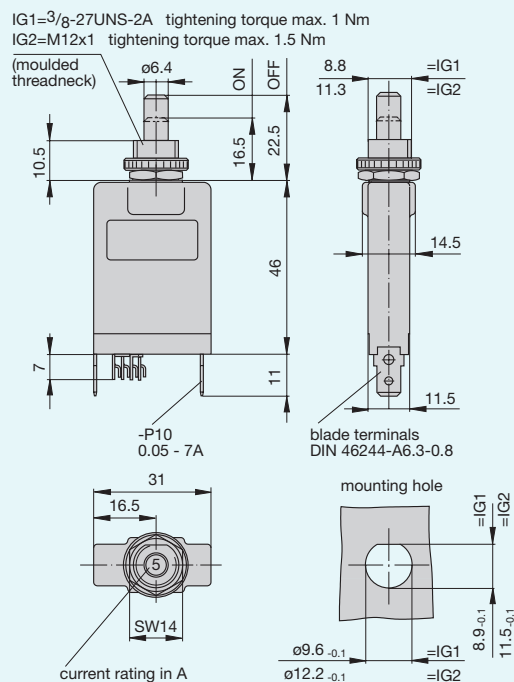
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V; DC 28 V	0.05...16 A
CSA/ UL	AC 250 V; DC 28 V	0.05...16 A
Semko (EN 60934)	AC 250 V; DC 28 V	0.1 ... 16 A
Demko	AC 250 V; DC 28 V	0.05...16 A

Dimensions

2-6200-...

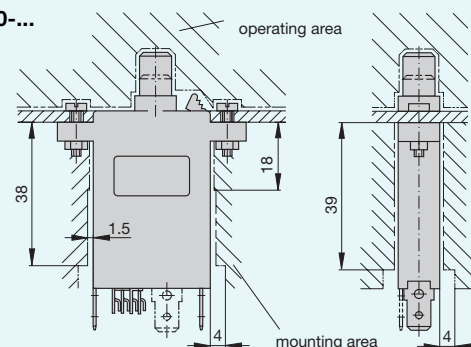


2-6400-...



Installation drawing

2-6200-...

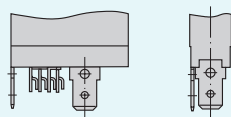


Thermal Overcurrent Circuit Breakers 2-6200/6400-...

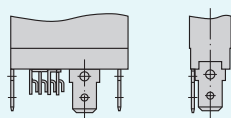
Terminal design

-P10 0,05...7 A
see dimension diagram

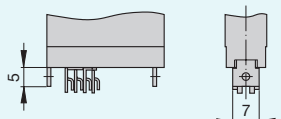
-P10 8...16 A



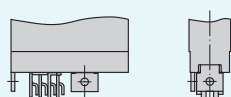
-P10-A3 0,05...16 A



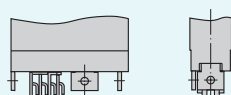
-L10 0,05...7 A



-L10 8...16 A

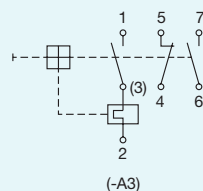


-L10-A3 0,05...16 A

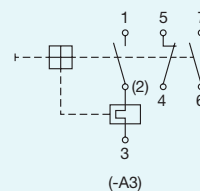


Internal connection diagrams

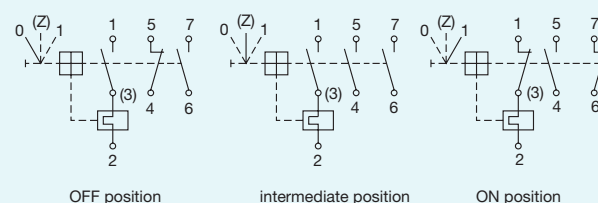
0.05...7 A



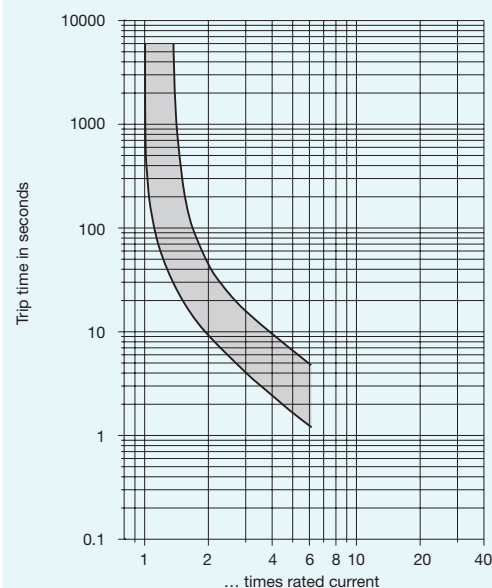
8...16 A



2-6200-...-ZR



Typical time/current characteristics at 23 °C

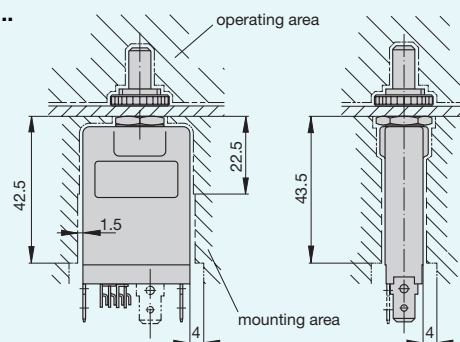


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

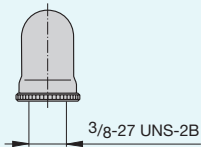
Installation drawing

2-6400-...

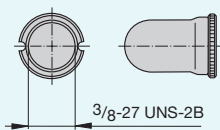


Accessories for type 2-6400-...

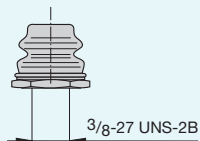
With 3/8" threadneck (-IG1)
Water splash cover, transparent Y 300 538 01
and knurled nut Y 300 628 01
X 200 799 02 (IP64)
X 200 799 01 bonded to nut (IP64)



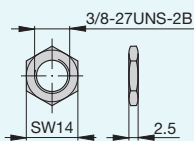
Water splash cover, transparent
with special knurled nut
X 200 798 01 (IP64)
X 200 798 02 bonded to nut (IP64)



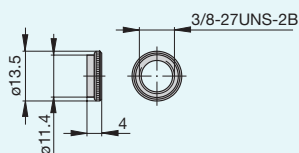
Hex nut with
splash cover black
X 210 739 01 (IP64)



Separate hardware
Hex nut
Y 300 192 01



Knurled nut
Y 300 284 02

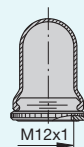


With M12 threadneck (-IG2)

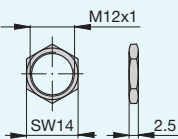
Hex nut with splash cover black
X 201 296 01 without O ring (IP64)
X 200 801 03 with O ring (IP66)
X 200 801 08 transparent
with O ring (IP66)



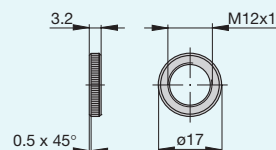
Water splash cover
transparent
with knurled nut
X 210 663 01 (IP64)



Separate hardware
Hex nut
Y 300 116 02



Knurled nut
Y 302 065 01

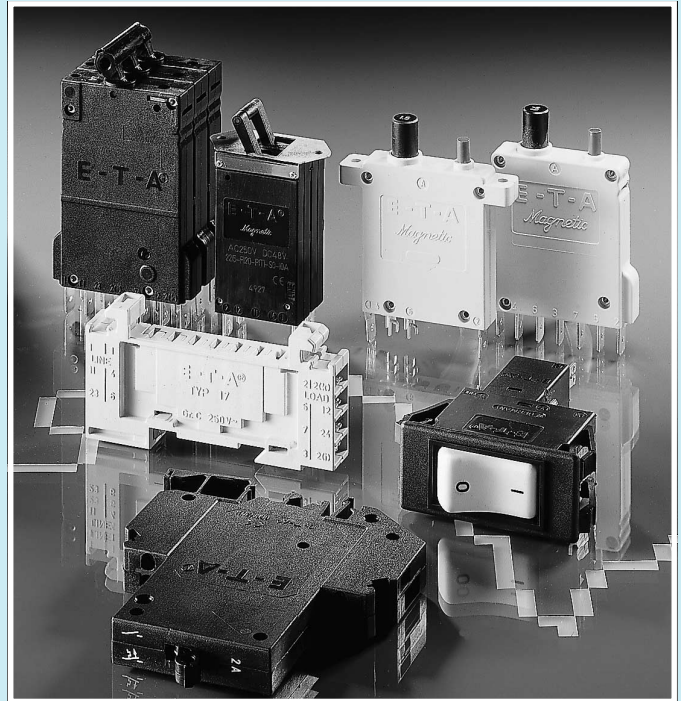


E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

**Single and multi pole
thermal-magnetic circuit breakers (CBEs)
with and without auxiliary contacts**

**Voltage ratings max. 3 AC 433 V, AC 250 V,
DC 65 V**

Current ratings 0.05...32 A



A latching type bimetal is combined with a magnetic coil to provide the joint benefits of delayed operation for low level over-current protection and fast magnetic action on higher value short circuits.

E-T-A has perfected thermal-magnetic technology to provide a choice of mounting options, covering an extensive range of current ratings all with high precision performance. These models are well suited to telecommunications, process control and other industrial applications where sophisticated equipment needs correct - and dependable - protection. The narrow profile of E-T-A thermal-magnetic circuit breakers enables high density packaging solutions.

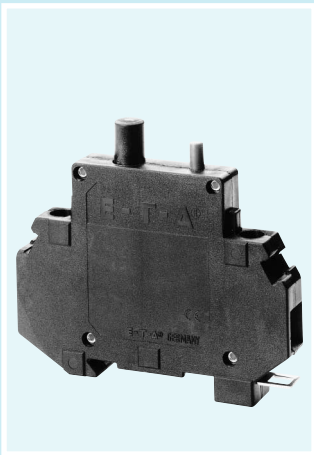
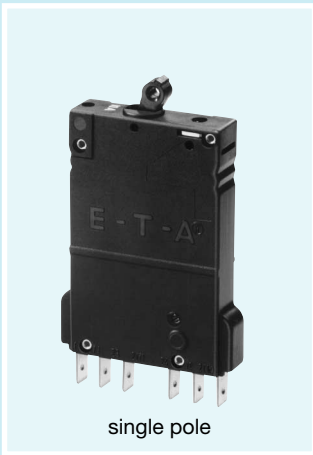
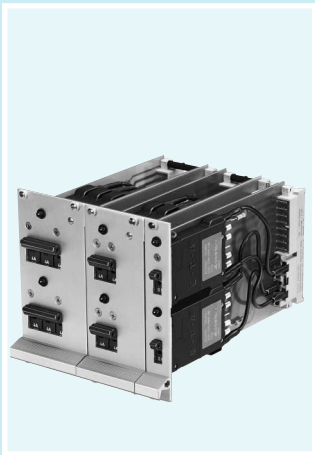
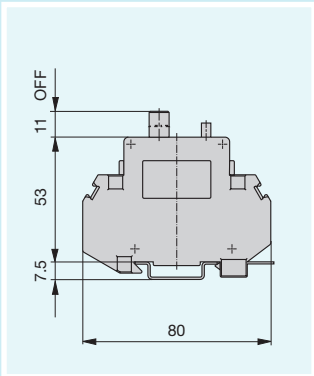
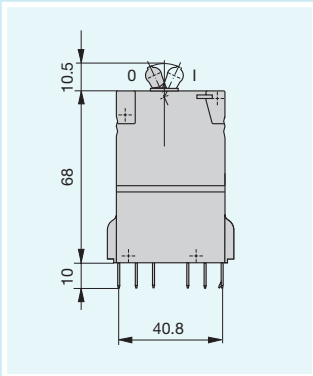
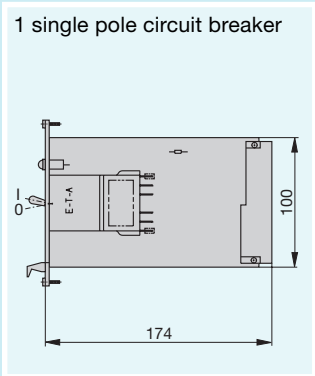
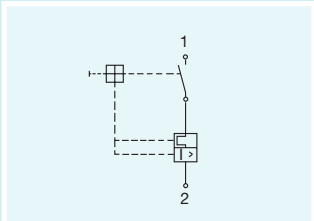
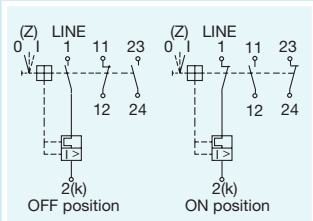
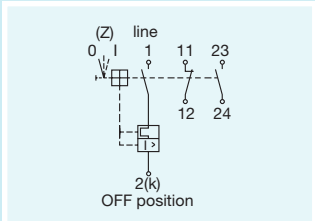
Additional features to ensure perfect fit of device to application include options such as auxiliary contacts for status signalling and the choice of push button or toggle manual control. There are also single, two and multi-pole models in a range of types and variants. Plug-in versions provide a convenient means of positive circuit interruption by simply removing the circuit breaker - ideal for safety critical systems during maintenance and shutdown.

E-T-A thermal-magnetic circuit breakers for track mounting can be fitted to different standard rail designs, either direct in the case of combi-foot models, or with an E-T-A adapter.

All models are available in special configurations with separate thermal and thermal-magnetic circuits, providing capability for overload protection together with an independent control circuit, which may be operated in response to an external sensor input.

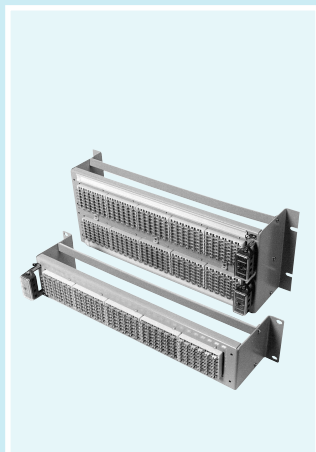
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes.

E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

Type No.	201 / 201-WA	2210-S2...-...	E2210 assembly
		 single pole	
Description	rail mounting 201 standard type 201-WA low resistance option	socket or panel mounting, toggle actuator, single or multi pole, with auxiliary contact option	type 2210-S on Euro Card for 19" rack mounting
Max. voltage rating	AC 250 V; DC 65 V	3 AC 433 V; AC 250 V; DC 65 V	3 AC 433 V; AC 250 V; DC 65 V
Current ratings	201: 0.05...16 A 201-WA: 0.05...10 A	0.1...25 A	0.1...16 A
Aux. contact rating	without auxiliary contacts	AC 240 V / DC 65 V 1 A	AC 240 V / DC 65 V 1 A
Typical life / contact rating	5,000 operations at $2 \times I_N$	10,000 operations at $1 \times I_N$	10,000 operations at $1 \times I_N$
Interrupting capacity I_{cn}	201: 0.05...0.8 A self-limiting 1...2 A 200 A 2.5...16 A 400 A 201-WA: 0.05...0.2 A self-limiting 0.3...2 A 200 A 2.5...10 A 400 A	0.1... 5 A 400 A 6 ...25 A 800 A	0.1... 5 A 400 A 6 ...16 A 800 A
Approvals	VDE, Demko, CSA, UL, LRoS	VDE, CSA, UL, Demko, Semko, BV, LRoS	
Available options	see pages 101 - 103	see pages 105 - 108	see pages 109 - 112
Dimensions			 1 single pole circuit breaker
Internal connection diagrams			

E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

19" Rack



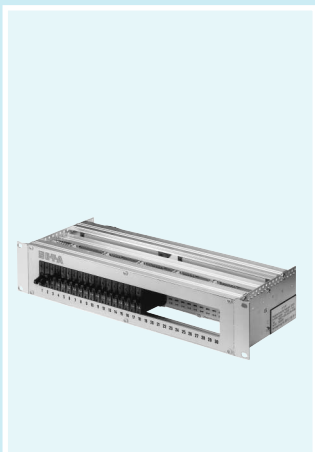
19" racks with sockets
type 63-P10-Si
(5 or 10)

AC 250 V, DC 65 V

Max. 16 A for each position

Max. 1 A for each position

Rack 19BGT2



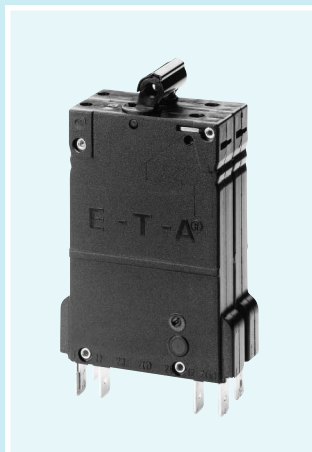
rack for max. 5 sockets
type 63-P10-Si
Prewired and auxiliary contact
options

AC 250 V, DC 65 V

Line feed: max. 63 A
Max. supply for each socket: 20 A
Max. load per position: 16 A

Line feed: max. 32 A
Max. supply for each socket: 10 A
Max. 1 A for each position

2210-S2.. for distribution rails



toggle actuator, single pole,
with auxiliary contact,
for distribution rail or
mounting socket

AC 250 V; DC 65 V

0.4...25 A

AC 240 V / DC 65 V
1 A

10,000 operations at 1xI_N

2210-S2...-410033:
AC 250 V 1000 A
DC 65 V 2000 A
or 2210-S2...-410005:
AC 250 V 2000 A
DC 65 V 3500 A

VDE, CSA, UL, Demko, Semko

Distribution rail X2210-S0606J



distribution rail for installation in
telecommunications control
cabinets, fitted with retaining
clip, extraction tool and cover

AC 250 V, DC 65 V

complete unit: max. 80 A
max. 25 A for each position

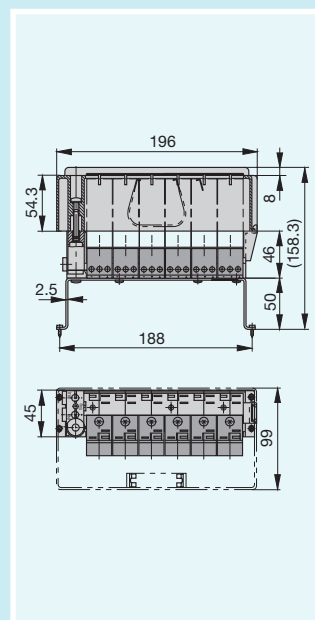
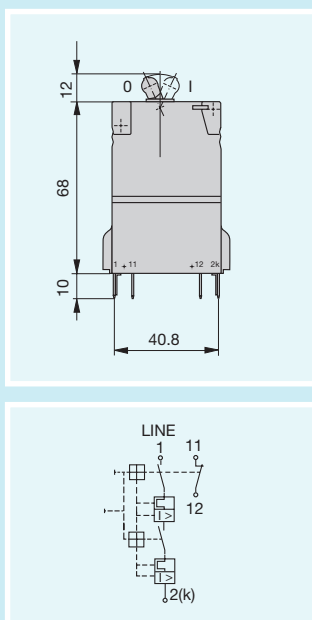
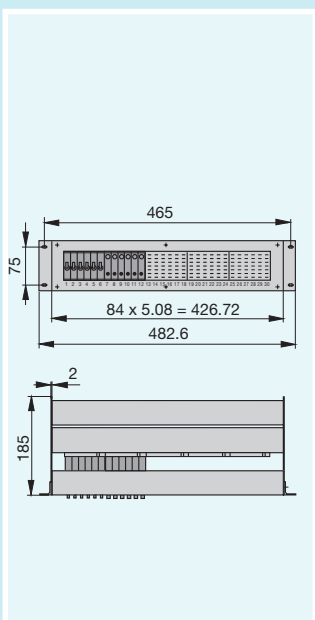
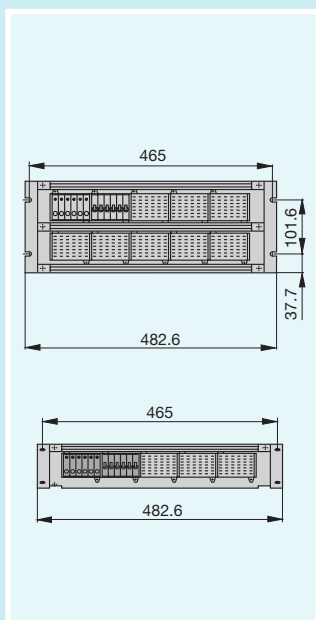
max. 1 A for each position

see pages 113 - 114

see pages 115 - 116

see pages 117 - 122

see pages 123 - 124

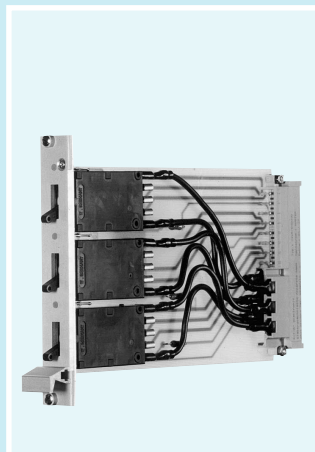


E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

Type No.	Distribution rail X2210-K...	2210-T2...-...	2215-...
		 3 pole	 2215-L1..
Description	fully insulated distribution rail for plug-in mounted circuit breakers, for telecommunications and control systems	rail mounting, toggle actuator, single or multipole, with auxiliary contact option	threadneck or PCB mounting, toggle actuator, single pole, with auxiliary contact option
Max. voltage rating	AC 250 V, DC 65 V	3 AC 433 V; AC 250 V; DC 65 V	AC 250 V; DC 48 V
Current ratings	complete unit: max. 80 A max. 25 A per position	0.1...32 A	0.05...10 A
Aux. contact rating	max. 1 A per position	AC 240 V / DC 65 V 1 A	AC 250 V / DC 28 V 1 A
Typical life / contact rating		10,000 operations at 1 x I _N	10,000 operations at 1 x I _N
Interrupting capacity I _{cn}		0.1... 5 A 400 A 6 ...32 A 800 A	300 A
Approvals		VDE, CSA, UL, BV, LRoS	VDE, CSA, UL, Semko,
Available options	see pages 125 - 129	see pages 131 - 134	see pages 135 - 137
Dimensions			
Internal connection diagrams			

E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

Circuit breaker E2215



type 2215-L on Euro Card for 19" rack mounting

2215-F1..



flange mounting, toggle actuator, double pole, with auxiliary contact option

3120-....-..M1-



rocker version

switch/circuit breaker with rocker or push button operation

3200



plug-in type with standard manual release facility

AC 250 V; DC 48 V

AC 250 V; DC 48 V

AC 250 V; DC 50 V

AC 250 V; DC 28 V

0.05...10 A

0.05...10 A

0.1...16 A

0.05...25 A

AC 250 V / DC 28 V
1 A

AC 250 V / DC 28 V
1 A

without auxiliary contacts

without auxiliary contacts

10,000 operations at $1 \times I_N$

10,000 operations at $1 \times I_N$

30,000 operations at $1 \times I_N$ 1pole
50,000 operations at $1 \times I_N$ 2pole

4,000 operations at $2 \times I_N$

300 A

600 A

0.1...2 A $100 \times I_N$
2.5...16 A 250 A 2 pole or
150 A 1 pole

0.05...0.8 A self-limiting
1...2 A 200 A
2.5...25 A 400 A

VDE, CSA, UL

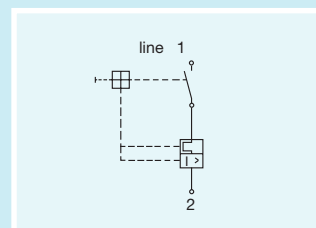
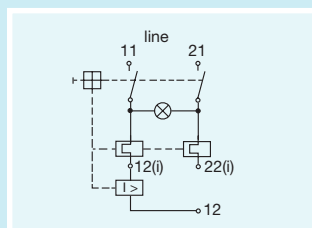
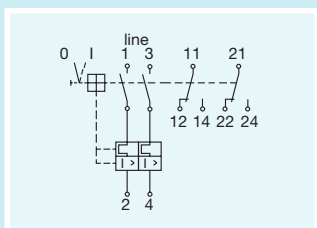
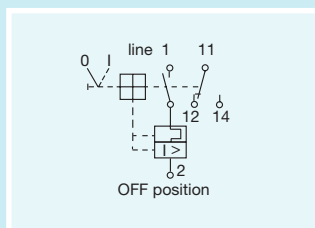
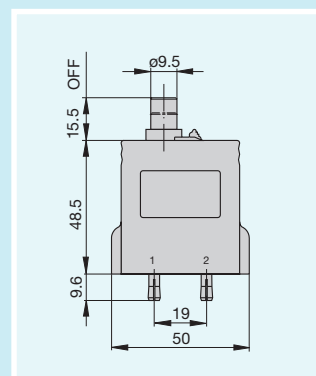
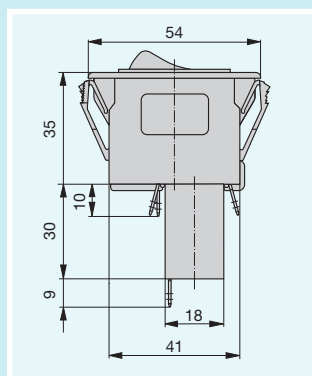
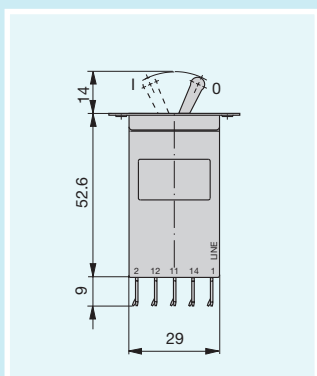
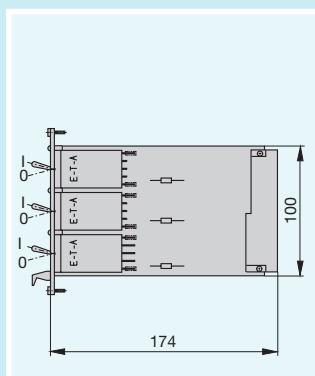
VDE, CSA, LRoS

see pages 139 - 140

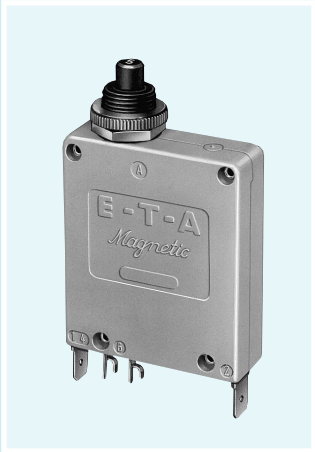
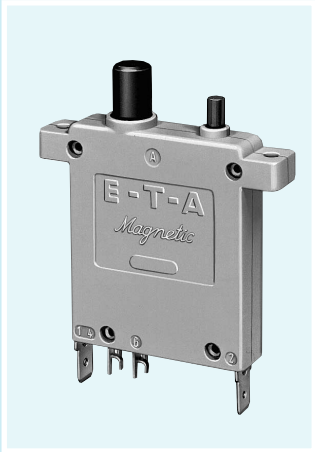
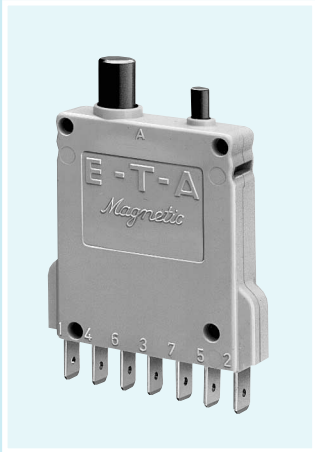
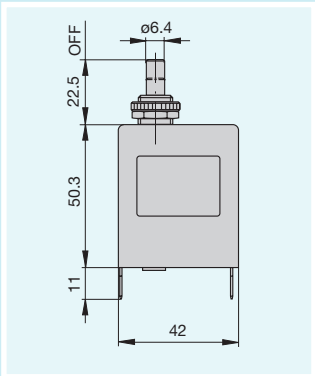
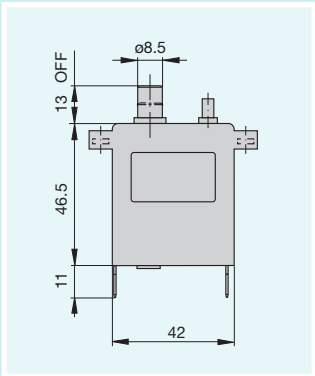
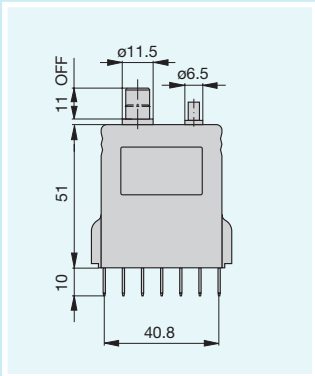
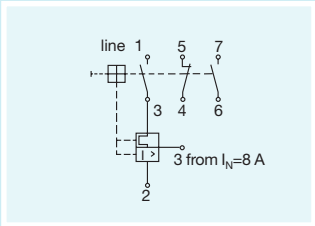
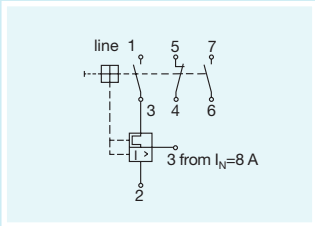
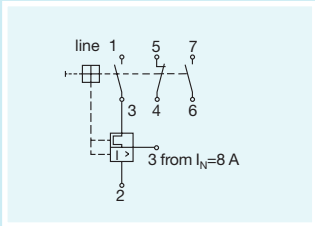
see pages 141 - 143

see pages 145 - 148

see pages 149 - 152



E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

Type No.	3300-... / 3400-...	3500-... / 4000-...	3600 / 3900-P10-Si
			
Description	threadneck panel mounting, with auxiliary contact option 3300 fast acting 3400 standard delay	flange mounting 3500 standard type with aux. contact option 4000 low resistance type with standard aux. contacts and intermediate position	socket mounting, single pole 3600 standard type with auxiliary contact option 3900 low resistance type with standard aux. contacts and intermediate position
Max. voltage rating	AC 250 V; DC 65 V	AC 250 V; DC 65 V	AC 250 V; DC 65 V
Current ratings	0.05...16 A	3500: 0.05...16 A 4000: 0.05...10 A	3600: 0.05...16 A 3900: 0.05...10 A
Aux. contact rating	AC 250 V / DC 65 V 1 A	AC 250 V / DC 65 V 1 A	AC 250 V / DC 65 V 1 A
Typical life / contact rating	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N	5,000 operations at 2 x I _N
Interrupting capacity I_{cn}	0.05...0.8 A self-limiting 1...2 A 200 A 2.5...16 A 400 A	3500: 0.05...0.8 A self-limiting 1...2 A 200 A 2.5...16 A 400 A 4000: 0.05...0.2 A self-limiting 0.3...2 A 200 A 2.5...10 A 400 A	3600: 0.05...0.8 A self-limiting 1...2 A 200 A 2.5...16 A 400 A 3900: 0.05...0.2 A self-limiting 0.3...2 A 200 A 2.5...10 A 400 A
Approvals	VDE, Demko, CSA, UL, Semko, Nemko, LRoS	VDE, Demko, CSA, UL, Semko, Nemko, LRoS	VDE, Demko, CSA, UL, Semko, Nemko, LRoS
Available options	see pages 153 - 156	see pages 157 - 160	see pages 161 - 164
Dimensions			
Internal connection diagrams			

E-T-A® Thermal-Magnetic Overcurrent Circuit Breakers

E-T-A Thermal-Magnetic Overcurrent Circuit Breakers - Selector Chart

Type No.	Mounting method					Main terminal design					Auxiliary contacts	Manual trip facility	Water splash cover	Number of poles		Illumination	Choice of characteristic curves	Max. ratings		
	threadneck	flange	socket	rail	Printed Circuit Board	blade terminals	plug-in pins	solder terminals	screw terminals	shunt terminal				single pole	multi pole			AC (V)	DC (V)	MAX I _n (A)
201				●					●			●		●				250	65	16
2210			●	●		●			●		○	●	○	●	●		●	433	65	32
2210 for distribution rail			●			●					●	●		●				250	65	25
2215	●	●			●	●		●		○	○	●		●	●		●	250	48	10
3120		●				●			○	○		●	○	●	●	○		250	50	16
3200			●				●					●		●				250	28	25
3300	●					●		●	●	○	○	○	○	●				250	65	16
3400	●					●		●	●	○	○	○	○	●				250	65	16
3500		●				●		●	●	○	○	●		●				250	65	16
3600			●			●				●	○	●		●				250	65	16
3900			●			●				●	●	●		●				250	65	10
4000		●				●		●		○	●	●		●				250	65	10

● = standard

○ = optional

E-T-A® Thermal-Magnetic Circuit Breaker 201/-WA

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. Complies with CBE standard EN 60934 (IEC 934)

Typical applications

Process control systems, instrumentation.

Accessories

X 200 409 01	Mounting adapter for asymmetric rail (G-profile).
X 210 589 01	50-way 2.5 mm ² cable links with prefitted connection lugs, black
X 210 589 02	As above but with 1.5 mm ² cable links, brown
X 221 497 00	Bus bar
X 221 498 00	Bus bar
X 221 496 00	Supply terminal for bus bar

Ordering information

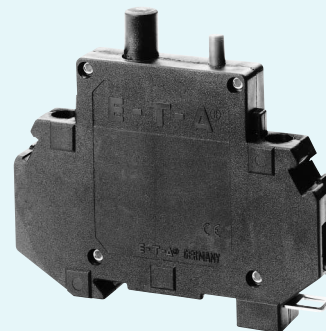
Type No.	
201	single pole, rail mounted version
201-WA	low-resistance version
Option	
2705	fitted with adapter X 200 409 01
Current ratings	
0.05...16 A	(type 201)
0.05...10 A	(type 201-WA)

201-WA - - 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)	
	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	
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			



201-...
standard type

201-WA-...
low-resistance type

Technical data

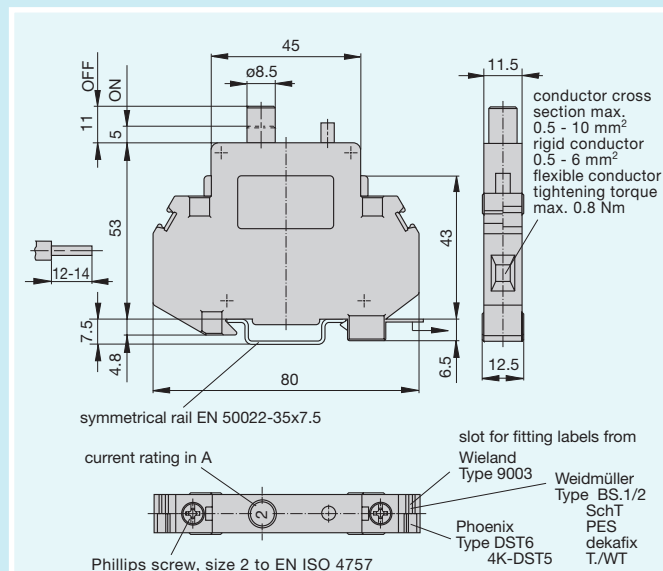
Voltage rating	AC 250 V, 50/60 Hz; DC 65 V (DC 80 V UL/CSA)		
Current rating range	201: 0.05 ... 16 A 201-WA: 0.05...10 A		
Typical life	5,000 operations at 2xI _N		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	201	201-WA	
	0.05...0.8 A 1...2 A 2.5...16 A	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	U _N	
	0.05...16 A 0.05...16 A	AC 250 V DC 80 V	1000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 20		
Vibration	5 g (57-500 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca		
Mass	approx. 60 g		

Approvals

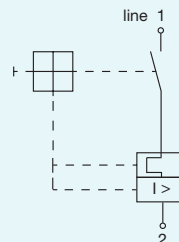
Authority	Voltage ratings	Current ratings
VDE, Demko,	AC 250 V, DC 65 V	0.05...16 A
CSA, UL	AC 250 V, DC 80 V	0.05...16 A
LROs	AC 250 V, DC 65 V	0.3...16 A

ET-A® Thermal-Magnetic Circuit Breaker 201/-WA

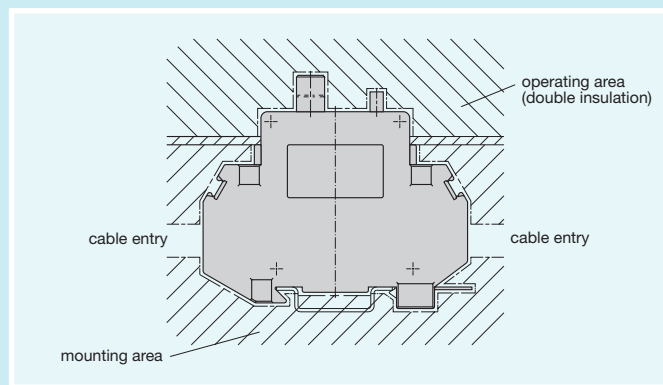
Dimensions



Internal connection diagram



Installation drawing for protection class II (IEC 730-1)



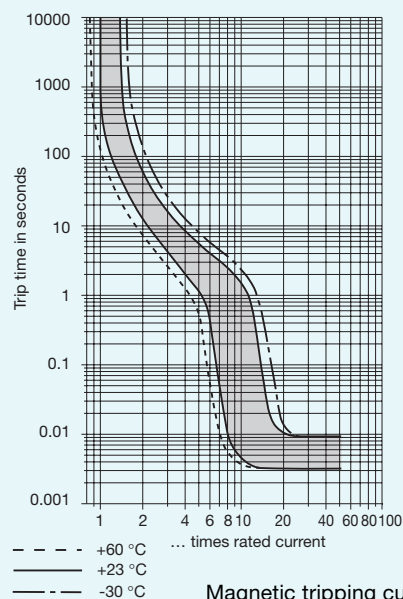
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Typical time/current characteristics

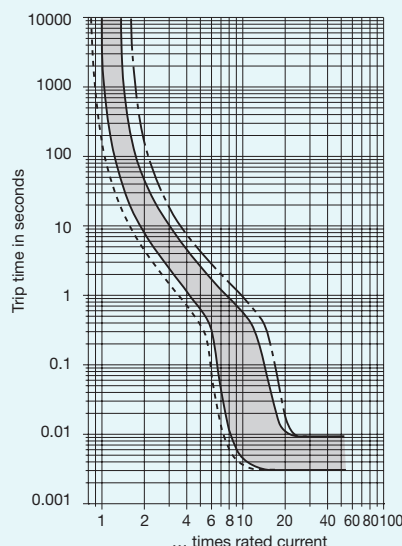
Type 201 0.05...7 A

AC



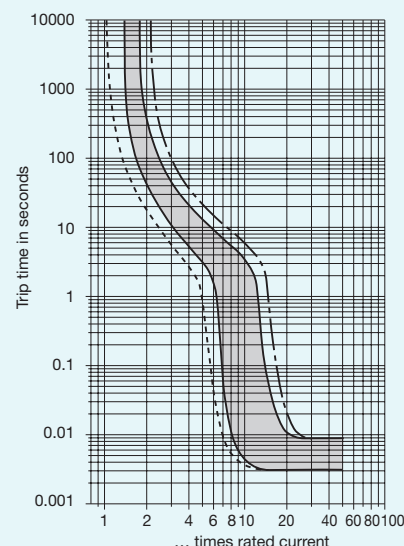
Type 201 8...16 A

AC



Type 201-WA 0.05...10 A

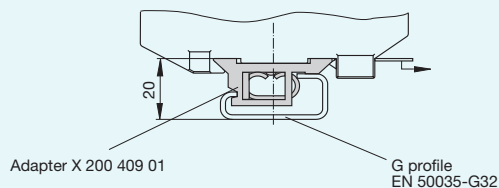
DC



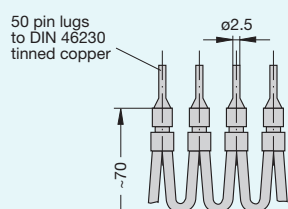
Magnetic tripping currents are decreased by 20 % on AC supplies.

Accessories

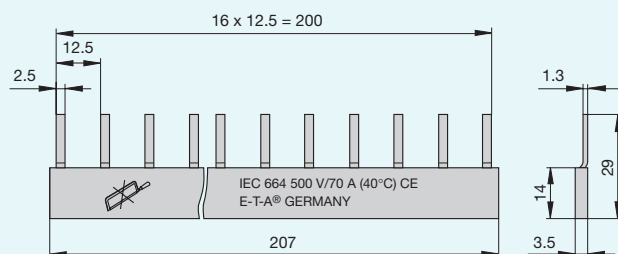
Adapter for EN rail 50035-G32 specified as a separate item
X 200 409 01



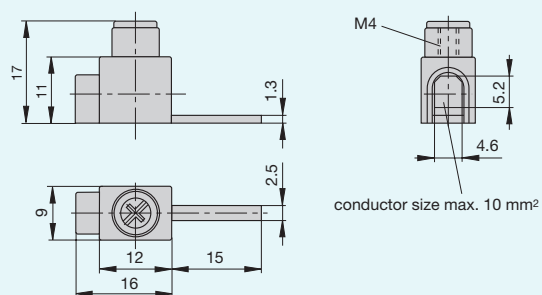
Connector bus links -K10
X 210 589 01/2.5 mm² (black)
X 210 589 02/1.5 mm² (brown)



Bus bar
X 221 498 01



Supply terminal for bus bar
X 221 496 01



E-T-A® Thermal-Magnetic Circuit Breaker 2210-S..

Description

One, two and three pole thermal-magnetic circuit breakers with trip-free, snap action 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 and fitted with an unprotected shunt tap terminal as standard. 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. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

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

Ordering information

Type No.	
2210	single or multi pole thermal-magnetic circuit breaker
Mounting	
S socket or panel mounting	
Actuator design	
2 toggle	
Number of poles	
1 1 pole protected	
2 2 pole protected	
3 3 pole protected	
4 4 pole protected	
5 2 pole, protected on one pole only	
Panel mounting	
0 without hardware	
1 with M3 thread	
2 with 6/32 thread	
Terminal design (main contacts)	
P1 blade terminals 6.3-0.8	
Characteristic curve	
F1 fast acting: therm. 1.01-1.4xI _N ; magn. 2-4xI _N DC (DC only)	
M1 standard delay: therm. 1.05-1.4xI _N ; magn. 6-12xI _N AC; 7.8-15.6xI _N DC	
T1 delayed: therm. 1.01-1.4xI _N ; magn. 10-20xI _N AC	
T2 thermal only, 1.01-1.4xI _N	
M3 standard delay, low resistance: therm. 1.4-1.8xI _N ; magn. 6-12xI _N AC; 7.8-15.6xI _N DC	
Intermediate position	
H without intermediate position (standard)	
Z with intermediate position	
Auxiliary contacts	
0 without auxiliary contacts	
1 with auxiliary contacts in all poles	
2 with auxiliary contacts in pole 1 (only multi pole devices)	
3 with auxiliary contacts in poles 1 and 3 (≥3 pole devices)	
Auxiliary contact function	
1 one each N/C and N/O (standard)	
2 one N/O contact (23/24)	
3 one N/C contact (11/12)	
4 one N/O contact, closed in the intermediate and ON position	
Auxiliary contact - terminal design	
1 same as main terminals	
Current ratings	
0.1...25 A	

2210-S 2 1 0 - P1 F1 - Z 1 1 1 - 10 A ordering example

Remote trip coil available to special order.



2210-S2...

Technical data

Voltage rating	AC 250 V; 3 AC 433 V (50-60 Hz); DC 65 V (higher voltages to special order)				
Current rating range	0.1...25 A for curves M1, T1, T2 0.1...16 A for curves F1, M3				
Auxiliary circuit	1 A, AC 240 V/DC 65 V				
Typical life	10,000 operations at 1xI _N				
Ambient temperature	-30...+60 °C (T 60)				
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2,5 kV	Pollution degree 2	reinforced insulation in operating area		
Dielectric strength (IEC 664 and 664A) operating area main/aux. circuit aux. circuit 11-12/23-24 pole/pole	Test voltage AC 3000 V AC 1500 V AC 1000 V AC 1500 V				
Insulation resistance	> 100 MΩ (DC 500 V)				
Interrupting capacity I _{cn}	0.1...5 A 400 A; 6...25 A 800 A Curve T2 : 0.1...25 A 15xI _N Curve M3: 0.1... 2 A AC 200 A				
Interrupting capacity (UL 10771)	I _N	0.1...8 A	10...16 A	20A	0.1...20 A
	U _N	AC 250 V	AC 125 V	AC 250 V	DC 65 V
	1 pole	1000 A	2000 A	3500 A	2000 A
	2 pole	2000 A	2000 A	3500 A	2000 A
	3 pole	2000 A	3AC 250V 2000 A	3AC 250V 2000 A	3AC 216V 3500 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00				
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 68-2-6, 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 68-2-27, Test Ea				
Corrosion	96 hours in 5 % salt mist to IEC 68-2-11, Test Ka				
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca				
Mass	approx. 50 g per pole				

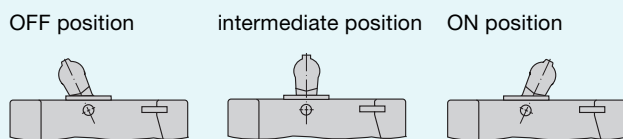
Dimensions 2210-S...

Current rating (A)	Internal resistance (Ω)				
	F1 fast acting	M1 standard delay for AC + DC	T1 delayed for AC	M3 standard delay for AC + DC	T2 thermal for AC + DC
	for DC				
0.1	162	92	81	42	77
0.2	39.3	26.1	24.2	11.7	23
0.3	17.5	11.6	10.4	5.6	10.2
0.4	9.2	6.6	6.0	2.9	5.7
0.5	6.8	4.1	3.9	1.75	3.7
0.6	4.2	3	2.7	1.42	2.6
0.8	2.8	1.65	1.53	0.75	1.39
1	1.6	1.10	0.98	0.5	0.9
1.5	0.78	0.47	0.42	0.22	0.36
2	0.42	0.28	0.24	0.136	0.19
2.5	0.26	0.183	0.17	0.083	0.141
3	0.18	0.124	0.12	0.057	0.091
4	0.12	0.077	0.073	0.041	0.051
5	0.092	0.063	0.055	0.032	0.040
6	0.054	0.045	0.039	0.021	0.027
8	0.025	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
10	0.022	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
20	-	≤ 0.02	≤ 0.02	-	≤ 0.02
25	-	≤ 0.02	≤ 0.02	-	≤ 0.02

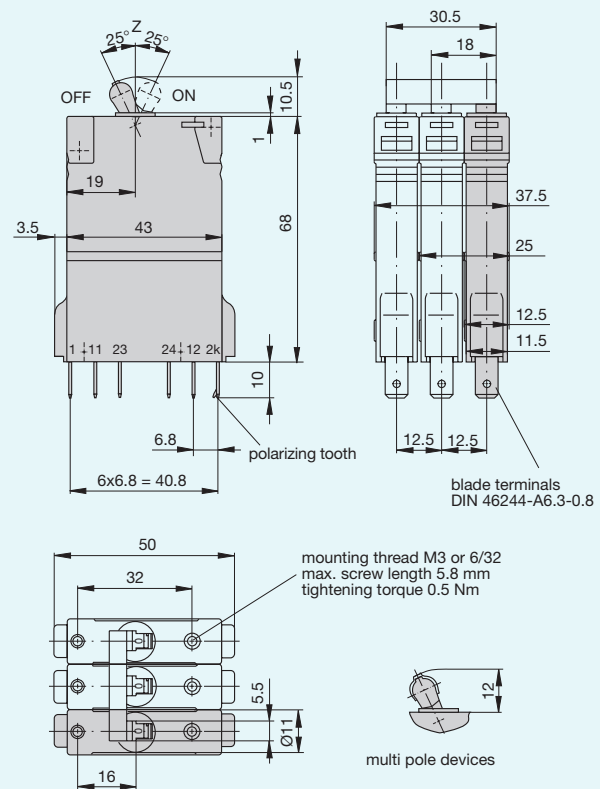
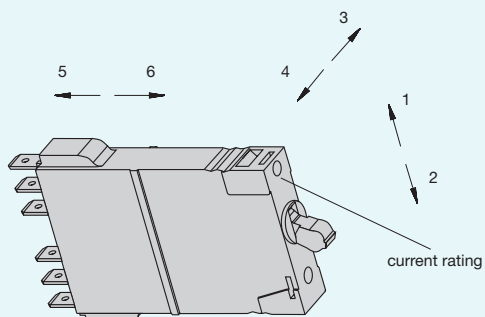
Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V, DC 65 V	
	3 AC 433 V	0.1...25 A
UL, CSA	AC 250 V, DC 65 V	0.1...25 A
Demko, Semko	AC 250 V, DC 65 V	0.1...16 A
LRoS, BV	3 AC 415 V,	
	AC 250 V, DC 65 V	0.1...20 A

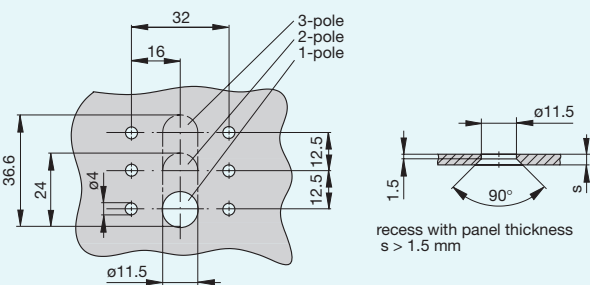
Toggle positions



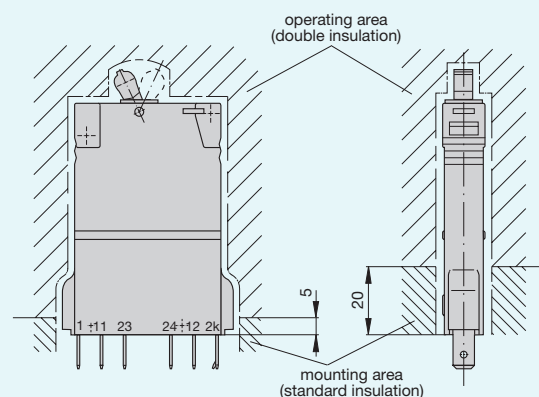
Shock directions



Cut-out dimensions 2210-S2...



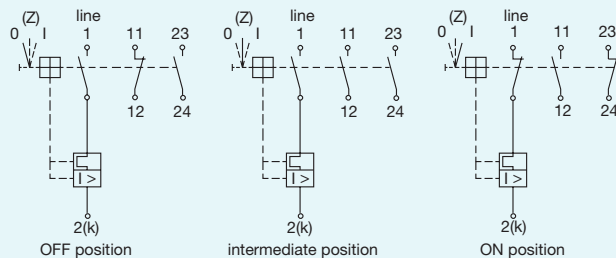
Installation drawing 2210-S2..



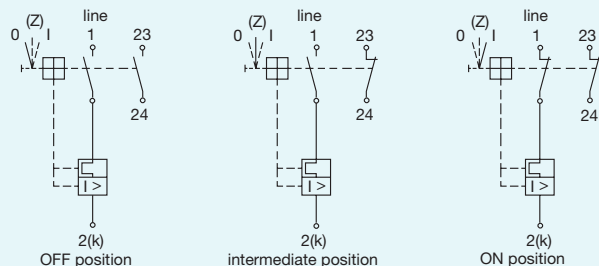
ET-A Thermal-Magnetic Circuit Breaker 2210-S..

Internal connection diagrams

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

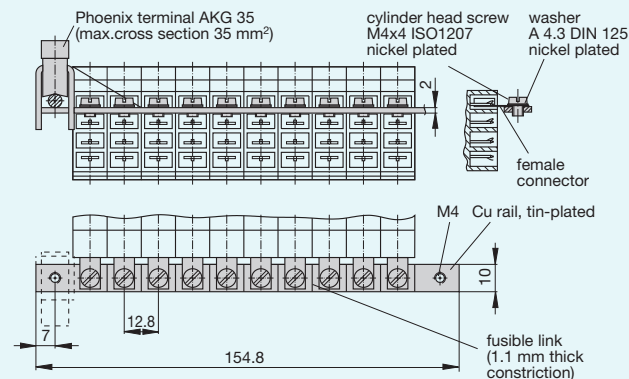


with auxiliary contact function 4

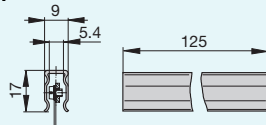


Accessories for mounting sockets

Bus bar for type 17 socket (for max. 100 A continuous load)
X 211 157 01 with terminal
X 211 157 02 without terminal

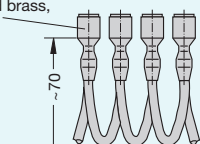


Insulated sleeving for bus bar
Y 303 824 01



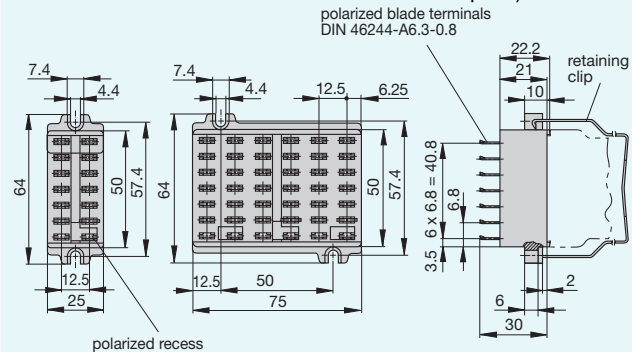
Connector bus links -P10
X 210 588 01/1.5mm² brown
X 210 588 02/2.5mm² black
X 210 588 03/2.5mm² red
X 210 588 04/2.5mm² blue

100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



Accessories for 2210-S...

2-way mounting socket 63-P10-Si (retaining clip Y 302 974 01 available on request)
23-P10-Si



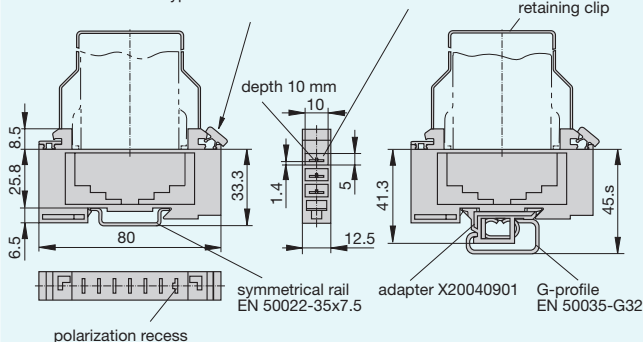
Single mounting sockets

17-P10-Si (retaining clip Y 302 974 02 available on request)

slot fitting labels from
Phoenix ZB, RBS, DST
Weidmüller dekafix, BS, PES
Wieland Type 9003

with adapter
17-P10-Si-20025

polarized blade terminals
DIN 46244-A6.3-0.8



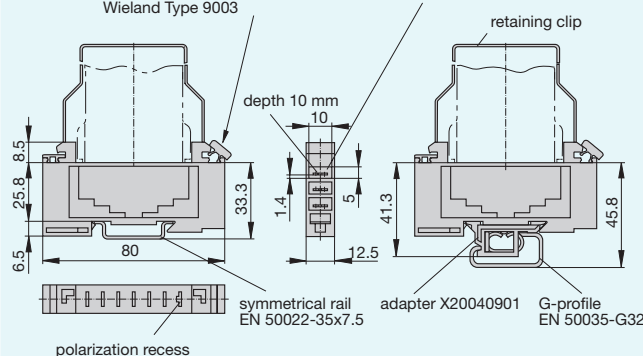
Single mounting sockets

17-P70-Si (retaining clip Y 302 974 02 available on request)

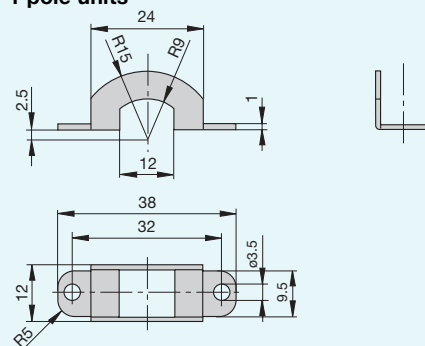
slot fitting labels from
Phoenix ZB, RBS, DST
Weidmüller dekafix, BS, PES
Wieland Type 9003

with adapter
17-P70-Si-20025

blade terminals DIN 46244 part 2
C profile (2x2.8-0.8)



Toggle guard for 1 pole units
X 221 617 01



Typical time/current characteristics

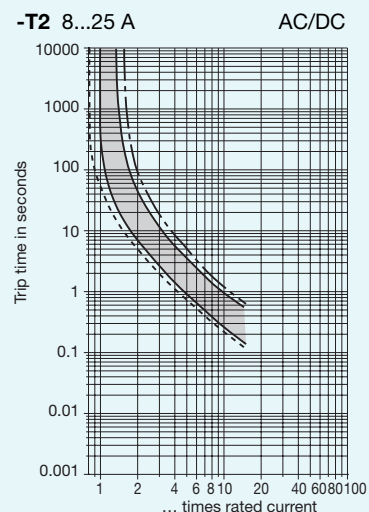
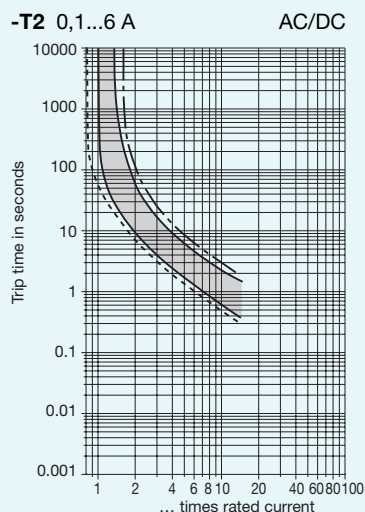
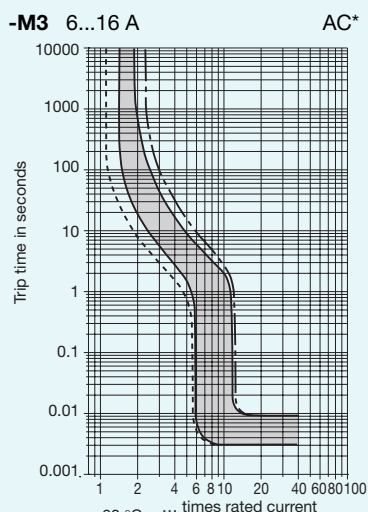
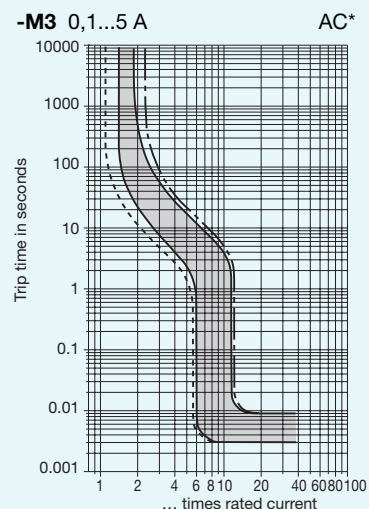
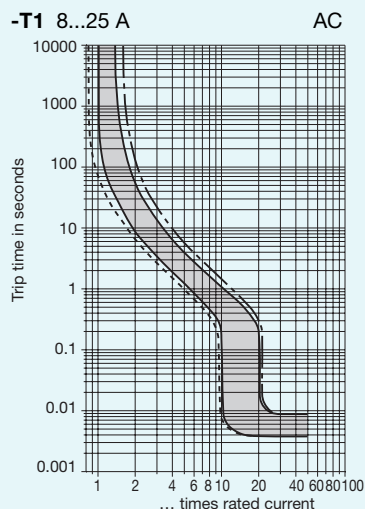
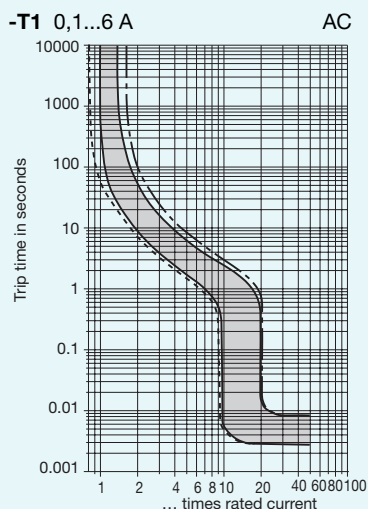
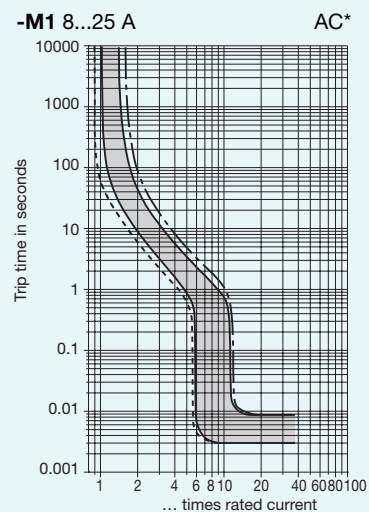
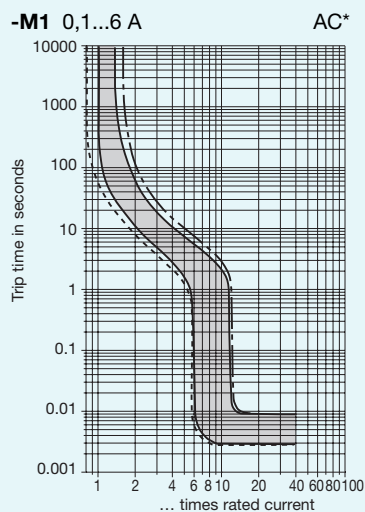
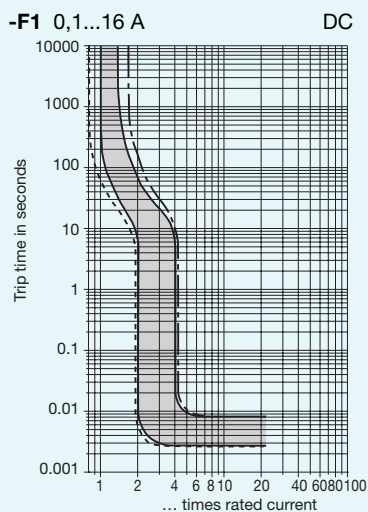
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.76	0.79	0.83	0.88	0.93	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, M1 and T2, and at max. $2.2 \times I_N$ with curve M3.

N.B.

* Magnetic tripping currents are increased by 30% on DC supplies.



- - - - +60 °C
 ——— +23 °C
 - - - - -30 °C

E-T-A® Thermal-Magnetic Circuit Breaker E2210-...

Description

Thermal-magnetic circuit breaker mounted on Euro Card for 19" rack mounting, with one Euro Card accommodating one or two single pole, double pole or three pole circuit breakers. Convenient toggle actuation enables series 2210 additionally to be used as an ON/OFF switch. A red LED is located in the front frame of the Euro Card, indicating the switching status of the circuit breaker (via the auxiliary circuit).

Typical applications

Process control, measuring and control systems, telecommunications.



Technical data

Circuit breaker

Main circuit:	
voltage rating	3 AC 433V; 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 TE = 5.08 mm, 1 HE = 44.45 mm)	
Width: one single pole circuit breaker	4 TE
one double pole circuit breaker	6 TE
one three pole circuit breaker	9 TE
two single pole circuit breakers	4 TE
two double pole circuit breakers	10 TE
two three pole circuit breakers	12 TE
Height:	3 HE
Material:	aluminium, anodized

LED

Voltage rating	DC 24 V / DC 60 V
----------------	-------------------

E-T-A® Thermal-Magnetic Circuit Breaker E2210-...

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																				
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																				
Characteristic curve **)																				
01 F1 fast acting: therm. 1.01-1.4xI _N ; magn. 2-4xI _N DC (DC only)																				
02 M1 standard delay: therm. 1.01-1.4xI _N ; magn. 6-12xI _N AC; 7.8-15.6xI _N DC																				
03 T1 delayed: therm. 1.01-1.4xI _N ; magn. 10-20xI _N AC																				
04 T2 thermal only, 1.01-1.4xI _N																				
05 M3 standard delay, low resistance: therm. 1.4-1.8xI _N AC; magn. 6-12xI _N AC; 7.8-15.6xI _N DC																				
XX different curves for multi pole 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																				
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																				

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

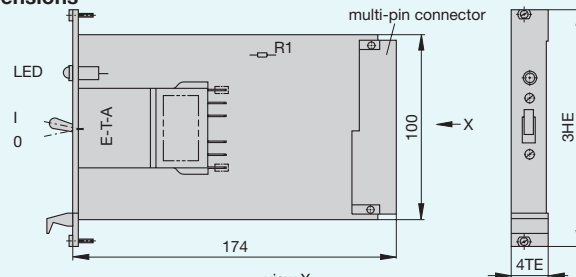
*) Clearly add the desired specifications.

**) With mounting styles 6, 7 and 8: both circuit breakers must have the same characteristics.

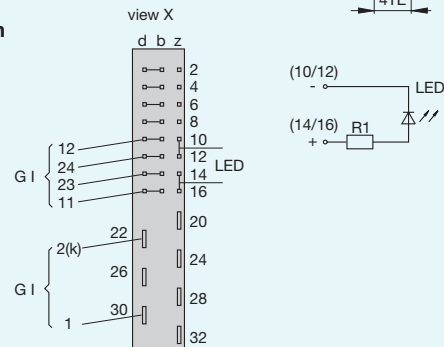
***) It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

One single pole circuit breaker

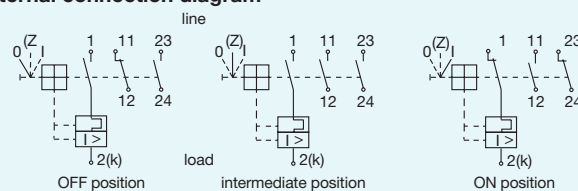
Dimensions



Terminal selection

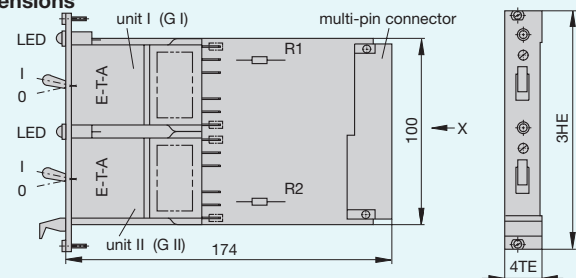


Internal connection diagram

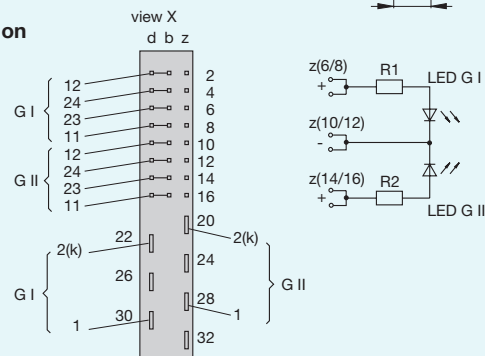


Two single pole circuit breakers

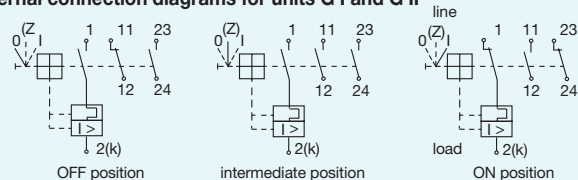
Dimensions



Terminal selection



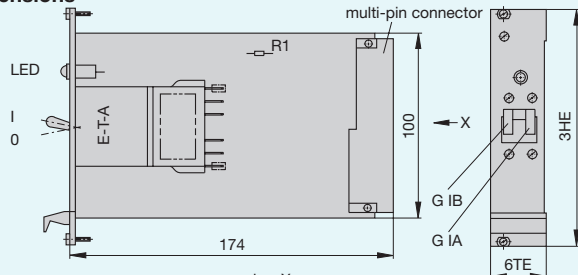
Internal connection diagrams for units G I and G II



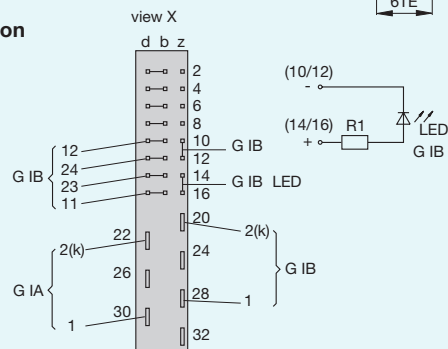
E-T-A® Thermal-Magnetic Circuit Breaker E2210-...

One double pole circuit breaker

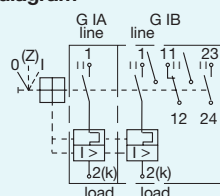
Dimensions



Terminal selection

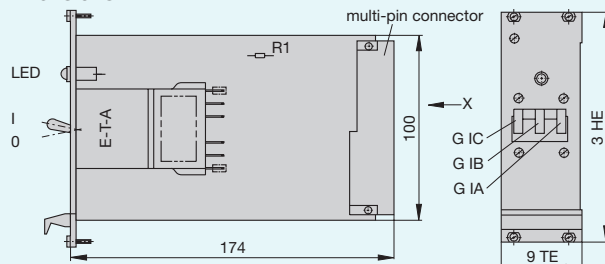


Internal connection diagram

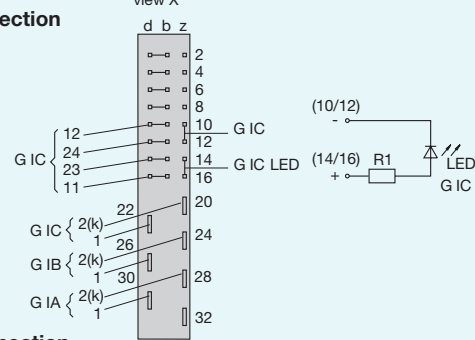


One three pole circuit breaker

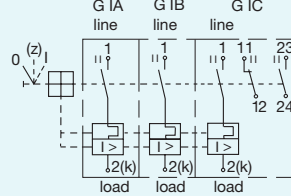
Dimensions



Terminal selection

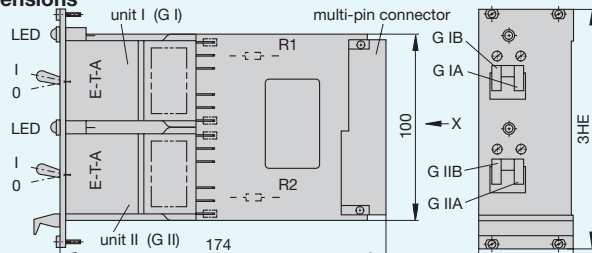


Internal connection diagram

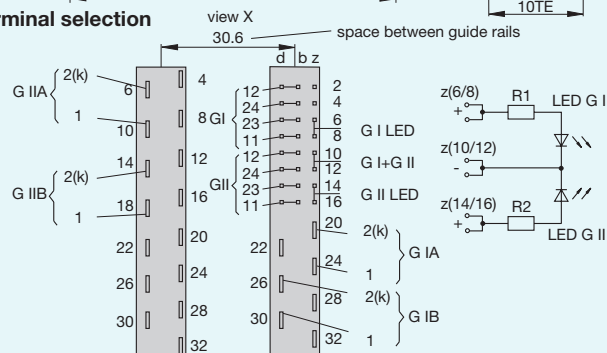


Two double pole circuit breakers

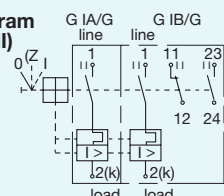
Dimensions



Terminal selection

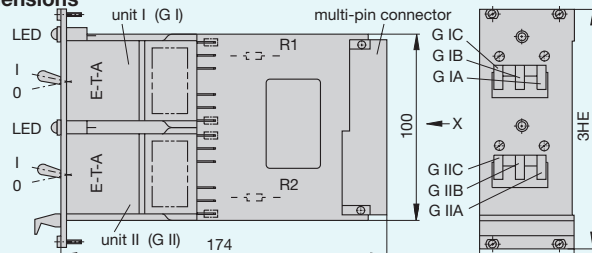


Internal connection diagram for units 1 (G I) and 2 (G II)

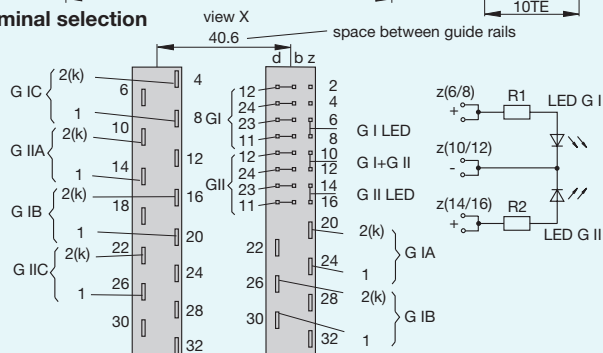


Two three pole circuit breakers

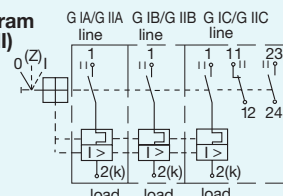
Dimensions



Terminal selection



Internal connection diagram for units 1 (G I) and 2 (G II)



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

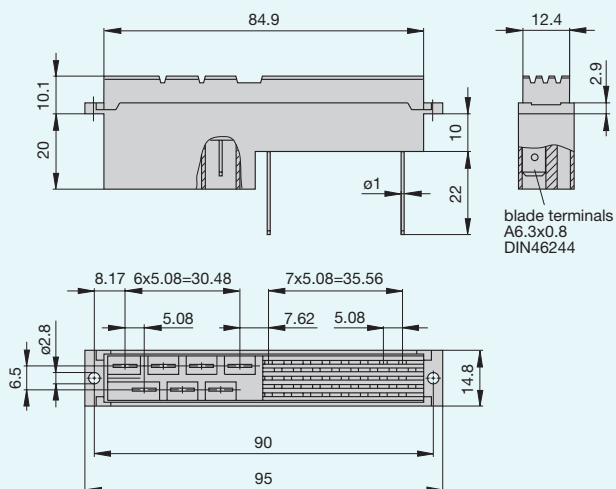
24/7 pole mixed socket to DIN 41612 - form M.
Connection: 7 pole for 6.3x0.8 mm connectors
and 24 pole for 2.8x0.8 mm connectors.

OZ041Z000005

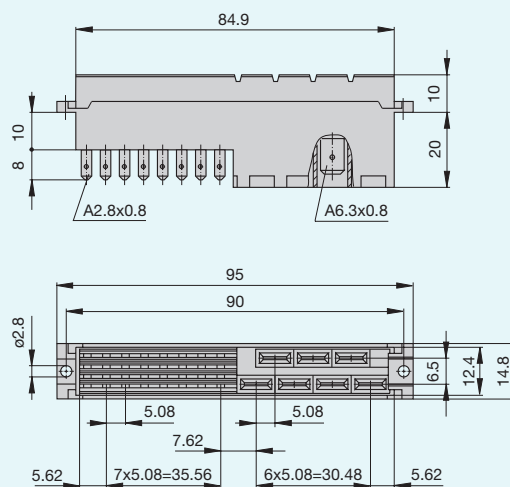
A 15 pole socket to DIN 41612, form H, for 6.3 x 0.8 mm connectors is required in addition to the socket mentioned above, if two double pole or two three pole circuit breakers are fitted on one Euro Card.

Dimensions of sockets for Euro Cards

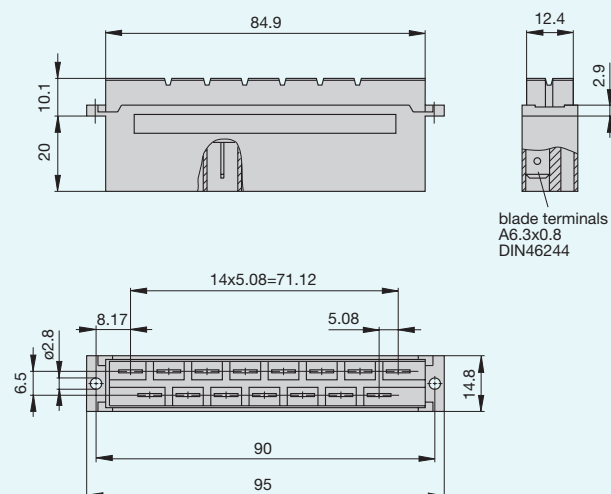
OZ041Z000004



OZ041Z000007

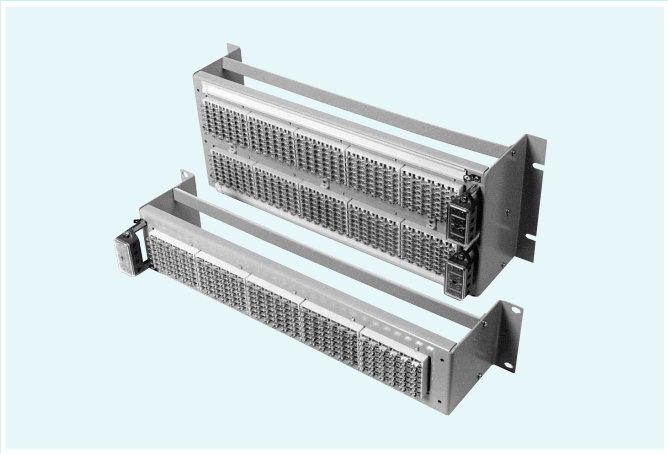


OZ041Z000005



Description

19" rack 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. Three rack sizes are available.



Typical applications

Circuit breakers that may be accommodated on 19" racks fitted with E-T-A sockets 63-P10-Si:

- type 2210 see pages 105 - 108
- type 3600 see pages 161 - 164
- type 3900 see pages 161 - 164

Technical data

Type No.	Height (1 HE = 44.45 mm)
X 201 096 01	4 HE
X 201 097 01	4 HE
X 211 530 01	2 HE
Material:	The 19" rack and the mounting flanges are made of 2 mm thick steel sheet.
Colour:	RAL 7032, grey

Ordering information

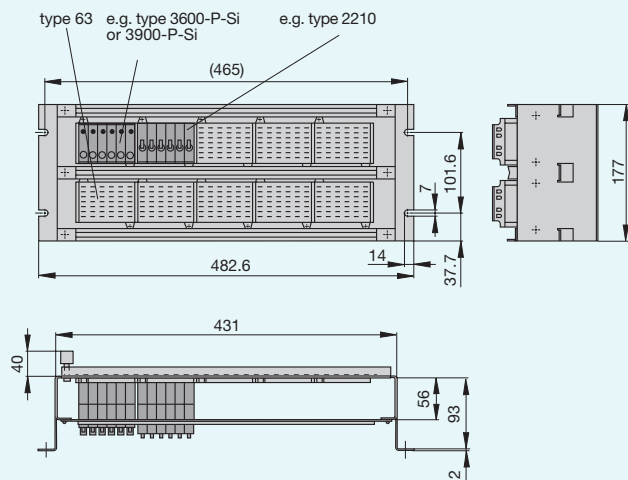
X 201 097 01	for 10 E-T-A terminal blocks 63-P10-Si
X 211 530 01	for 5 E-T-A terminal blocks 63-P10-Si
X 201 096 01	for 9 E-T-A terminal blocks 63-P10-Si plus 1 fuse holder

Connection

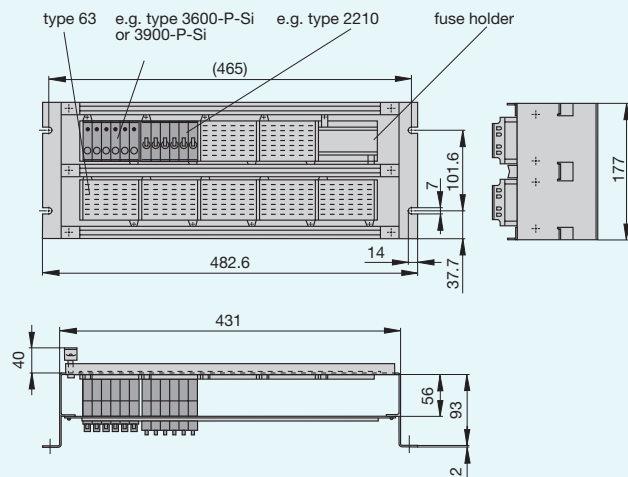
by means of one or two 4 pole female multi-pin connectors for max 4 mm² cables, which may be connected either on the right or left side of the rack.

Dimensions

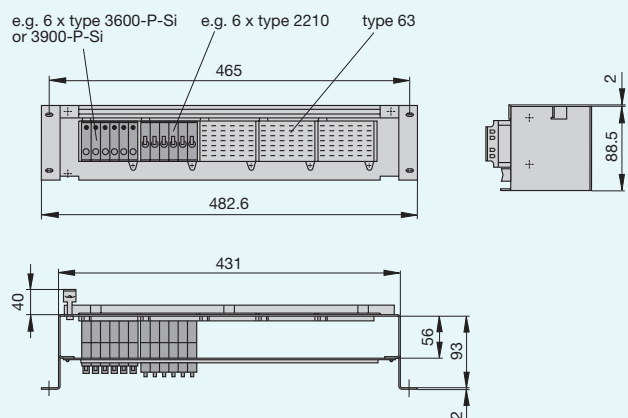
X 201 097 01 19" rack with 10 E-T-A sockets 63-P10-Si



X 201 096 01 19" rack with 9 E-T-A sockets 63-P10-Si plus one fuse holder



X 211 530 01 19" rack with 5 E-T-A sockets 63-P10-Si



Accessories

Connector bus links -P10

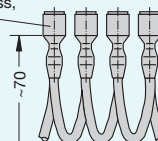
X 210 588 01/1.5mm², brown

X 210 588 02/2.5mm², black

X 210 588 03/2.5mm², red

X 210 588 04/2.5mm², blue

100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



E-T-A® 19BGT2 19" Rack

Description

The compact 19" rack features aluminium profiled cross members with an anodized front plate. The panel cutout accommodates up to 30 positions numbered 1 through 30. Blanks cover unused positions, with 6, 12, 24 or 30 being "open".

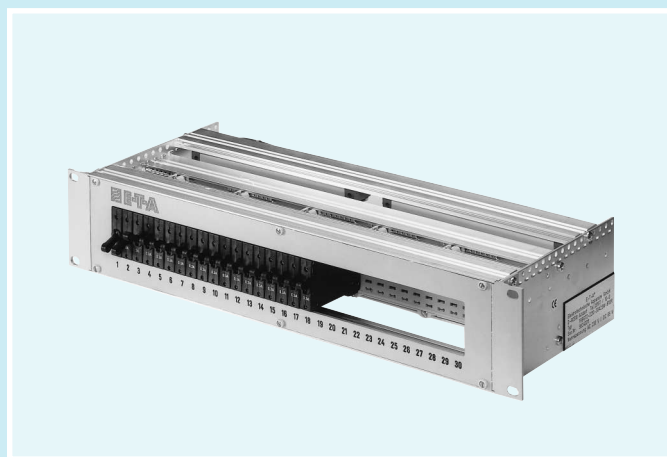
The rack can be fitted with plug-in type circuit breakers 3600/3900, 2210 or E-T-A Solid State Remote Power Controller (SSRPC) E-1048-600. Please specify the correct option according to the ordering information shown, as different depths must be allowed for.

Four bus bars (X1...X4) with 10 positions each (6.3 mm blade terminals) provide easy terminal connection.

Prewired options available ex factory are:

- Parallel connected feed (2.5 mm²) with separate supply for each socket via bus bars X1 and X2.
Choice of wiring colours: black, red, blue, grey. Outputs are not connected.
- Parallel connected auxiliary contacts (N/C) grouped per socket, 0.75 mm², via bus bars X3 (supply) and X4 (signalisation).
Choice of wiring colours: black, red, blue, grey.
- Series connected auxiliary contacts (N/O) of all positions with 0.75 mm², via bus bars 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, custom designed markings etc., are available to special order.



Technical data

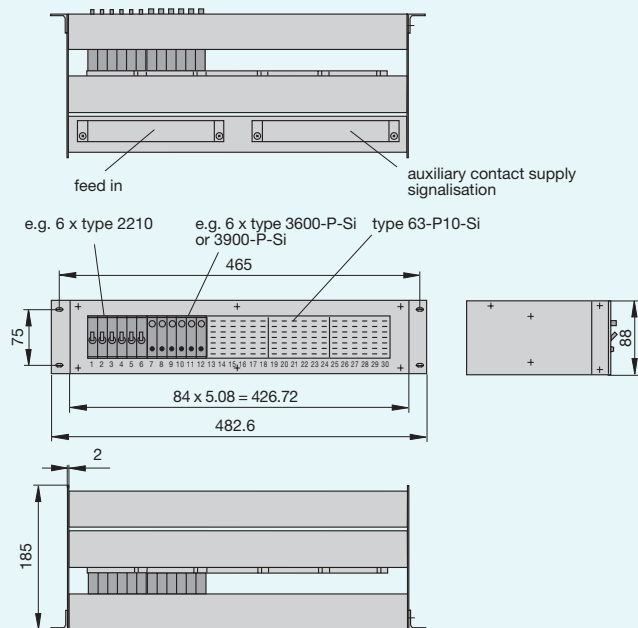
19" rack	length: 84 TE total length: 426.72 mm height: 2 HE total height: 88.90 mm depth: 184 mm material: aluminium, anodized
Front cutout for 30 positions, numbered 1 through 30	1 socket = 6 positions (No. 1 - 6) 2 sockets = 12 positions (No. 1 - 12) 3 sockets = 18 positions (No. 1 - 18) 4 sockets = 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
Bus bars Feed (X1, X2)	10-way for 6.3 mm blade terminals max. current rating: 63 A
Bus bars Auxiliary contacts (X3, X4)	10-way for 6.3 mm blade terminals max. current rating: 32 A
Feed	HO7VK cables 2.5 mm ² with fully insulated 6.3 mm blade terminals to VBG 4 one cable per socket max. current rating: 20 A
Auxiliary contact wiring	HO7VK cables 0.75 mm ² with fully insulated 6.3 mm blade terminals to VBG 4 max. current rating: 20 A
Wire colour option	black, red, blue, or grey
Voltage rating	AC 250 V/DC 65 V
Housing ground/earth	on the inner side via 6.3 mm blade terminals

Ordering information

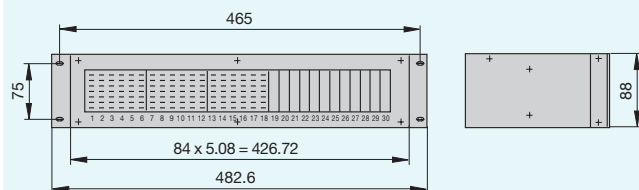
Type No.
19BGT 19"-rack
Height
2 2 HE = 88.90 mm
Circuit breaker types (prepared)
2210 for circuit breaker type 2210
3600 for circuit breaker type 3600
1048 for SSRPC E-1048-600
Number of positions
06 6 poles
12 12 poles
18 18 poles
24 24 poles
30 30 poles
Feed prewired
A0 without
A2 feed prewired (2.5 mm ²)
Wire colour
SW black
RT red
BL blue
GR grey
Auxiliary contacts prewired (0.75 mm ²)
B0 without
B1 aux. contacts connected in series (not for E-1048-600)
B2 aux. contacts connected in parallel
Wire colour
SW black
RT red
BL blue
GR grey

19BGT 2 - 2210 - 24 A2 SW - B1 RT ordering example

Dimensions

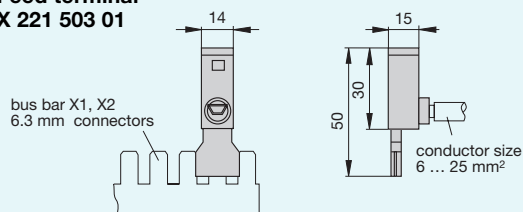


Example: Version for 18 positions

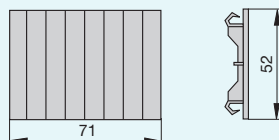


Accessories

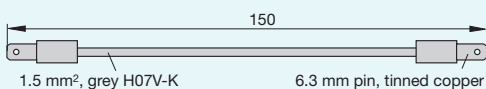
Feed terminal X 221 503 01



Blanks (can be separated) Y 306 485 01



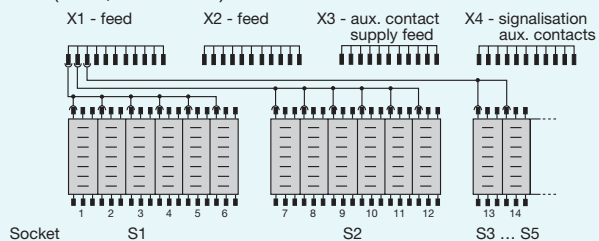
Plug-in jumper X 221 544 01



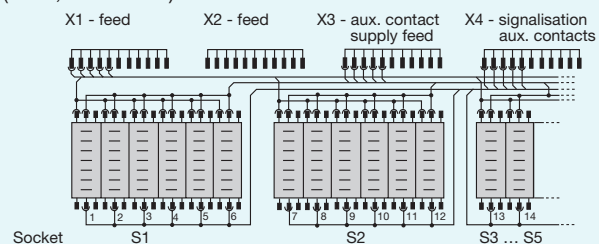
to bypass the auxiliary contacts of sockets not used

Terminals

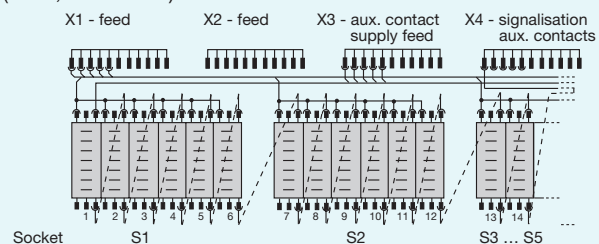
Feed (2210, 3600/3900)



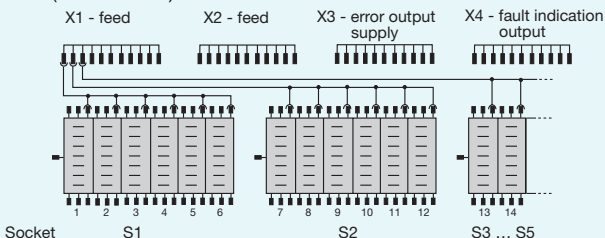
Feed with auxiliary contacts connected in parallel (2210, 3600/3900)



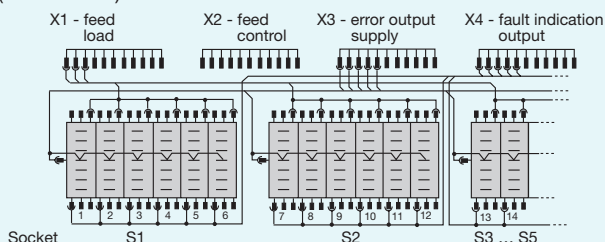
Feed with auxiliary contacts connected in series (2210, 3600/3900)



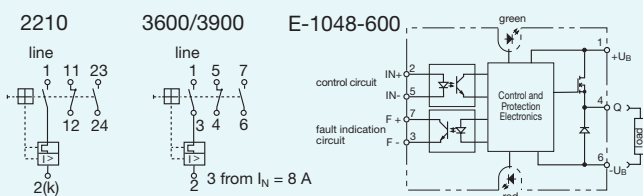
Feed (E-1048-600)



Feed with fault outputs connected in parallel (E-1048-600)



Internal connection diagrams



Description

Single pole thermal-magnetic circuit breaker with trip-free, snap action 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 rails X 2210-S0606J, X 2210-K... or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005.

Typical applications

Communications systems, power supplies, process control equipment.

Accessories

23-P10-Si-202005	Lug mounted socket which accommodates one single pole two-chamber type 2210 circuit breakers. With push-on terminals.
63-P10-Si-202005	Lug mounted socket which accommodates 3 single pole two-chamber type 2210 circuit breakers. With push-on terminals.
X 2210-S0606J	Terminal rail
X 2210-KA303 E	3-way terminal blocks
X 2210-K0404 E	4-way terminal blocks
X 2210-K0505 E	5-way terminal blocks
X 2210-K0606 E	6-way terminal blocks
X 2210-K0707 E	7-way terminal blocks
X 2210-K0808 E	8-way terminal blocks
X 2210-K0909 E	9-way terminal blocks
X 211 018 01	Tool to aid withdrawal of circuit breakers from terminal blocks.

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_N continuous load

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V, DC 65 V	1...25 A
Demko/Semko	AC 250 V, DC 65 V	1...16 A
CSA/UL	AC 250 V, DC 65 V	1...25 A



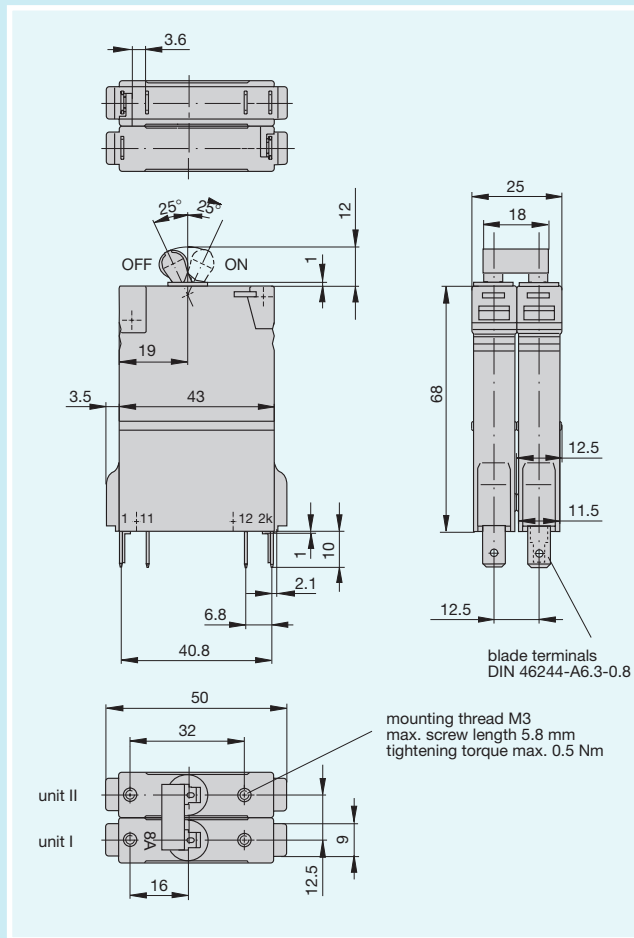
2210-S291-P9M2-410033-... A

Technical data

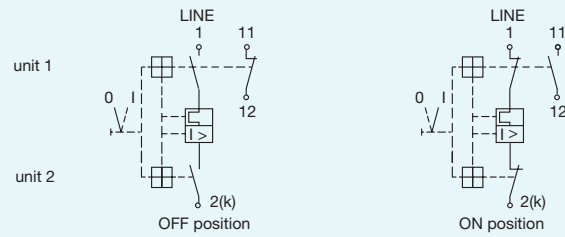
Voltage rating	AC 250V; DC 65V	
Current rating range	1...25 A	
Auxiliary circuit	1 A, AC 240 V/DC 65 V resistive load	
Typical life	> 10,000 operations at 1 x I _N > 20,000 operations mechanical	
Ambient temperature	-30°C...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area main to aux. circuit	Test voltage AC 3000 V AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 250 V 1000 A cosφ = 0.8 DC 65 V 2000 A L/R = 4 ms	
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00	
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 68-2-6, Test Fc 10 frequency cycles/axis	
Shock	25 g (11ms) directions 1, 2, 3, 4, 5 20 g (11 ms) direction 6 to IEC 68-2-27, Test Ea	
Corrosion	96 hours in 5 % salt mist to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca	
Mass	approx. 80 g	

Thermal-Magnetic Circuit Breaker 2210-S291-P9M2-410033-...A

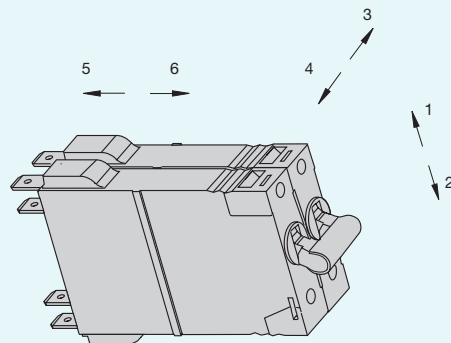
Dimensions



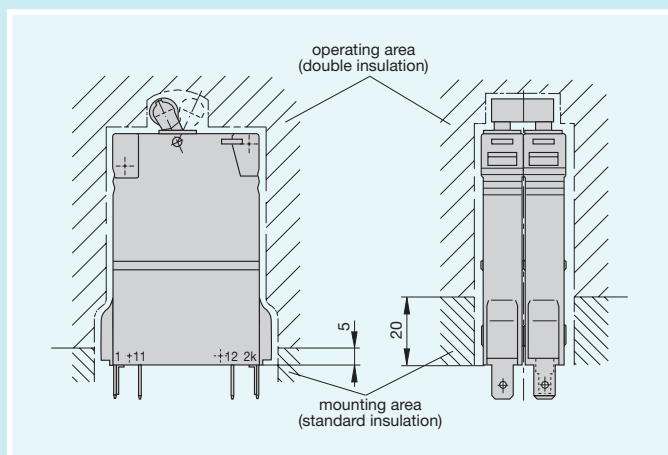
Internal connection diagrams



Shock directions



Installation drawing



Description

Single pole thermal-magnetic circuit breaker with trip-free, snap action 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 rails X 2210-S0606J, X2210-K... or terminal blocks 23-P10-Si-202005 and 63-P10-Si-202005.

Typical applications

Communications systems, power supplies, process control equipment.

Accessories

23-P10-Si-202005	Lug mounted socket which accommodates one single pole two-chamber type 2210 circuit breakers. With push-on terminals.
63-P10-Si-202005	Lug mounted socket which accommodates 3 single pole two-chamber type 2210 circuit breakers. With push-on terminals.
X 2210-S0606J	Terminal rail
X 2210-KA303 E	3-way terminal blocks
X 2210-K0404 E	4-way terminal blocks
X 2210-K0505 E	5-way terminal blocks
X 2210-K0606 E	6-way terminal blocks
X 2210-K0707 E	7-way terminal blocks
X 2210-K0808 E	8-way terminal blocks
X 2210-K0909 E	9-way terminal blocks
X 211 018 01	Tool to aid withdrawal of circuit breakers from terminal blocks.

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 _N continuous load	

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	AC 250 V, DC 65 V	0.4...25A
Demko/Semko	AC 250 V, DC 65 V	0.4...16 A
CSA/UL	AC 250 V, DC 65 V	0.4...25 A

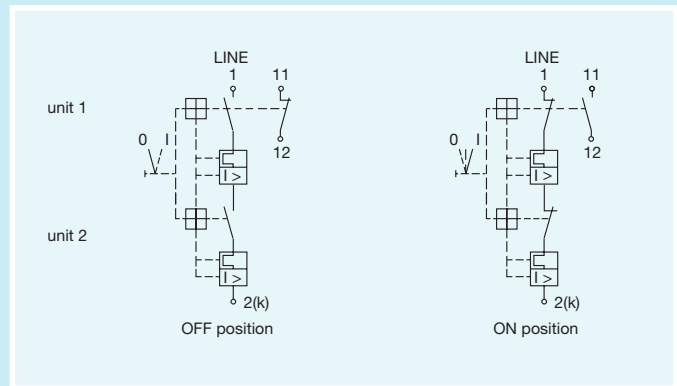


2210-S291-P9M2-410005-... A

Technical data

Voltage rating	AC 250V; DC 65V	
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 _N > 20,000 operations mechanical	
Ambient temperature	-30°C...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage AC 3000 V main to aux. circuit AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 250 V cosφ = 0.8 0.4...1 A self-limiting 1.6...25 A 2000 A DC 65 V L/R = 4 ms 0.4...4 A self-limiting 6...25 A 3500 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00	
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz); to IEC 68-2-6, Test Fc 10 frequency cycles/axis	
Shock	25 g (11ms) directions 1, 2, 3, 4, 5 20 g (11 ms) direction 6 to IEC 68-2-27, Test Ea	
Corrosion	96 hours in 5 % salt mist to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca	
Mass	approx. 80 g	

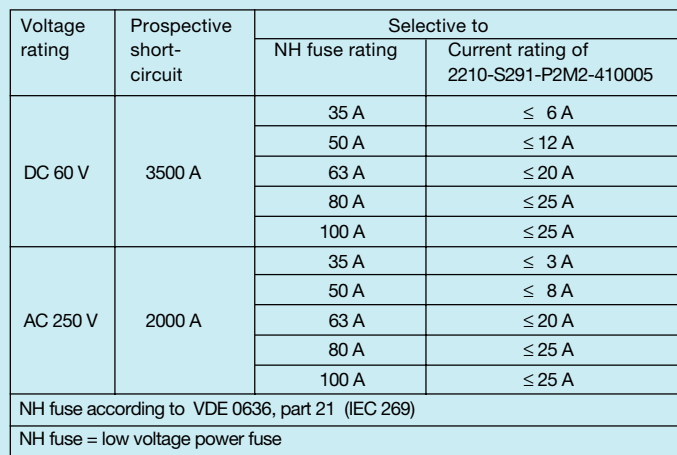
Internal connection diagrams



A 3D perspective diagram of a three-phase circuit breaker assembly. Six numbered arrows indicate the degrees of freedom for movement:

- 1: Vertical movement (up and down) of the right-hand phase assembly.
- 2: Vertical movement (up and down) of the left-hand phase assembly.
- 3: Diagonal movement (up and to the right) of the right-hand phase assembly.
- 4: Diagonal movement (down and to the left) of the right-hand phase assembly.
- 5: Horizontal movement (to the left) of the left-hand phase assembly.
- 6: Horizontal movement (to the right) of the left-hand phase assembly.

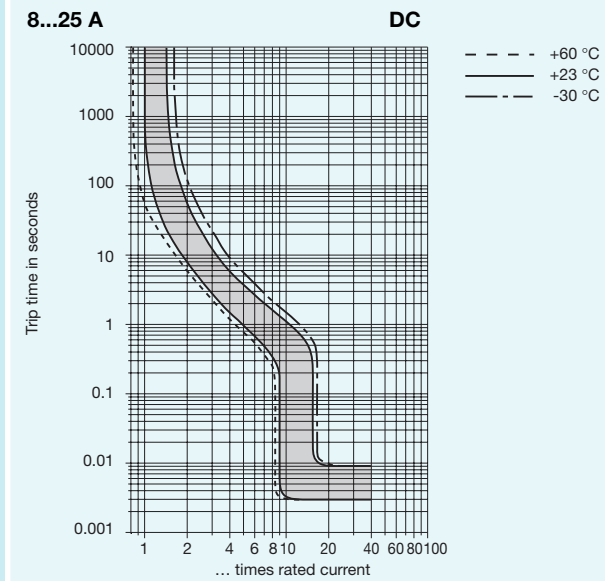
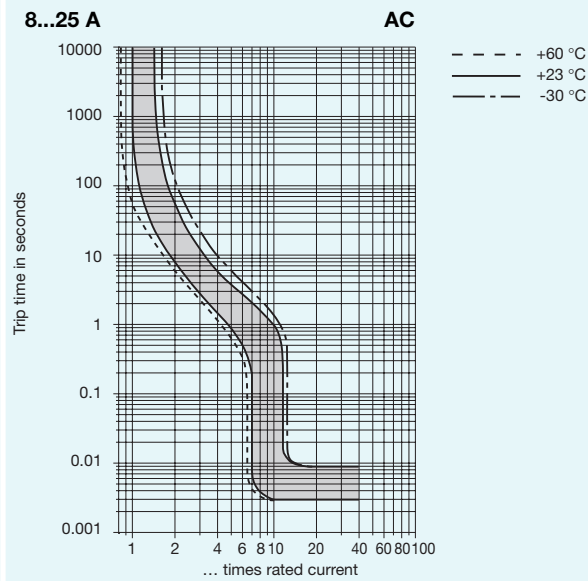
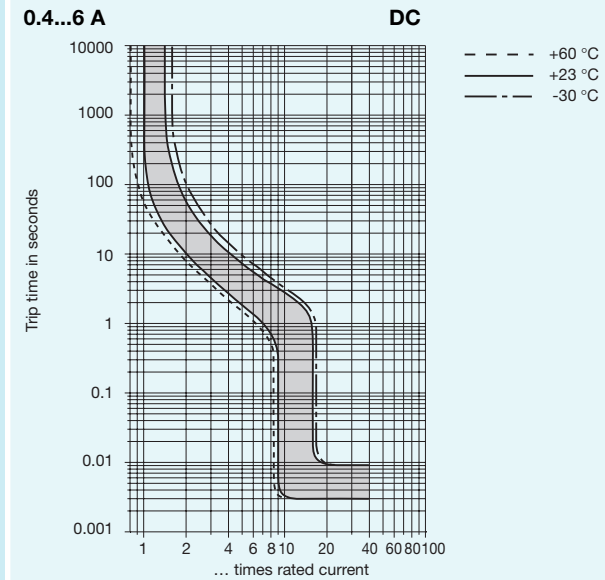
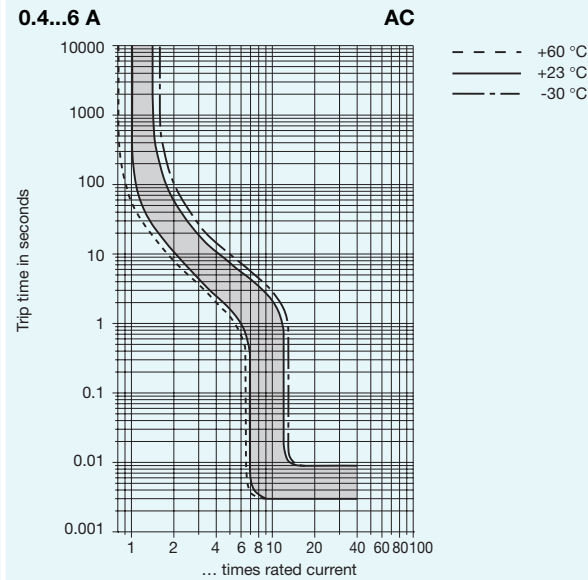
Selective back-up fuses



Typical time/current characteristics

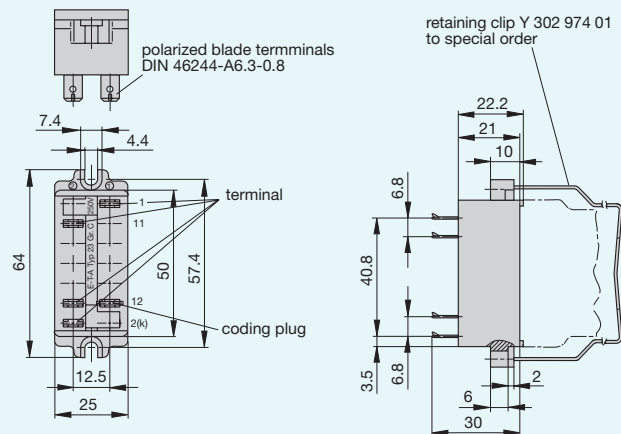
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors shown to determine the circuit breaker rating required.

Ambient temp. °C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

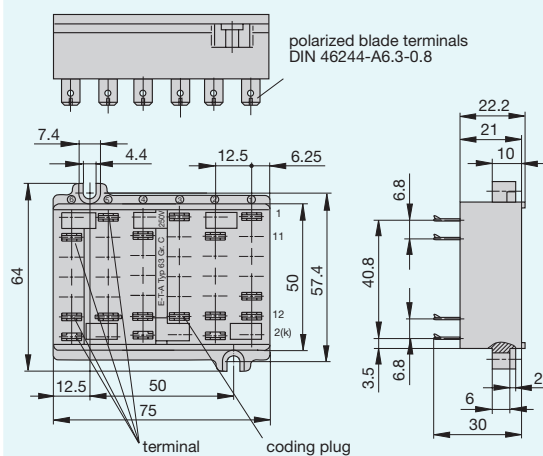


Accessories

Mounting sockets 23-P10-Si-202005



63-P10-Si-202005



Distribution rail X2210-S06... see pages 123 - 124

Distribution rail X2210-K... see pages 125 - 129

E-T-A® Distribution rail X2210-S06...

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).

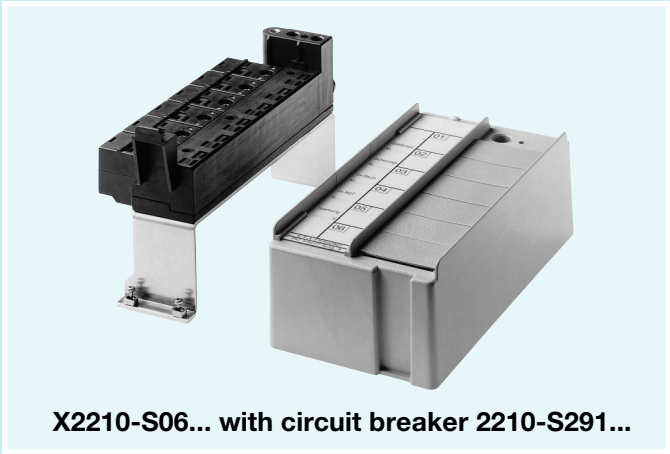
Typical applications

Telecommunications systems using ETSI racks; process control, measuring and control systems.

Ordering information

Type No.	
X2210	Module for circuit breaker type 2210-...
Version	
S	distribution rail
Identification number	
06	6 positions
Terminal block (fitted)	
00	without
01	1 x
02	2 x
03	3 x
04	4 x
05	5 x
06	6 x
Accessories (fitted)	
G	without
H	with mounting bracket
J	with mounting bracket, cover and 6 blanks
K	with mounting bracket, cover and 5 blanks
L	with mounting bracket, cover and 4 blanks
M	with mounting bracket, cover and 3 blanks
N	with mounting bracket, cover and 2 blanks
P	with mounting bracket, cover and 1 blank
Q	with mounting bracket and cover, without blanks
R	without mounting bracket, with cover and 6 blanks

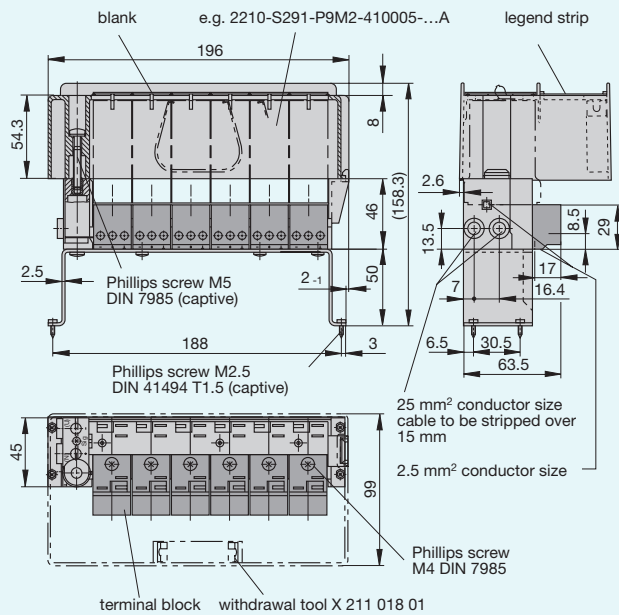
X2210 - S 06 06 J ordering example



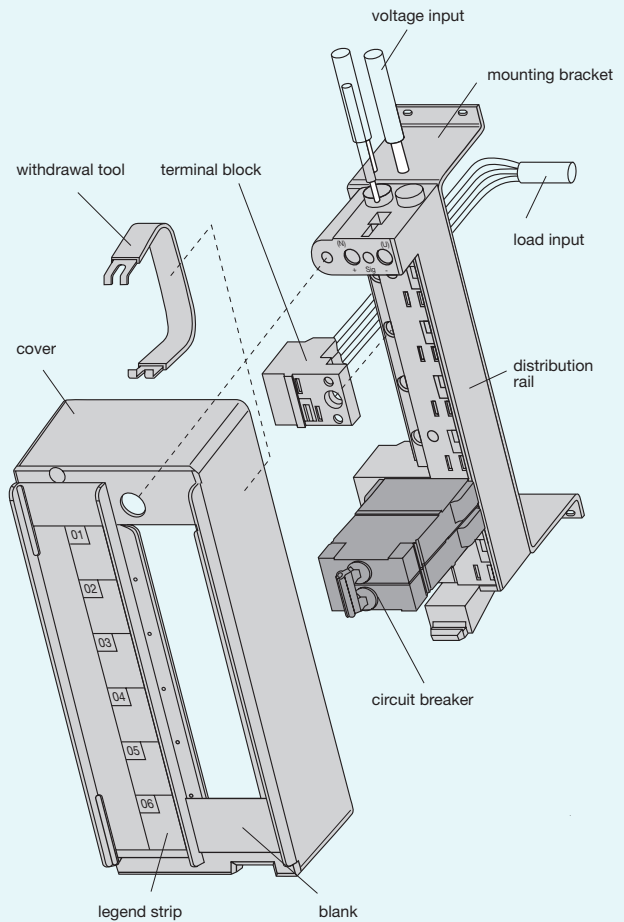
Technical data

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 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame resistance (IEC 695, part 2-2)	self-extinguishing	
Terminal design		
input	clamp-type terminal 2.5 to 25 mm ²	
output	clamp-type terminal 0.5 to 2.5 mm ²	
Typical volume resistances in main circuit		
input terminal B + (N) to output terminal + (N)	< 1.5x10 ⁻³ Ω	
input terminal B - (U) to female contact 2 (k)	< 1.5x10 ⁻³ Ω	
input terminal B-Sig to female contact 12	< 2x10 ⁻³ Ω	
output terminal - (U) to female contact 1	< 1.5x10 ⁻³ Ω	
output terminal - ⊥ to female contact 11	< 2x10 ⁻³ Ω	
Mass X2210-S0606J	660 g	

Dimensions



Installation example



E-T-A® Distribution rail X2210-K...

Description

E-T-A rails distribute electrical power in telecommunications, automation, data and control systems. A compact version is available for 3 to 9 loads. Mounting brackets and cover are not included. Live parts in terminals areas are protected against brush contact (VDE 106 part 100).

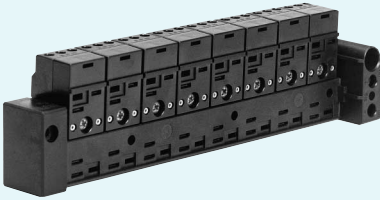
Typical applications

Telecommunications systems (surveillance systems); process control.

Ordering information

Type No.	
X2210	Module for circuit breaker type 2210-...
Version	
K	compact distribution rail
Identification number	
A3	for 3 circuit breakers
04	for 4 circuit breakers
05	for 5 circuit breakers
06	for 6 circuit breakers
07	for 7 circuit breakers
08	for 8 circuit breakers
09	for 9 circuit breakers
Terminal block (intermediate element) (fitted)	
00	without
01	1 x
02	2 x
03	3 x
04	4 x
05	5 x
06	6 x
07	7 x
08	8 x
09	9 x
E	short version

X2210 - K 04 04 E ordering example for 4 positions



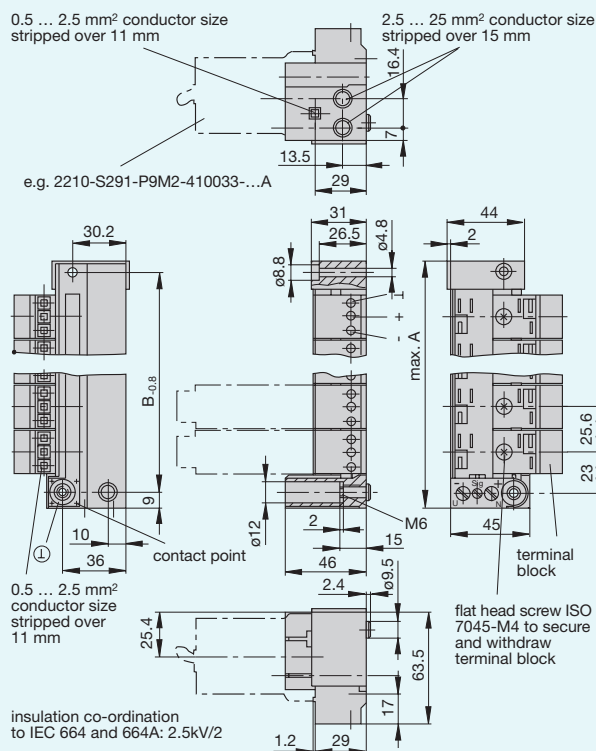
X2210-K...

Technical data

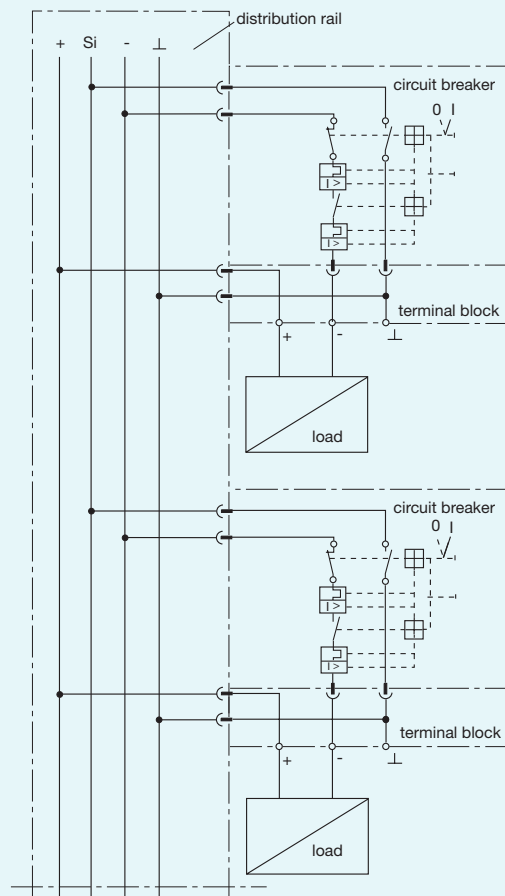
Circuit breakers to be fitted	2210-S291-P9M2-410005 2210-S291-P9M2-410033	
Voltage rating	AC 250 V, DC 65 V	
Load	max. 25 A per position max. 80 A for complete unit	
Signalisation (N/C contact)	AC 240 V/DC 65 V max. 1 A per position	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame resistance (IEC 695, part 2-2)	self-extinguishing	
Terminal design		
input (terminal A/B):	clamp-type terminal 2.5 to 25 mm ² single and stranded conductor	
output (terminal block + or N, ⊥ or U)	clamp-type terminal 0.5 to 2.5 mm ² single and stranded conductor	
Typical volume resistances in main circuit		
input terminal A/B +(N) to output terminal + (N)	< 1,5 x 10 ⁻³ Ω	
input terminal A/B - (U) to female contact 2 (k)	< 1,5 x 10 ⁻³ Ω	
input terminal A/B - Sig to female contact 12	< 2 x 10 ⁻³ Ω	
output terminal - (U) to female contact 1	< 1,5 x 10 ⁻³ Ω	
output terminal - to female contact 11	< 2 x 10 ⁻³ Ω	
Mass X2210-K0404 E	approx. 280 g	

Dimensions

Distribution rail		B	A
X2210-KA303 E	3-way	99.6	116
X2210-K0404 E	4-way	125.2	141.5
X2210-K0505 E	5-way	150.7	167.5
X2210-K0606 E	6-way	176.3	193
X2210-K0707 E	7-way	201.9	218.5
X2210-K0808 E	8-way	227.5	244
X2210-K0909 E	9-way	253.1	270



Internal connection diagram



E-T-A® Distribution rail X2210-K01.../K02.../K03...

Description

E-T-A rails distribute electrical power in telecommunications, automation, data and control systems. They have been designed to the BW7R design requirement of the telecommunications industry. Mounting brackets and cover are not included.

Live parts in terminal areas are protected against brush contact (VDE 106 part 100).

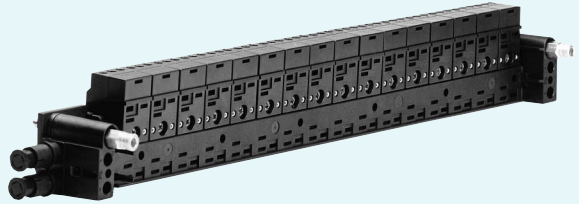
Typical applications

Telecommunications systems of the BW7R design; process control, measuring and control systems

Ordering information

Type No.	
X2210	Module for circuit breaker type 2210-...
Version	
K distribution rail	
Identification number	
01 standard	
02 distribution rail for remote supply	
03 distribution rail, separate rails (2x8 outputs)	
Terminal block (intermediate element) (fitted)	
00 without	
01 1 x	
02 2 x	
03 3 x	
04 4 x	
05 5 x	
06 6 x	
07 7 x	
08 8 x	
09 9 x	
10 10 x	
11 11 x	
12 12 x	
13 13 x	
14 14 x	
15 15 x	
16 16 x	
Accessories (fitted)	
B insulating sleeving 2, cover 1	
C insulating sleeving 2, cover 0	
D insulating sleeving 0, cover 1	
F insulating sleeving 1, cover 2, for remote supply	

X2210 - K 01 04 B ordering example



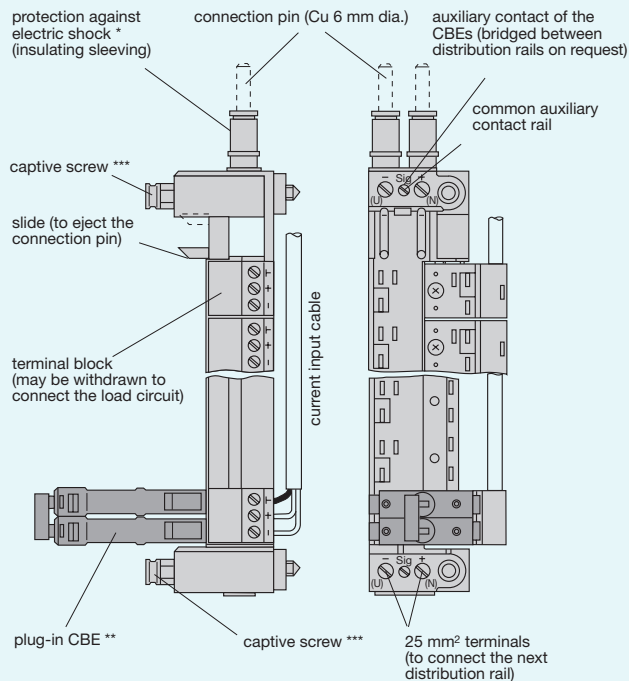
X2210-K01.../K02.../K03...

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 664 asnd 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame resistance (IEC 695, part 2-2)	self-extinguishing	
Terminal design input (terminal A/B):	clamp-type terminal 2.5 to 25 mm ² single and stranded conductor	
output (terminal block + or N, ⊥ or U)	clamp-type terminal 0.5 to 2.5 mm ² single and stranded conductor	
Typical volume resistances in main circuit		
input terminal A/B + (N) to output terminal + (N)	< 1,5 x 10 ⁻³ Ω	
input terminal A/B - (U) to female contact 2 (k)	< 1,5 x 10 ⁻³ Ω	
input terminal A/B - Sig to female contact 12	< 2 x 10 ⁻³ Ω	
output terminal - (U) to female contact 1	< 1,5 x 10 ⁻³ Ω	
output terminal - to female contact 11	< 2 x 10 ⁻³ Ω	
Mass X2210-K0116 B	approx. 1140 g	

ET-A® Distribution rail X2210-K01.../K02.../K03...

Connection

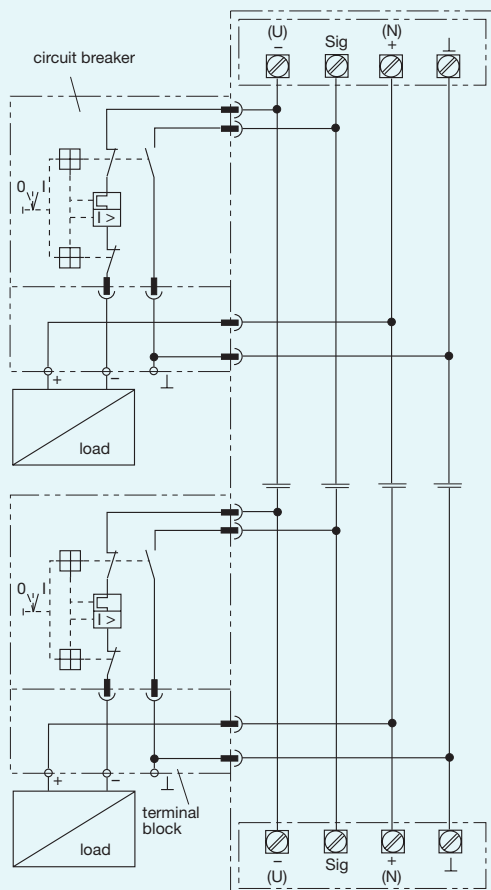


* Connection pins and insulating sleeves may be removed when the distribution rail is directly connected by cable.

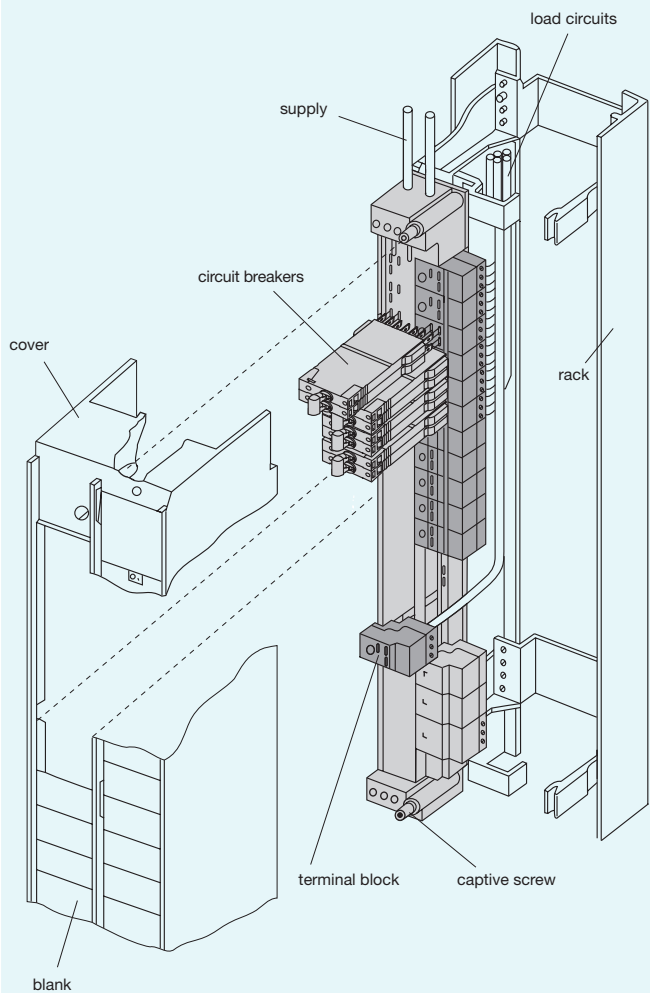
** Inserted in cover.

*** Also ground connection between distribution rail and 7R rack. Separate ground connection not required.

Internal connection diagram



Installation



The distribution rail is secured to the mounting bracket by means of the captive screws. A moulded cover is provided.

Two aluminium brackets carry the distribution rail and the moulded cover, at the same time leaving room for the cables. Several units can similarly be mounted together.

The supply cable which should be protected to a max. of 100 A is connected via a terminal block to the plus, minus and signal cables. Further distribution rails may be connected with power on by means of the insulated slide pins.

The distribution rail will accommodate up to 16 circuit breakers or similar components.

An intermediate block is fitted for each position to facilitate installation of the load circuits in service. All 16 plug-in blocks can be inserted or removed by the Phillips screw.

Load circuits can be safely installed without interrupting the supply. Finger-safe distribution rail components can also be inserted with power on.

Plug-in connections ensure ease of installation.

The cover and blanks provide front of rail protection.

Description

E-T-A distribution rails ensure ease of expansion and retrofit without the need to disconnect the system. Safe operation with power on is ensured by the fully insulated plug-in design, enabling industry demands for trouble-free operation to be satisfied. Major benefits of this well-proven system include high reliability and user convenience.

E-T-A distribution rails meet the needs of many power supply systems including the 7R design of the German telecommunications market.

Even where space is at a premium E-T-A circuit breakers type 2210-S291-P9M2-410005-..., for both AC and DC use, will protect all downstream electrical equipment from overcurrent and short-circuits as well as providing protection against electrical shock hazards.

The Bw7R type 2 configuration can be equipped with one standard unit and one modified version for remote supply devices. Additional versions of the standard type are suitable both for telecommunications and process control and automation.

Features

- **Fully insulated design**
Absolutely safe in operation even when retrofitted, as live parts cannot be touched.
- **Ease of mounting**
Fastening of the assembly is by means of two bolts only.
- **Ease of electrical installation**
The connection of only plus, minus and signal cable is required to operate the distribution rail for 16 outs. No further wiring is necessary.
- **Cost-effective expansion**
Distribution rails can readily be installed in multiples. Safe electrical connection of several rails, even during systems operation, is by use of coupling pins.
- **No costly system downtime**
Live components need not be disconnected when the system is expanded.
- **Safe connection of the supply line**
Plug-in intermediate elements provide safe connection of the supply line independent of its position, thereby minimising installation difficulties.
- **Ease of access**
Distribution rails can be mounted from the front. The load lines which are preconnected to the adapter plug can be easily inserted in the cable space obviating the need for costly threading.
- **Compact design**
Optimum utilisation of the space available as circuit breakers, distribution rail and accessories have been designed in close cooperation with users and system designers.
- **Electrical safety**
The system is suitable for voltages up to AC 275 V or DC 75 V (max. 100 A back-up fuse; 25 mm² connecting cable).
Insulation co-ordination in conformance with IECF 664 and 664A.

Application

● Telecommunications

Terminal rails of the Bw7R type 2 design can be connected to power supplies providing AC 230 V (max. 275 V) or DC 60 V (max. 75 V).

A back-up fuse with a max. rating of 100 A should be connected. Power distribution is by means of 16 outputs which are protected by E-T-A circuit breakers.

Expansion is possible as required.

Power supply units of telecommunication equipment are typically connected downstream.

- **X2210-K0116 B** is designed to power system units
- **X2210-K0212 F** is designed for remote feeds

Both terminal rails can be mounted in Bw7R racks, one unit requiring a space of 500 mm.

● Process control, automation and telecommunications

Initially designed for Bw7R (vertical mounting), the terminal rails are also suitable for 19" control cabinets and other designs.

Distribution rails

● Distribution rail X2210-K0316 E

Positions 8 and 9 of this type are physically isolated so that two independent distribution rails with 8 outputs each are available in one housing.

The signal contact rail is not isolated.

Feed-in from both sides.

Two separate power supplies which can carry different potentials (e.g. DC 65 V; AC 230 V) are accommodated on 500 mm spacings.

● Terminal strip X2210-K0404 E to X2210-K0404 E

A compact version of the distribution rail is available for applications requiring small distribution rails with up to 9 outputs only but providing the same benefits as the standard version.

Feed from one side allows the supply of 4 to 9 outputs. The compact distribution rail can be used where space is at a premium because its length may be varied.

● Group signalisation

The circuit breakers suitable for the distribution rails comprise an auxiliary contact closing when the main contact opens.

All auxiliary contacts are placed above the distribution rail, parallel between ground and the group signalisation rail.

● Single signalisation

Single signalisation can be provided by means of a modified intermediate element. The ground connection generally required in telecommunication systems is obviated.

"Signal potential" is applied to the terminal of the intermediate element as soon as the circuit breaker trips. The system manufacturer should however provide separate signal lines (max. 16) which should be connected to the ground terminal of the intermediate element.

E-T-A® Thermal-Magnetic Circuit Breaker 2210-T2..

Description

One, two and three pole thermal-magnetic circuit breakers with trip-free, snap action 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 to 32 A with a choice of characteristic curves. All screw terminals are recessed for safety. Approved to CBE standard EN 60934 (IEC 934).

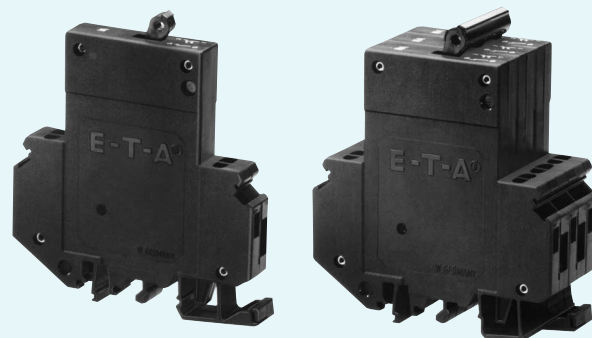
Typical applications

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

Ordering information

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

2210 - T2 1 0 - K0 M1 - H 1 2 1 - 10 A ordering example



single pole

2210-T2..

3 pole

Technical data

Voltage rating	AC 250 V; 3 AC 433 V (50/60 Hz); DC 65 V AC 277/480 V UL/CSA	
Current rating range	0.1...32 A (32 A resistive load only)	
Auxiliary circuit	1 A, AC 240 V / DC 65 V	
Typical life	10,000 operations at 1xI _N	
Ambient temperature	-30...+60 °C (T 60)	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage operating area AC 3000 V main/aux. circuit AC 3000 V pole/pole AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.1...5 A 400 A; 6...32 A 800 A; Curve T2 : 0.1...32 A 15xI _N Curve M3: 0.1... 2 A 200 A AC	
Interrupting capacity (UL 1077)	I _N	0.1...16 A 20...32 A
	1 + 2 pole	AC 277 V / 5000 A AC 277 V / 2000 A
	3 pole	3 AC 480 V / 5000 A 3 AC 480 V / 2000 A
	1 + 2 pole	DC 65 V / 2000 A DC 65 V / 2000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 20	
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 68-2-6, 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 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca	
Mass	approx. 60 g per pole	

ET-A Thermal-Magnetic Circuit Breaker 2210-T2..

Standard current ratings and typical internal resistance values

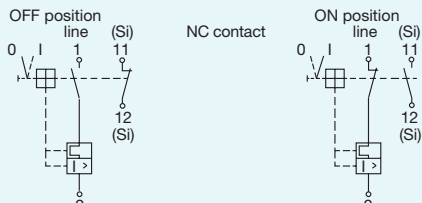
Current rating (A)	Internal resistance (Ω)				
	F1 fast acting for DC	M1 standard delay for AC + DC	T1 delayed for AC	M3 low resistance standard delay for AC + DC	T2 thermal for AC + DC
0.1	162	92	81	42	77
0.2	39.3	26.1	24.2	11.7	23
0.3	17.5	11.6	10.4	5.6	10.2
0.4	9.2	6.6	6.0	2.9	5.7
0.5	6.8	4.1	3.9	1.75	3.7
0.6	4.2	3	2.7	1.42	2.6
0.8	2.8	1.65	1.53	0.75	1.39
1	1.6	1.10	0.98	0.5	0.9
1.5	0.78	0.47	0.42	0.22	0.36
2	0.42	0.28	0.24	0.136	0.19
2.5	0.26	0.183	0.17	0.083	0.141
3	0.18	0.124	0.12	0.057	0.091
4	0.12	0.077	0.073	0.041	0.051
5	0.092	0.063	0.055	0.032	0.040
6	0.054	0.045	0.039	0.021	0.027
8	0.025	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
10	0.022	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
12	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02	≤ 0.02
16	≤ 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

Approvals

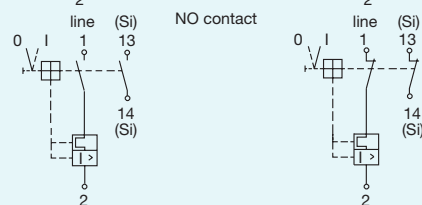
Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 433 V, AC 250 V, DC 65 V	0.1...32 A
LRoS, BV	3 AC 433 V, AC 250 V, DC 65 V	0.1...32 A
UL, CSA	3 AC 480 V, AC 277 V, DC 65 V	0.1...32 A

Internal connection diagrams

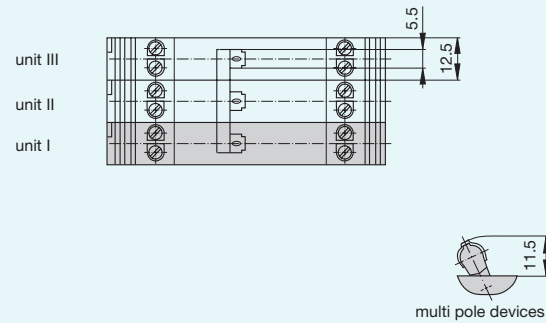
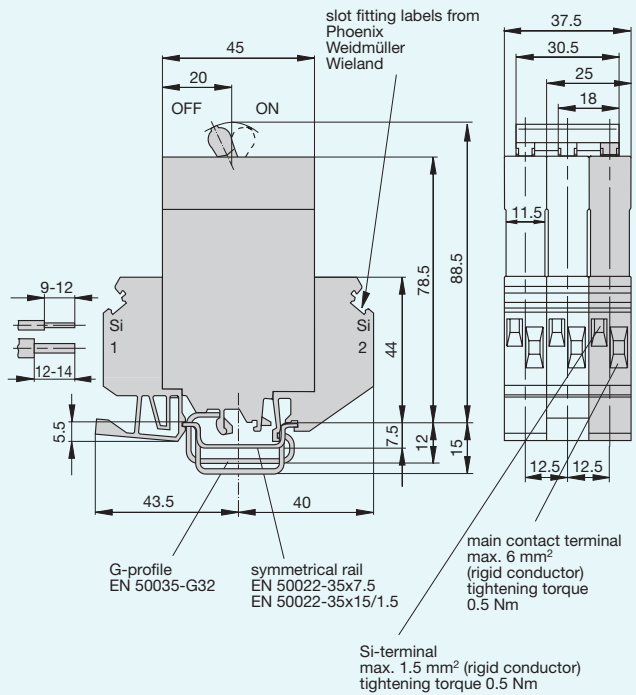
...-H131-...



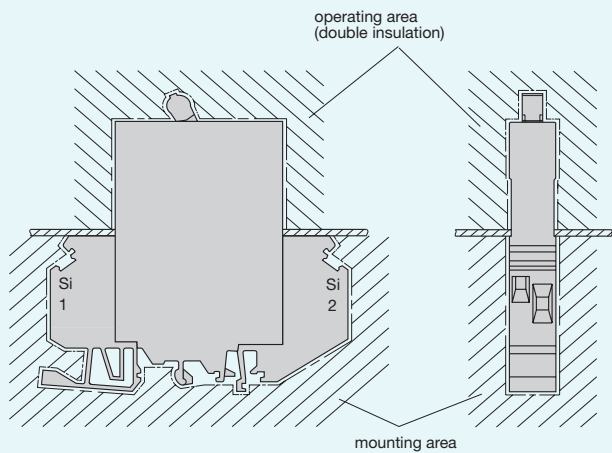
...-H121-...



Dimensions



Installation drawing



Thermal-Magnetic Circuit Breaker 2210-T2..

Typical time/current characteristics

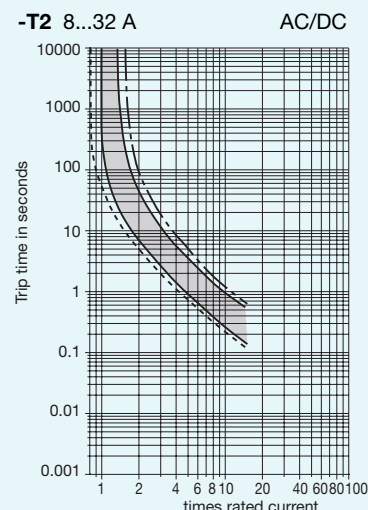
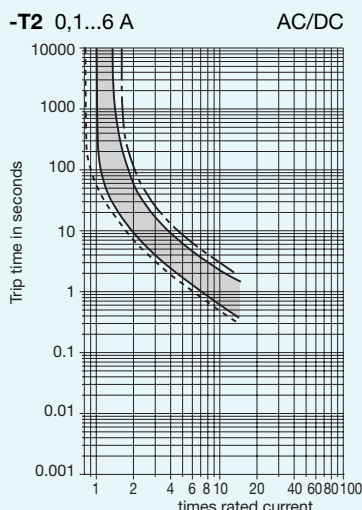
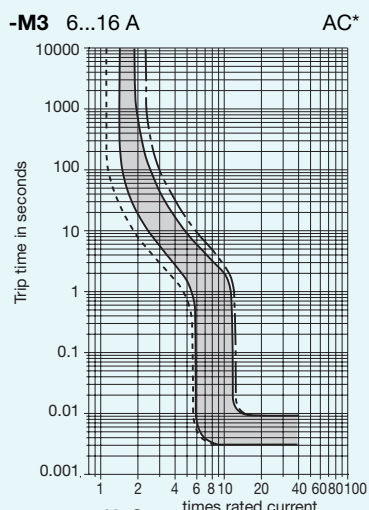
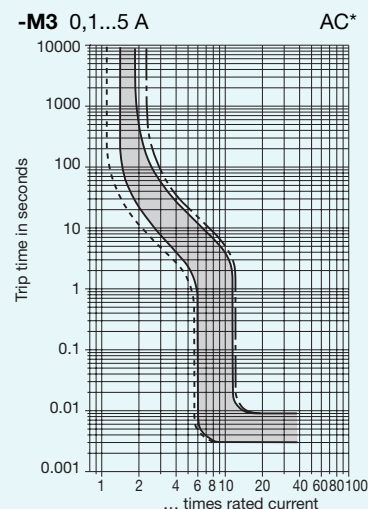
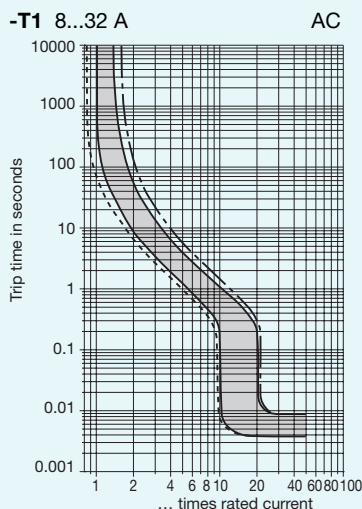
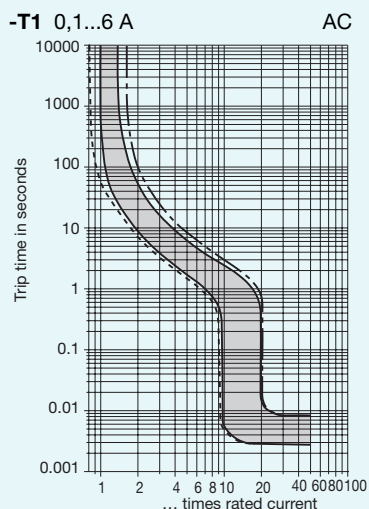
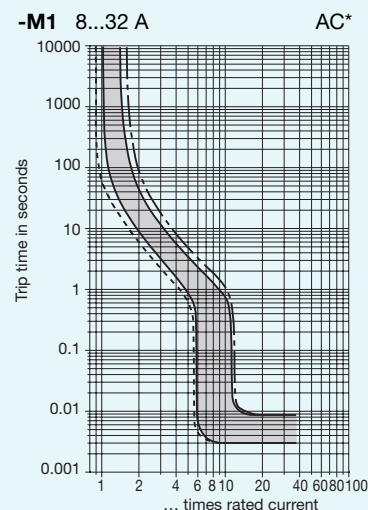
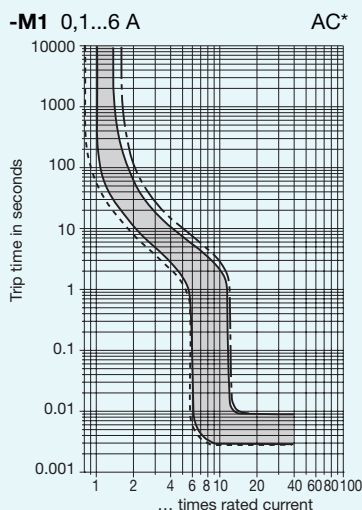
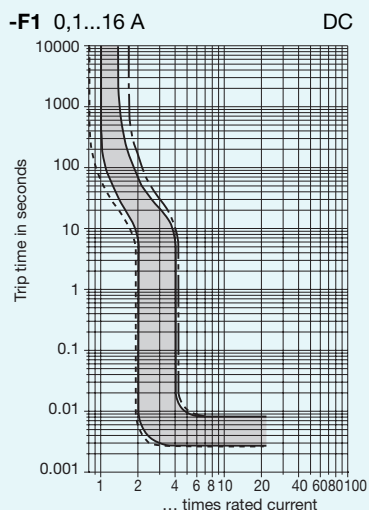
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

Multi pole devices: all poles symmetrically loaded.

N.B.

* Magnetic tripping currents are increased by 30% on DC supplies.

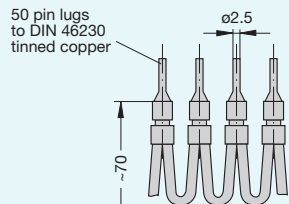


- - - +60 °C
 ——— +23 °C
 . . . -30 °C

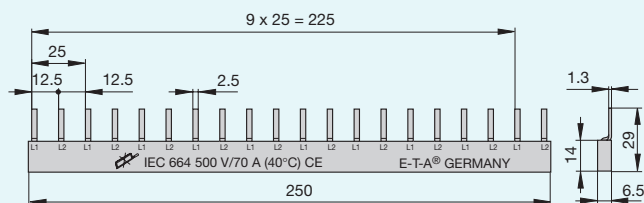
E-T-A® Thermal-Magnetic Circuit Breaker 2210-T2..

Accessories

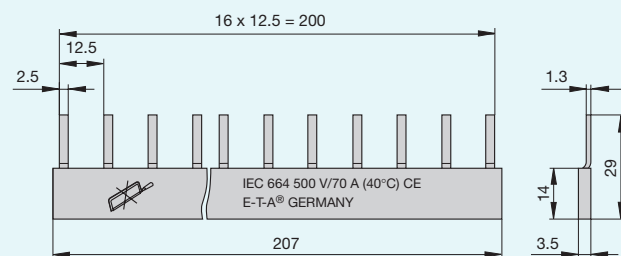
Connector bus links -K10
X 210 589 01/2.5mm² black
X 210 589 02/1.5mm² brown



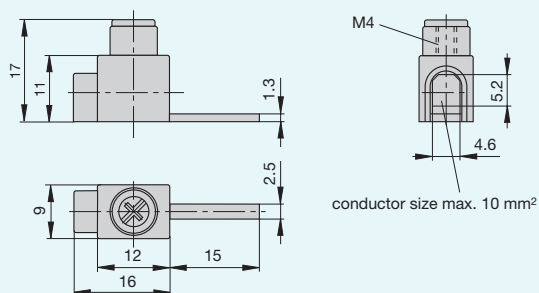
Bus bar for 2 pole units
X 221 497 01



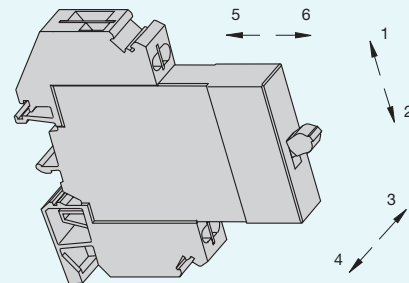
Bus bar for 1 pole units
X 221 498 01



Supply terminal for bus bar
X 221 496 01



Shock directions



E-T-A® Thermal-Magnetic Circuit Breaker 2215-L.../G...

Description

Miniaturised single pole thermal-magnetic circuit breakers with trip-free, snap action 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. Complies with CBE standard EN 60934 (IEC 935).

Typical applications

Control equipment, communications systems, instrumentation.

Ordering information

Type No.	
2215	single pole thermal-magnetic circuit breaker
Mounting	
G1	threadneck panel mounting
L1	PCB mounting
Number of poles	
1	1 pole protected
Mounting hardware	
0	without accessories
1	2 hex nuts 1/4"-40 UNS-2A, serrated washer, location pin (-G1 only)
Terminal design (main contacts)	
P1	blade terminals 6.3-0.8 without shunt terminal
B1	blade terminals 6.3-0.8, with shunt terminal
L1	solder pins, without shunt terminal
M1	solder pins, with shunt terminal
Characteristic curve	
F1	fast acting: 1.01-1.4xI _N ; magn. 2-4xI _N DC (DC only)
M1	standard delay: therm. 1.01-1.4xI _N ; magn. 5-10xI _N DC; magn. 3.5-8xI _N AC
T1	delayed: therm. 1.01-1.4xI _N ; magn. 10-16xI _N AC
Auxiliary contacts	
S0	without auxiliary contact
S1	with auxiliary contact (change over)
Auxiliary contact - terminal design	
1	blade terminals 6.3x0.8 -G1
2	solder pins -L1
Current ratings	
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 rating (A)	Internal resistance (Ω)
0.05	440	1.5	0.54
0.1	108	2	0.33
0.2	29.9	2.5	0.20
0.3	14.2	3	0.14
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	1.19	10	≤ 0.02



2215-L1..



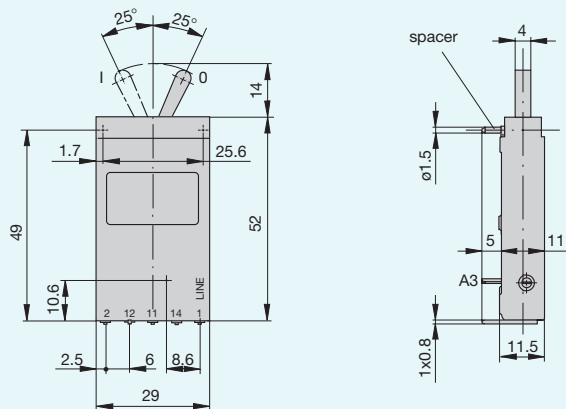
2215-G1..

Technical data

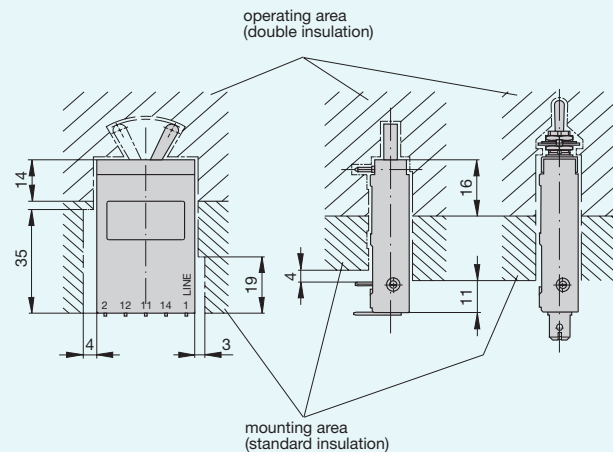
Voltage rating	AC 250 V, 50/60 Hz; DC 48 V (higher DC voltages to special order)		
Current rating range	0.05...10 A		
Auxiliary circuit	1 A, AC 250 V/DC 28 V		
Typical life	10,000 operations at 1xI _N		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength IEC 664 and 664A) operating area main/aux. circuit	Test voltage AC 3000 V AC 1500 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	300 A		
Interrupting capacity (UL 1077)	I _N	U _N	
	0.05 A	AC 250 V	200 A
	0.1...6 A	AC 250 V	1000 A
	8...10 A	AC 250 V	2000 A
	0.05...10 A	DC 50 V	200 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00		
Vibration	Curve F1: 6 g (57-500 Hz), ±0.46 mm (10-57 Hz) Curves M1, T1: 8 g (57-500 Hz), ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	Curves F1, M1, T1: 30 g (11 ms), directions 1, 2, 3, 4, 5, Curve F1: 10 g (11 ms), direction 6 Curves M1, T1: 15 g (11 ms), direction 6 to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca		
Mass	approx. 25 g		

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

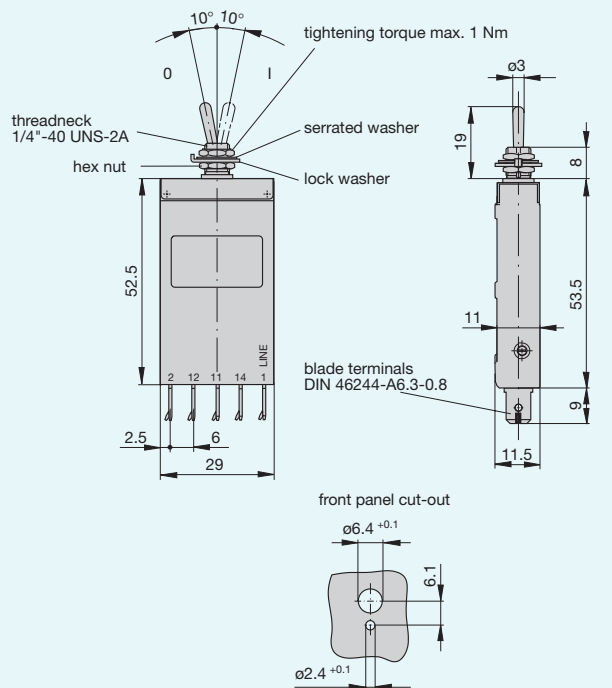
Dimensions 2215-L1...



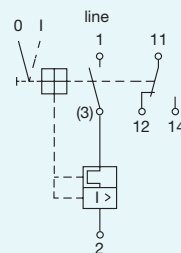
Installation drawing



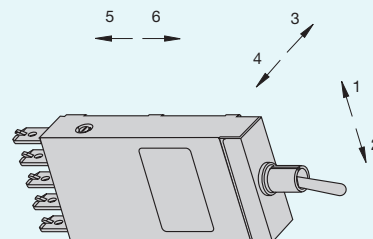
Dimensions 2215-G1...



Internal connection diagram



Shock directions



Approvals

Authority	Voltage ratings	Current ratings
VDE	AC 250 V, DC 28 V	0.05...10 A
UL	AC 250 V, DC 50 V	0.05...10 A
CSA	AC 250 V, DC 48 V	0.05...10 A
Semko	AC 250 V, DC 28 V	0.1 ...10 A

Typical time/current characteristics

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

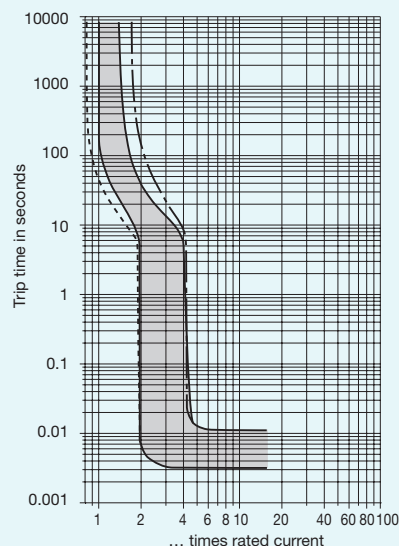
Ambient temperature °C	-30	-20	-10	0	+10	+20	+30	+40	+50	+60
Multiplication factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

N.B.

*Magnetic tripping currents are increased by 30% on DC supplies.

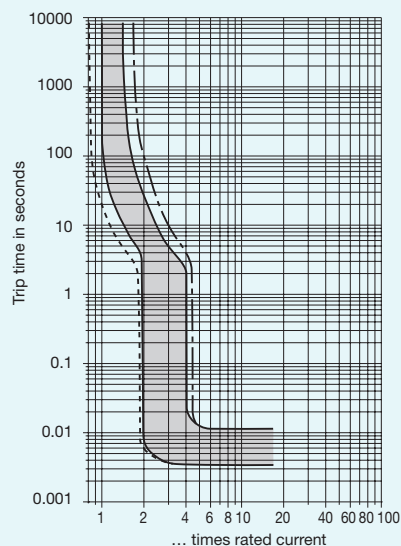
-F1 0.05...6 A

DC



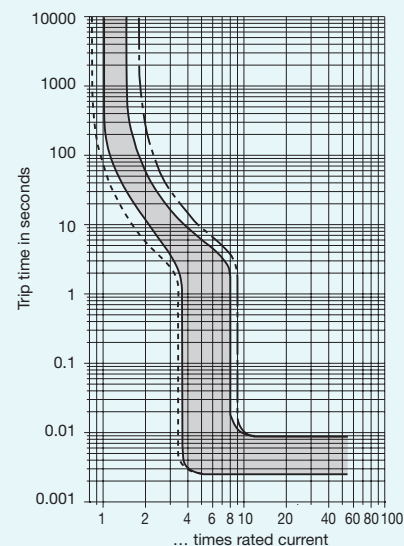
-F1 8...10 A

DC



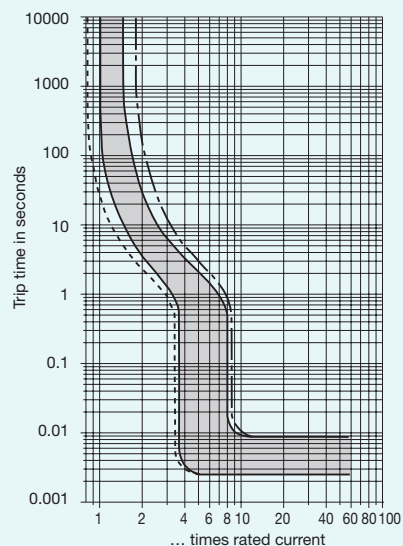
-M1 0.05...6 A

AC*



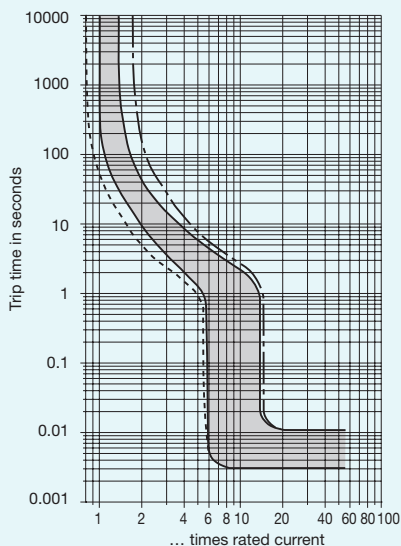
-M1 8...10 A

AC*



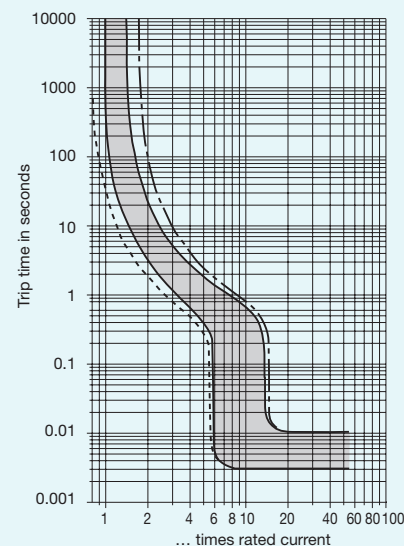
-T1 0.05...6 A

AC*



-T1 8...10 A

AC*



- - - - +60 °C
 ——— +23 °C
 - . - . -30 °C

E-T-A® Thermal-Magnetic Circuit Breaker E2215 for 19" Rack Mounting

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 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.

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 A6.3-9,8 (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
Auxiliary contacts
S1 with auxiliary contacts (change over)
Auxiliary contact - terminal design
1 same as main terminals
Current ratings
0.05...10 A

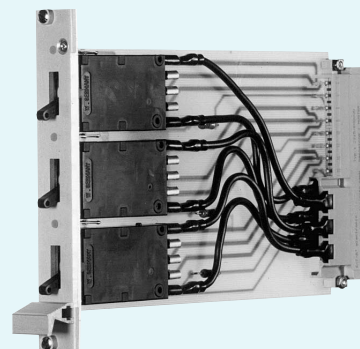
E2215 - 3 1 1 - L2 1 0 - 02 - S1 1 - 0.1 A ordering example

Select the circuit breakers to above ordering information. For further information please refer to pages 135 - 137.

It is possible to fit circuit breakers of mixed current ratings on the Euro Card.

Please add "Circuit breakers to be mounted on Euro Card" to the circuit breaker designation when ordering so that the applicable suffix number for the special version (E2215-L2..) can be determined .

19" racks may also be fitted with one or two circuit breakers by the customer, using industry standard components such as base plates, front plates with handle, sockets. Connection by means of blade terminals 6.3x0.8 mm.



E2215-...

Technical data

Circuit Breaker

Main circuit:

voltage rating	AC 250 V (50/60 Hz); DC 48 V
current rating range	0.05...10 A
standard current ratings	0.1 0.2 0.3 0.4 0.5 0.6 0.8 A 1 1.5 2 2.5 3 4 5 A 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 TE (1 TE = 5.08 mm)
height	3 HE (1 HE = 44.45 mm)

Material

aluminium, anodized

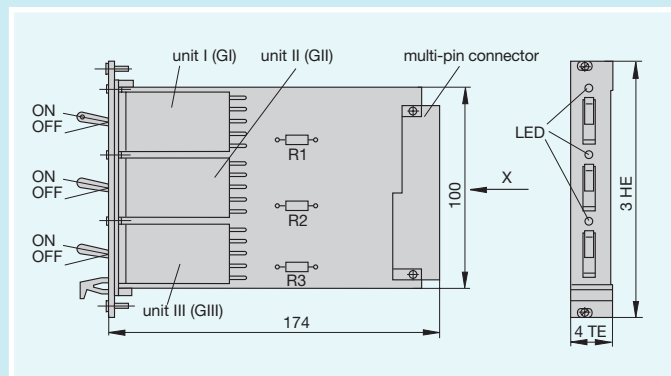
LED

Max. voltage rating

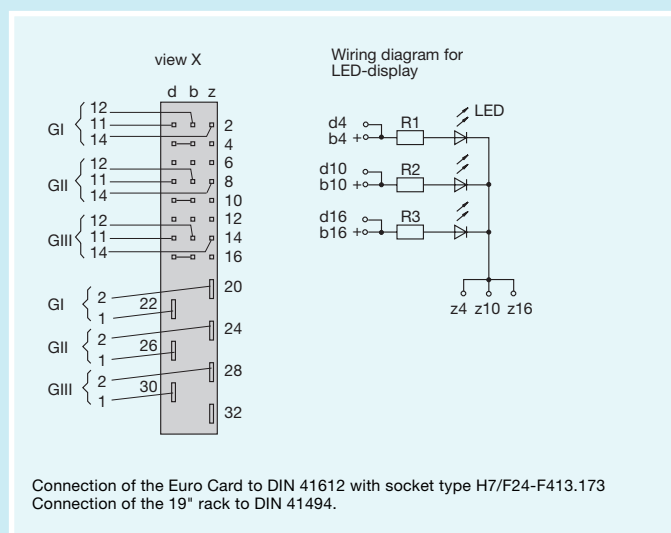
DC 24 V

Thermal-Magnetic Circuit Breaker E2215 for 19" Rack Mounting

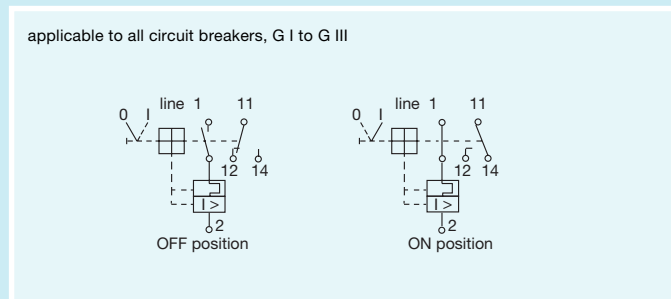
Dimensions



Terminal selection



Internal connection diagrams



E-T-A® Thermal-Magnetic Circuit Breaker 2215-F1...

Description

Miniaturised two pole thermal-magnetic circuit breakers with trip-free, snap action 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 934).

Typical applications

Control equipment, communications systems, instrumentation.

Ordering information

Type No.	
2215	double pole thermal-magnetic circuit breaker
Mounting	
F1	flange mounting, with M3 mounting thread
Number of poles	
2	2 pole protected
5	2 pole, protected on one pole only
Accessories	
0	without
Terminal design (main contacts)	
P1	blade terminals 6.3 x 0.8 mm, without shunt terminal
Characteristic curve	
F1	fast acting: 1.01-1.4xI _N ; magn. 2-4xI _N DC (DC only)
M1	standard delay: therm. 1.01-1.4xI _N ; magn. 5-10xI _N DC; magn. 3.5-8xI _N AC
T1	delayed: therm. 1.01-1.4xI _N ; magn. 8-16xI _N DC; magn. 6-13xI _N AC
Auxiliary contacts	
S0	without auxiliary contacts
S1	with auxiliary contacts (change over)
S2	with auxiliary contact on pole 1 only
Auxiliary contact - terminal design	
1	blade terminals 6.3x0.8
Current ratings	
0.05...10 A	

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	0.54
0.1	108	2	0.33
0.2	29.9	2.5	0.20
0.3	14.2	3	0.14
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	1.19	10	≤ 0.02



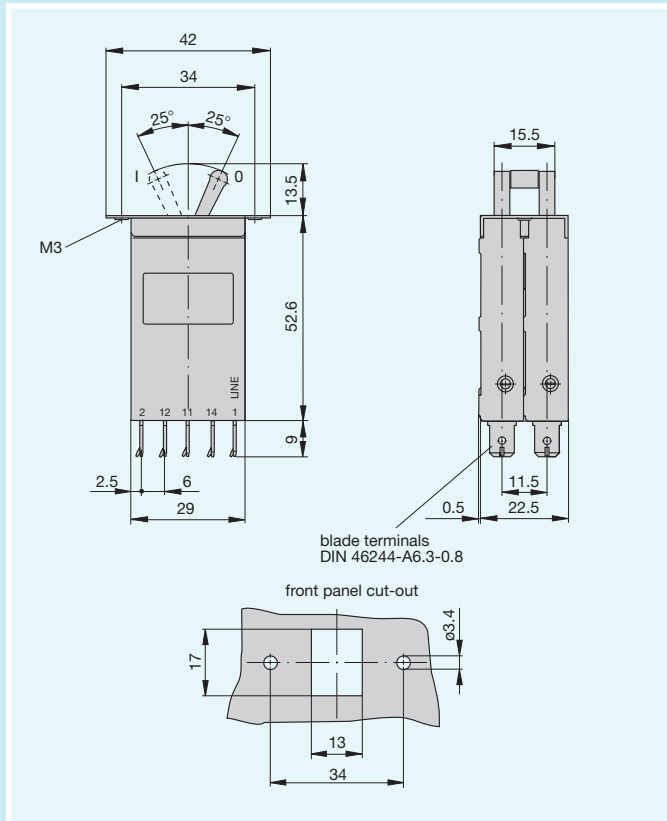
2215-F1...

Technical data

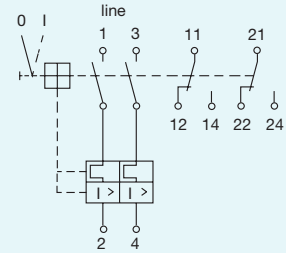
Voltage rating	AC 250 V, 50/60 Hz; DC 48 V (higher DC voltage to special order)	
Current rating range	0.05...10 A	
Auxiliary circuit	1 A, AC 250 V/DC 28 V resistive load	
Typical life	10,000 operations at 1xI _N	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage operating area AC 3000 V pole/pole AC 1500 V main/aux. circuit AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	600 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00	
Vibration	Curve F1: 6 g (57-500 Hz), ±0.46 mm (10-57 Hz) Curves M1, T1: 8 g (57-500 Hz), ±0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis	
Shock	Curves F1, M1, T1: 30 g (11 ms), directions 1, 2, 3, 4, 5 Curve F1: 10 g (11 ms), direction 6 Curves M1, T1: 15 g (11 ms) direction 6 to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca	
Mass	approx. 50 g	

Thermal-Magnetic Circuit Breaker 2215-F1...

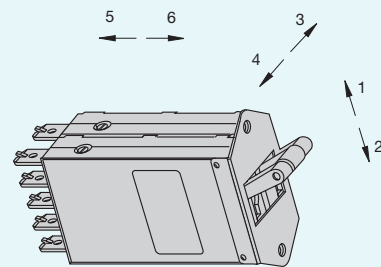
Dimensions 2215-F1...



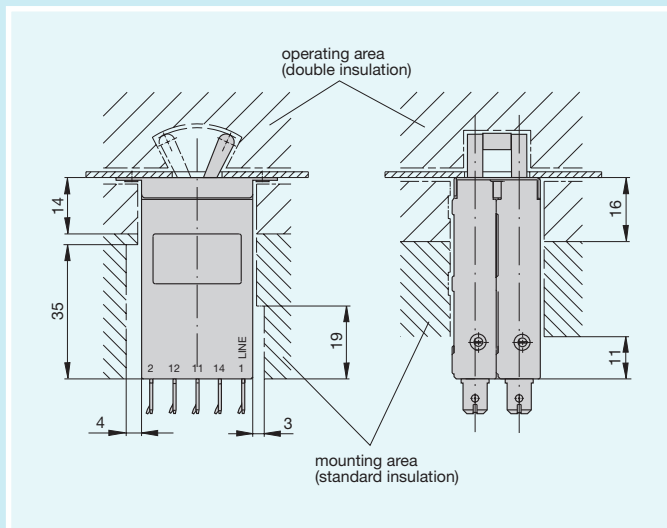
Internal connection diagram



Shock directions



Installation drawing



Thermal-Magnetic Circuit Breaker 2215-F1...

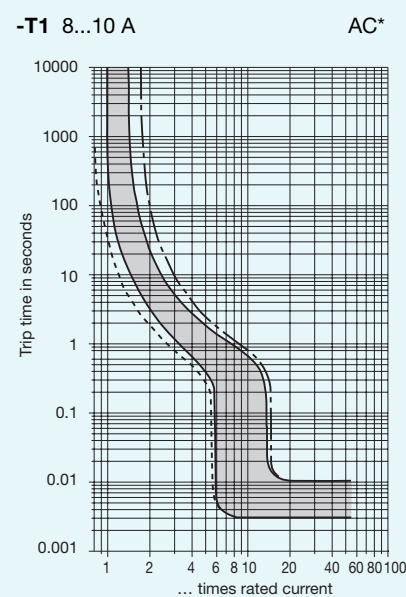
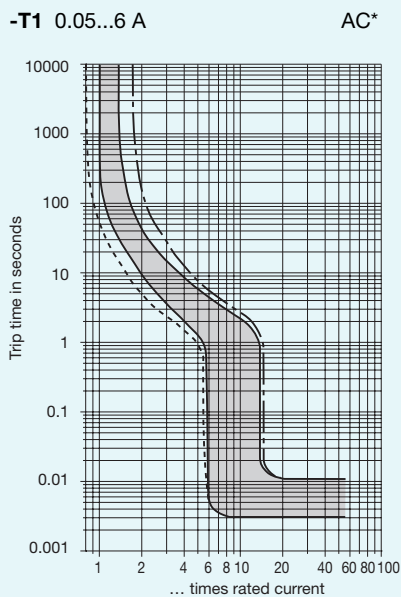
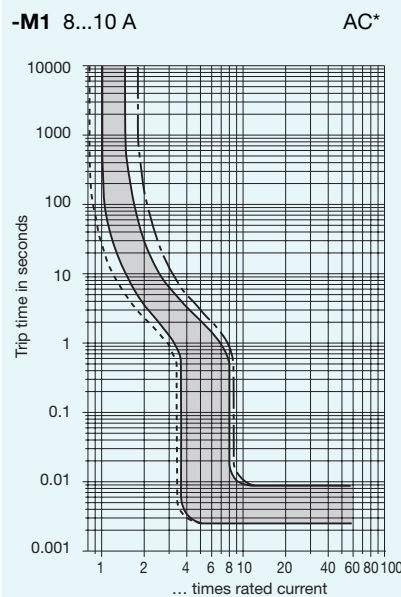
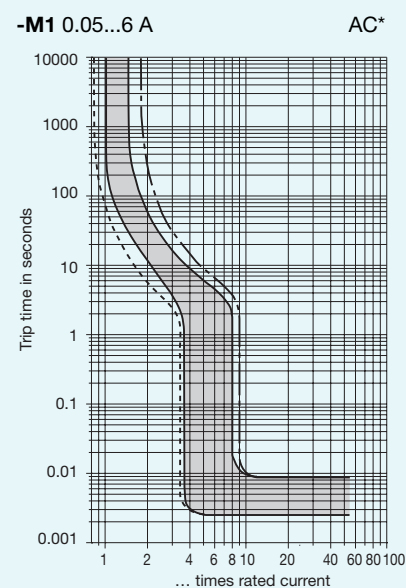
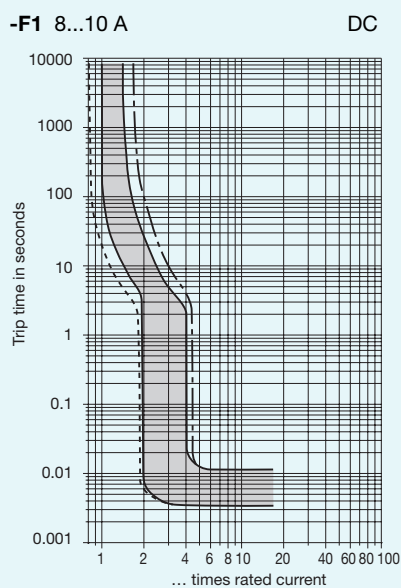
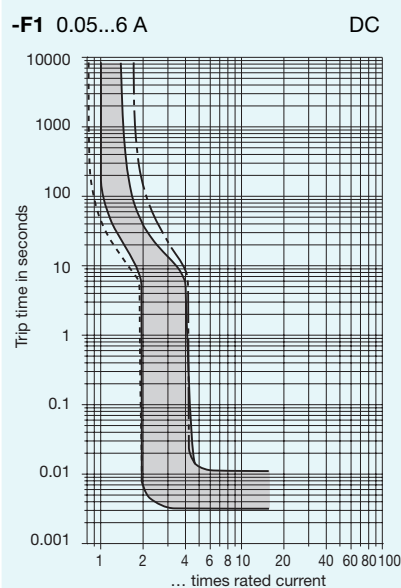
Typical time/current characteristics

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-30	-20	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.76	0.79	0.83	0.88	0.93	1	1.04	1.11	1.19	1.29

N.B.

*Magnetic tripping currents are increased by 30% on DC supplies.



- - - +60 °C
 — +23 °C
 - . - -30 °C

E-T-A® Thermal-Magnetic Circuit Breaker 3120-...-M1-..

Description

Single or two pole rocker switch/thermal-magnetic circuit breaker (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. Neon illumination (filament bulb for low voltages) is optional. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

Motors, machine tools, office equipment, appliances.

Accessories

- Y 303 068 01 Insulated cover, snap-fitted to the exposed areas of the two incoming terminals (when terminal screws are not specified) to provide brush contact protection.
- Y 303 675 01 Retaining clip for -F3 mounting frame for panel thicknesses under 2 mm.
- Y 303 675 02 As above for panel thicknesses under 4 mm.
- Y 303 885 31 Blanking piece in -F3 size mounting frame.
- X 210 832 01 Separate water splash cover for use with -F4 and -F5 size mounting frames.

Standard current ratings and typical internal resistance values

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

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...14 A



3120-...-M...

Technical data

Voltage rating	AC 250 V, 50/60 Hz; DC 50 V		
Current ratings	0.1...16 A		
Typical life	50,000 operations at 1xI _N double pole 30,000 operations at 1xI _N single pole		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area current path/ current path	Test voltage AC 3000 V AC 1500 V		
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	0.1...2 A 2.5...16 A	100 x I _N 250 A 2 pole 150 A 1 pole	
Interrupting capacity (UL 1077)	I _N 0.1...4 A 5... 10 A 12...14 A	U _N AC 250 V AC 250 V AC 125 V	200 A 2000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 (with water splash protection IP 54) terminal area IP 00		
Vibration	8 g (57-500 Hz) ±0.61 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis		
Shock	30 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	approx. 53 g (2 pole) approx. 50 g (1 pole)		

Thermal-Magnetic Circuit Breaker 3120-...-M1-..

Ordering information

Type	3120	rocker switch/circuit breaker
Mounting	F	snap-in frame
Size of frame	3	to fit in cut-out 50.5x21.5 mm
panel thickness	1	- 6.35 mm
4	to fit in cut-out 44.5x22 mm	1 - 2.5 mm
5	to fit in cut-out 44.5x22 mm	2.6 - 4 mm
6	to fit in cut-out 45x33.7 mm	1.2 - 2.4 mm
Number of poles	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	
Mounting frame design	1	collar height 1 mm
3	collar height 9 mm (with safety frame)	
4	collar height 2 mm, with water splash protection (IP 54) (not with -F6 frame)	
Terminal configuration	P7	blade terminals 2x2.8-0.8 mm (terminals 12(k), 22(k), 11, 21)
H7	12(k), 22(k): blade terminals 2x2.8-0.8	11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8
N7	as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8	
G7	as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8	
Characteristic curve	M1	standard delay, therm. 1.01-1.4xIN; magn. 4-9xIN AC
Switch style	W	rocker
Switch colour designation	OPAQUE	TRANSLUCENT (for illuminated versions)
01	black	12 white
02	white	14 red
04	red	15 orange
		19 green
Rocker markings	A	0 AUS/ OFF
B		I EIN/ ON
C		0 AUS/ OFF
D		I EIN/ ON
E		0 AUS/ OFF
F		I EIN/ ON
X		
	A B C D E F X	
	X = without marking	
Rocker illumination (optional)	B	with illumination AC/DC
G	green LED, AC/DC	
Y	yellow LED, AC/DC	
R	red LED, AC/DC	
Illumination voltage range/ power consumption	0	4-7 V/6 V/80 mA (B,G,Y,R)
1	10-14 V/12 V/75mA (B,G,Y,R)	
2	20-28 V/24 V/35mA (B,G,Y,R)	
3	90-140 V/115 V/<1 mA (B)	
4	185-275 V/230 V/<1 mA (B)	
5	42-54 V/48 V/35 mA (B,Y,R)	
Current ratings	0.1...16 A	

3120 - F 3 2 1 - N7 M1 - W 12 A B 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.

Ordering information

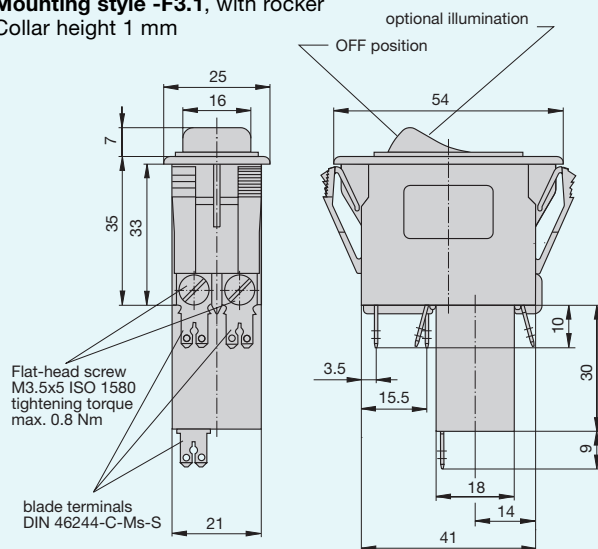
Type	3120	push button switch/circuit breaker
Mounting	F	snap-in frame
Size of frame	2	special frame for fitting splash cover
3	to fit in cut-out 50.5x21.5 mm	panel thickness 1 - 6.35 mm
Number of poles	1	1 pole, thermal-magnetic protection
2	2 pole, thermal-magnetic protection on one pole, thermally protected on the other pole	
5	2 pole, thermal-magnetic protection on one pole, unprotected on the other pole	
Mounting frame design	F	frame with two push buttons
G	frame with one push button	
Terminal configuration	P7	blade terminals 2x2.8-0.8 mm (terminals 12(k), 22(k), 11, 21)
H7	12(k), 22(k): blade terminals 2x2.8-0.8	11, 21: terminal screws M3.5, blade terminals 2x2.8-0.8
N7	as P7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8	
G7	as H7, but shunt terminals (12(i) and 22(i)) are blade terminals 2x2.8-0.8	
Characteristic curve	M1	standard delay, therm. 1.01-1.4xIN; magn. 4-9xIN AC
Switch style/colour	D	1 push button (reset only)
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)	B	filament bulb (AC/DC)
L	neon (AC)	
G	green LED, AC/DC	
Y	yellow LED, AC/DC	
R	red LED, AC/DC	
Illumination voltage range/ power consumption	0	4-7 V/6 V/80 mA (B,G,Y,R)
1	10-14 V/12 V/75mA (B,G,Y,R)	
2	20-28 V/24 V/35mA (B,G,Y,R)	
3	90-140 V/115 V/<1 mA (L)	
4	185-275 V/230 V/<1 mA (L)	
5	42-54 V/48 V/35 mA (Y,R)	
Current ratings	0.1...16 A	

3120 - F 3 2 F - N7 M1 - S GRX L 4 - 10 A ordering example

Thermal-Magnetic Circuit Breaker 3120-...-M1-..

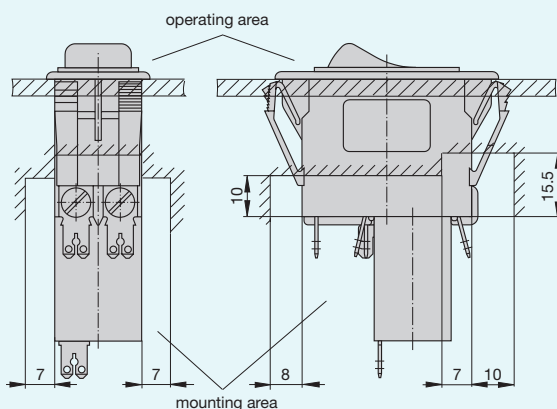
Dimensions

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



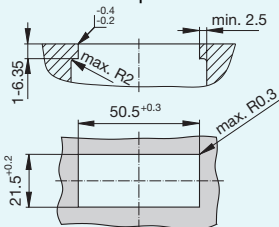
Installation drawing

Required safety distances for rocker and push button

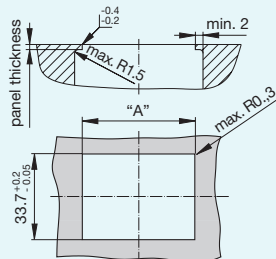


Cut-out dimensions

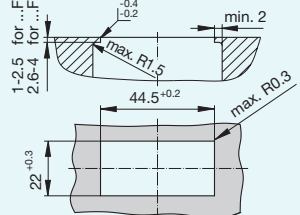
Cut-out for mounting style -F3 with rocker and push button



Cut-out for mounting style -F6 with rocker



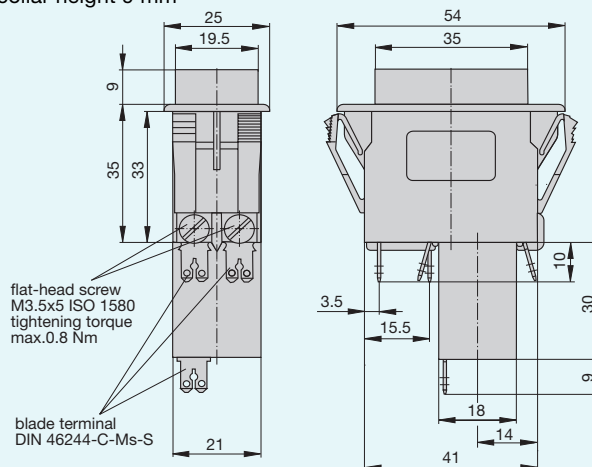
Cut-out for mounting style -F4/-F5 with rocker



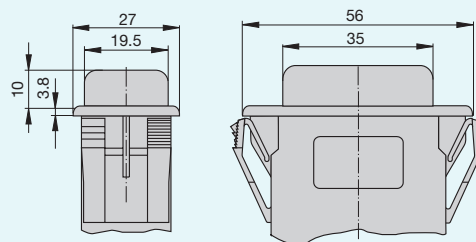
panel thickness	1.2 ^{+0.4} ₀	1.6 ^{+0.8} ₀	2.4 ⁺¹ ₀
dimension "A"	45 ^{+0.2} _{-0.05}	45 ^{+1.1} _{-0.05}	45 ^{+2.2} _{-0.05}

Mounting frame variants

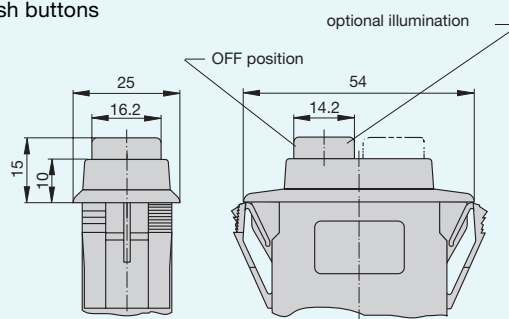
Mounting style -F3.3, with rocker
collar height 9 mm



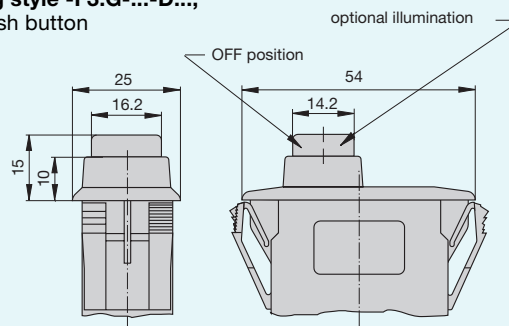
Mounting style -F3.4, with rocker
collar height 2 mm, with water splash protection



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



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

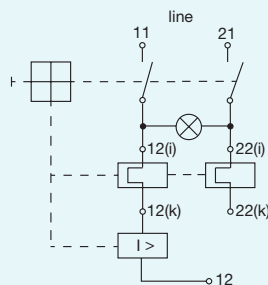


For mounting styles -F2., -F4., -F5., -F6..
please see pages 67 and 71

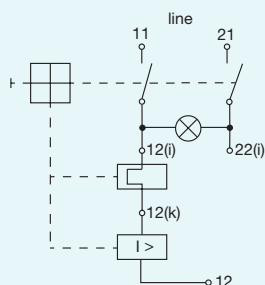
ET-A® Thermal-Magnetic Circuit Breaker 3120-...-M1-..

Internal connection diagrams

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

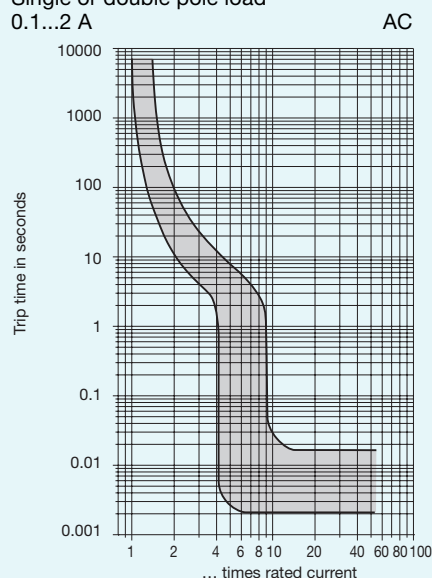


therm.-magn. protection on one pole
unprotected on the other pole

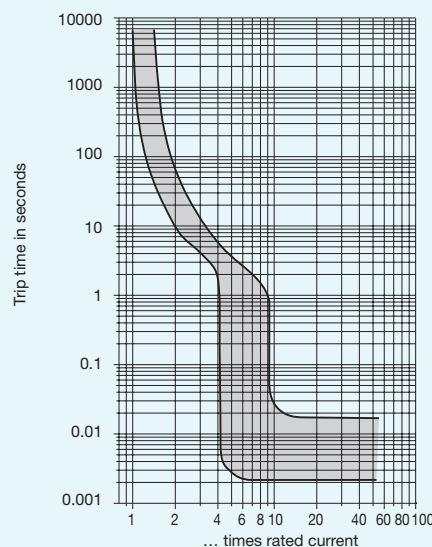


Typical time/current characteristics at 23 °C

Single or double pole load
0.1...2 A



2.5...16 A



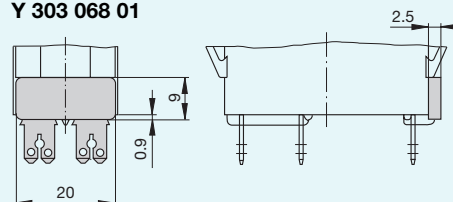
N.B.
Magnetic tripping
currents are increased
by 25% on DC supplies.

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

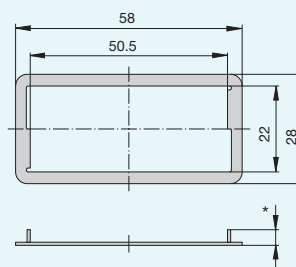
Ambient temperature °C	-30	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.8	0.84	0.88	0.92	1	1.08	1.14	1.23

Accessories

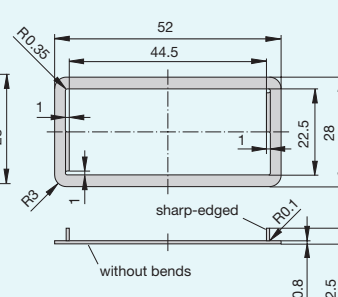
Insulated cover
Y 303 068 01



Retaining clip for 3120-F3...
Y 303 675 01/02

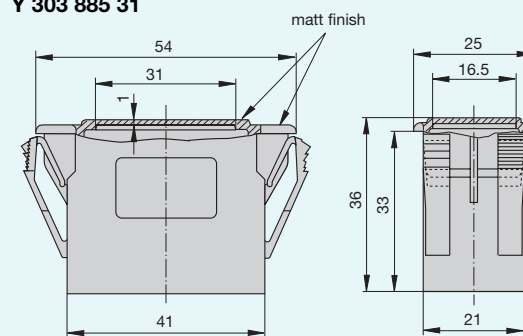


Retaining clip for 3120-F5...
Y 303 676 01

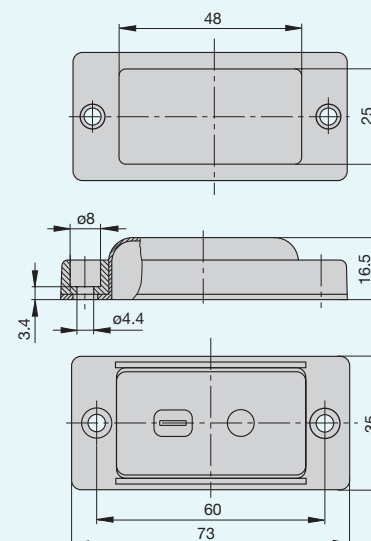


Y303 675 01 suitable
for panel thickness < 2 mm
Y303 675 02 suitable
for panel thickness < 4 mm

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



Separate water splash cover for use with
-F4../-F5.. size mounting frames
X 221 619 01



Separate water splash cover for style -F2 see page 72

E-T-A® Thermal-Magnetic Overcurrent Circuit Breaker 3200

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. Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Control equipment, extra-low voltage wiring systems and components.

Accessories

10R-K10	Modular snap-together surface mounted sockets, each accommodating two plug-in circuit breakers. With screw terminals.
10R-P10	As above but with push-on terminals.
10R-A10	As above but with a combination of screw and push-on terminals.
Y 301 166 02	Two-way brass connecting/bus bar links for type 10 sockets.
Y 301 166 01	Four-way brass connecting/bus bar links for type 10 sockets.
16	Single socket for symmetric EN rail mounting.
Y 301 477 01	Blanking plug with insulated pins, for sockets 10, 20, 40, 60.
X 210 589 01	50-way 1.5mm ² cable links with pre-fitted connection lugs for type 10F-K10/-A10 sockets.
X 210 589 02	As above but with 2.5mm ² cable links.
X 210 588 01	100-way 1.5mm ² cable links with pre-fitted push-on connectors for type 10F-P10 sockets.
X 210 588 02	As above but with 2.5mm ² cable links.

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 (Ω)	Current rating (A)	Internal resistance (Ω)
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



3200-...

Technical data

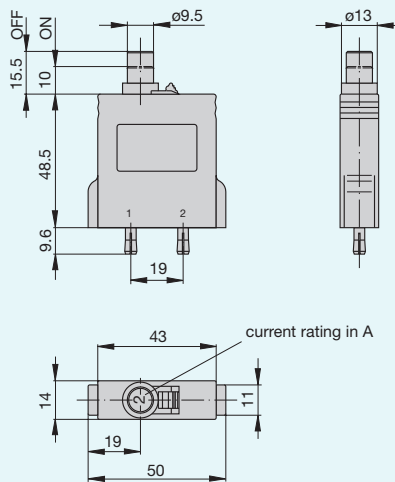
Voltage rating	AC 250 V, 50/60 Hz; DC 28 V	
Current ratings	0.05...25 A	
Typical life	4000 operations at 2xI _N	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V double insulation	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.05...0.8 A	self-limiting
	1...2 A	200 A
	2.5...25 A	400 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	5 g (57-500 Hz)±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 50 g	

Approvals

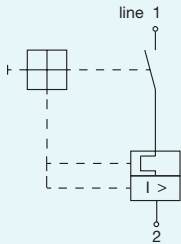
Authority	Voltage ratings	Current ratings
VDE	AC 250 V, DC 28 V	0.05...25 A
CSA	AC 250 V, DC 28 V	0.05...15 A
LRoS	AC 250 V, DC 28 V	0.3 ...25 A

ET-A® Thermal-Magnetic Overcurrent Circuit Breaker 3200

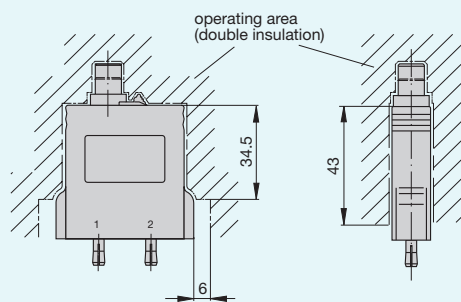
Dimensions



Internal connection diagram



Installation drawing

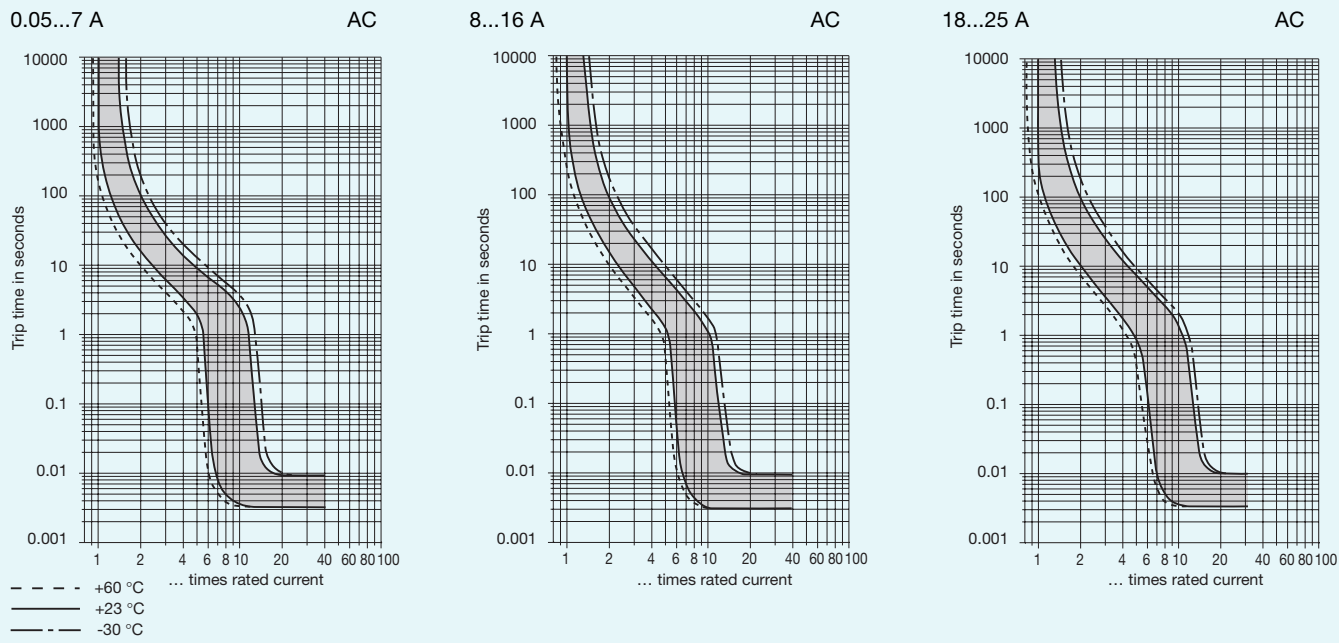


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

N.B.
Magnetic tripping currents are increased by 20% on DC supplies.

Typical time/current characteristics

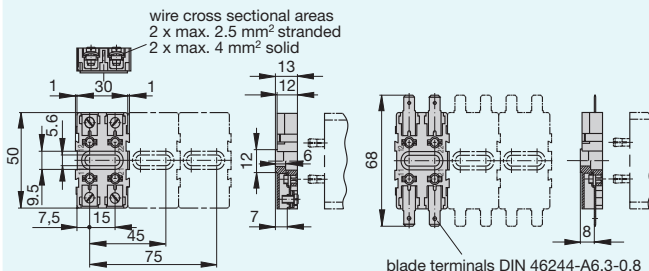


Accessories

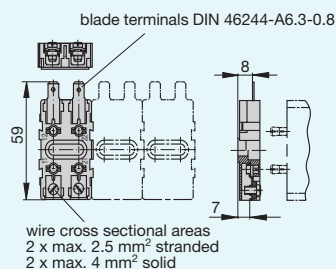
Sockets (continuous load up to 16 A)

10R-K10

10R-P10

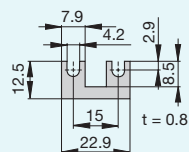


10R-A10

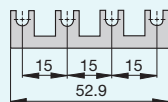


Bus bars for sockets 10...

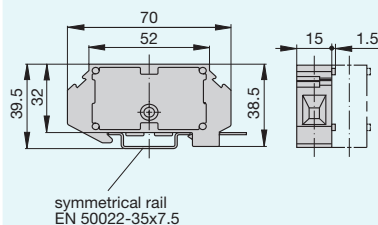
Y 301 166 02, two-way



Y 301 166 01, four-way



Socket 16

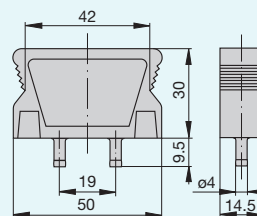


Adapter
for socket 16
X 200 409 01
for track mounting to
EN 50035-G32 (G profile)
on request

Blanking plug

Y 301 477 01

for sockets 10R-P10/K10/A10

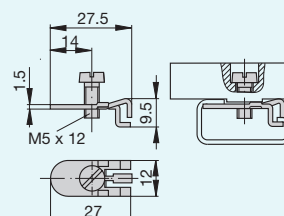


Terminal for mounting rack

(DIN/EN 50035-G32)

X 200 800 01

for sockets 10R, 10F

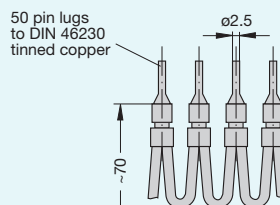


Connector bus links -K10

X 210 589 01/2.5mm²

X 210 589 02/1.5mm²

for sockets 20, 40, 60, 10R-K10/-A10 and 16



Connector bus links -P10

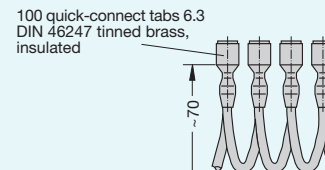
X 210 588 01/1.5mm², brown

X 210 588 02/2.5mm², black

X 210 588 03/2.5mm², red

X 210 588 04/2.5mm², blue

for sockets 10R-P10, 10R-A10



E-T-A® Thermal-Magnetic Circuit Breakers 3300/3400

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). Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics.

Accessories

- X 210 663 01 Water splash cover/knurled nut assembly for version with press-to-reset only (-IG2).
X 200 801 08 Concertina style splash cover/hex nut assembly for version with press-to-reset only (-IG2).

Ordering information

Type No.	
3300	fast acting
3400	standard delay
Mounting	
IG2	moulded threadneck M12x1, protection class II, (bulk-shipped) not with -H; leave blank for metal threadneck (required for -H)
Terminal design	
P10	blade terminals 6.3-0.8
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) for M12x1 metal threadneck only *)
Auxiliary contacts (optional)	
Si	with silver-plated solder terminals (N/O and N/C)
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

*) metal threadneck version for -H is not approved.

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 (Ω)		Current ratings (A)	Internal resistance (Ω)	
	3300	3400		3300	3400
0.05	477	447	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	0.020	≤ 0.02
0.6	4.8	4.3	10	≤ 0.02	≤ 0.02
0.8	2.5	2.5	12	≤ 0.02	≤ 0.02
1	1.93	1.67	13	≤ 0.02	≤ 0.02
1.5	0.81	0.61	14	≤ 0.02	≤ 0.02
2	0.44	0.38	15	≤ 0.02	≤ 0.02
2.5	0.27	0.24	16	≤ 0.02	≤ 0.02



3300
fast acting

3400
standard delay

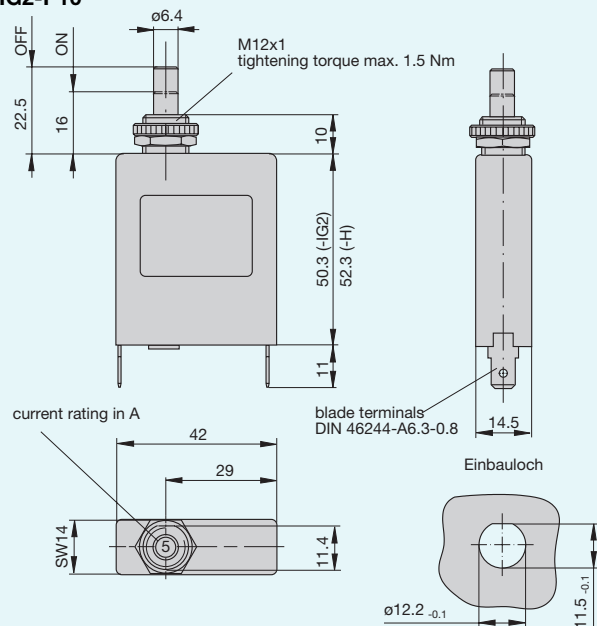
Technical data

Voltage rating	AC 250 V, 50/60 Hz; DC 65 V		
Current ratings	0.05...16 A		
Auxiliary circuit	1 A, AC 250 V/DC 65 V		
Typical life	5000 operations at 2xI _N		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A) operating area	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area main circuit/aux. circuit aux. circuit 4-5/6-7	Test voltage AC 3000 V double insulation AC 1500 V AC 840 V		
Insulation resistance	>100 MΩ (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 DC 80 V	1000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca		
Mass	3300: approx. 55 g 3400: approx. 50 g		

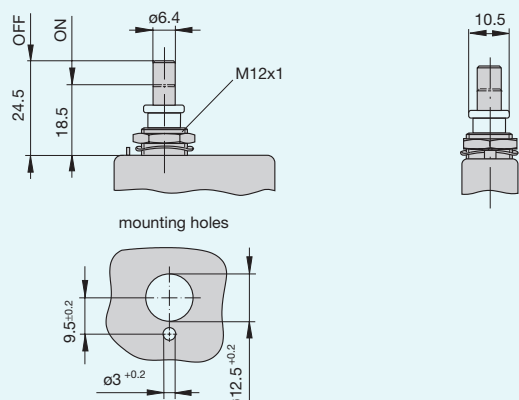
ET-A® Thermal-Magnetic Circuit Breakers 3300/3400

Dimensions

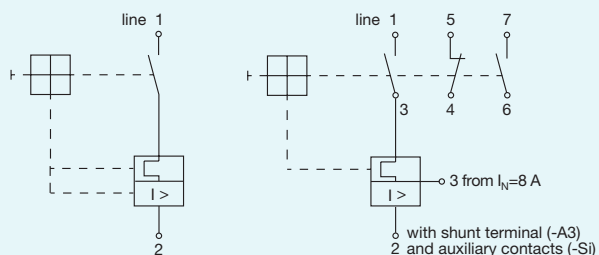
-IG2-P10



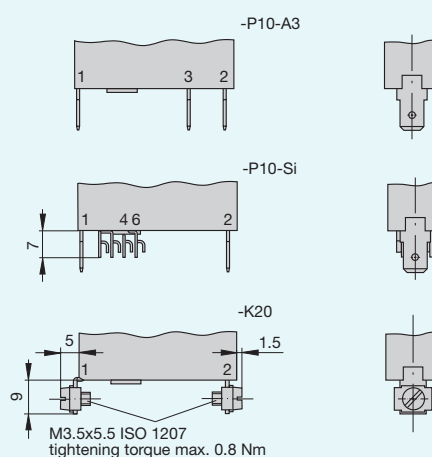
-H



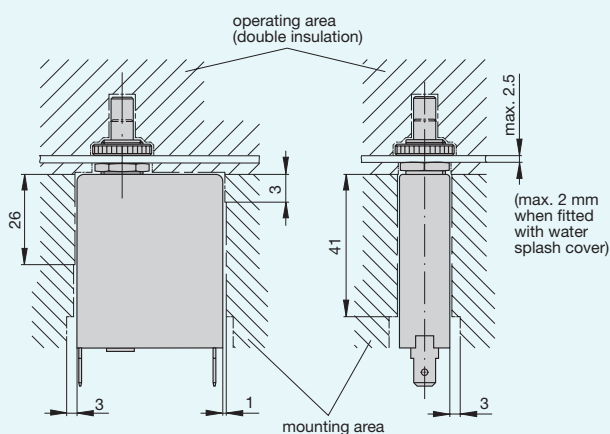
Internal connection diagrams



Terminal design



Installation drawing



Approvals

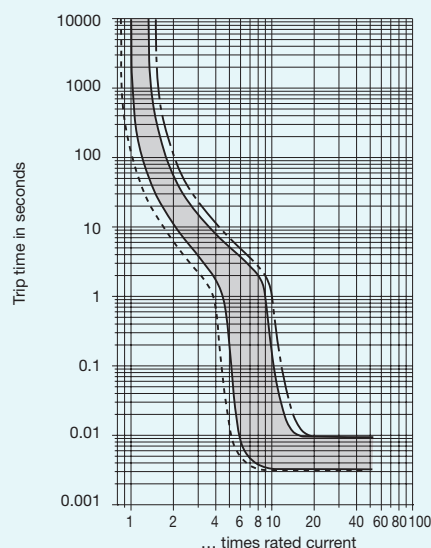
Authority	Voltage ratings	Current ratings
VDE, Demko,	AC 250 V, DC 65 V	0.05...16 A
LRoS	AC 250 V, DC 65 V	0.3 ...16 A
CSA, UL	AC 250 V, DC 80 V	0.05...16 A
Nemko	AC 250 V, DC 65 V	0.05...15 A (3300)
	AC 250 V	0.05...16 A (3400)
Semko	AC 250 V	2 A and 2.5 A

Metal threadneck version for -H is not approved

Typical time/current characteristics

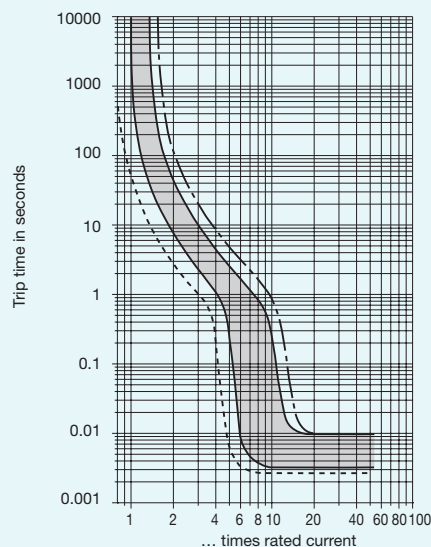
Type 3300 0.05...7 A

AC



Type 3300 8...16 A

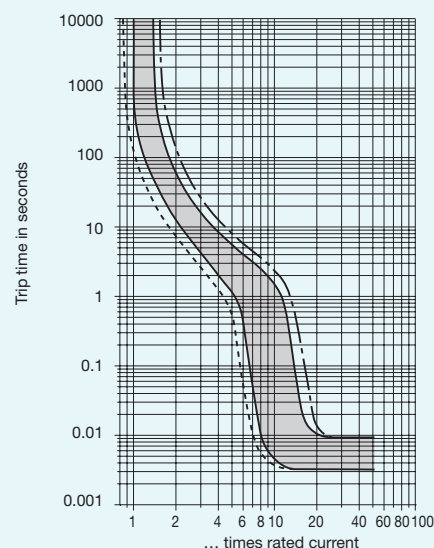
AC



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

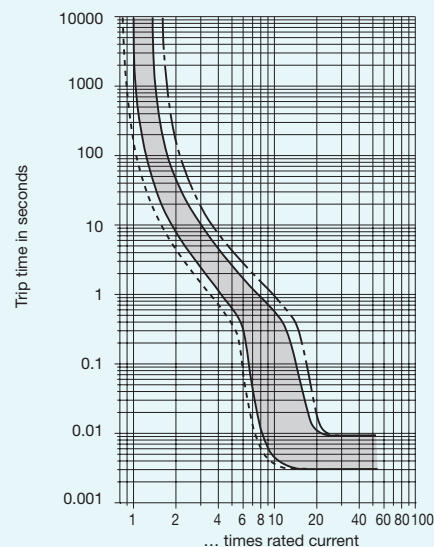
Type 3400 0.05...7 A

AC



Type 3400 8...16 A

AC



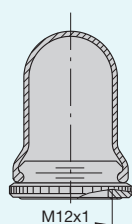
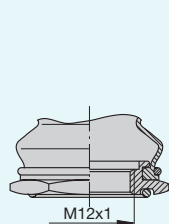
Magnetic tripping currents are increased by 20% on DC supplies.

Accessories

For push buttons with M12 moulded threadneck (-IG2)

Hex nut with splash cover, black
X 201 296 01 (IP 64)
X 200 801 08 (IP 66)with O-ring

Water splash cover, transparent with knurled nut
X 210 663 01 (IP 64)



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

E-T-A® Thermal-Magnetic Circuit Breakers 3500/4000

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. Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Control systems, instrumentation, medical equipment, machine tools, robotics, communications systems.

Ordering information

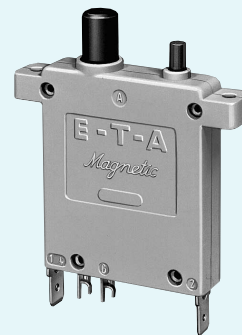
Type No.	
3500	standard version
4000	low resistance version
Mounting (optional)	
F11	flange with additional M3 insertion nuts
Terminal design	
P10	blade terminals 6.3-0.8, tinned
K20	screw terminals M 3.5x5.5 with clamp (not with -Si or type 4000)
Shunt terminal (optional)	
A3	same as main terminals (up to $I_N = 7$ A, max. load 5 A)
Auxiliary contacts (optional with type 3500)	
Si	auxiliary contacts, silver plated terminals one each N/O and N/C
ZR-Si	auxiliary contacts with intermediate position (standard with type 4000)
Current ratings	
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 (Ω)		Current ratings (A)	Internal resistance (Ω)	
	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	≤ 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			



3500
standard type

4000
low-resistance type

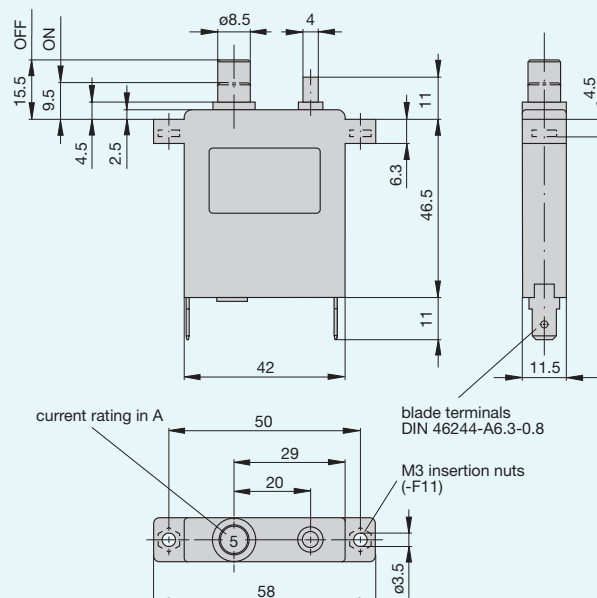
Technical data

Voltage rating	AC 250 V, 50/60 Hz; DC 65 V		
Current rating range	3500: 0.05...16 A 4000: 0.05...10 A		
Auxiliary circuit	1 A, AC 250 V/DC 65 V		
Typical life	5,000 operations at 2xI _N		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area main/aux. circuit aux. circuit 4-5/6-7	Test voltage AC 3000 V AC 1500 V AC 840 V		
Insulation resistance	> 100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	3500	4000	
	0.05...0.8 A	0.05...0.2 A	self-limiting
	1...2 A	0.3...2 A	200 A
	2.5...16 A	2.5...10 A	400 A
Interrupting capacity (UL 1077)	I _N	U _N	
	0.05...16 A	AC 250 V	1000 A
	0.05...16 A	DC 80 V	1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	5 g (57-500 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca		
Mass	approx. 40 g		

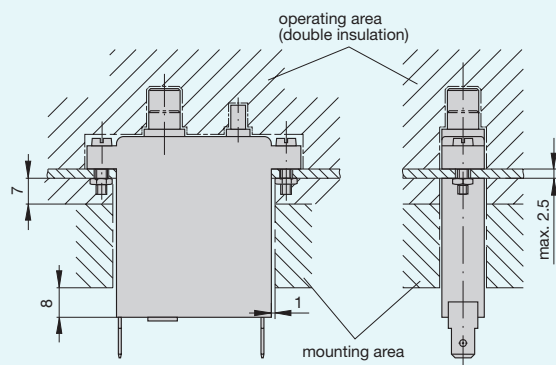
ET-A® Thermal-Magnetic Circuit Breakers 3500/4000

Dimensions

Version -P10



Installation drawing

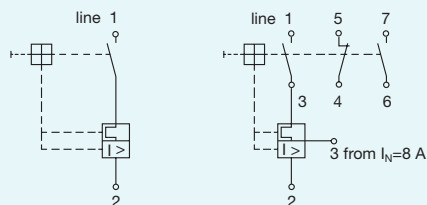


Approvals

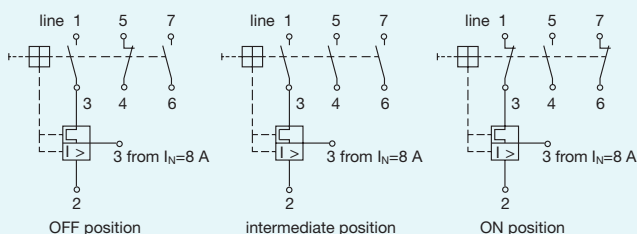
Authority	Voltage ratings	Current ratings
3500:		
VDE, Demko	AC 250 V, DC 65 V	0.05...16 A
CSA, UL	AC 250 V, DC 80 V	0.05...16 A
Nemko, Semko	AC 250 V, DC 65 V	0.05...10 A
LROs	AC 250 V, DC 65 V	0.3 ...16 A
4000:		
VDE, Demko, Semko	AC 250 V, DC 65 V	0.05...10 A
LROs	AC 250 V, DC 65 V	0.3 ...10 A
CSA, Nemko	AC 250 V	0.05...10 A

Internal connection diagrams

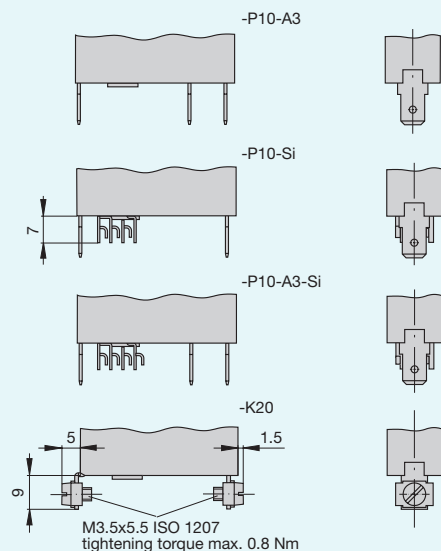
with shunt terminal (-A3)
and auxiliary contacts (-Si)



Switching position with intermediate position and
auxiliary contacts (-ZR-Si)



Terminal design



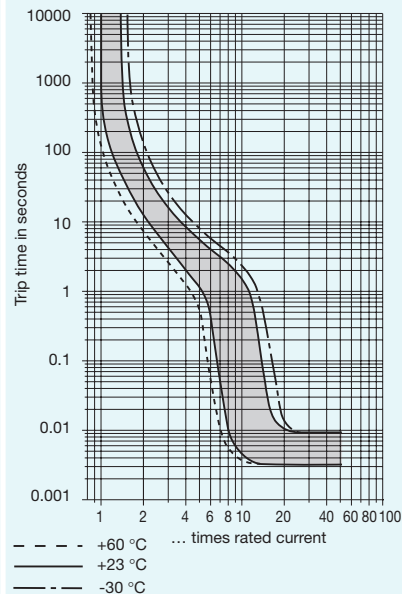
Typical time/current characteristics

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

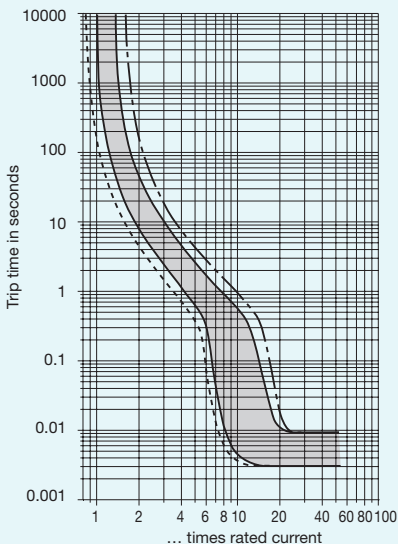
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

N.B.
* Magnetic tripping currents are increased by 20% on DC supplies.
** Magnetic tripping currents are decreased by 20% on AC supplies.

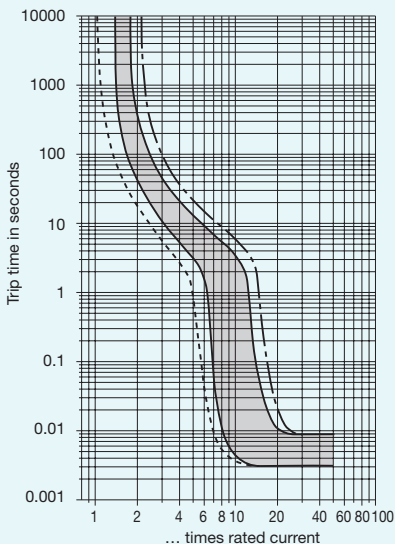
3500 0.05...7 A AC*



3500 8...16 A AC*



4000 0.05...10 A DC**



Thermal-Magnetic Circuit Breakers 3500

Special version 3500-...-2100

Single pole thermal-magnetic overcurrent circuit breaker with slow magnetic trip curve, suitable for high inrush currents (up to $12xI_N$). Suffix -2100 is also available for types 3400 and 3600. Enquire for further details.

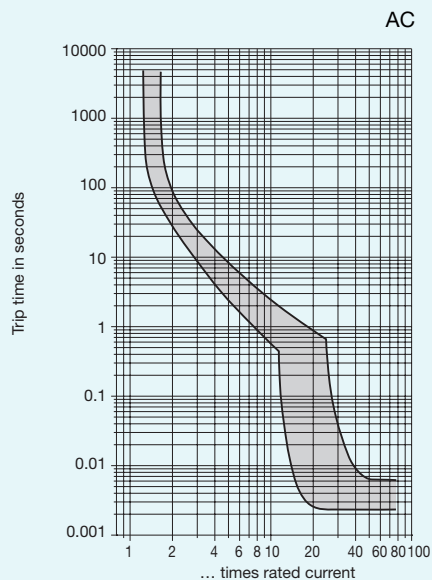
Typical applications

Industrial control systems, telecommunications, etc.

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
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	≤ 0.02
1	1.88	14	≤ 0.02
1.5	0.77	15	≤ 0.02
2	0.42	16	≤ 0.02
2.5	0.24		

Typical time/current characteristics at 23 °C



N.B.

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

Special version 3500-...-2350

Single pole thermal-magnetic circuit breaker suitable for high ambient temperatures. The special rating of the circuit breaker allows resetting at no load in ambient temperatures up to +80°C. Suffix -2350 is also available for types 3400 and 3600. Enquire for further details.

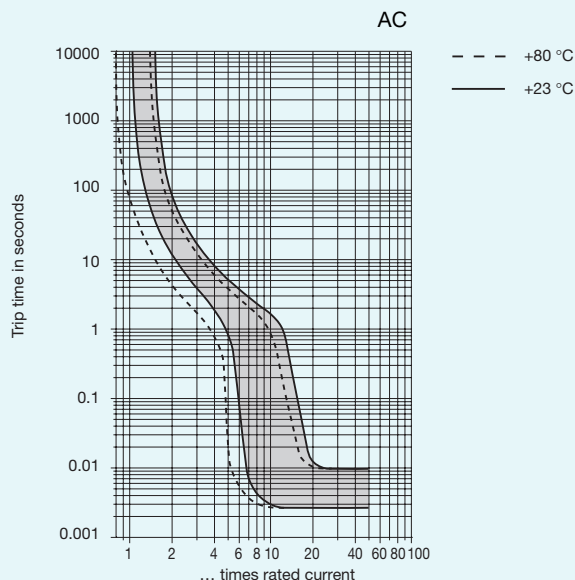
Typical applications

Industrial control systems

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
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	≤ 0.02
1	2.3	15	≤ 0.02
1.5	0.89	16	≤ 0.02
2	0.48		

Typical time/current characteristics



N.B.

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

E-T-A® Thermal-Magnetic Circuit Breakers 3600/3900

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. Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Process control systems, instrumentation, communications systems.

Accessories

23-P10-Si	Lug mounted socket. With push-on terminals.
63-P10-Si	Lug mounted socket. With push-on terminals.
17-P10-Si	EN rail mounted socket.
17-P10-Si-20025	Socket supplied with adapter fitted or asymmetric rail mounting (G-profile).
Y 301 398 02	Withdrawal tool - spring metal clip to aid withdrawal of the circuit breaker from its mounting socket.
X 210 588 01	100-way 1.5mm ² cable links with pre-fitted push-on connectors for type 10F-P10 sockets.
X 210 588 02	As above but with 2.5mm ² cable links.
Y 300 504 02	One pair of clips to facilitate panel mounting of types 3600 and 3900.

Ordering information

Type No.	
3600	standard version
3900	low-resistance version
Terminal design	
P10	blade terminals 6.3-0.8
Auxiliary contacts (optional with type 3600)	
Si	with blade terminals 6.3-0.8, one each NO/NC, (type 3900 with intermediate position as standard)
Si60	special auxiliary contact closed in the intermediate and ON position
ZR-Si	auxiliary contacts with intermediate position (type 3600)
Si3/R	special auxiliary contacts, 2 NC contacts with reset button (not approved)
Current ratings	
0.05...16 A	(type 3600)
0.05...10 A	(type 3900)

3600 - P10 - Si - 10 A ordering example

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

Standard current ratings and typical internal resistance values

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	5.7	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	
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

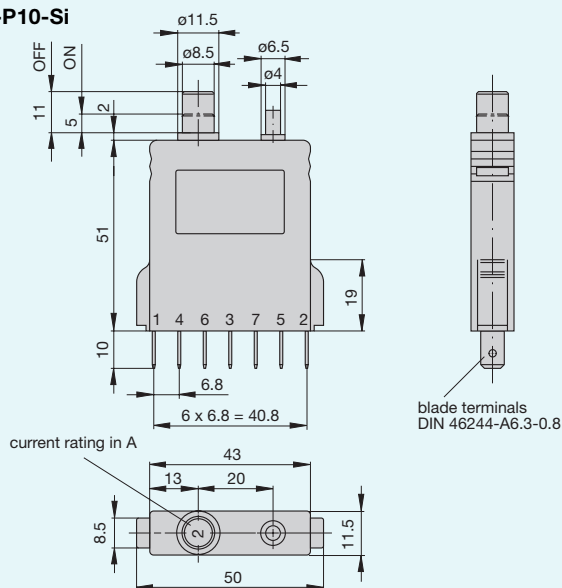
Voltage rating	AC 250 V, 50/60 Hz; DC 65 V		
Current rating range	3600: 0.05...16 A; 3900: 0.05...10 A		
Auxiliary circuit	1 A, AC 250 V/DC 65 V		
Typical life	5000 operations at 2xI _N		
Ambient temperature	-30...+60 °C		
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2	
Dielectric strength (IEC 664 and 664A) operating area main/aux. circuit aux. circuit 4-5/6-7	Test voltage AC 3000 V AC 1500 V AC 840 V		
Insulation resistance	>100 MΩ (DC 500 V)		
Interrupting capacity I _{cn}	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) type 3600	I _N 0.05...16 A 0.05...16 A	U _N AC 250 V DC 80 V	1000 A 1000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00		
Vibration	5 g (57-500 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 68-2-27, Test Ea		
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, Test Ka		
Humidity	240 hours at 95 % RH to IEC 68-2-3, Test Ca		
Mass	approx. 45 g		

Approvals

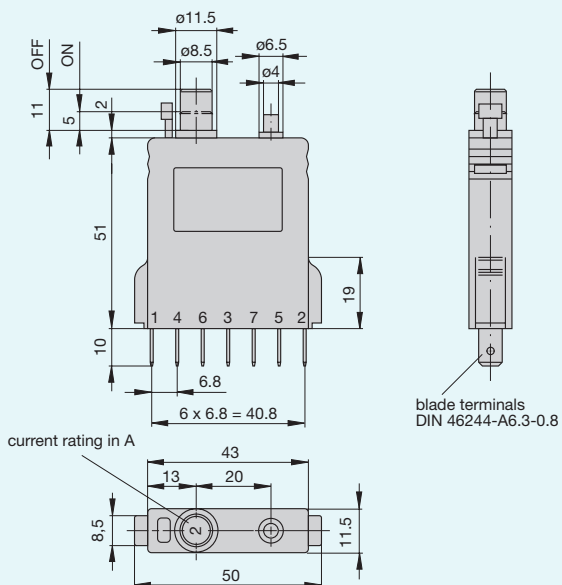
Authority	Voltage ratings	Current ratings
3600:		
VDE, Demko, Nemko	AC 250 V, DC 65 V	0.05...16 A
Semko	AC 250 V, DC 65 V	0.1 ...10 A
CSA/UL	AC 250 V, DC 80 V	0.05...16 A
LROs	AC 250 V, DC 65 V	0.3 ...16 A
3900:		
VDE, Demko, Semko	AC 250 V, DC 28 V	0.05...10 A
Nemko	AC 250 V	0.05...10 A
LROs	AC 250 V, DC 65 V	0.3 ...10 A

Dimensions

-P10-Si

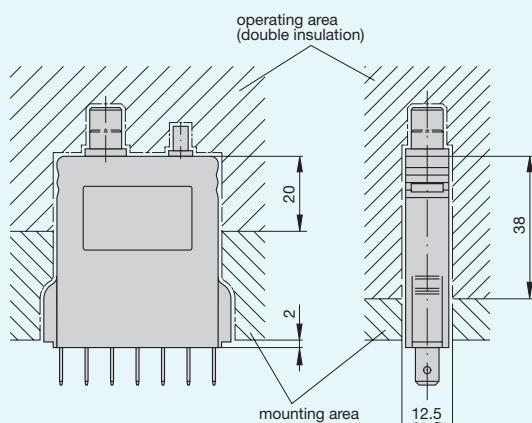


-Si3/R



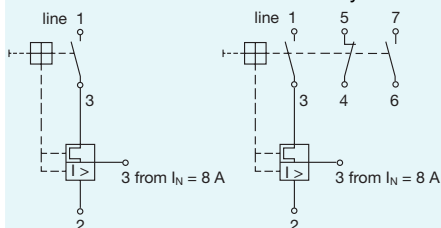
Intermediate position: Holding down reset button and actuating manual release simultaneously.

Installation drawing

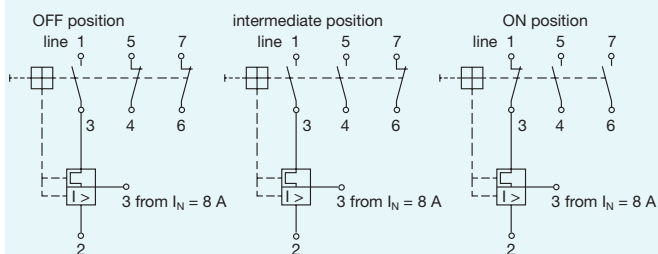


Internal connection diagrams

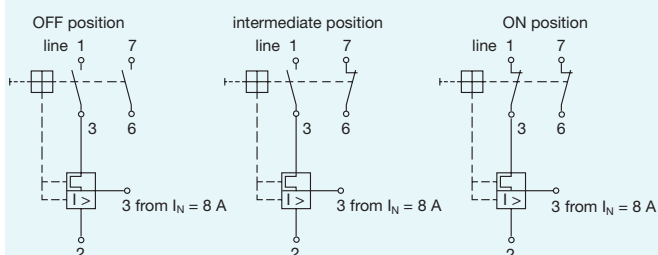
with shunt terminal (standard) and auxiliary contacts



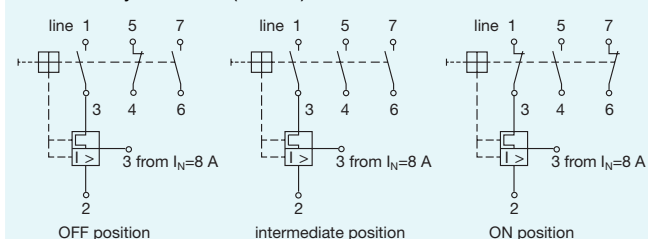
Switching position with auxiliary contacts and reset button (-Si3/R)



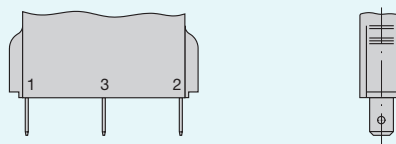
Switching position with special auxiliary contact (-Si60)



Switching position with intermediate position and auxiliary contacts (-ZR-Si)



Terminal design -P10-A3



E-T-A® Thermal-Magnetic Circuit Breakers 3600/3900

Typical time/current characteristics

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

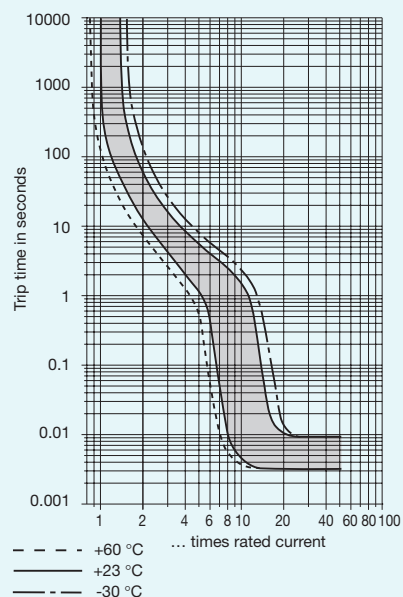
N.B.

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

** Magnetic tripping currents are decreased by 20% on AC supplies.

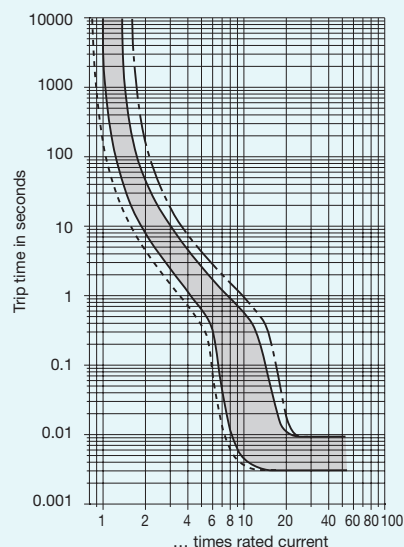
3600 0.05...7 A

AC*



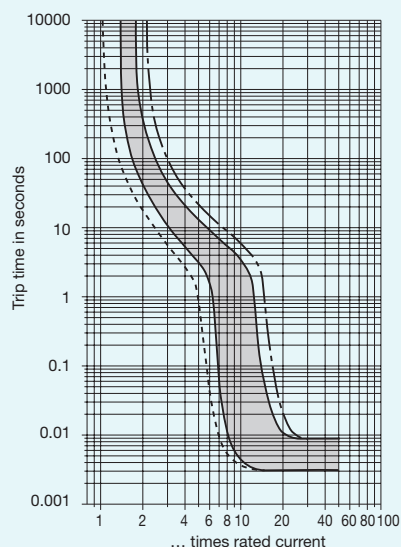
3600 8...16 A

AC*



3900 0.05...10 A

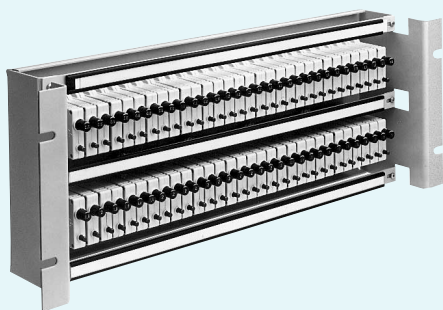
DC**



Accessories

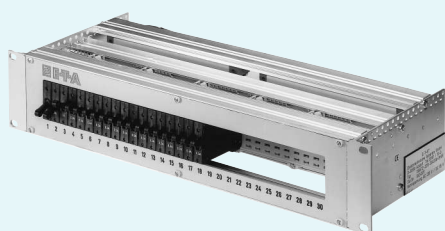
19" Rack

accommodating up to 60 E-T-A thermal-magnetic circuit breakers type 3600-P10-Si or 3900-P10-Si.
For technical data see pages 113-114.



19" Rack 19BGT2 2HE

for 18, 24 or 30 circuits.
For technical data see pages 115 - 116.

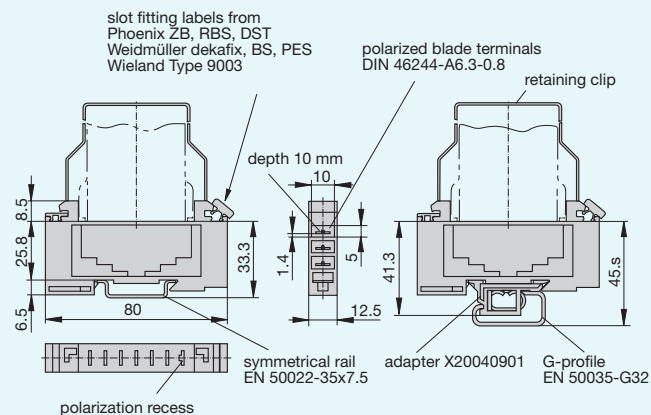


Accessories

Sockets

17-P10-Si
(continuous load up to 16 A)

17-P10-Si- 20025
mounted with adapter

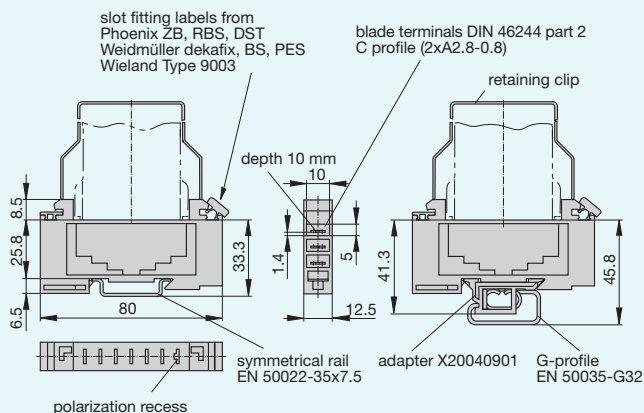


Retaining clip Y 300 581 11
Please enquire for dimension diagram.

Sockets

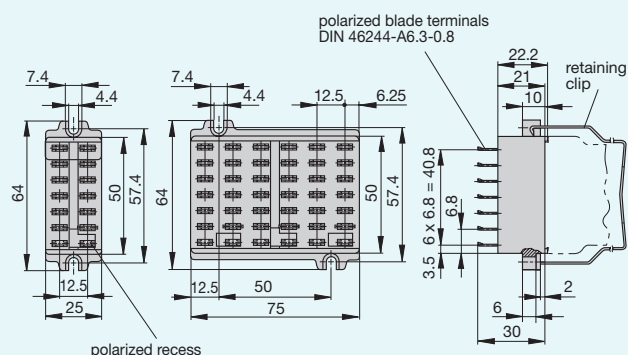
17-P70-Si

17-P70-Si- 20025
mounted with adapter



Sockets
23-P10-Si

63-P10-Si

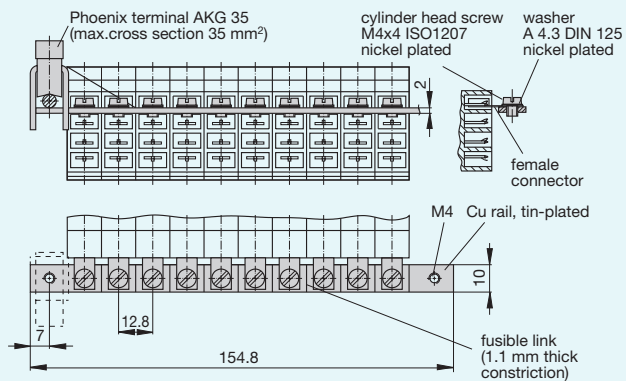


Retaining clip Y 300 581 03
Please enquire for dimension diagram.

Bus bar for socket 17 (for max. 100 A continuous load)

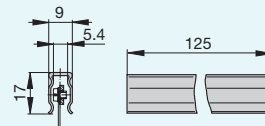
X 211 157 01 with terminal

X 211 157 02 without terminal



Insulated sleeving for busbar

Y 303 824 01



Connector bus links -P10

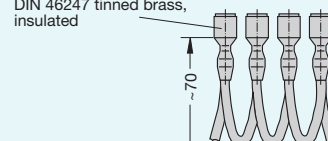
X 210 588 01 /1,5mm², brown

X 210 588 02 /2,5mm², black

X 210 588 03 /2,5mm², red

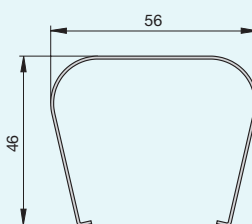
X 210 588 04 /2,5mm², blue

100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



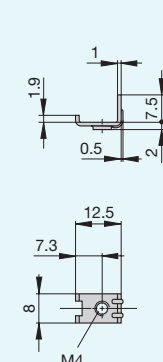
Extraction tool

Y 301 398 02

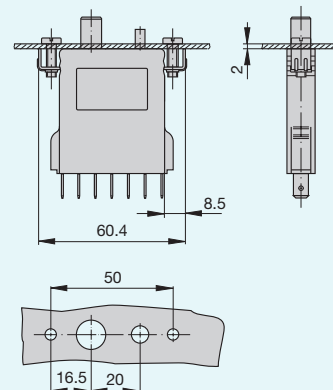


2 mounting clips

Y 300 504 02



**Installation drawing with
mounting clips Y 300 504 02**

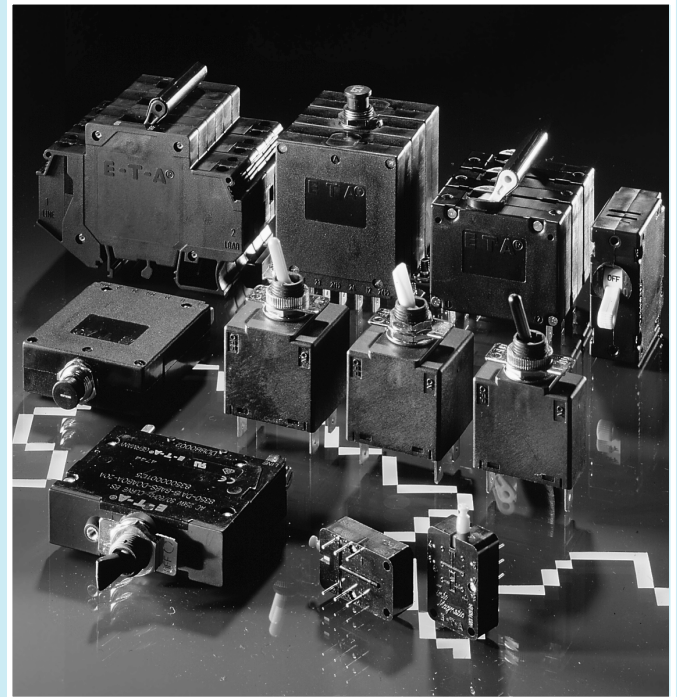


E-T-A® Magnetic and Hydraulic-Magnetic Overcurrent Circuit Breakers

Single and multi pole magnetic and hydraulic-magnetic circuit breakers (CBEs)

**Voltage ratings max. 3 AC 415 V
AC 250 V, DC 80 V**

Current ratings 0.006...100 A



The E-T-A range of magnetic CBEs includes the miniature Printo-magnetic series (808 and 809) with extremely fast operating characteristics for printed circuit board applications, and series 8330, 8340 and 8350 for higher current duties.

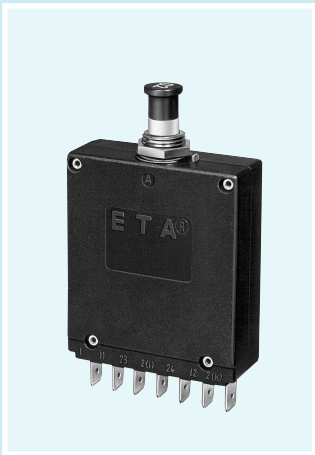
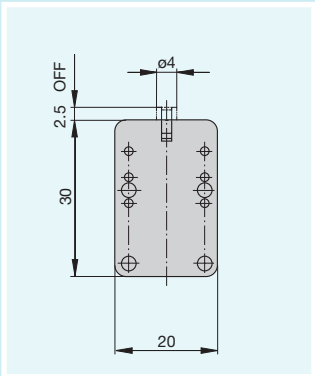
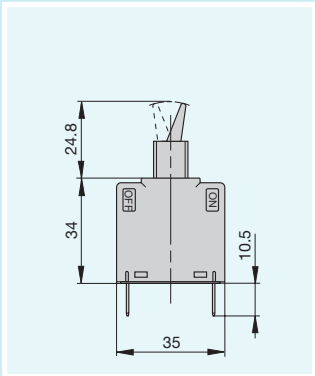
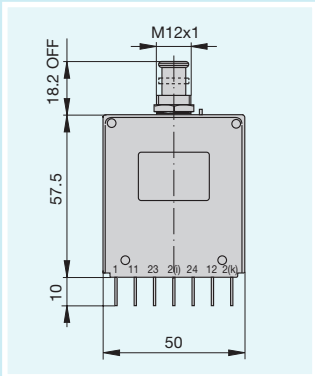
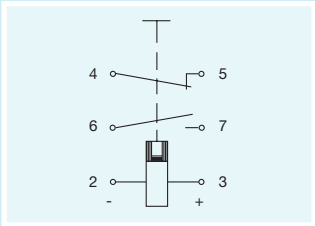
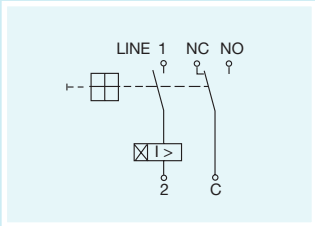
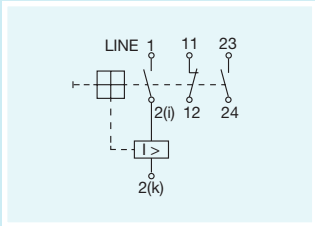
Types 808 and 809 cover ratings from as low as 0.006 A up to 5 A with low internal resistance values. Their unique method of magnetic operation not only provides rapid response times, but is also suited to impulse disconnection for control applications.

Type 8340-G provides the option of either single round hole panel mounting or plug-in mounting utilising an E-T-A series 18 base. On/off control is by means of a push/pull button with visual indication of the off/tripped position. Types 8340-F and 8340-T, with industry standard dimensions and toggle actuation, are panel mounted with two fixing bolts (8340-F) or rail mounted with combi-foot (8340-T).

All models within the 8330, 8340 and 8350 range offer a choice of fast acting magnetic operation or hydraulically delayed switching characteristics which may be selected to suit a range of application requirements such as those of the telecommunications and process control industries, where precise and dependable protection of sophisticated systems cannot be compromised. The 8330 is available in single and two pole models, multipole options are also available for types 8340 and 8350. Single, two and three pole models are available with various internal circuit configurations to provide status signal and relay trip functions.

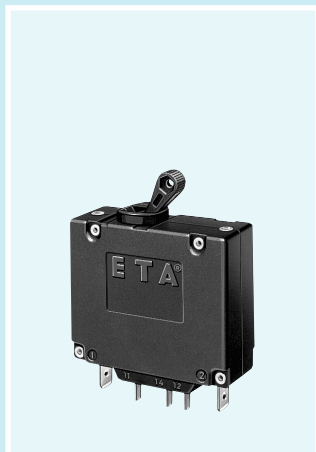
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes.

Magnetic and Hydraulic-Magnetic Overcurrent Circuit Breakers

Type No.	808 / 809-...	8330-...	8340-G2...
			
Description	PCB mounting 808: fast-acting type 809: delayed type	Toggle/baton or rocker circuit breaker, flange or threadneck mounting, with auxiliary contact option	Push/pull circuit breaker, threadneck panel mounting, with auxiliary contact option
Max. voltage rating	DC 24 V (please inquire for other voltages)	AC 240 V (50/60 Hz); DC 50 V	3 AC 415 V; AC 240 V (50/60 Hz); DC 80 V
Current ratings	808: 0.01 ...5 A 809: 0.006...3 A	0.1...25 A	0.02...30 A
Aux. contact rating	5 A	-	1 A
Typical life	6,000 operations at 5A for switching circuit and 2.65 or 4.4 I _N for excitation circuit	10,000 operations with 1 x I _N	10,000 operations with I _N 1 pole 1,000 operations with I _N 2 and 3pole
Interrupting capacity I _{cn}	100 A 1000 A max. (to UL 1077)	AC: 1000 A DC: 500 A	AC: 1200 A DC: 2000 A
Approvals	CSA, UL	CSA, UL,	VDE, CSA, UL, BV, LRoS
Available options	see pages 169 - 170	see pages 171 - 174	see pages 175 - 178
Dimensions			
Internal connection diagrams			

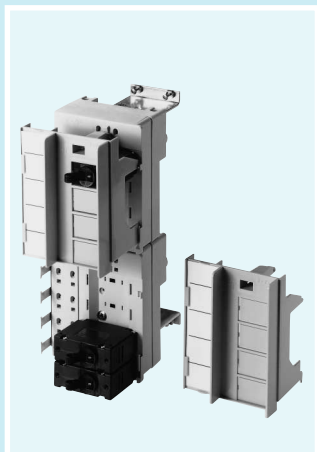
E-T-A® Magnetic and Hydraulic-Magnetic Overcurrent Circuit Breakers

8340-F...



Toggle circuit breaker,
flange mounting,
with auxiliary contact option

X8340-S02 /-S04



Modular distribution rail for
circuit breaker type 8340-F...

8340-T...



Toggle circuit breaker,
rail mounting,
with auxiliary contact option

8350-...



Toggle circuit breaker,
flange mounting,
with auxiliary contact option

3 AC 415 V;
AC 240 V (50/60 Hz); DC 80 V

AC 230 V; DC 65 V

3 AC 415 V;
AC 240 V (50/60 Hz); DC 80 V

3 AC 415 V;
AC 240 V (50/60 Hz); DC 80 V

0.02...30 A

0.02...80 A

0.02...30 A

0.1... 60 A multi pole
0.1...100 A single pole

6 A

AC: 6 A
DC: 1 A

1 A

1 A

10,000 operations with 1 x I_N
single and multi pole

10,000 operations with I_N
single and multi pole

6,000 operations with I_N

AC: 1200 A
DC: 2000 A

AC: 1200 A
DC: 2000 A

AC: 5000 A (I_{nc})
DC: 5000 A (I_{nc})

VDE, CSA, UL,
BV, LRoS, QPL

VDE, CSA, UL,

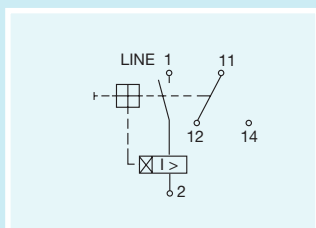
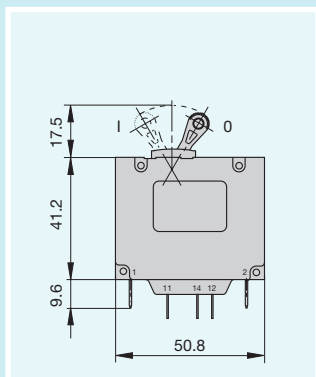
VDE, CSA, UL,

see pages 179 - 182

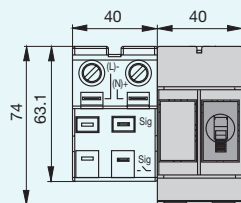
see pages 183 - 186

see pages 187 - 190

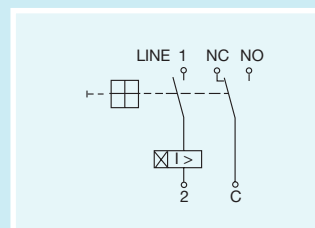
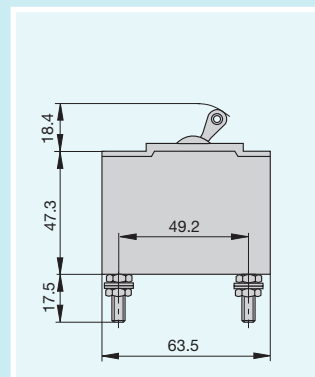
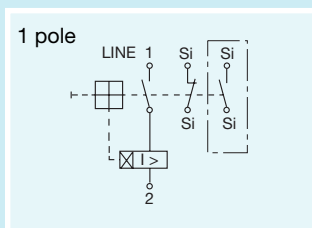
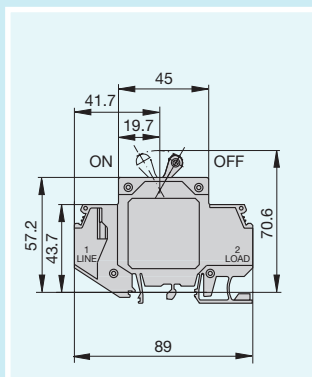
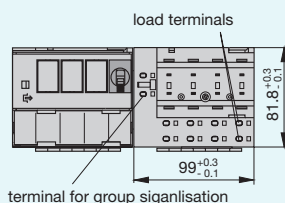
see pages 191 - 194



X8340-S02



X8340-S04



Selector Chart

Type No.	Mounting method					Main terminal design							Number of poles		Actuator				Choice of characteristic curves	Ratings		
	Threadcheck	Flange	Socket	Rail	Printed Circuit Board	Blade terminals	Solder terminals	Screw terminals	Stud terminals				Single pole	Multi pole	Toggle	Push-pull	Rocker			AC (V)	DC (V)	MAX I _n (A)
808					●		●			●	○		●			●				24	5	
809					●		●			●	○		●			●				24	3	
8330	●	○				●				○	●	○	●	●	●		○	○	●	240	50	25
8340-F		●				●		○		○	●	○	●	●	●				●	415	80	30
8340-G	●		●			●		○		○	●	○	●	●		●			●	415	80	30
8340-T				●				●		○	●		●	●	●				●	415	80	30
8350	●	●		○		○		○	○	○	●	○	●	●	●				●	415	80	100

● = standard
○ = optional



E-T-A® Magnetic Overcurrent Circuit Breakers 808/809-...

Description

Single pole miniaturised magnetic circuit breaker 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
809	delayed
Manual release (optional)	
H	manual release facility
Current ratings	
0.01 ...5 A	type 808
0.006...3 A	type 809

808 - H - 1 A ordering example

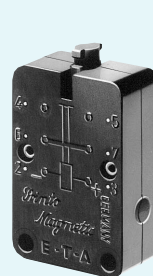
The exact part number required can be built up from the table of choices shown above. Ordering references for optional features should be omitted if not required.

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)		Current rating (A)	Internal resistance (Ω)	
	808	809		808	809
0.006	-	625	0.7	0.143	0.050
0.01	625	-	0.8	0.096	0.040
0.012	-	170	0.9	0.085	-
0.02	170	77	1	0.073	0.031
0.03	77	29.2	1.2	0.050	≤ 0.02
0.04	47	18.5	1.5	0.031	≤ 0.02
0.05	29.2	10.3	1.8	-	≤ 0.02
0.06	-	5.6	2	≤ 0.02	≤ 0.02
0.08	10.3	-	2.5	≤ 0.02	-
0.1	5.6	3.4	3	≤ 0.02	≤ 0.02
0.2	1.65	0.89	3.25	≤ 0.02	-
0.3	0.89	0.28	4	≤ 0.02	-
0.4	0.39	0.143	4.5	≤ 0.02	-
0.5	0.28	0.096	5	≤ 0.02	-
0.6	0.198	0.073			

Approvals

Authority	Voltage ratings	Current ratings	
UL	AC 120 V, DC 60 V	0.01...5 A	(type 808)
	AC 120 V, DC 60 V	0.006...3 A	(type 809)
CSA	AC 115 V, DC 60 V	0.01...5 A	(type 808)
	AC 115 V, DC 28 V	0.006...3 A	(type 809)



808/809



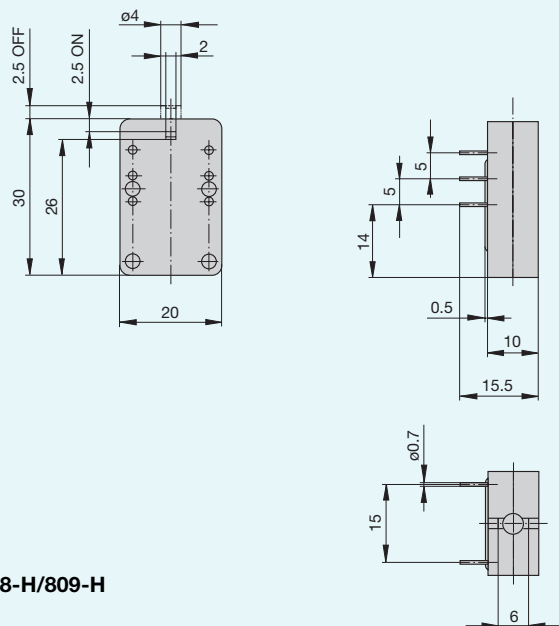
808/809-H-...

Technical data

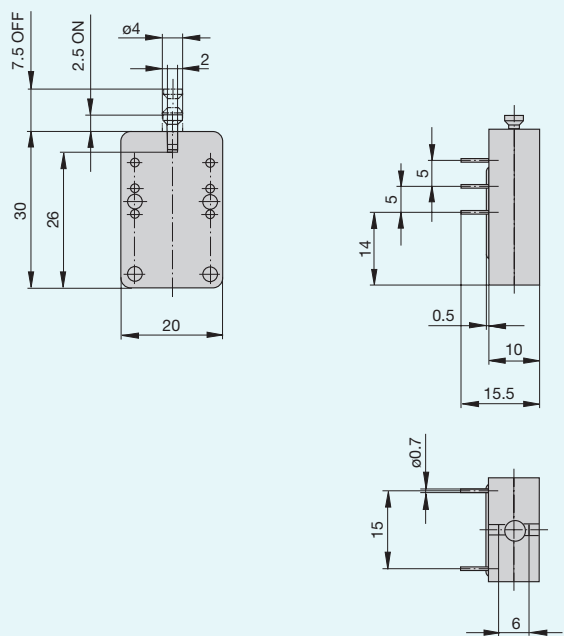
Voltage rating	DC 24 V (other voltages to special order)	
Current ratings	Type 808 0.01...5 A	Type 809 0.006...3 A
Max. continuous load excitation circuit (2-3)	2.65 x I _N	4.4 x I _N
Max. continuous load switching circuit 6-7 auxiliary circuit 4-5	5 A	5 A
Typical life	6000 operations at 5 A for switching circuit, at 2.65 or 4.4 x I _N for excitation circuit	
Ambient temperature	-30...+70 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 2
Dielectric strength (IEC 664 and 664A)	Test voltage	
excitation to switching circuit	AC 840 V	
excitation to auxiliary circuit	AC 1680 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity (o-o-o)	100 A	
Interrupting capacity (UL 1077)	1000 A AC 120 V 200 A DC 60 V	
Degree of protection (IEC 529/DIN 40050)	operating area IP 30 terminal area IP 00	
Vibration	3 g (57-500 Hz), ±0.23 mm (10-57 Hz), to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 10 g	

Dimensions

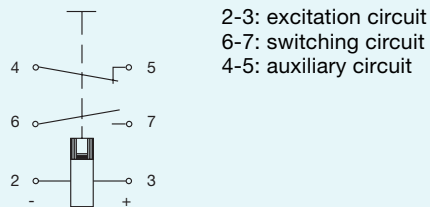
808/809



808-H/809-H

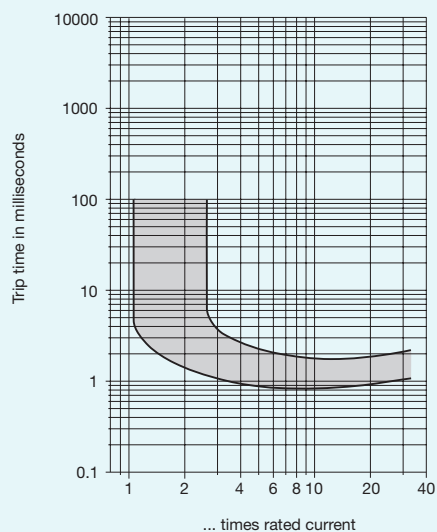


Internal connection diagram

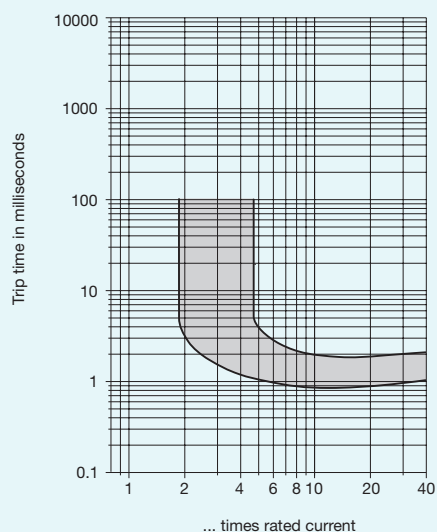


Typical time/current characteristics at 23 °C

Type 808



Type 809



Note:
(Magnetic) tripping currents are decreased by 20% on AC supplies

E-T-A® Magnetic and Hydraulic-Magnetic Circuit Breaker 8330-...

Description

Single and double pole magnetic and hydraulic-magnetic circuit breaker with trip-free mechanism and toggle or rocker actuation. A choice of fast magnetic only or hydraulically delayed switching characteristics (S type MO or HM CBE to EN 60934/IEC 934) ensures suitability for a wide range of applications. Low temperature sensitivity at rated load. Industry standard dimensions and threadneck or snap in panel mounting. Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Power supplies, process control, switchgear and controlgear

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω) per pole
0.1	101
1	0.99
2	0.25
3	0.1
5	0.041
10	0.011
15	0.0057
20	0.0039
25	0.0028

Approvals

Authority	Voltage ratings	Current ratings
UL/CSA	AC 240 V; DC 50 V	0.1...25 A
VDE	AC 240/ V; DC 50 V	0.1...25 A under test



Technical data

Voltage rating	AC 240 V 50/60 Hz DC 50 V	
Current rating range	0.1...25 A	
Auxiliary circuit	AC 125 V 3A; DC 30 V 2 A	
Typical life	10,000 operations at I _N	
Ambient temperature	-40...+75°C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in the operating area	Pollution degree 2
Dielectric strength (IEC 664 and 664A)	Test voltage	
operating area	AC 3000 V	
pole to pole	AC 1500 V	
main to auxiliary circuit	AC 1500 V	
switching to trip circuit	AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	1,000 A at AC 240 V 500 A at DC 50 V	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40; terminal area IP 00	
Vibration	single pole: 10 g (57-500 Hz) ± 0.76 mm (10-57) double pole: 7 g (57-500 Hz) ± 0.54 mm (10-57) to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	50 g (6 ms) to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca	
Mass	approx. 30 g per pole (depending on version)	

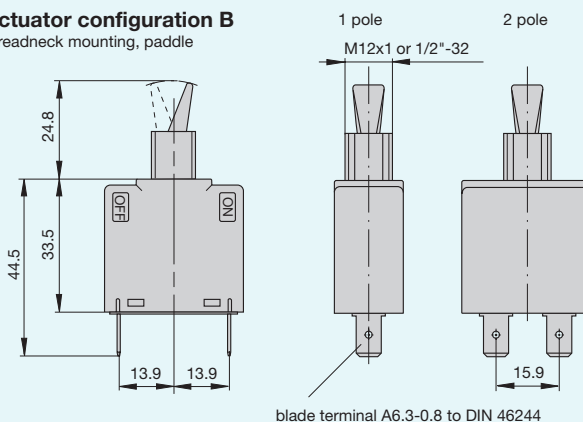
Ordering information

Type No.					
8330	circuit breaker				
Mounting					
F flange mounting, black					
G threadneck mounting, black (standard)					
H threadneck mounting, light-grey					
Q flange mounting, light-grey					
Size	Mounting: F G H Q				
G panel thickness 1 -2.5 mm	X X X X				
L M12 12 mm high (flattened on one side)	X X				
M 1/2"-32 12 mm high (flattened on one side)	X X				
Number of poles					
1 single pole					
2 double pole					
Panel hardware (bulk)	Mounting: F G H Q				
0 without hardware	X X X X				
9 rocker guard	X X				
B 2 hex nuts, 1 legend plate	X X				
D 2 hex nuts, 1 washer with locating pin, 1 legend plate	X X				
F 1 hex nut, 1 knurled nut, 1 legend plate	X X				
H 1 hex nut, 1 knurled nut, 1 washer with locating pin, 1 legend plate	X X				
S 1 legend plate, with splash cover	X X				
Terminal design					
P blade terminals A6.3-0.8					
Actuator configuration					
B paddle, 1 paddle/unit for accessories 0,B,D,F,H					
C baton, 1 baton/unit for accessories 0,B,D,F,H,S					
R rocker, 1 rocker/unit for accessories 0,9					
W illuminated rocker, 1 rocker/unit, for accessories 0,9					
Characteristic curve					
00 switch only					
AS long delay					
BS medium delay					
CS short delay					
OP instantaneous trip					
Actuator colour and marking details					
Colour	Marking	B	C	R	W
2 white	without	X	X	X	X
3 black	without	X	X	X	X
7 red	without	X	X	X	X
B green	I - O			X	X
C white	I - O			X	X
D black	I - O			X	X
H red	I - O			X	X
J orange	I - O			X	X
M green	ON-OFF			X	X
N white	ON-OFF			X	X
P black	ON-OFF			X	X
T red	ON-OFF			X	X
U orange	ON-OFF			X	X
Illumination voltage					
voltage range	actuator				
1 AC 100-125 V	W				
2 AC 220-250 V	W				
3 DC 8- 16 V	W				
4 DC 16- 24 V	W				
5 DC 24- 32 V	W				
6 DC 32- 48 V	W				
X	without illumination B, C, R, W				
Auxiliary contacts					
A no auxiliary contacts					
B one change over per pole					
H one change over per unit (multipole version only)					
Internal circuit					
A switch					
B series trip					
D relay trip (remote trip)					
Remote trip					
00 no remote trip					
03 12V; 04: 24V; 21: 120V; 22: 240V					
Frequency					
4	AC 50/60 Hz				
9	DC				
Current rating					
0.1...25 A					

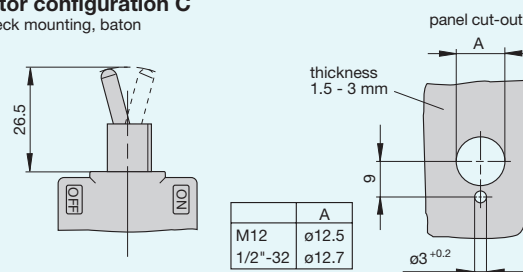
8330 - G L 1 0 - P B BS - 3 X A B 00 4 - 5 A ordering example

Dimensions – threadneck mounted version

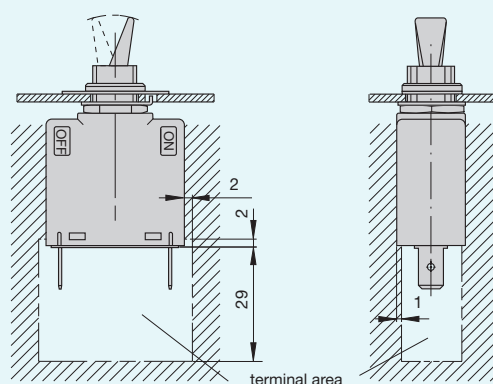
Actuator configuration B
threadneck mounting, paddle



Actuator configuration C
threadneck mounting, baton

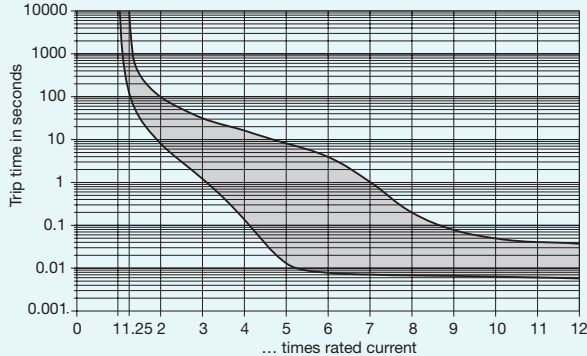


Installation drawing

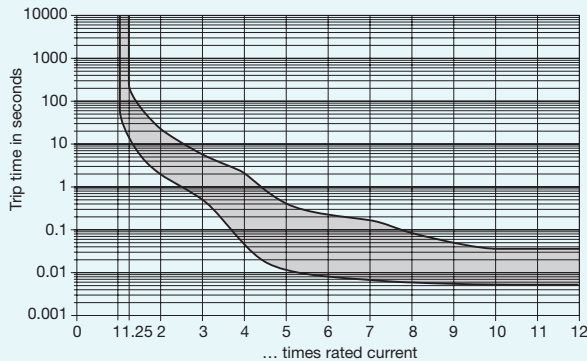


Typical time/current characteristics

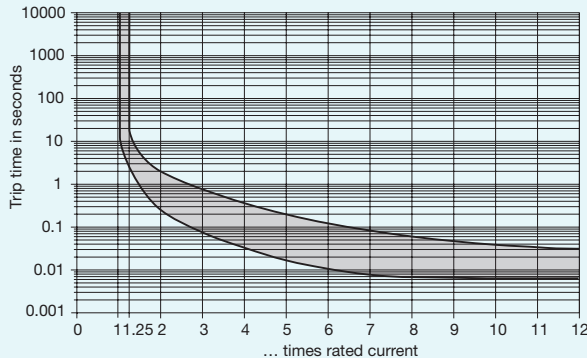
AC 50/60 Hz, DC, ambient temperature +23 °C / +73.4 °F
Curve AS - long delay



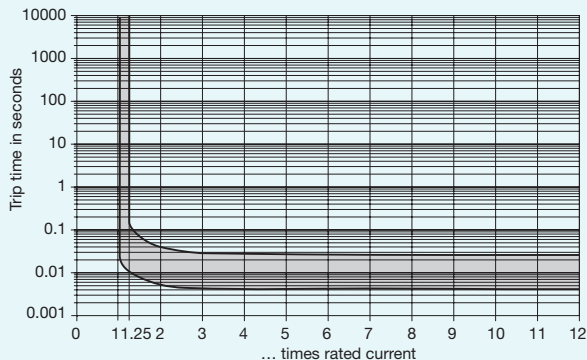
Curve BS - medium delay



Curve CS - short delay



Curve OP - instantaneous trip

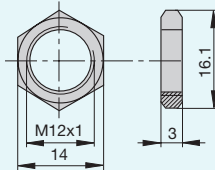


Series 8330 will not trip at a halfsine wave of 10 ms and an amplitude of $\leq 8 \times I_N$.

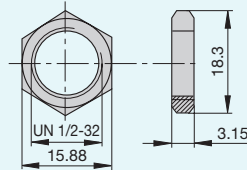
All curves are for mounting planes 1, 2, 3, 4

Accessories

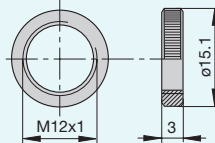
Threadneck design L:
Hex nut M 12x1
Y 300 116 02



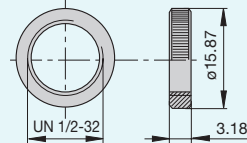
Threadneck design M:
1/2"-32
Y 300 486 20



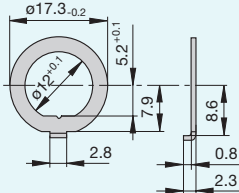
Knurled nut M 12x1
Y 302 065 01



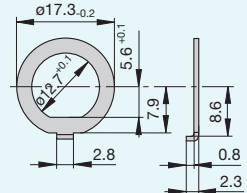
1/2"-32
Y 301 999 01



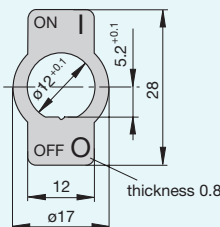
Washer with locating pin
Y 306 401 01



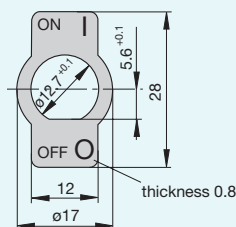
Y 306 424 01



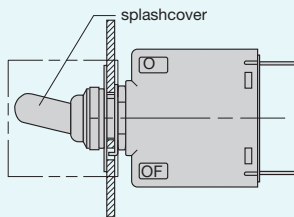
Legend plate
Y 306 402 01



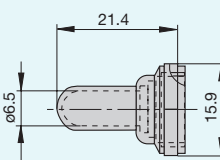
Y 306 425 01



Splash cover M 12x1
X 221 427 01



1/2"-32
X 221 434 01



Ordering code	Threadneck design -L (M12)					Threadneck design -M (1/2"-32)				
	B	D	F	H	S	B	D	F	H	S
Y 300 116 02	2	2	1	1						
Y 300 486 20						2	2	1	1	
Y 302 065 01			1	1						
Y 301 999 01								1	1	
Y 306 401 01		1		1						
Y 306 424 01							1		1	
Y 306 402 01	1	1	1	1	1					
Y 306 425 01						1	1	1		1
X 221 427 01					1				1	
X 221 434 01										1

ETA® Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-G2...

Description

Single, two and three pole magnetic circuit breakers with tease-free, trip-free, snap action 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 934).

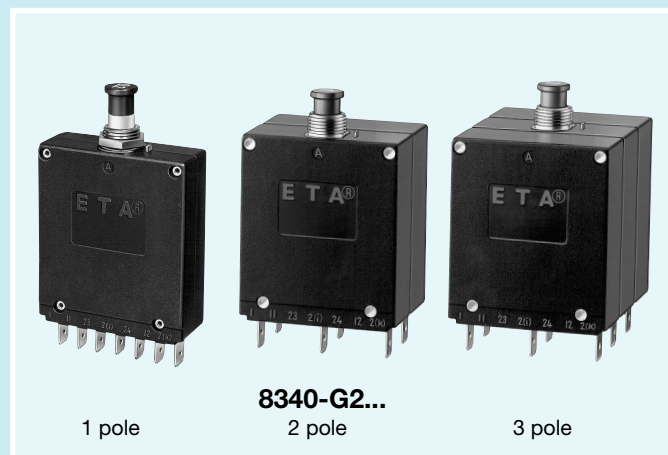
Typical application

Control equipment, communications systems, power semiconductors.

Ordering information

Type No.	
8340	Magnetic push/pull circuit breaker
Mounting	
G	threadneck panel mounting
Threadneck design	
2	M 12x1
Number of poles (main current paths)	
0	single pole, switch only
1	single pole, protected
2	two pole, protected
3	three pole, protected
5	two pole, protected on one pole only
Panel hardware	
0	without panel hardware
1	with hex nut M 12x1 and washer 12/15
Terminal design	
N	blade terminals, with shunt circuit
G	screw terminals with metric thread (recommended for $I_N > 20$ A). Shunt circuit, blade terminal
X	separate switching and trip circuit, blade terminals
Terminal Size	
1	terminals N and X: blade terminals A6.3-0.8 mm. terminal G: screw terminals M4 with flat head screw M4x6
Characteristic curve	
F4	instantaneous trip: magn. 1.5-2.2 x I_N DC ($I_N \leq 20$ A) magn. 1.2-1.7 x I_N AC 50/60 Hz ($I_N \leq 25$ A)
E1	short delay: magn.-hydr. 1.01-1.4 x I_N , DC
E2	short delay: magn.-hydr. 1.01-1.4 x I_N , AC 50/60Hz
H1	medium delay: magn.-hydr. 1.01-1.4 x I_N , DC
H2	medium delay: magn.-hydr. 1.01-1.4 x I_N , AC 50/60Hz
R1	long delay: magn.-hydr. 1.01-1.5 x I_N , DC
R2	long delay: magn.-hydr. 1.01-1.5 x I_N , AC 50/60Hz
Actuator colour	
A	black with white trip indicator band
Actuator marking	
0	without marking
4	rated current
Auxiliary contacts	
H0	without auxiliary contacts
H1	with auxiliary contacts
H2	with auxiliary contacts on pole 1 only (2 and 3 pole types)
H3	with auxiliary contacts on poles 1 and 3 (3 pole type)
Auxiliary contact function	
1	one each N/O and N/C
2	1 pair N/O (23/24)
3	1 pair N/C (11/12)
Auxiliary contact terminal design	
1	blade terminals A6.3-0.8 mm
Current ratings	
	0.02...30 A

8340 - G 2 1 1 - N 1 F4 - A 4 H1 1 1 - 8 A ordering example



Technical data

Voltage rating	3 AC 415 V; AC 240 V, 50/60 Hz; DC 80V
Current ratings	0.02...30 A
Auxiliary circuit	1 A, AC 240 V/DC 65 V; 0.5 A, DC 80 V
Typical life	1 pole: 10,000 operations at 1xI _N 2 and 3 pole: 1000 operations at 1xI _N
Ambient temperature	-40...+85 °C
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area pole to pole (2 + 3 pole) main to auxiliary circuit aux. circuit 11-12/23-24 switching to trip circuit (-X)	Test voltage AC 3000 V AC 1500 V AC 1500 V AC 1000 V AC 1500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity I _{cn}	1200 A at AC; 2000 A at DC
Interrupting capacity (UL 1077)	I _N 0.025...30 A 1 pole AC 250 V/3500 A 1 pole DC 65 V/2000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00
Vibration	with button down: 10 g (57-2000 Hz), ±0.76 mm (10-57 Hz) at 0.9 x I _N Other mounting planes: 10 g (57-2000 Hz) bei I _N to IEC 68-2-6, test Fc 10 frequency cycles/axis
Shock	100 g (11 ms) at 1xI _N , directions 1,2,3,4,5 100 g (11 ms) at 0.8xI _N , direction 6 to IEC 68-2-27, test Ea
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca
Mass	approx. 70 g per pole

Standard purely magnetic type: 8340-G211-N1F4-A4H111-...A

Standard hydraulic-magnetic type: 8340-G211-N1E1-A4H0-...A

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V, AC 240 V, DC 80 V	0.02...30 A
UL, CSA	3 AC 250 V, AC 250 V, DC 65 V	0.02...30 A
LRoS, BV	AC 250 V, DC 65 V	0.1...30 A

Standard current ratings and typical internal resistance values

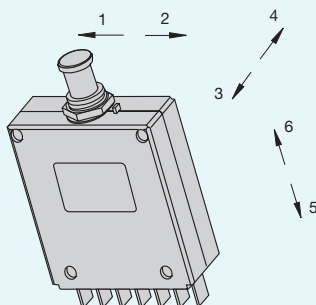
Current rating (A)	Internal resistance (Ω) per pole curve -F4	curves -E1/H1/R1	curves -E2/H2/R2
0.02	376	1498	1814
0.05	94	376	365
0.08	35.8	148	144
0.1	23	94	84
0.15	9.9	39	38
0.2	5	23	22.4
0.3	2.44	9.9	9.7
0.5	0.79	3.16	3.1
0.75	0.39	1.55	1.51
1	0.25	0.79	0.77
1.5	0.10	0.37	0.36
2	0.059	0.20	0.24
2.5	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

*duty cycle 50 % ON period, 30 min

Accessories

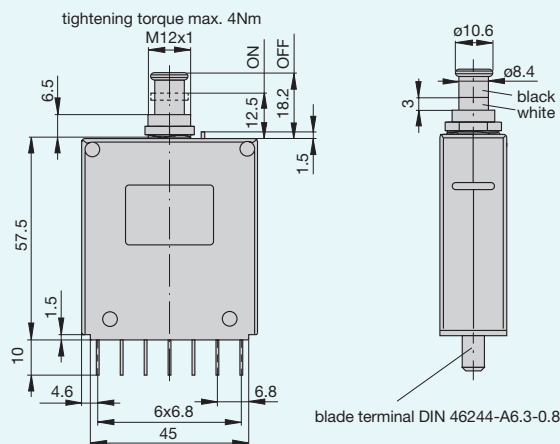
- 18-P10-Si EN rail mounted socket may be used in multiples of two or three for two and three pole circuit breakers.
- 18-P10-Si-20025 Socket supplied with adapter fitted for asymmetric rail mounting (G-profile).
- X 211 158 01 Six-way connecting/bus bar link with clamp terminal.
- X 211 158 02 Six-way connecting/bus bar link, as above but without clamp terminal.
- Y 303 824 11 Insulated sleeving for connecting bus X 211 158 ..
- Y 300 579 11 Retaining clip for socket 18-P10-Si.
- X 210 588 01 100-way 1.5mm² brown cable links with pre-fitted push-on connectors.
- X 210 588 02 As above but with 2.5mm² black cable links.
- X 210 588 03 As above but with 2.5mm² red cable links.
- X 210 588 04 As above but with 2.5mm² blue cable links.
- Y 300 116 02 Hex nut M 12x1
- Y 300 118 03 Spring washer
- X 200 801 01 Concertina style splash cover/hex nut assembly.
- X 200 802 01 Splash seal/hex nut assembly, allowing full visibility of the push button actuator.
- X 200 803 01 Screw-tightened clamp-on actuator extension to aid manual operation.

Shock directions / Mounting attitudes

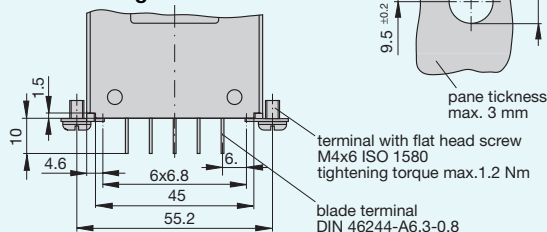


Dimensions (1 pole)

Terminal design -N

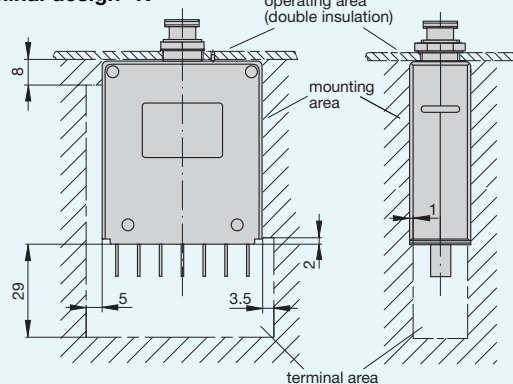


Terminal design -G

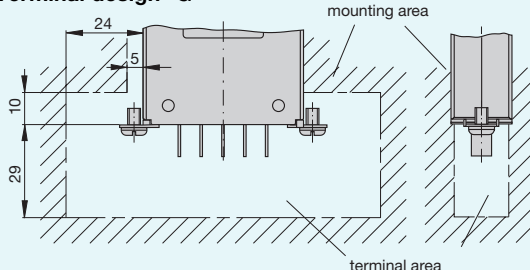


Installation drawings

Terminal design -N



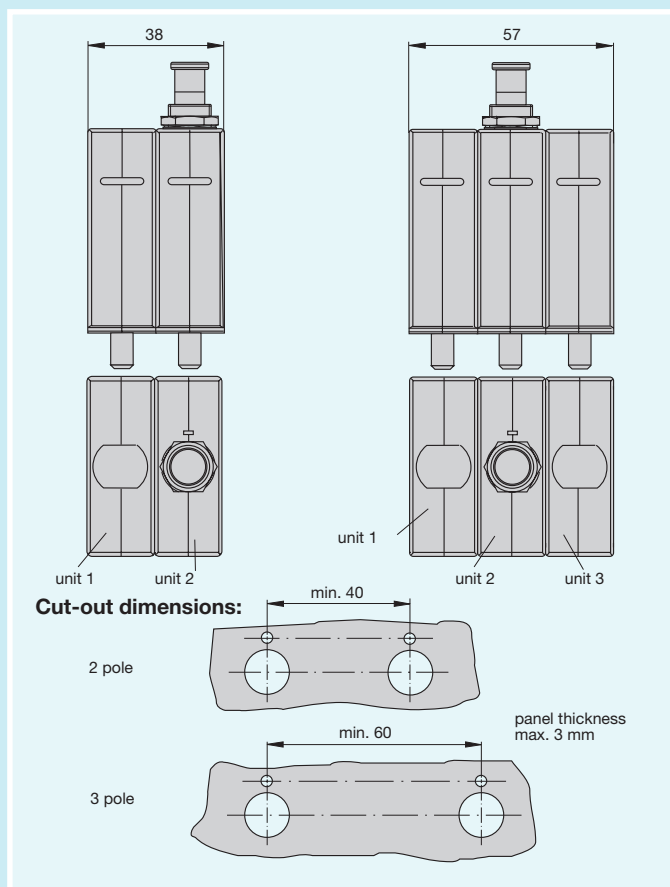
Terminal design -G



Dimensions (2 pole)

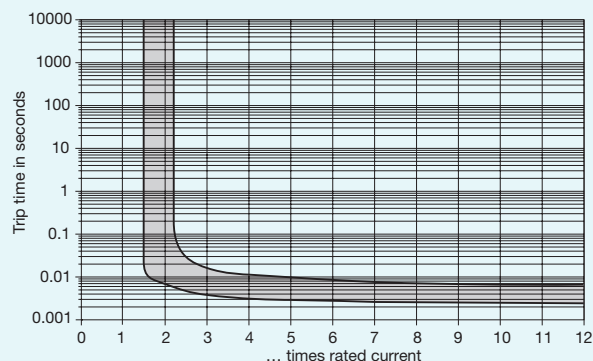
Dimensions (3 pole)

Typical time/current characteristics

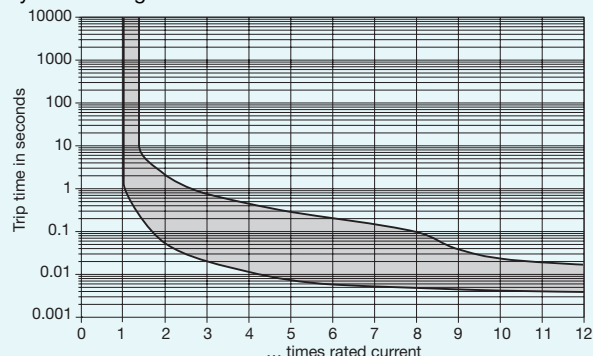


Curve -F4, magnetic

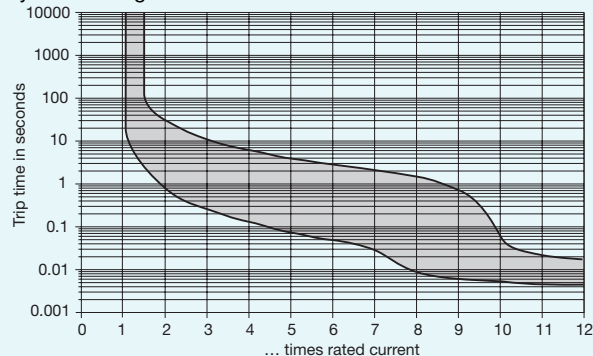
($I_N > 20$ A, 50 % ON period, 30 min) at 23 °C



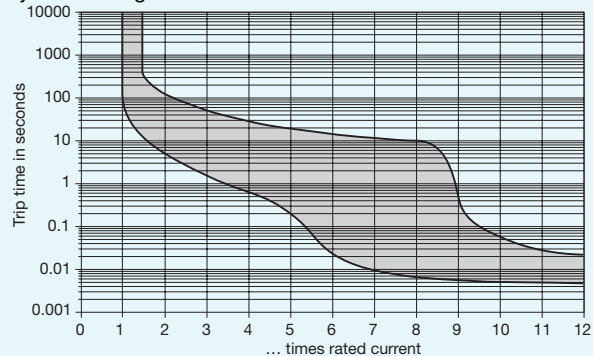
Short delay curves E1 for DC and E2 for AC 50/60 Hz, hydraulic-magnetic



Medium delay curves H1 for DC and H2 for AC 50/60 Hz hydraulic-magnetic

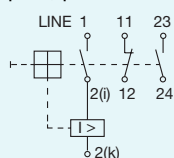


Long delay curves R1 for DC and R2 for AC 50/60 Hz hydraulic-magnetic

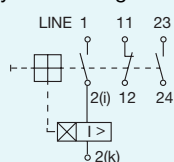


Internal connection diagrams

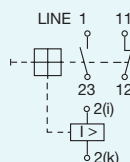
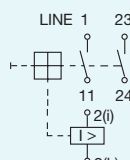
1 pole, protected magnetically



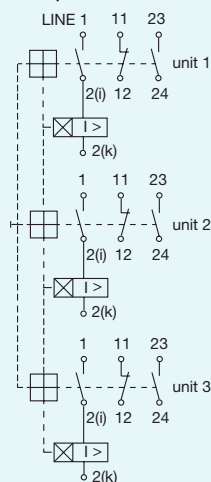
1 pole, protected hydraulic-magnetically



Circuit variants 1 pole



multipole



8340-G211-X1F4-A4H121-...A

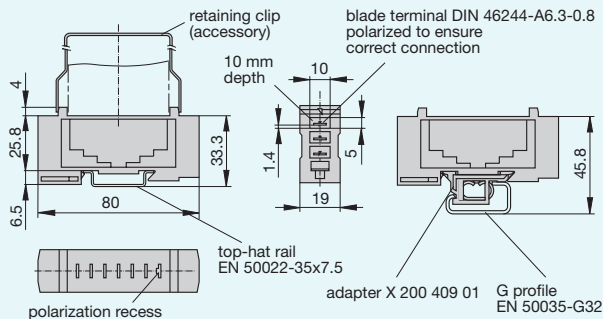
1 - 11 switching circuit
2(l) - 2(k) magnetic trip circuit
23 - 24 auxiliary circuit (N/C)

8340-G211-X1F4-A4H131-...A

1 - 23 switching circuit
2(l) - 2(k) magnetic trip circuit
11 - 12 auxiliary circuit (N/C)

Accessories

Socket 18-P10-Si



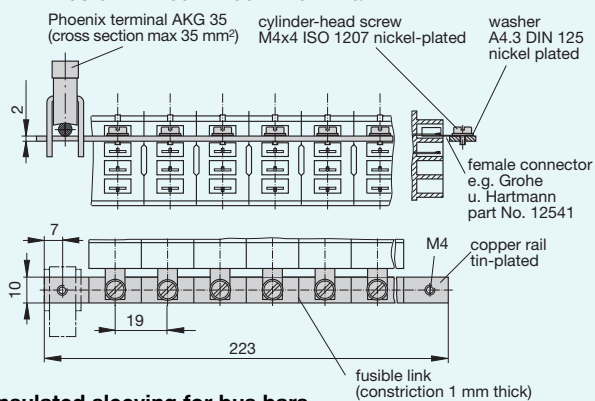
Polarized socket with adapter 18-P10-Si-20025

blade terminal DIN 46244-A6.3-0.8
polarized to ensure
correct connection

Bus bar for socket 18

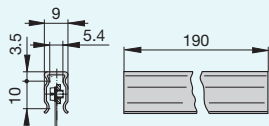
X 211 158 01 with Phoenix terminal

X 211 158 02 without Phoenix terminal



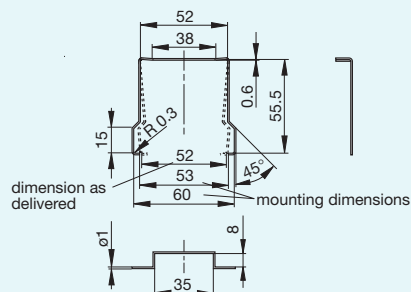
Insulated sleeving for bus bars

Y 303 824 11



Retaining clip for socket 18-P10-Si

Y 300 579 11



Connector bus link -P10

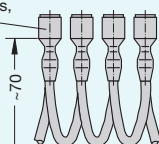
X 210 588 01/1,5mm², brown

X 210 588 02/2,5mm², black

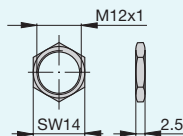
X 210 588 03/2,5mm², red

X 210 588 04/2,5mm², blue

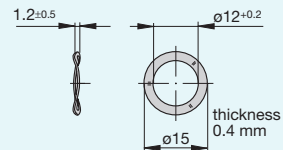
100 quick-connect tabs 6.3
DIN 46247 tinned brass,
insulated



Hex nut Y 300 116 02



Spring washer Y 300 118 03



Accessories for push button

Splash cover, transparent

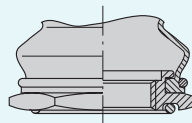
nickel plated hex nut

X 200 801 08 (IP 66)

Splash cover, black

black finish hex nut

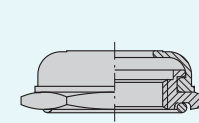
X 200 801 03 (IP 66)



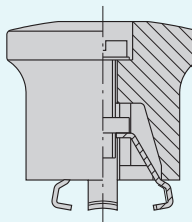
Splash seal black/

hex nut assembly and O ring

X 200 802 01 (IP 54)



Actuator extension X 200 803 01



ETA® Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-F...

Description

Single and multipole magnetic circuit breakers with trip-free, snap-action 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. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

Control equipment, communications systems, transportation, power supplies.

Accessories

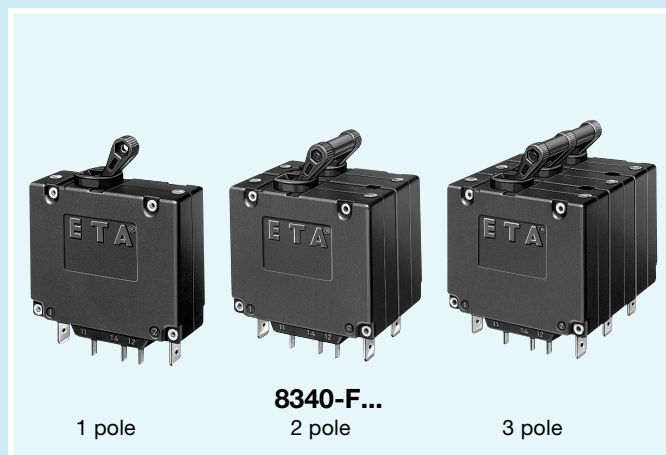
- X 211 117 01 Single pole splash cover with fixing plate.
- X 211 118 01 Two pole splash cover with fixing plate.
- X 211 119 01 Three pole splash cover with fixing plate.

Standard current ratings and typical internal resistance values

Current rating (A)	Curves and internal resistance per pole (Ω)			
	F1	F2	K1, M1, T1	K2, M2, T2
0.02	1498	957	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

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V, AC 240 V, DC 80 V	0.02...30 A
UL, CSA	3 AC 250 V, AC 250 V, DC 65 V	0.02...30 A
LROs, BV	AC 250 V, DC 65 V	0.1 ...30 A
QPL (Sweden)	AC 240 V, DC 50 V	1 ...30 A



Technical data

Voltage rating	3 AC 415 V; AC 240 V, 50/60 Hz; DC 80V (higher DC ratings to special order)	
Current ratings	0.02...30 A	
Auxiliary circuit	6 A, AC 240 V/DC 28 V 1 A, DC 65 V; 0.5 A, DC 80 V	
Typical life	10,000 operations at $1xI_N$	
Ambient temperature	-40...+85 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage operating area	AC 3000 V
	pole to pole (2 and 3 pole)	AC 1500 V
	main to auxiliary circuit	AC 1500 V
	switching to trip circuit	AC 1500 V (version -X)
Insulation resistance	> 100 M Ω (DC 500 V)	
Interrupting capacity I_{cn}	1200 A at AC, 2000 A at DC	
Interrupting capacity (UL 1077)	I_N	0.025...20 A 25...30 A
	1 pole	AC 250 V/3500 A AC 250 V/3500 A
	2 pole	AC 250 V/3500 A AC 250 V/5000 A
	3 pole	3AC 250V/3500 A 3AC250V/5000 A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40	
	terminal area IP 00	
Vibration	with toggle down: 10 g (57-2000Hz) ± 0.76 mm (10-57 Hz) at $0.9xI_N$ Directions 1, 2, 3, 4, 5: 10 g (57-2000 Hz) at $1xI_N$. With curves F1, F2 in all planes: 10 g (57-2000 Hz) ± 0.76 mm (10-57 Hz) at $0.8xI_N$, to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	100 g (11 ms) at $1xI_N$, directions 1-5 100 g (11 ms) at $0.8xI_N$, direction 6. With curves F1, F2: 100 g (11 ms) at $0.8xI_N$ to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 65 g per pole	

Ordering information

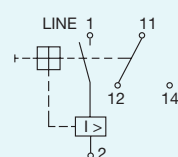
Ordering information

Type No.	8340	magnetic circuit breaker with toggle actuator
Mounting	F	flange mounting
Configuration	1	with mounting nuts 6-32 UNC
	4	with mounting nuts M3
	9	snap-in frame
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 pole only
	6	four pole, protected on poles 1, 2 and 3 only
	7	two pole, switch only
Panel hardware	0	without panel hardware
Terminal design (main contact)	K2	screw terminals with metric thread, (recommended for $I_N > 20$ A)
	P1	blade terminals
	X1	blade terminals with separate switching and relay circuit
Characteristic curves		
Characteristic curve F, instantaneous trip:		
F1	DC	trip at $1.01-1.5 \times I_N$
F2	AC 50/60 Hz	trip at $1.01-1.5 \times I_N$
Characteristic curve K, short delay:		
K1	DC	trip time at $2 \times I_N$: 0.16-1.2 s
K2	AC 50/60 Hz	trip time at $2 \times I_N$: 0.13-1.6 s
Characteristic curve M, medium delay:		
M1	DC	trip time at $2 \times I_N$: 0.6-7.5 s
M2	AC 50/60 Hz	trip time at $2 \times I_N$: 2.2-20 s
Without characteristic curve:		
Q0	switch only	
Characteristic curve T, long delay:		
T1	DC	trip time at $2 \times I_N$: 10-70 s
T2	AC 50/60 Hz	trip time at $2 \times I_N$: 15-150 s
Relay trip X:		
X1	voltage trip at DC, instantaneous trip	
X2	voltage trip at AC, instantaneous trip	
Other curves to special order (e.g. pulse delayed)		
Actuator colour	A	black
	B	white
Actuator marking	0	without marking
	2	ON-OFF
	3	I-O
	5	I-O side marking
Auxiliary contacts	H0	without auxiliary contacts
	H1	with auxiliary contacts
	H2	auxiliary contacts on one pole only (multi pole)
	H3	auxiliary contacts on poles 1 and 3 (3 and 4 pole)
	G1	as H1, but contacts gold plated
	G2	as H2, but contacts gold plated
	G3	as H3, but contacts gold plated
Auxiliary contact function	4	1 change over contact
Auxiliary contact terminal design	2	blade terminal 2.8-0.5 mm
Current ratings		0.02...30 A
Voltage rating (for relay trip)		DC 5 V, 8 V, 12 V, 24 V
		AC 110 V, 220 V, 240 V

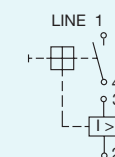
8340 - F 1 1 0 - P1 M1 - A 1 H1 4 2 - 30 A ordering example

Internal connection diagrams

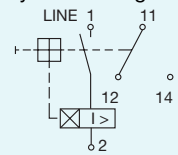
1 pole protected magnetically



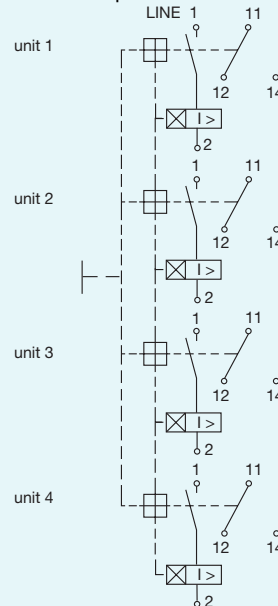
with separate switching and relay circuit



1 pole protected hydraulic-magnetic

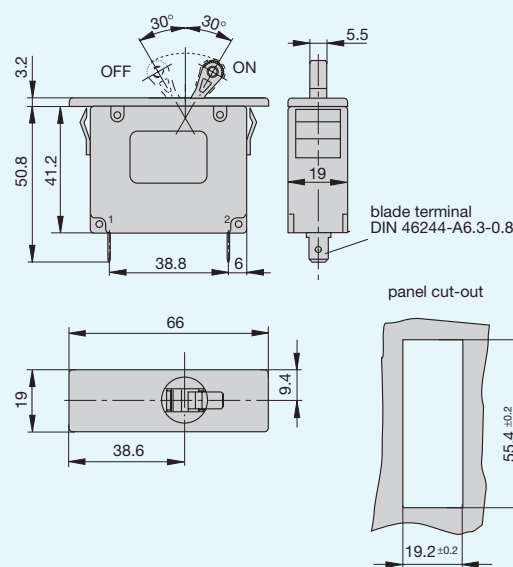


multipole

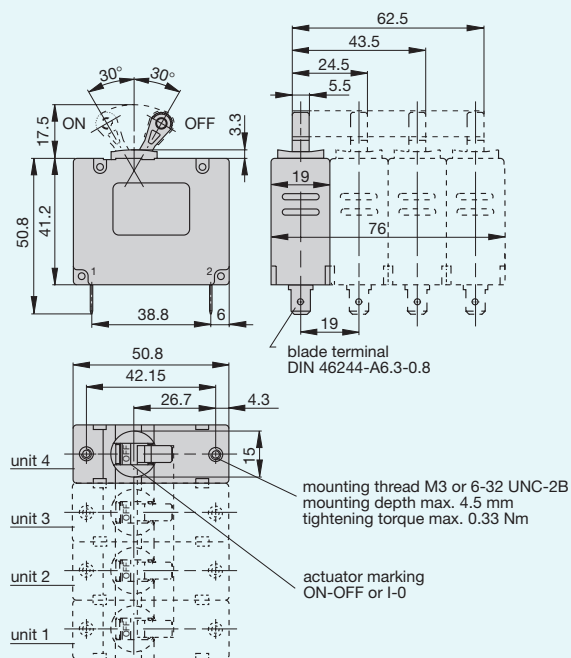


Dimensions

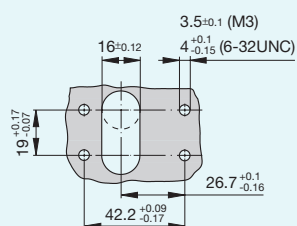
Mounting Configuration 8340-F9..



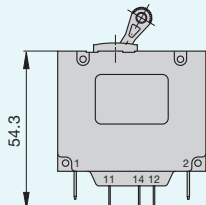
Dimensions



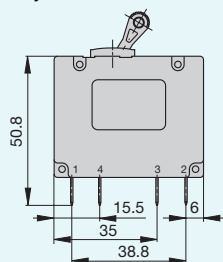
Cut-out dimensions:



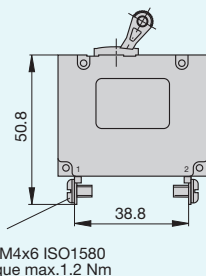
with auxiliary contacts:



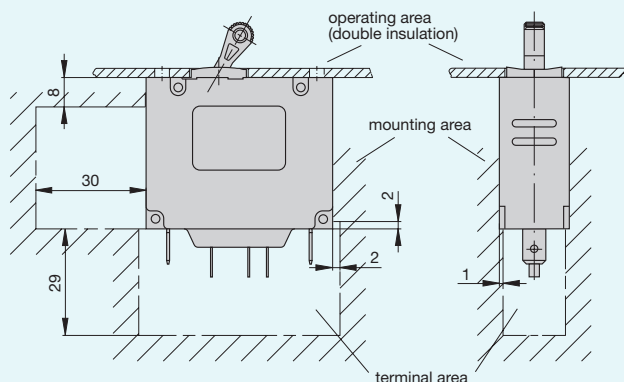
with separate switching and relay circuit 8340-F...-X...



with screw terminals (recommended for $I_N > 20$ A)



Installation drawing

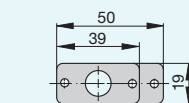


Accessories

Splash covers (transparent) with fixing plate (IP54)

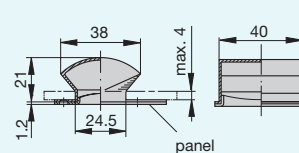
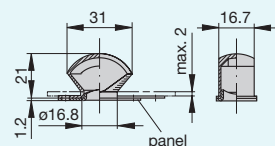
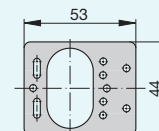
X 211 117 01

1 pole

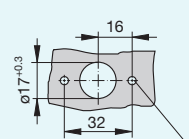


X 211 118 01

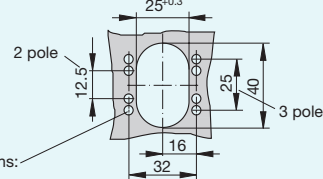
2 pole



mounting hole



mounting hole

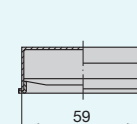
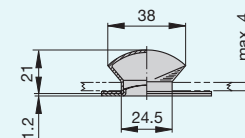
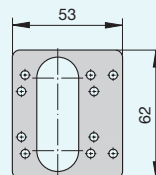


mounting dimensions:
M3 - hole dia. 3.5
6-32 UNC-2B - hole dia. 4

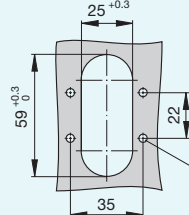
X 211 119 01

3 pole

mounting hole

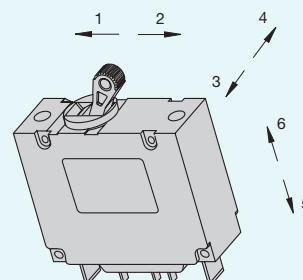


mounting hole



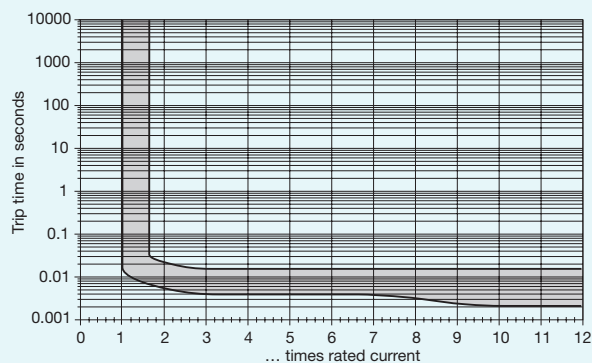
mounting dimensions:
M3 - hole dia. 3.5
6-32 UNC-2B - hole dia. 4

Shock directions / mounting attitudes

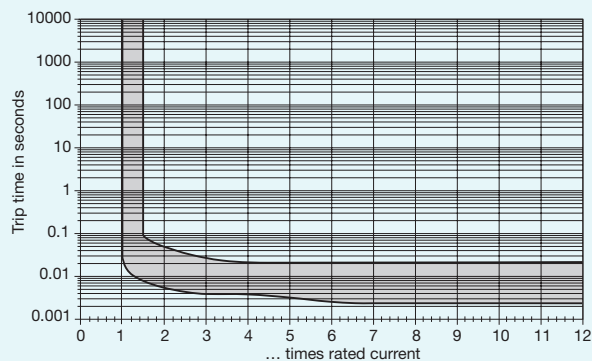


Typical time/current characteristics at 23 °C

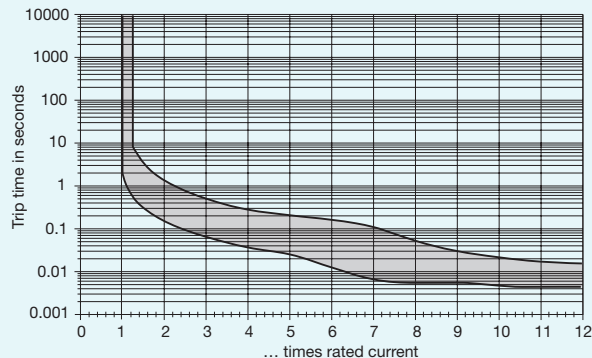
Curve F1 (instantaneous)
for DC



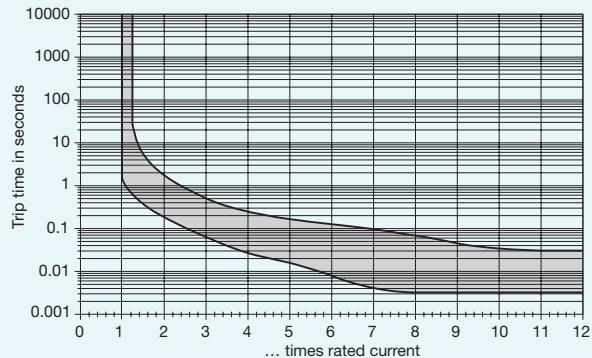
Curve F2 (instantaneous)
for AC 50/60 Hz



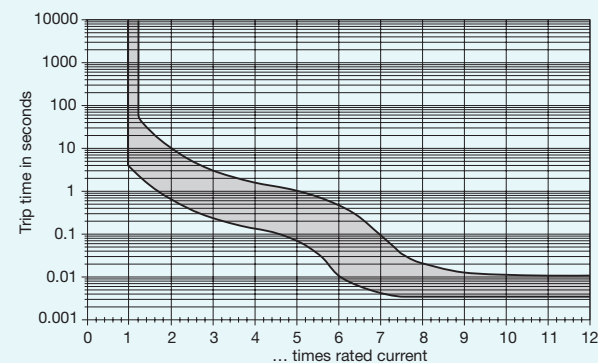
Curve K1 (short delay)
for DC



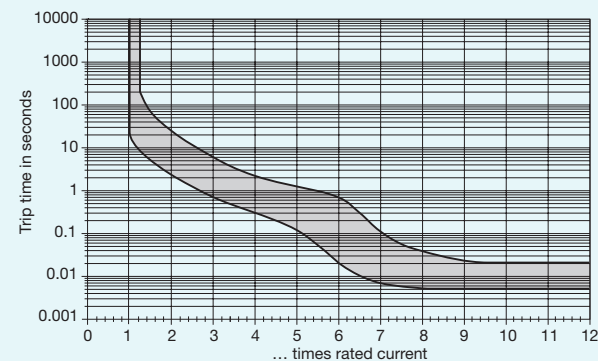
Curve K2 (short delay)
for AC 50/60 Hz



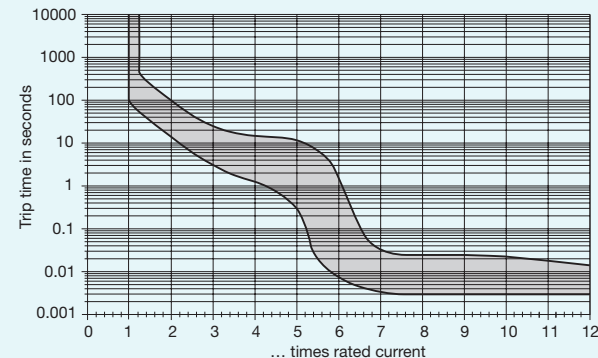
Curve M1 (medium delay)
for DC



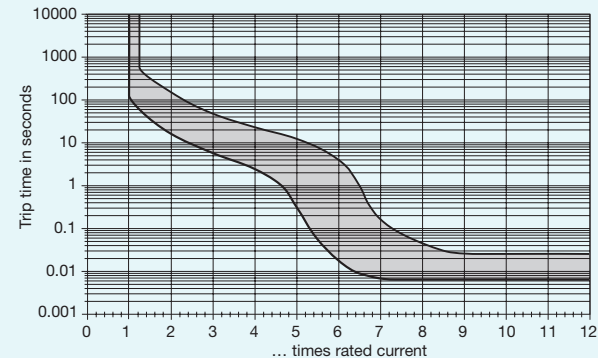
Curve M2 (medium delay)
for AC 50/60 Hz



Curve T1 (long delay)
for DC



Curve T2 (long delay)
for AC 50/60 Hz



N.B. All curves are for mounting planes 1, 2, 3, 4. Other characteristic curves to special order.

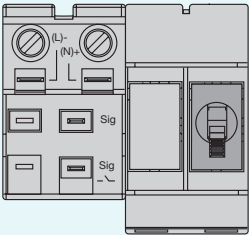
ET-A® Distribution rail X8340-S02

Description

Modular distribution rail, each module accommodating 2 magnetic or hydraulic-magnetic circuit breakers 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



X8340-S02

Ordering information

Type No.	
X8340	Distribution rail for circuit breaker type 8340
Version	
S	rail
Identification number	
02	modular, for 2 circuit breakers
Power supply	
L	left-side
R	right-side
Modules with power supply	
1	1 module, 2-way
2	2 modules, 2-way each
0	10 modules, 2-way each
Signalisation	
0	without signalisation
1	group signalisation
2	group signalisation, through-connected for right- or left-side power supply (main current path separated)
Accessories	
00	without accessories
01	cover per module
02	ground bridge in first module
03	M4 mounting screw per module
07	cover + ground bridge + M4 mounting screw

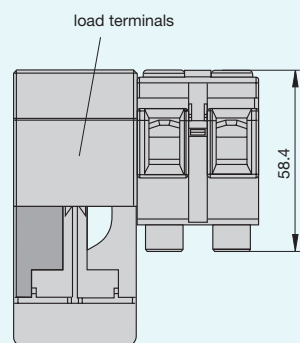
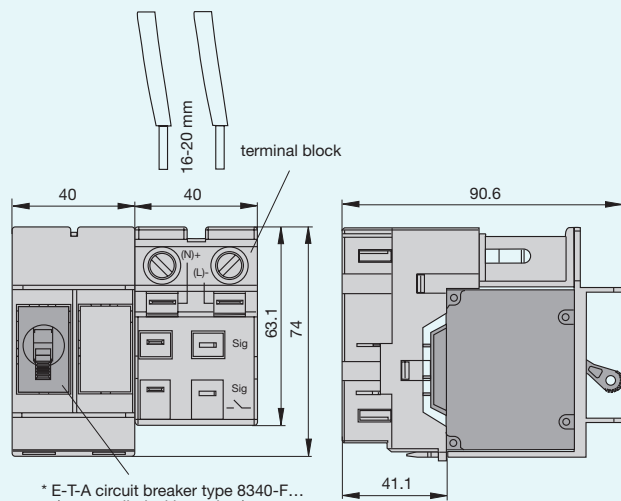
X8340 - S 02 . . . - . . . ordering example

Technical data

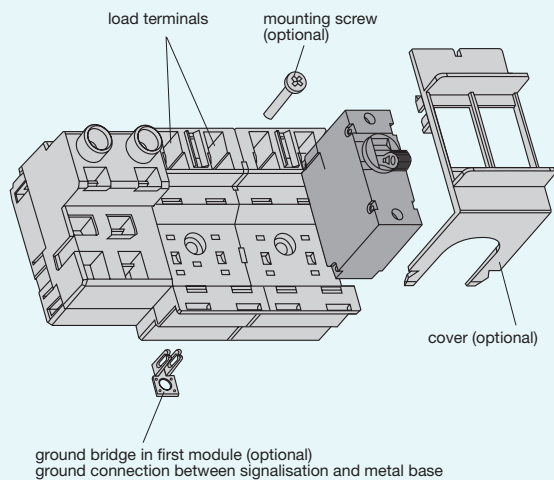
For circuit breaker type	8340-F.10-P1..-H142	
Voltage rating	AC 230 V, DC 65 V	
Load	16 A per position 80 A for complete unit	
Signalisation (N/C)	AC 230 V, 6 A /DC 65 V 1 A per position	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardance (IEC 695, part 2-2)	self-extinguishing	
Supply terminal design (terminal socket)	recessed screw/pressure plate 35 mm ² feed-in 6...25 mm ² with connector sleeve additional blade terminals 6.3x0.8	
load (module)	blade terminals 6.3x0.8	
signalisation (module)	blade terminals 4.8x0.8	
Mass X8340-S02L1-100	245 g	

Dimensions

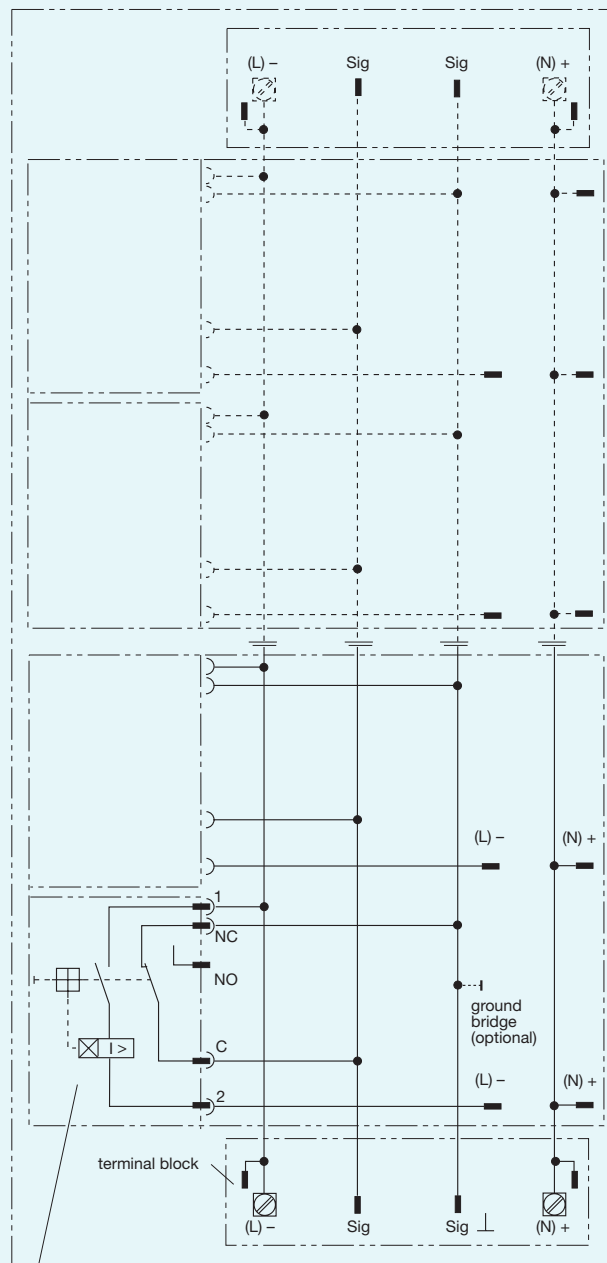
Distribution rail, shown with power supply right-side



Distribution rail, power supply left-side
X8340-S02L-...



Internal connection diagram



module with circuit breaker E-T-A 8340-F...

ET-A® Distribution rail X8340-S04

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 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

Type No.	
X8340	Distribution rail for circuit breaker type 8340
Version	
S	rail
Identification number	
04	modular, for 4 circuit breakers
Modules with power supply	
1	1 module, 4-way
2	2 modules, 4-way each
Accessories	
0	without accessories
1	mounting bracket
2	mounting bracket + cover
3	cover
Signalisation	
0	without signalisation
1	group signalisation + ground connection
2	group signalisation

X8340

-

S

04

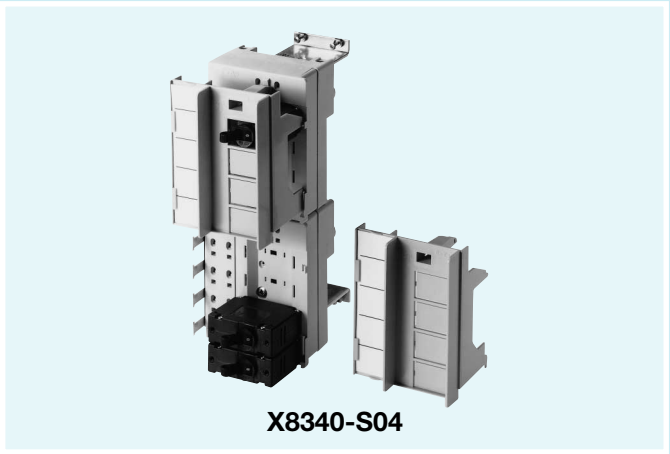
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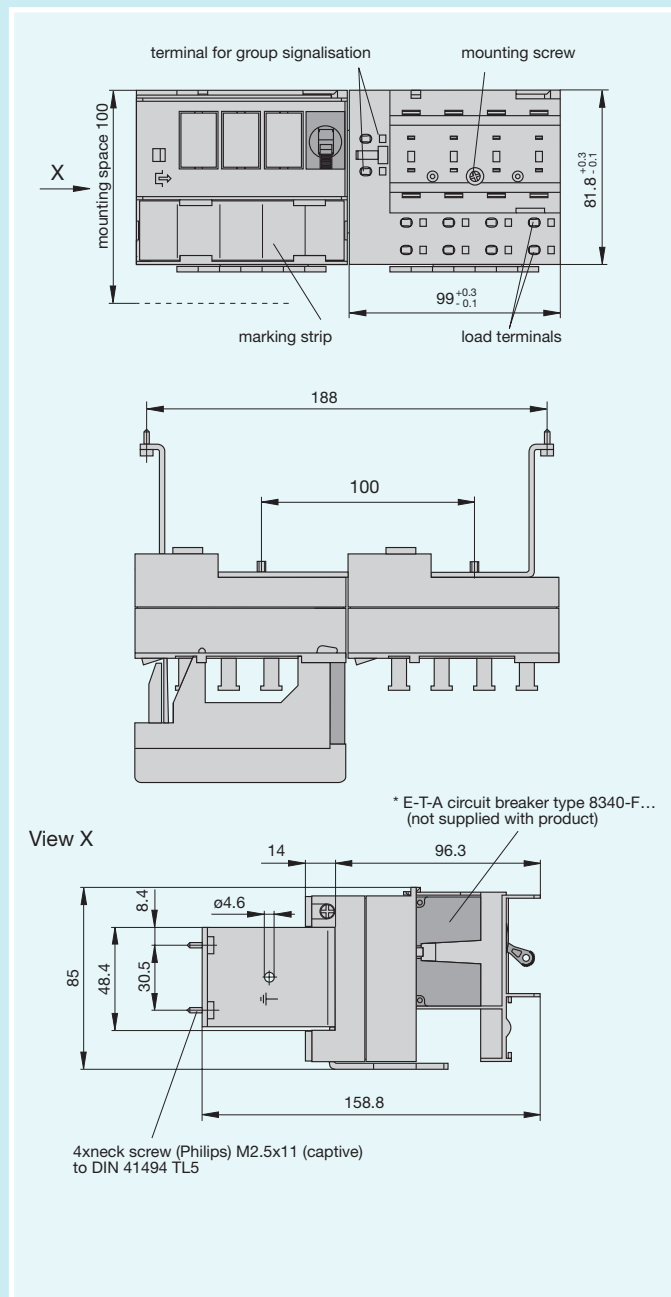
ordering example



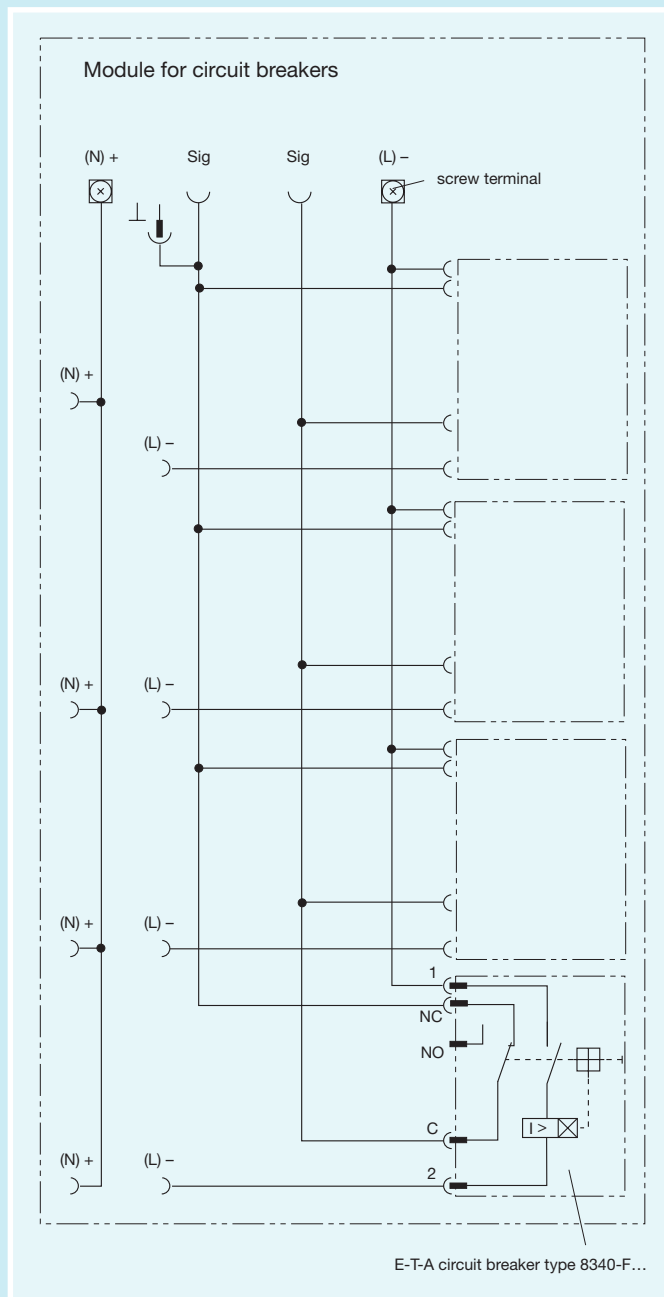
Technical data

For circuit breakers	8340-F110-P1...-A1H142	
Voltage rating	AC 230 V, DC 65 V	
Load	20 A per position 80 A for module	
Signalisation (N/C)	AC 230 V, 6 A/DC 65 V 1 A per position	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2
Flame retardane (VDE 0471, part 2-2)	self-extinguishing	
Supply terminal design	recessed screw/pressure plate feed 6...25 mm ² or 6...16 mm ² with connector sleeve	
load and signalisation	screw-less connectors 0.5...4 mm ²	
Mass		
module	220 g	
cover	35 g	
bracket	145 g	

Dimensions



Internal connection diagram



E-T-A® Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-T...

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.

Approved to CBE standard EN 60934 (IEC 934).

Typical applications

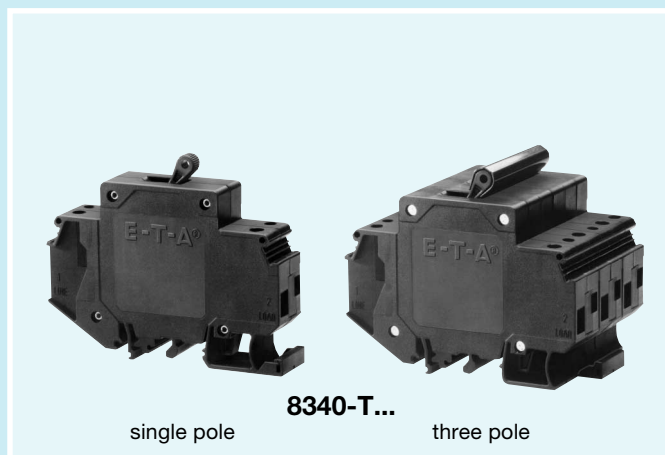
Power supplies, control equipment, communication systems, EDP systems.

Standard current ratings and typical internal resistance values

Current rating (A)	Curves and internal resistance per pole (Ω)			
	F1	F2	K1, M1, T1	K2, M2, T2
0.02	1498	957	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

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V, AC 240 V, DC 80 V	0.02...30 A
UL, CSA	3 AC 250 V; AC 250 V, DC 65 V	0.02...30 A



Technical data

Voltage rating	3 AC 415V; AC 240V (50/60Hz); DC 80V (higher DC voltages to special order)	
Current rating range	0.02...30 A	
Auxiliary circuit	1 A, AC 240 V/DC 65 V; 0.5 A DC 80 V	
Typical life	10,000 operations at 1 x I _N	
Ambient temperature	-40...+85 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A)	Test voltage operating area AC 3000 V pole to pole AC 1500 A main to aux. circuit AC 1500 V	
Insulation resistance	> 100 M Ω (DC 500 V)	
Interrupting capacity I _{cn}	1200 A at AC 2000 A at DC	
Interrupting capacity (UL 1077)	I _N 0.02...20 A 25...30 A	1 pole AC240V/3500 A AC240V/3500 A 2 pole AC240V/3500 A AC240V/5000 A 3 pole 3AC250V/3500A 3AC240V/5000A 1-3 pole DC 65V/2000A DC 65V/2000A
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 20	
Vibration	with toggle down: 10 g at 0.9 I _N directions 1,2,3,4,5: 10 g at 1 x I _N with curves F1, F2: 10 g at 0.8 x I _N in all planes. (57-2000 Hz) $\pm$ 0.76 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis	
Shock	100 g (11 ms) at 1 x I _N , directions 1,2,3,4,5 100 g (11 ms) at 0.8 x I _N , direction 6 with curves F1, F2: 100 g (11 ms) at 0.8xI _N to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca	
Mass	approx. 98 g per pole	

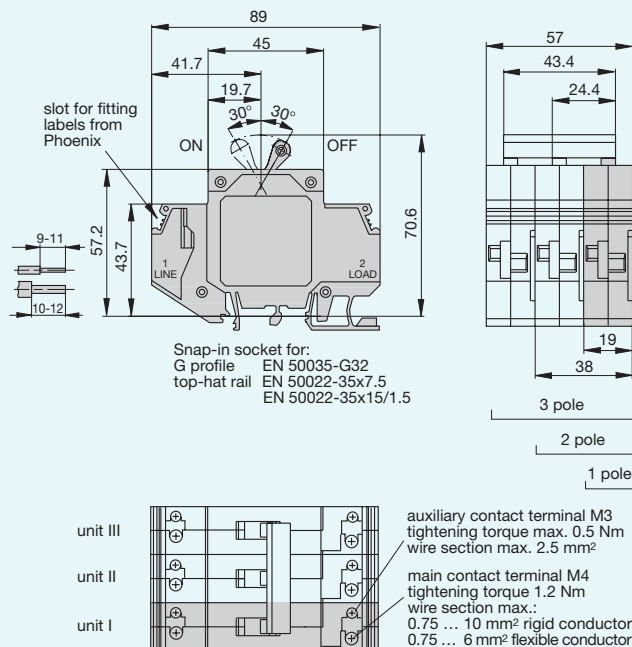
Magnetic and Hydraulic-Magnetic Circuit Breaker 8340-T...

Ordering information

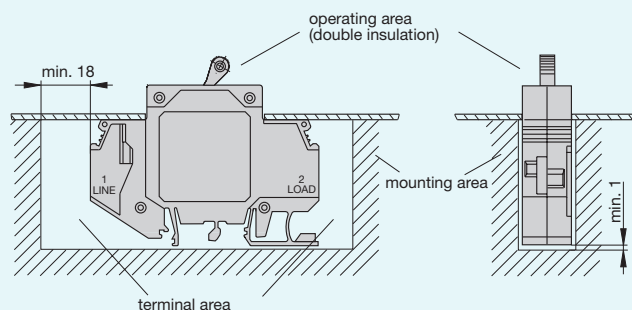
Type No.	
8340	circuit breaker with toggle actuator
Mounting	
T	rail mounting
Configuration	
1	snap-on installation
Number of poles	
0	single pole, switch only
1	single pole protected
2	two pole protected
3	three pole protected
4	four pole protected
5	two pole, protected on one pole only
6	four pole, protected on poles 1, 2 and 3 only
7	two pole, switch only
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 60/50Hz trip at $1.01-1.5 \times I_N$
Curve K, short delay:	
K1	DC trip at $2 \times I_N$ 0.16-1.2s
K2	AC 60/50Hz trip at $2 \times I_N$ 0.13-1.6s
Curve M, medium delay:	
M1	DC trip at $2 \times I_N$ 0.6-7.5s
M2	AC 60/50Hz trip at $2 \times I_N$ 2.2-20 s
Without characteristic curve	
Q0	switch only
Curve T, long delay:	
T1	DC trip at $2 \times I_N$ 10-70s
T2	AC 60/50Hz trip at $2 \times I_N$ 15-150s
Other characteristic curves to special order	
Actuator colour	
A	black
Marking on housing top surface	
E	I-O and ON-OFF
F	I-O and ON-OFF and current rating, voltage, curve and wiring diagram
Auxiliary contacts	
H0	without auxiliary contacts
H1	with auxiliary contact
H2	with auxiliary contact on one pole only (≥ 2 pole)
Auxiliary contact function	
2	1 N/O contact
3	1 N/C contact
Auxiliary contact terminal design	
6	screw/pressure plate M3
Current ratings	
0.02...30 A	

8340 - T 1 1 0 - K1 M1 - A E H1 2 6 - 10 A ordering example

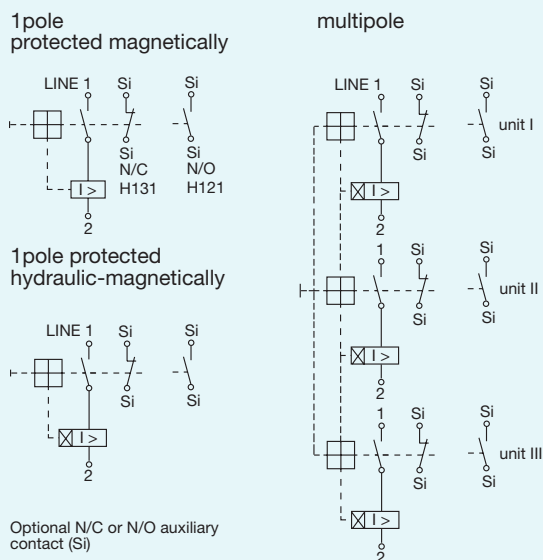
Dimensions



Installation drawing

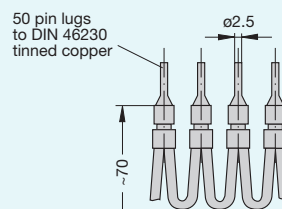


Internal connection diagrams

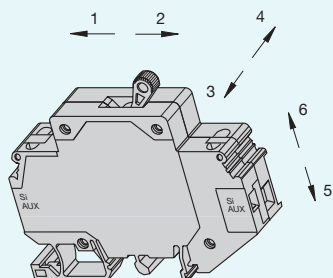


Accessories

Connector bus links -K10
X 210 589 01/2.5mm² black
X 210 589 02/1.5mm² brown

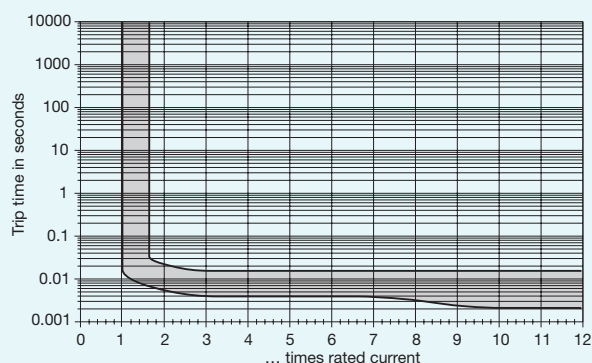


Shock directions / Mounting attitudes

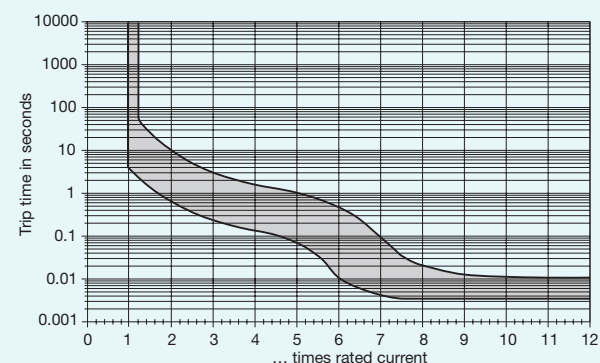


Typical time/current characteristics at 23 °C

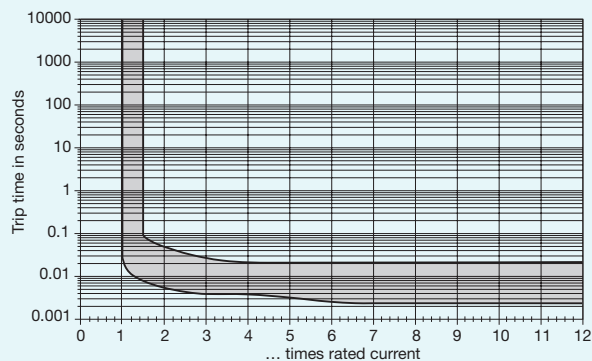
Curve F1 (instantaneous)
for DC



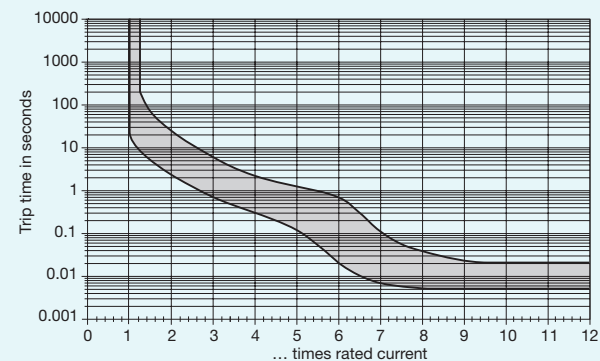
Curve M1 (medium delay)
for DC



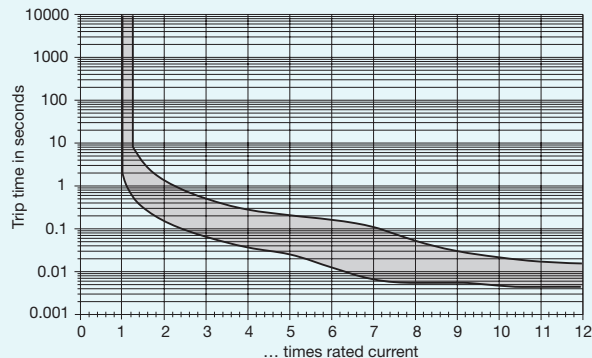
Curve F2 (instantaneous)
for AC 50/60 Hz



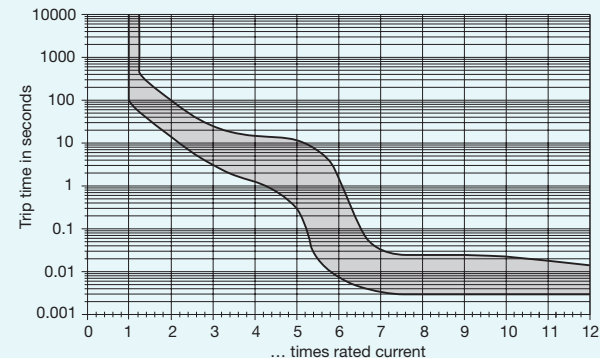
Curve M2 (medium delay)
for AC 50/60 Hz



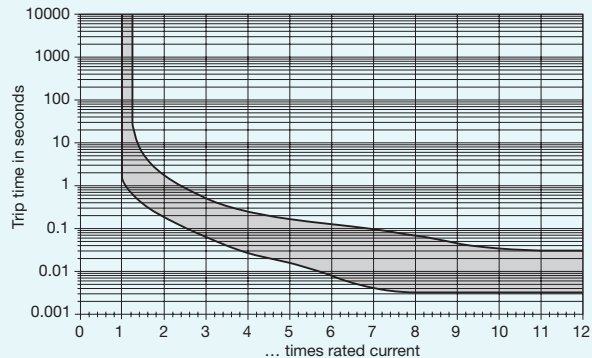
Curve K1 (short delay)
for DC



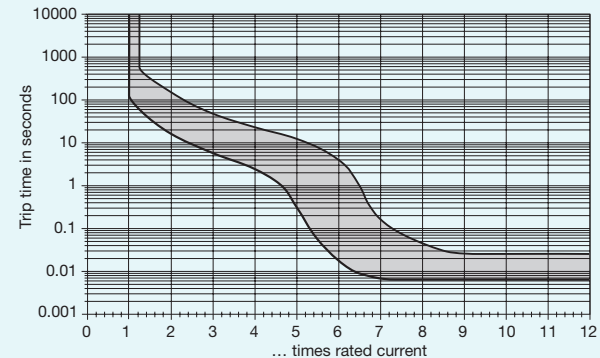
Curve T1 (long delay)
for DC



Curve K2 (short delay)
for AC 50/60 Hz



Curve T2 (long delay)
for AC 50/60 Hz



N.B. All curves are for mounting planes 1, 2, 3, 4. Other characteristic curves to special order.

E-T-A® Magnetic and Hydraulic-Magnetic Circuit Breaker 8350-...

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. Industry standard dimensions and panel mounting. Low temperature sensitivity at rated load. Approved to CBE standard EN 60934 (IEC 934).

Typical applications

Communications systems, process control and transportation

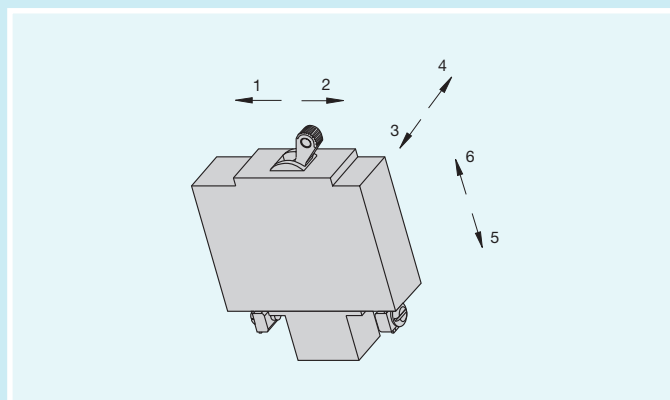
Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω) per pole
0.1	94
1	0.823
2	0.214
3	0.094
5	0.044
10	< 0.02
15	< 0.02
20	< 0.02
25	< 0.02
30	< 0.02
40	< 0.02
50	< 0.02
60	< 0.02
80	< 0.02
100	< 0.02

Approvals

Authority	Voltage ratings	Current ratings
VDE (EN 60934)	3 AC 415 V, AC 240 V, DC 80 V	0.1...60 A
UL, CSA	3 AC 433 V, AC 250 V, DC 80 V	1...60 A (100 A single pole)

Shock directions



Technical data

Voltage rating	3 AC 415 V; AC 240 V 50/60 Hz DC 80 V	
Current rating range	0.1... 60 A multi pole 0.1...100 A single pole	
Auxiliary circuit	6 A, AC 240 V/DC 28 V 1 A, DC 65 V; 0.5A, DC 80 V	
Typical life	6,000 operations at I_N	
Ambient temperature	-40...+85°C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV reinforced insulation in operating area	Pollution degree 2
Dielectric strength (IEC 664 and 664A)	Test voltage operating area pole to pole main to auxiliary circuit switching to trip circuit	AC 3000 V AC 1500 V AC 1500 V AC 1500 V
Insulation resistance	> 100 M Ω (DC 500 V)	
Interrupting capacity I_{cn} EN 60934, PC 1 UL 1077	5000 A at AC 240/415 V, DC 80 V	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40; terminal area IP 00	
Vibration	10 g (10-500 Hz) $\pm$ 0.76 mm (10-57) to IEC 68-2-6, Test Fc, 10 frequency cycles/axis	
Shock	100 g (6 ms half-sine) to IEC 68-2-27, Test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH, to IEC 68-2-3, Test Ca	
Mass	approx. 65...100 g per pole (depending on version)	

Ordering information

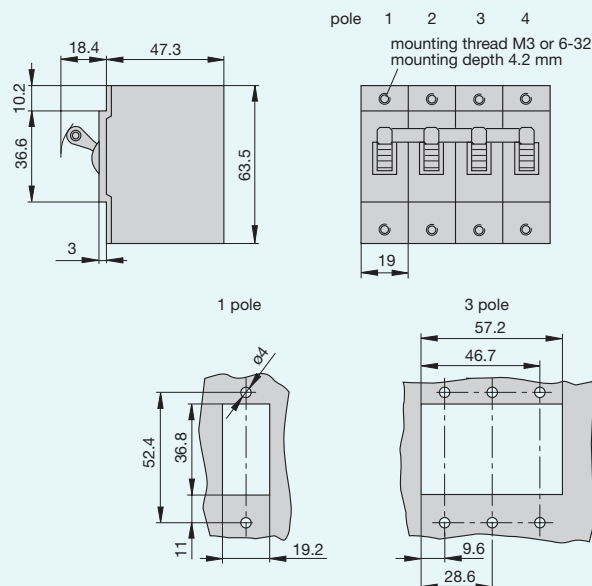
Type No.	8350	circuit breaker with toggle actuator
Mounting		
A* flange mounting, with rectangular aperture, standard toggle		
C flange mounting, round aperture, standard toggle		
D threadneck mounting, paddle, I _N ≤30 A only, max. 3 poles		
H rail mounting, I _N ≤25 A only		
Configuration		
A* metric, no interphase barrier		
B metric M3, with interphase barrier (small)		
C imperial 6-32, no interphase barrier		
D imperial 6-32, with interphase barrier (small)		
Number of poles		
1* single pole		
2* two pole		
3* three pole		
4 four pole		
Colour of front face		
B* black		
Terminal design		
A* stud terminal, M5 or 10-32 (≤60 A)		
B clamp terminal, M4 or 8-32 (≤30 A)		
C rear push-on terminal (≤25 A)		
M*stud terminal, M6 or 1/4-20 (standard for >60 A)		
Y stud terminal, M6 or 1/4-20		
one tooth washer and one hex nut per terminal		
Actuator configuration		
A* 1 toggle per pole (mounting A and C)		
G reduced number of toggles per unit (mounting A and C)		
J 1 paddle per unit (mounting D)		
K 1 baton		
Characteristic curve		
AS long delay		
BS* medium delay		
CS short delay		
00 switch only		
Actuator colour and marking details		
C white I-0		
D black I-0		
N white on-off		
P black on-off		
2* white no marking		
3* black no marking		
Not used		
0*		
Auxiliary contacts		
A* no auxiliary contacts		
B one change over		
F trip alarm (on request)		
H one change over contact in the last pole (for multipole version)		
L signal contact in last pole (multipole versions only)		
Internal circuit		
A switch		
B*series trip		
D relay trip		
J dual control, 4 terminals (≤60A)		
Remote trip (internal circuit D or J only) current ratings upon request		
0* no remote trip		
1 DC 24 V		
4 AC 120 V		
5 AC 230 V		
Frequency		
A* AC 50/60 Hz		
D* DC		
Current rating		
0.1... 60 A (multi pole)		
0.1...100 A (single pole)		

8350 - A A 3 B - A A BS - 3 0 A B 0 A - 1 A

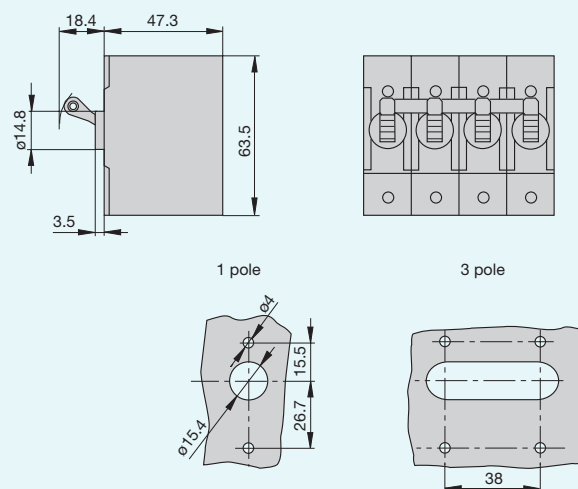
*Bold type versions are preferred. For special configuration please enquire

Dimensions

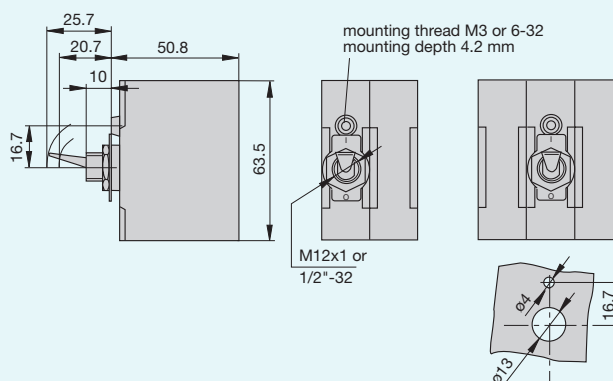
Mounting version A standard mounting: 1 to 4 poles



Mounting version C C-frame mounting: 1 to 4 poles

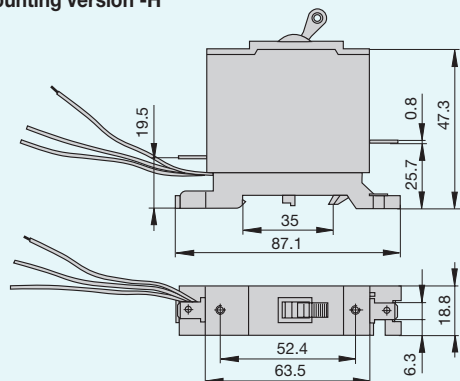


Mounting version D threadneck mounting: 1 to 3 poles

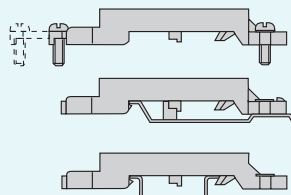


Dimensions

Mounting version -H

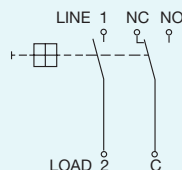


Mounting variants

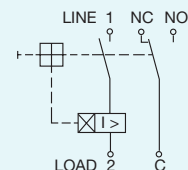


Internal connection diagrams

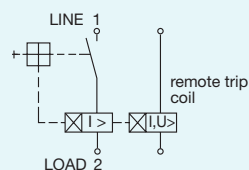
A - Switch with auxiliary contacts



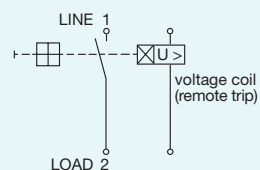
B - Series trip with auxiliary contacts



J - Dual control

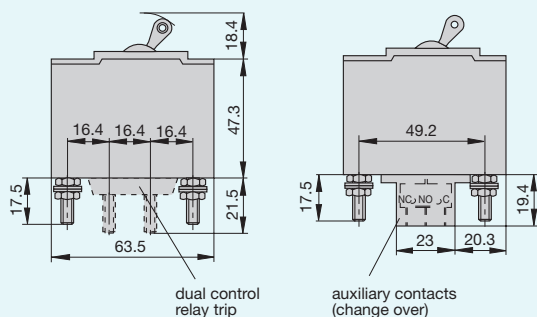


D - Relay trip

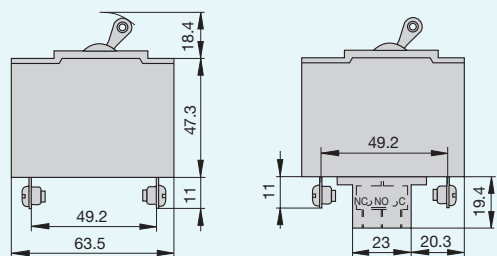


Terminal design / Dimensions

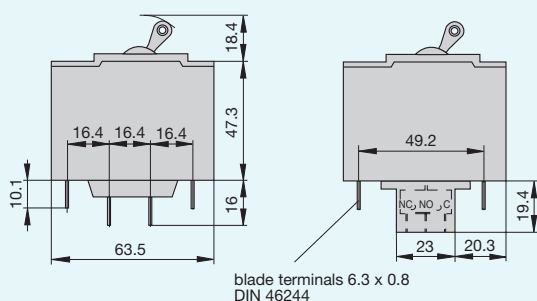
A/M stud terminals



B clamp terminals ($I_N \leq 30$ A)

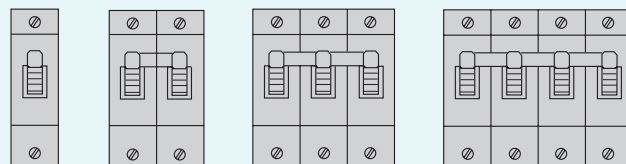


C rear push-on terminals ($I_N \leq 25$ A)

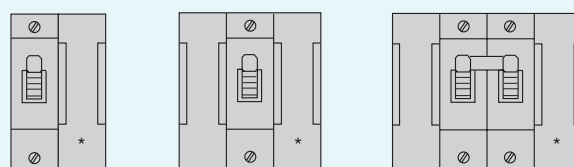


Actuator configuration

A 1 toggle per pole



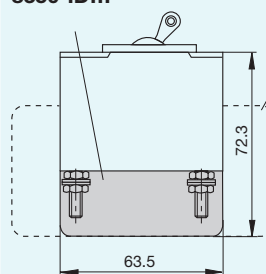
G reduced number of toggles per unit



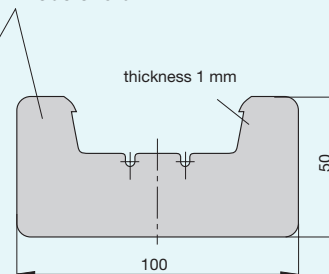
* Denotes microswitch pole on multipole units.

Interphase barriers / Dimensions

Interphase barrier (small) 8350-.B... 8350-.D...

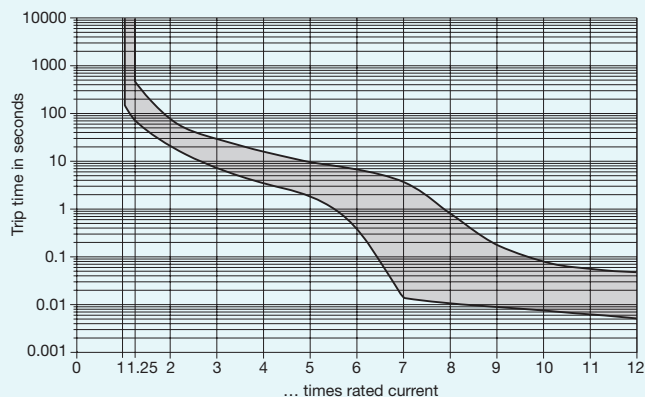


Interphase barrier (large) for snap on Y 306 345 01

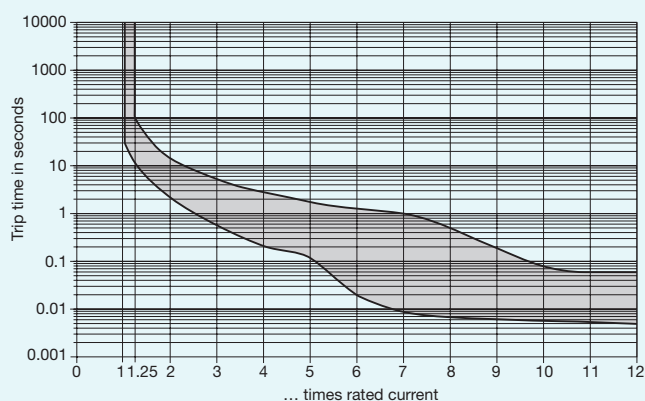


Typical time/current characteristics

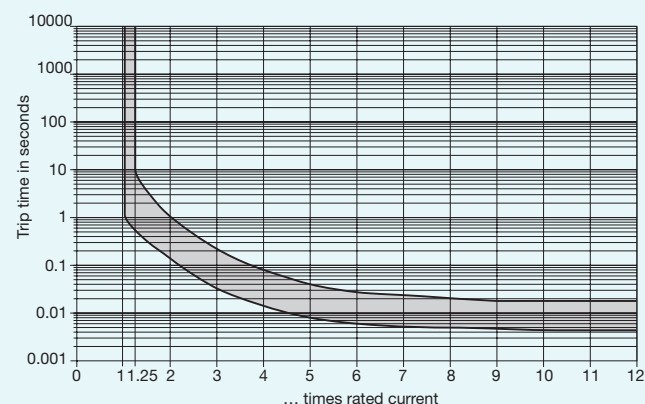
Curve AS - long delay
for AC 50/60 Hz, DC
at ambient temperature +23 °C



Curve BS - medium delay
for AC 50/60 Hz, DC
at ambient temperature +23 °C



Curve CS - short delay
for AC 50/60 Hz, DC
at ambient temperature +23 °C



Series 8350 with characteristics AS, BS and CS will not trip at a halfsine wave of 10 ms and an amplitude of ≤ 8 times rated current.

The tripping characteristics as outlined in this catalogue will only be maintained if the escutcheon is mounted on a vertical surface.

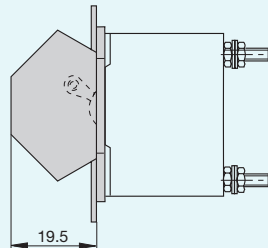
Accessories

Splash cover (IP64) for 8350-A.../8350-H...

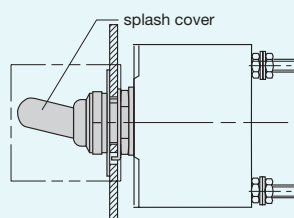
Y 306 265 01 1pole

Y 306 266 01 2pole

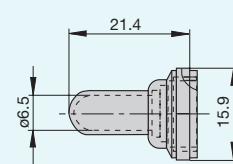
Y 306 267 01 3pole



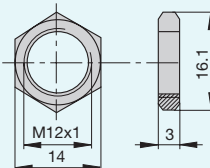
Splash cover M12x1
X 221 427 01



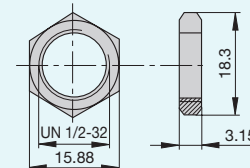
1/2"-32
X 221 434 01



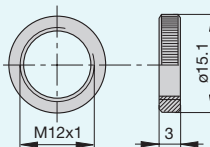
Threadneck design L:
Hex nut M12x1
Y 300 116 02



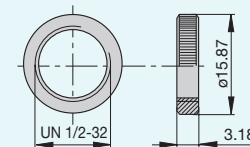
Threadneck design M:
1/2"-32
Y 300 486 20



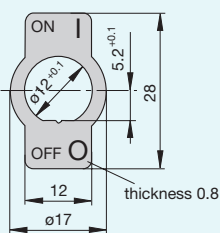
Knurled nut M12x1
Y 302 065 01



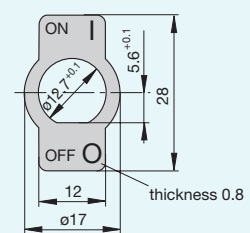
1/2"-32
Y 301 999 01



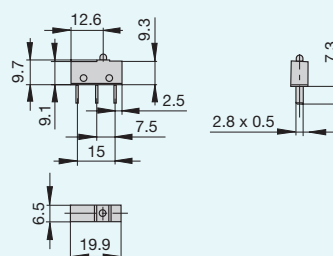
Legend plate
Y 306 402 01



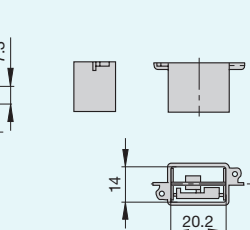
Y 306 425 01



Auxiliary switch (change over contact)
Y 306 268 01



Auxiliary switch housing
Y 306 269 01



Single and multi pole high performance circuit breakers (CBEs) and battery isolation switches with and without remote control

**Voltage ratings max. 3 AC 660 V, AC 250 V,
DC 220 V**

Current ratings 0.05...500 A



E-T-A high performance circuit breakers, of thermal or thermal magnetic operation, have been designed for applications with uncompromising performance and reliability requirements.

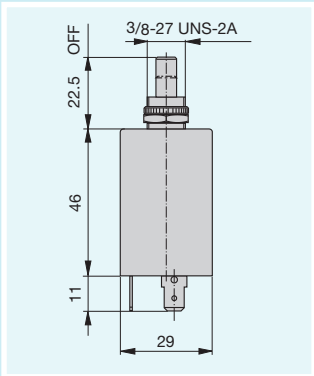
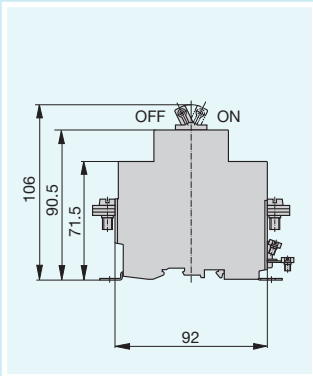
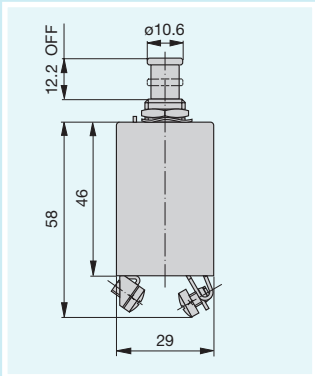
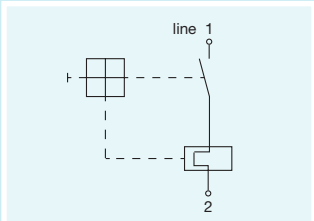
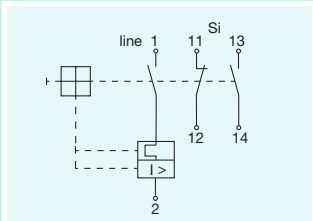
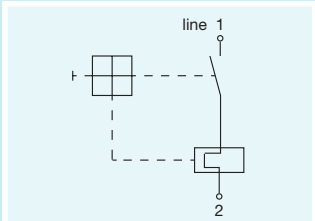
Models are available for aircraft, defence equipment, marine systems and other specialised equipment where safety is paramount.

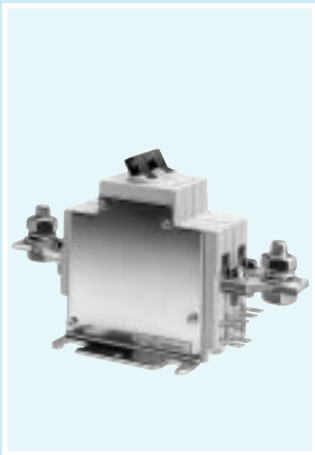
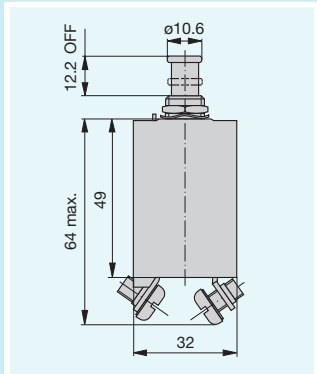
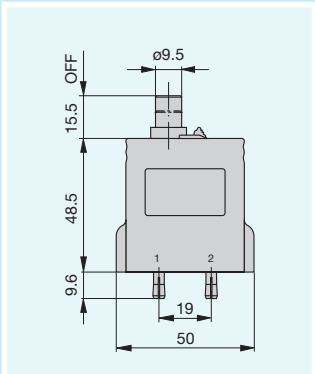
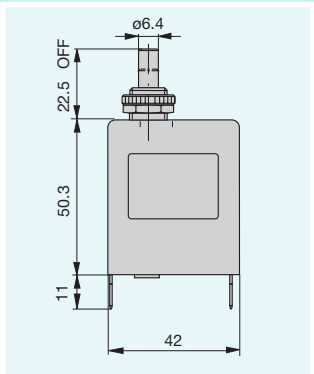
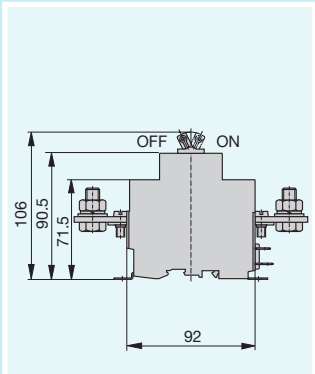
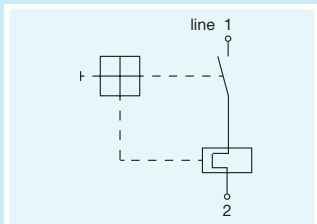
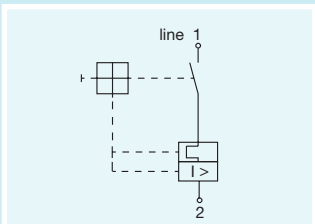
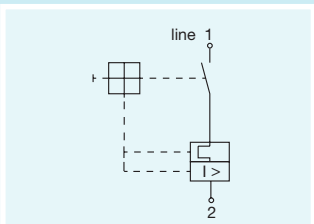
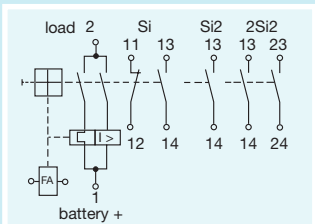
All the circuit breakers in this catalogue section are highly resistant to the effects of shock, vibration, salt spray, humidity and similar influences. Their small physical size, low mass and advanced construction guarantee total versatility. Approvals are held from the supervisory authorities of key relevant industries. For example, E-T-A aircraft circuit breakers have been qualified for use in some of the world's most advanced aircraft, fixed wing and helicopter.

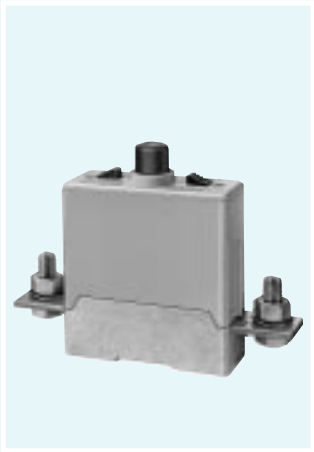
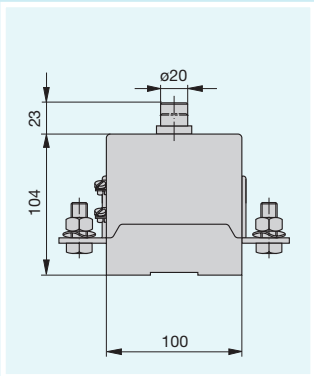
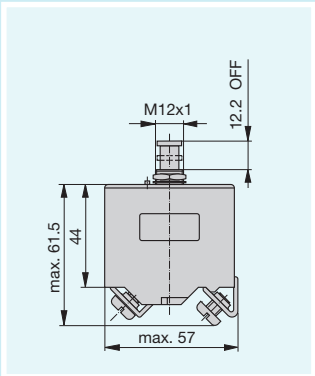
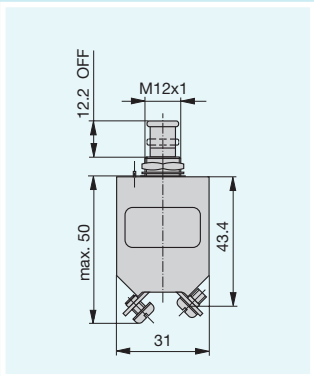
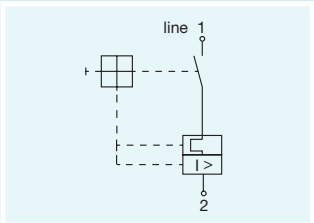
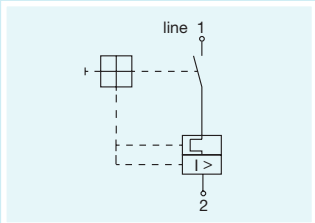
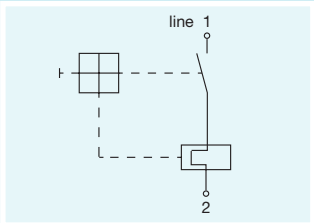
Accessories include panel seals providing various levels of protection for E-T-A single-hole panel mount models, from splash proofing right up to full immersion.

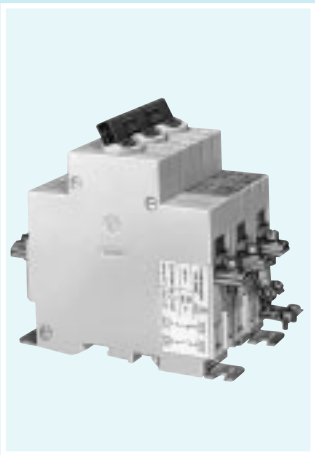
Complementing these high performance products, E-T-A battery isolation switches with remote control capability are especially suited to installation in the main battery systems of heavy duty vehicles - including tankers, boats, off-road plant and other battery powered equipment. Remote disconnection offers the dual benefits of user convenience and safety.

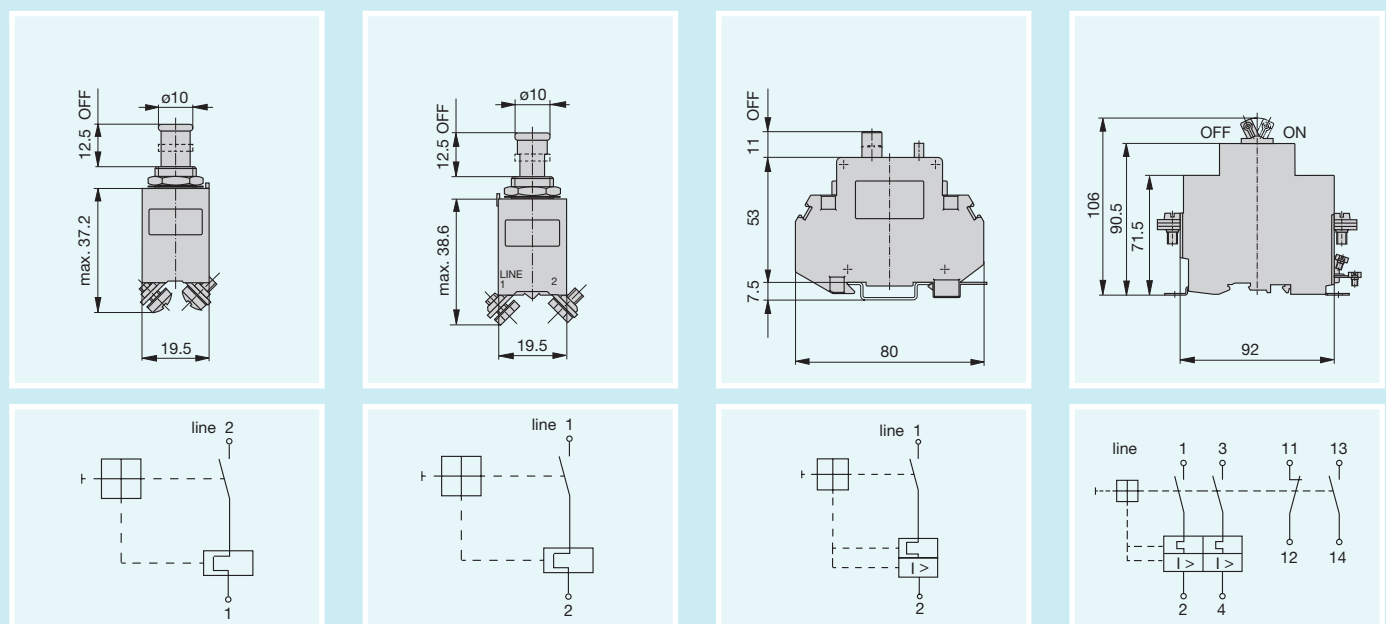
All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes.

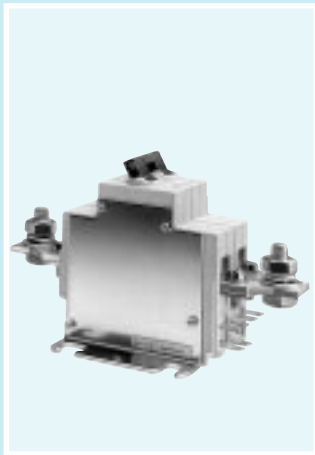
Type No.	402-...	410-...	412-...
			
Description	thermal type threadneck panel mounting	thermal-magnetic, surface, panel or track mounting, toggle operated	thermal, threadneck panel mounting, push/pull operation
Max. voltage rating	AC 250 V; DC 28 V	AC 240 V; DC 110 V	AC 115 V (400 Hz); DC 28 V
Current ratings	8...16 A	10...125 A (VDE 0660) 7...100 A (VDE 0641)	6 ...25 A vehicle type (-FN) 7.5...35 A aircraft type (-LN)
Aux. contact rating		6 A, AC 240 V or DC 28 V; 1 A, DC 110 V	
Typical life	4,000 operations at $2 \times I_N$	10,000 operations at $1 \times I_N$ 20,000 operations mechanical	4,000 operations at $2 \times I_N$
Interrupting capacity I_{cn}	1,000 A	AC 240 V: 6,000 A DC 110 V: 5,000 A	AC 115 V (400 Hz): 1,000 A DC 28 V: 6,000 A
Approvals		LRoS, BV	UL, LRoS
Available options	see pages 205 - 206	see pages 207 - 210	see pages 211 - 212
Dimensions			
Internal connection diagrams			

413-...	428-...	433 / 434-...	437-...
			
thermal, threadneck mounting, push/pull operation	thermal-magnetic, plug-in type, with hand release	thermal-magnetic, threadneck panel mounting, with hand release option 433-... fast-acting 434-... standard delay	single pole, toggle operated, with remote trip coil
AC 115 V (400 Hz); DC 28 V	AC 250 V; DC 28 V	AC 250 V; DC 28 V	DC 144 V
30...50 A vehicle type (-FN) 30...70 A aircraft type (-LN)	0.05...25 A	0.05...16 A	40...240 A
			6 A, DC 28 V 0.2 A, DC 180 V
2,000 operations at 1 x I _N	4,000 operations at 2 x I _N	4,000 operations at 2 x I _N	3,000 operations at 240 A/DC 180 V 10,000 operations at 240 A/DC 28 V 20,000 operations mechanical
AC 115 V (400 Hz): 1,000 A DC 28 V: 6,000 A	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 VDE 0636)	0.05...5 A 400 A 5.5...7.5 A 750 A 8...16 A 1,000 A (with back- up fuse NH 40 A to VDE 0636)	2,000 A at DC 180 V 10,000 A at DC 28 V
UL, LRoS, BV, QPL Sweden	VDE	VDE, Demko	LRoS, BV
see pages 213 - 214	see pages 215 - 217	see pages 219 - 222	see pages 223 - 224
			
			

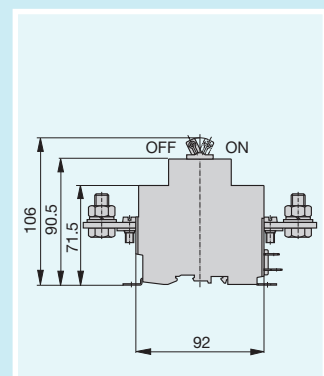
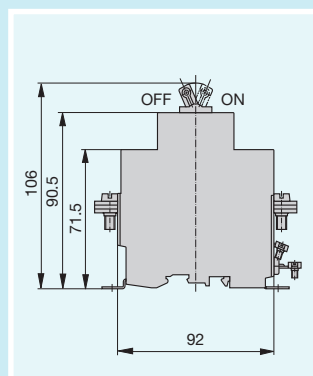
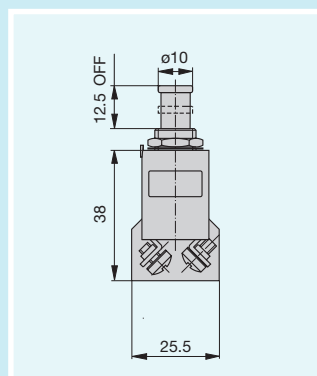
Type No.	446 / 447 / 449-...	452-...	482-...
			
Description	thermal-magnetic, base mounting	thermal-magnetic, threadneck panel mounting, push/pull operation	thermal, single pole, threadneck panel mounting, push/pull operation, with auxiliary contact option
Max. voltage rating	DC 28 V	AC 115 V (400 Hz), DC 28 V	AC 115 V (400 Hz), DC 28 V,
Current ratings	446: 30...400 A; 447: 100...400 A 449: 125...500 A	50...100 A	0.1...50 A
Aux. contact rating	10 A		0.5 A, DC 28 V
Typical life	1,000 operations at 1 x I _N	1,000 operations at 1 x I _N	10,000 operations, mechanical 5,000 operations at 1 x I _N
Interrupting capacity I _{cn}	10,000 A	DC 28 V: 6,000 A AC 115 V (400 Hz): 1,500 A	0.1...2.5 A 15 x I _N 3...3.5 A 250 A DC / 150 A AC 4...7 A 500 A 7.5...50 A 6,000 A DC / 1,000 A AC 35...50 A 3,000 A DC / 1,000 A AC
Approvals	449: VG 95345, part 15 447: QPL Sweden	LROs, BV, VG 95345 part 17, QPL Canada, Sweden	VG 95345 T21, QPL Canada, LROs
Available options	see pages 225 - 226	see pages 227 - 229	see pages 231 - 233
Dimensions			
Internal connection diagrams			

483-...	4120-...	4201-...	520 / 530-...
			
thermal, single pole, threadneck panel mounting, push/pull operation, temperature compensated, explosion-proof, miniaturized, with auxiliary contact option, full military specification	thermal, single pole, threadneck panel mounting, push/pull operation, temperature compensated, explosion-proof, miniaturized, with auxiliary contact option, commercial aircraft specification	single pole, thermal-magnetic, rail mounting, with hand release	thermal-magnetic, surface, panel or track mounting, toggle operation 520 double pole 530 three pole
AC 115 V (400 Hz); DC 28 V	AC 115 V (400 Hz); DC 28 V	AC 250 V; DC 28 V	AC 240 V; 3 AC 415 V; 3 AC 500 V 3 AC 660 V; DC 110 V; DC 220 V
1...25 A	1...25 A	0.05...16 A	10...125 A (VDE 0660) 7...100 A (VDE 0641)
0.5 A, DC 28 V	0.5 A, DC 28 V		6 A, AC 240 V or DC 28 V; 1 A DC 110 V
20,000 operations mechanical 10,000 operations at 1 x I _N	20,000 operations mechanical 5,000 operations at 1 x I _N	4,000 operations at 2 x I _N	10,000 operations at 1 x I _N 20,000 operations mechanical
AC 115 V (400 Hz): ≤ 4 A 1,000 A 5 A 2,000 A 7.5...25 A 2,500 A DC 28 V: 1...25 A 6,000 A	AC 115 V (400 Hz): 1... 3 A 1,000 A 5...25 A 2,000 A DC 28 V: 1...25 A 6,000 A	0.05...5 A 400 A 5.5...7.5 A 750 A 8...16 A 1,000 A (with back-up fuse NH 40 A to VDE 0636)	AC 240 V 10,000 A 3 AC 415 V 5,000 A 3 AC 500 V 4,000 A 3 AC 660 V 2,000 A DC 110 V 10,000 A DC 220 V on request
LN 29886, VG 95 345 T6, MS 3320, QPL	EN 2495, EN 3773	VDE, Demko	LRoS, BV
see pages 235 - 238	see pages 239-240	see pages 241 - 242	see pages 207 - 210

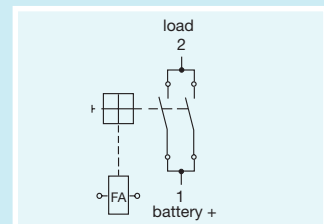
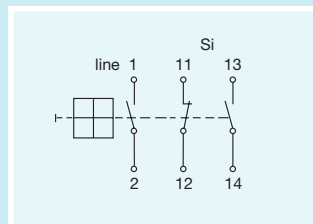
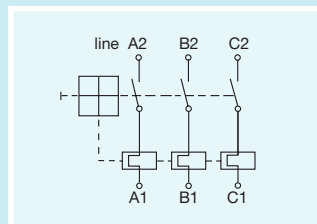


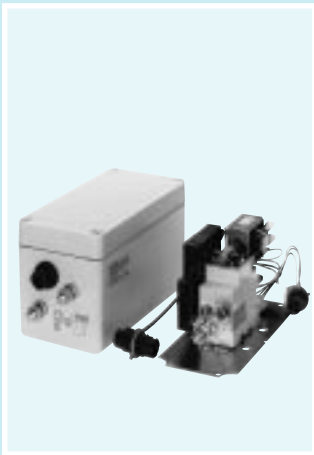
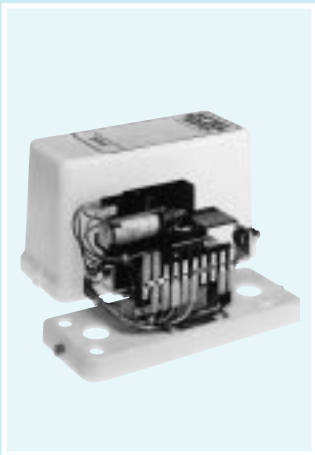
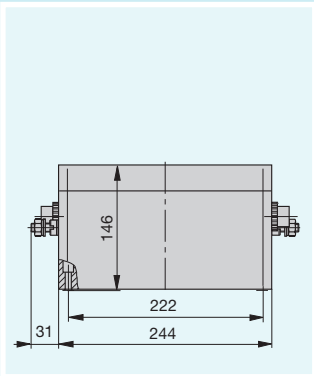
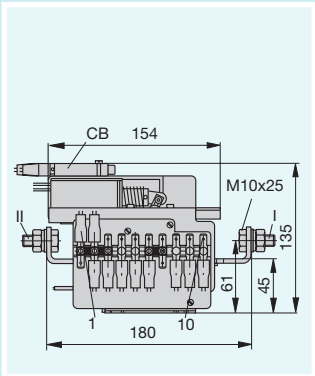
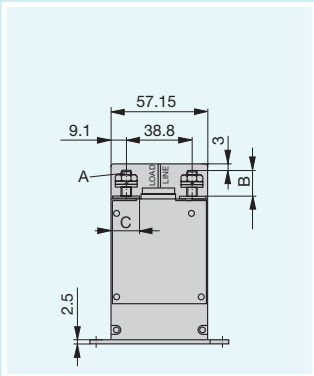
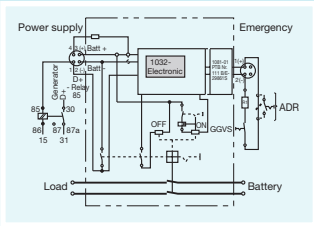
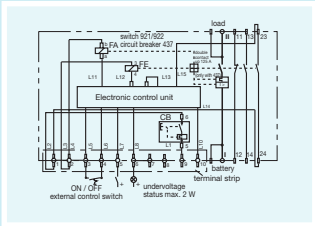
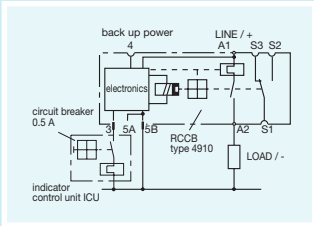
Type No.	583-...	911/912/913/914-...	921/922
			
Description	3 pole, thermal, threadneck panel mounting, push/pull operation, temperature compensated, explosion-proof, miniaturized, with auxiliary contact option	isolation switch 911 1 pole 912 2 pole 913 3 pole 914 4 pole toggle operation, surface, panel or track mounting	battery isolation switch 921 1 pole 922 2 pole toggle operation, surface mounting, with remote disconnection and reconnection facilities, optional enclosure
Max. voltage rating	3 AC 200 V (400 Hz); DC 28 V	AC 240 V; 3 AC 415 V; 3 AC 500 V; DC 110 V	DC 12 V / DC 24 V
Current ratings	1...25 A	32 A, 63 A, 125 A	921: 240 A 922: 120 A
Aux. contact rating	0.5 A, DC 28 V non-inductive	6 A, AC 240 V or DC 28 V 1 A, DC 110 V	6 A, DC 28 V
Typical life	20,000 operations mechanical 10,000 operations at 1 x I _N	10,000 operations at 1 x I _N 20,000 operations mechanical	10,000 operations electrical 20,000 operations mechanical
Interrupting capacity I_{cn}	3 AC 200 V (400 Hz): ≤ 4 A 1,000 A 5 A 2,000 A 7.5...25 A 2,500 A DC 28 V: 1...25 A 6,000 A		2,500 A type 921 1,500 A type 922
Approvals	LN 29887, VG 95 345 T11, MS 14154, QPL		LRoS, BASEEFA
Available options	see pages 243 - 246	see pages 247 - 249	see pages 251 - 252

Dimensions



Internal connection diagrams



E-1032	E-1073-437/921/922	4910 (RCCB)	Type No.
			
battery emergency switch, single or double pole, to ADR requirements	single or double pole, remote disconnection and reconnection, with undervoltage protection optional	remote control circuit breaker (RCCB) single pole, temperature compensated, with auxiliary contacts	Description
DC 12 V; DC 24 V	DC 12 V; DC 24 V	DC 28 V (DC 18...36 V)	Max. voltage rating
921: 240 A 922: 120 A	437: 40...240 A 921: 240 A 922: 120 A	5...100 A	Current ratings
6 A at DC 28 V	6 A at DC 28 V	DC 28 V, AC 115 V (400 Hz): 3 A	Aux. contact rating
10,000 operations electrical 20,000 operations mechanical	10,000 operations electrical 20,000 operations mechanical	50,000 operations at 1 x I _N	Typical life
DC 28 V (921): 2,500 A DC 28 V (922): 1,500 A	DC 28 V (437): 10,000 A DC 28 V (921): 2,500 A DC 28 V (922): 1,500 A	6,000 A	Interrupting capacity I _{cn}
TÜV			Approvals
see pages 253 - 256	see pages 257 - 260	see pages 261 - 262	Available options
			Dimensions
			Internal connection diagrams

High Performance Circuit Breakers - Selector Chart

Type	Mounting method					Main terminal design					Auxiliary contacts	Manual trip facility	Water splashcover	Number of poles		Choice of characteristic curves	Ratings		
	threadneck	panel	socket	surface	rail	blade terminals	plug-in pins	solder terminals	screw terminals					single pole	multi pole		AC (V)	DC (V)	I _n
402	●					○			○				○	●			250	28	25
410		●		○	○				●		○	●	○	●	520 530	●	240	110	125
412	●								●			●	○	●		●	115	28	35
413	●								●			●	○	●		●	115	28	70
428			●		(○)		●					●		●			250	28	25
433/434	●					○		○	○			○	○	●		●	250	28	16
437				●					●		○	●		●		●		144	240
446/447/449				●					●		○	●		●		●		28	500
452	●	●							●			●	○	●		●	115	28	100
482	●								●		○	●	○	●			115	28	50
483	●								●		○	●	○	●	583		115	28	25
4120	●								●		○	●	○	●	583		115	28	25
4201					●				●			●		●			250	28	16
4910				●					●		○			●				28	100
520/530		●		○	○				●		○	●	only 520 ○	410	●	●	660	220	125
583	●								●		○	●	○	483	●		115 200	28	25
911-914		●		○	○				●		○	●	only 911/ 912 ○	911	912 913 914		240	110	125 240 1pol.
921/922		●		○	○				●		○	●	○	921	922			24	120/922 240/921
E-1032				●					●				●	○	○			12 24	120 240 1pol.
E-1073				●					●		○	○	○	○	○	●		12/24 144	120 240 1pol.

● = standard
○ = optional

Cross Reference List of German military part numbers versus E-T-A part numbers

VG Number	E-T-A Type	VG Number	E-T-A Type
VG 95345 T06-001	483-G411-K1M1-A1S0ZN-1A	VG 95345 T15-106	449-K-H-FN-Si-315A
VG 95345 T06-002	483-G411-K1M1-A1S0ZN-2A	VG 95345 T15-107	449-K-H-FN-Si-350A
VG 95345 T06-003	483-G411-K1M1-A1S0ZN-2,5A	VG 95345 T15-108	449-K-H-FN-Si-400A
VG 95345 T06-004	483-G411-K1M1-A1S0ZN-3A	VG 95345 T15-109	449-K-H-FN-Si-500A
VG 95345 T06-005	483-G411-K1M1-A1S0ZN-4A		
VG 95345 T06-006	483-G411-K1M1-A1S0ZN-5A	VG 95345 T17-001	452-K34-FN2-60A
VG 95345 T06-007	483-G411-K1M1-A1S0ZN-6A	VG 95345 T17-002	452-K34-FN2-70A
VG 95345 T06-008	483-G411-K1M1-A1S0ZN-7,5A	VG 95345 T17-003	452-K34-FN2-80A
VG 95345 T06-009	483-G411-K1M1-A1S0ZN-8A	VG 95345 T17-004	452-K34-FN2-90A
VG 95345 T06-010	483-G411-K1M1-A1S0ZN-10A	VG 95345 T17-005	452-K34-FN2-100A
VG 95345 T06-011	483-G411-K1M1-A1S0ZN-15A	VG 95345 T17-101	452-K14-LN2-60A
VG 95345 T06-012	483-G411-K1M1-A1S0ZN-16A	VG 95345 T17-102	452-K14-LN2-70A
VG 95345 T06-013	483-G411-K1M1-A1S0ZN-20A	VG 95345 T17-103	452-K14-LN2-80A
VG 95345 T06-014	483-G411-K1M1-A1S0ZN-25A	VG 95345 T17-104	452-K14-LN2-90A
		VG 95345 T17-105	452-K14-LN2-100A
VG 95345 T06-101	483-G111-K1M1-A1S1ZN-1A	VG 95345 T21-001	482-N-MS-0,5A
VG 95345 T06-102	483-G111-K1M1-A1S1ZN-2A	VG 95345 T21-002	482-N-MS-1,0A
VG 95345 T06-103	483-G111-K1M1-A1S1ZN-2,5A	VG 95345 T21-003	482-N-MS-1,5A
VG 95345 T06-104	483-G111-K1M1-A1S1ZN-3A	VG 95345 T21-004	482-N-MS-2,0A
VG 95345 T06-105	483-G111-K1M1-A1S1ZN-4A	VG 95345 T21-005	482-N-MS-3,0A
VG 95345 T06-106	483-G111-K1M1-A1S1ZN-5A	VG 95345 T21-006	482-N-MS-3,5A
VG 95345 T06-107	483-G111-K1M1-A1S1ZN-6A	VG 95345 T21-007	482-N-MS-4,0A
VG 95345 T06-108	483-G111-K1M1-A1S1ZN-7,5A	VG 95345 T21-008	482-N-MS-4,5A
VG 95345 T06-109	483-G111-K1M1-A1S1ZN-8A	VG 95345 T21-009	482-N-MS-5,0A
VG 95345 T06-110	483-G111-K1M1-A1S1ZN-10A	VG 95345 T21-010	482-N-MS-5,5A
VG 95345 T06-111	483-G111-K1M1-A1S1ZN-15A	VG 95345 T21-011	482-N-MS-6,0A
VG 95345 T06-112	483-G111-K1M1-A1S1ZN-16A	VG 95345 T21-012	482-N-MS-6,5A
VG 95345 T06-113	483-G111-K1M1-A1S1ZN-20A	VG 95345 T21-013	482-N-MS-7,0A
VG 95345 T06-114	483-G111-K1M1-A1S1ZN-25A	VG 95345 T21-014	482-N-MS-7,5A
		VG 95345 T21-015	482-N-MS-8,0A
VG 95345 T11-001	583-G411-K1M1-A1S0TN-1A	VG 95345 T21-016	482-N-MS-10A
VG 95345 T11-002	583-G411-K1M1-A1S0TN-2A	VG 95345 T21-017	482-N-MS-12A
VG 95345 T11-003	583-G411-K1M1-A1S0TN-2,5A	VG 95345 T21-018	482-N-MS-15A
VG 95345 T11-004	583-G411-K1M1-A1S0TN-3A	VG 95345 T21-019	482-N-MS-20A
VG 95345 T11-005	583-G411-K1M1-A1S0TN-4A	VG 95345 T21-020	482-N-MS-25A
VG 95345 T11-006	583-G411-K1M1-A1S0TN-5A	VG 95345 T21-021	482-N-MS-30A
VG 95345 T11-007	583-G411-K1M1-A1S0TN-6A	VG 95345 T21-022	482-N-MS-35A
VG 95345 T11-008	583-G411-K1M1-A1S0TN-7,5A	VG 95345 T21-023	482-N-MS-40A
VG 95345 T11-009	583-G411-K1M1-A1S0TN-8A	VG 95345 T21-024	482-N-MS-45A
VG 95345 T11-010	583-G411-K1M1-A1S0TN-10A	VG 95345 T21-025	482-N-MS-50A
VG 95345 T11-011	583-G411-K1M1-A1S0TN-15A		
VG 95345 T11-012	583-G411-K1M1-A1S0TN-16A	VG 95345 T21-101	482-MS-0,5A
VG 95345 T11-013	583-G411-K1M1-A1S0TN-20A	VG 95345 T21-102	482-MS-1,0A
VG 95345 T11-014	583-G411-K1M1-A1S0TN-25A	VG 95345 T21-103	482-MS-1,5A
		VG 95345 T21-104	482-MS-2,0A
VG 95345 T11-101	583-G111-K1M1-A1S1UN-1A	VG 95345 T21-105	482-MS-3,0A
VG 95345 T11-102	583-G111-K1M1-A1S1UN-2A	VG 95345 T21-106	482-MS-3,5A
VG 95345 T11-103	583-G111-K1M1-A1S1UN-2,5A	VG 95345 T21-107	482-MS-4,0A
VG 95345 T11-104	583-G111-K1M1-A1S1UN-3A	VG 95345 T21-108	482-MS-4,5A
VG 95345 T11-105	583-G111-K1M1-A1S1UN-4A	VG 95345 T21-109	482-MS-5,0A
VG 95345 T11-106	583-G111-K1M1-A1S1UN-5A	VG 95345 T21-110	482-MS-5,5A
VG 95345 T11-107	583-G111-K1M1-A1S1UN-6A	VG 95345 T21-111	482-MS-6,0A
VG 95345 T11-108	583-G111-K1M1-A1S1UN-7,5A	VG 95345 T21-112	482-MS-6,5A
VG 95345 T11-109	583-G111-K1M1-A1S1UN-8A	VG 95345 T21-113	482-MS-7,0A
VG 95345 T11-110	583-G111-K1M1-A1S1UN-10A	VG 95345 T21-114	482-MS-7,5A
VG 95345 T11-111	583-G111-K1M1-A1S1UN-15A	VG 95345 T21-115	482-MS-8,0A
VG 95345 T11-112	583-G111-K1M1-A1S1UN-16A	VG 95345 T21-116	482-MS-10A
VG 95345 T11-113	583-G111-K1M1-A1S1UN-20A	VG 95345 T21-117	482-MS-12A
VG 95345 T11-114	583-G111-K1M1-A1S1UN-25A	VG 95345 T21-118	482-MS-15A
		VG 95345 T21-119	482-MS-20A
VG 95345 T15-001	449-K-H-FN-125A	VG 95345 T21-120	482-MS-25A
VG 95345 T15-002	449-K-H-FN-160A	VG 95345 T21-121	482-MS-30A
VG 95345 T15-003	449-K-H-FN-200A	VG 95345 T21-122	482-MS-35A
VG 95345 T15-004	449-K-H-FN-225A	VG 95345 T21-123	482-MS-40A
VG 95345 T15-005	449-K-H-FN-250A	VG 95345 T21-124	482-MS-45A
VG 95345 T15-006	449-K-H-FN-315A	VG 95345 T21-125	482-MS-50A
VG 95345 T15-007	449-K-H-FN-350A		
VG 95345 T15-008	449-K-H-FN-400A	VG 95345 T23 A	X 200 802 01
VG 95345 T15-009	449-K-H-FN-500A	VG 95345 T23 B	X 200 801 08
VG 95345 T15-101	449-K-H-FN-Si-125A	VG 95345 T23 D	X 200 803 01
VG 95345 T15-102	449-K-H-FN-Si-160A		
VG 95345 T15-103	449-K-H-FN-Si-200A		
VG 95345 T15-104	449-K-H-FN-Si-225A		
VG 95345 T15-105	449-K-H-FN-Si-250A		

Cross Reference List of EN military part numbers versus E-T-A part numbers

EN/MS Number	E-T-A Type	MS Number	E-T-A Type
EN 2495-01A M	4120-G111-K1M1-A1S0ZN-1A	MS 3320-5VL	483-W533-J1M1-B2S0Z-5A
EN 2495-02A M	4120-G111-K1M1-A1S0ZN-2A	MS 3320-6VL	483-W533-J1M1-B2S0Z-6A
EN 2495-2A5 M	4120-G111-K1M1-A1S0ZN-2,5A	MS 3320-7.5VL	483-W533-J1M1-B2S0Z-7,5A
EN 2495-03A M	4120-G111-K1M1-A1S0ZN-3A	MS 3320-10VL	483-W533-J1M1-B2S0Z-10A
EN 2495-05A M	4120-G111-K1M1-A1S0ZN-5A	MS 3320-15VL	483-W533-J1M1-B2S0Z-15A
EN 2495-7A5 M	4120-G111-K1M1-A1S0ZN-7,5A	MS 3320-20VL	483-W533-J1M1-B2S0Z-20A
EN 2495-10A M	4120-G111-K1M1-A1S0ZN-10A		
EN 2495-15A M	4120-G111-K1M1-A1S0ZN-15A	MS 14154-1	583-G533-J1M1-B2S0X-1A
EN 2495-20A M	4120-G111-K1M1-A1S0ZN-20A	MS 14154-2	583-G533-J1M1-B2S0X-2A
EN 2495-25A M	4120-G111-K1M1-A1S0ZN-25A	MS 14154-2.5	583-G533-J1M1-B2S0X-2,5A
		MS 14154-3	583-G533-J1M1-B2S0X-3A
EN 2495-01A U	4120-G111-J2M1-K5S0ZN-1A	MS 14154-4	583-G533-J1M1-B2S0X-4A
EN 2495-02A U	4120-G111-J2M1-K5S0ZN-2A	MS 14154-5	583-G533-J1M1-B2S0X-5A
EN 2495-2A5 U	4120-G111-J2M1-K5S0ZN-2,5A	MS 14154-6	583-G533-J1M1-B2S0X-6A
EN 2495-03A U	4120-G111-J2M1-K5S0ZN-3A	MS 14154-7.5	583-G533-J1M1-B2S0X-7,5A
EN 2495-05A U	4120-G111-J2M1-K5S0ZN-5A	MS 14154-10	583-G533-J1M1-B2S0X-10A
EN 2495-7A5 U	4120-G111-J2M1-K5S0ZN-7,5A	MS 14154-15	583-G533-J1M1-B2S0X-15A
EN 2495-10A U	4120-G111-J2M1-K5S0ZN-10A	MS 14154-20	583-G533-J1M1-B2S0X-20A
EN 2495-15A U	4120-G111-J2M1-K5S0ZN-15A		
EN 2495-20A U	4120-G111-J2M1-K5S0ZN-20A		
EN 2495-25A U	4120-G111-J2M1-K5S0ZN-25A		
EN 3773-004 D 01A	4120-G112-J2M1-K5S0ZN-1A		
EN 3773-004 D 02A	4120-G112-J2M1-K5S0ZN-2A		
EN 3773-004 D 2A5	4120-G112-J2M1-K5S0ZN-2,5A		
EN 3773-004 D 03A	4120-G112-J2M1-K5S0ZN-3A		
EN 3773-004 D 05A	4120-G112-J2M1-K5S0ZN-5A		
EN 3773-004 D 7A5	4120-G112-J2M1-K5S0ZN-7,5A		
EN 3773-004 D 10A	4120-G112-J2M1-K5S0ZN-10A		
EN 3773-004 D 15A	4120-G112-J2M1-K5S0ZN-15A		
EN 3773-004 D 20A	4120-G112-J2M1-K5S0ZN-20A		
EN 3773-004 D 25A	4120-G112-J2M1-K5S0ZN-25A		
MS 3320-1	483-G533-J1M1-B2S0Z-1A		
MS 3320-2	483-G533-J1M1-B2S0Z-2A		
MS 3320-2.5	483-G533-J1M1-B2S0Z-2,5A		
MS 3320-3	483-G533-J1M1-B2S0Z-3A		
MS 3320-4	483-G533-J1M1-B2S0Z-4A		
MS 3320-5	483-G533-J1M1-B2S0Z-5A		
MS 3320-6	483-G533-J1M1-B2S0Z-6A		
MS 3320-7.5	483-G533-J1M1-B2S0Z-7,5A		
MS 3320-10	483-G533-J1M1-B2S0Z-10A		
MS 3320-15	483-G533-J1M1-B2S0Z-15A		
MS 3320-20	483-G533-J1M1-B2S0Z-20A		
MS 3320-1L	483-L533-J1M1-B2S0Z-1A		
MS 3320-2L	483-L533-J1M1-B2S0Z-2A		
MS 3320-2.5L	483-L533-J1M1-B2S0Z-2,5A		
MS 3320-3L	483-L533-J1M1-B2S0Z-3A		
MS 3320-4L	483-L533-J1M1-B2S0Z-4A		
MS 3320-5L	483-L533-J1M1-B2S0Z-5A		
MS 3320-6L	483-L533-J1M1-B2S0Z-6A		
MS 3320-7.5L	483-L533-J1M1-B2S0Z-7,5A		
MS 3320-10L	483-L533-J1M1-B2S0Z-10A		
MS 3320-15L	483-L533-J1M1-B2S0Z-15A		
MS 3320-20L	483-L533-J1M1-B2S0Z-20A		
MS 3320-1V	483-V533-J1M1-B2S0Z-1A		
MS 3320-2V	483-V533-J1M1-B2S0Z-2A		
MS 3320-2.5V	483-V533-J1M1-B2S0Z-2,5A		
MS 3320-3V	483-V533-J1M1-B2S0Z-3A		
MS 3320-4V	483-V533-J1M1-B2S0Z-4A		
MS 3320-5V	483-V533-J1M1-B2S0Z-5A		
MS 3320-6V	483-V533-J1M1-B2S0Z-6A		
MS 3320-7.5V	483-V533-J1M1-B2S0Z-7,5A		
MS 3320-10V	483-V533-J1M1-B2S0Z-10A		
MS 3320-15V	483-V533-J1M1-B2S0Z-15A		
MS 3320-20V	483-V533-J1M1-B2S0Z-20A		
MS 3320-1VL	483-W533-J1M1-B2S0Z-1A		
MS 3320-2VL	483-W533-J1M1-B2S0Z-2A		
MS 3320-2.5VL	483-W533-J1M1-B2S0Z-2,5A		
MS 3320-3VL	483-W533-J1M1-B2S0Z-3A		
MS 3320-4VL	483-W533-J1M1-B2S0Z-4A		

E-T-A® High Performance Thermal Circuit Breaker 402-...

Description

Single pole high performance version of type 2-5700 (section 1) thermal circuit breaker, with push-to-reset tease free, trip-free, snap action mechanism (R-type TO CBE to EN 60 934). Designed for threadneck panel mounting and for applications with a high fault current switching requirement.

Typical applications

Extra low voltage systems, industrial equipment.

Accessories

X 200 799 02	Water splash cover/knurled nut assembly.
X 200 799 01	As above with the cover bonded to the nut for extra retention.
X 200 798 01/02	As X 200 799 02 and 01 above but featuring a slotted knurled ring for wrench front of panel tightening.
X 210 739 01	Water splash cover/hex nut. The concertina design is extended when the button trips to the OFF position.

Ordering information

Type No.	
402	threadneck panel mounting*
Terminal design	
P10	blade terminals 6.3-0.8
K14	screw terminals M4x6
Current ratings	
8 ... 16 A	

402	-	P10	-	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)
8	< 0.02	14	< 0.02
10	< 0.02	15	< 0.02
12	< 0.02	16	< 0.02



402-...

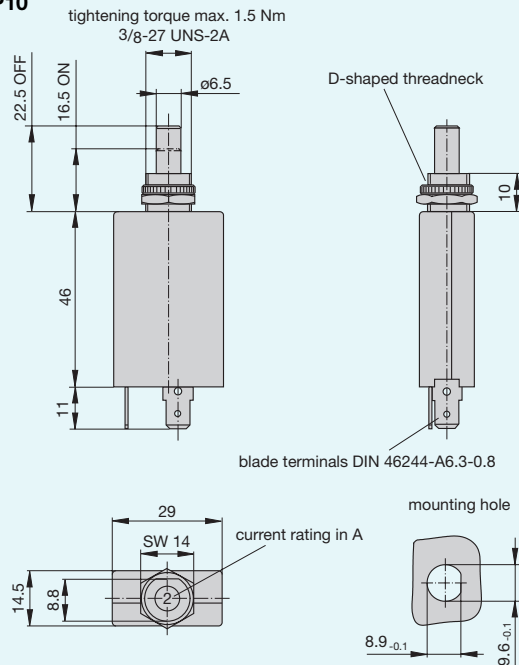
Technical data

Voltage rating	AC 250 V; DC 28 V	
Current rating range	8...16 A (20...25 A to special order)	
Typical life	4,000 operations at $2 \times I_N$	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 (threadneck should be earthed/grounded)
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 2000 V	
Insulation resistance	> 100 M Ω (DC 500 V)	
Interrupting capacity I_{cn}	1000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	8 g (57-500 Hz) ± 0.61 mm (10-57 Hz) to IEC 68-2-6, Test Fc 10 frequency cycles/axis	
Shock	40 g (11 ms) to IEC 68-2-7, Test Ea	
Corrosion	48 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 35 g	

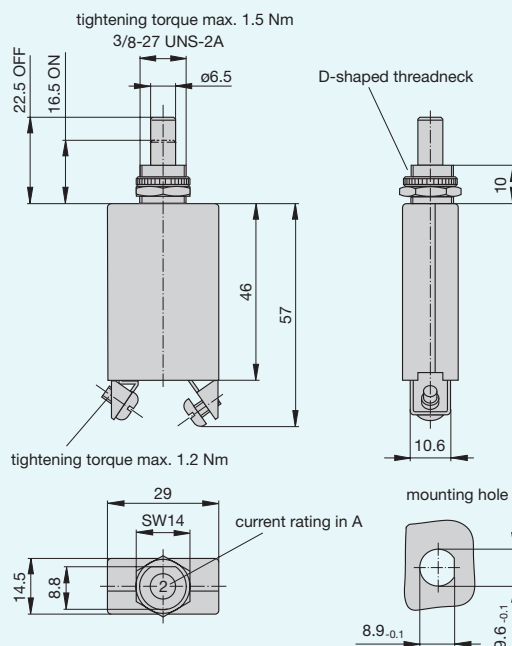
High Performance Thermal Circuit Breaker 402-...

Dimensions

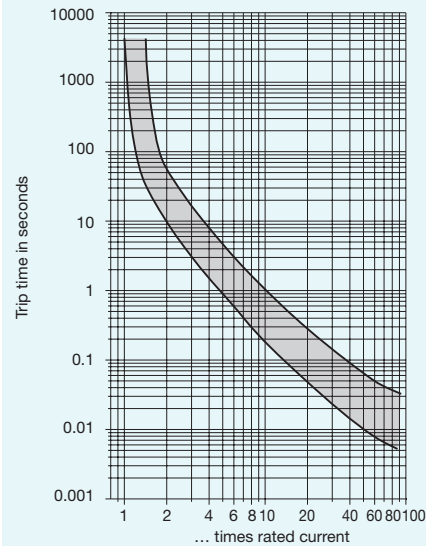
402-P10



-K14



Typical time/current characteristics at 23 °C

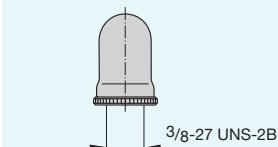


Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

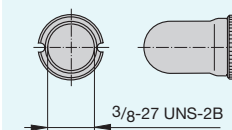
Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Accessories

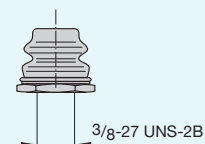
Water splash cover, transparent Y 300 538 01
+ knurled nut Y 300 628 01
X 200 799 02 (IP64)
X 200 799 01 bonded to nut (IP64)



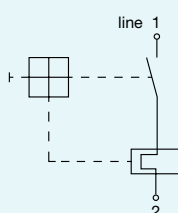
**Splash cover, transparent/
knurled nut assembly (IP64)**
X 200 798 01
X 200 798 02 bonded to nut



**Splash cover, transparent/
hex nut assembly (IP64)**
X 210 739 01



Internal connection diagram



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, thyristor and silicon rectifiers.

Accessories

- X 211 118 01 Single pole splashcover with fixing plate.
- X 211 119 01 Two pole splashcover with fixing plate.
- X 211 705 01 Terminal insulation cover for use with types 410, 520 and 530 - two per pole required.

Interrupting capacity to IEC 947/EN 60947

AC voltage

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

DC voltage

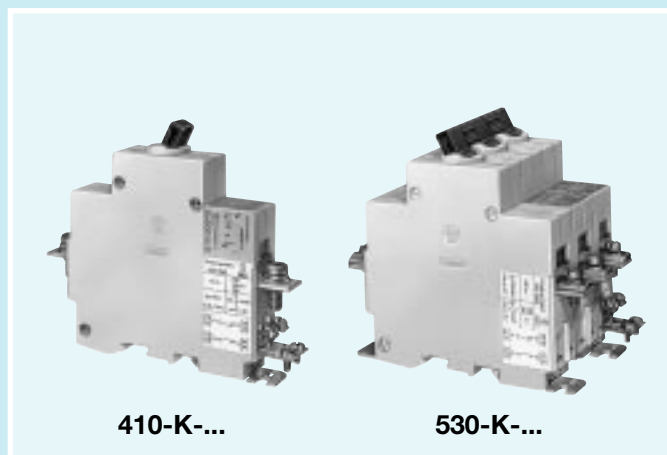
Number of poles	Voltage rating	Interrupting capacity $I_N = 12...125 A$	Interrupting capacity $I_N = 7+10 A$	Time constant
1	DC 110 V	3,000 A	3,000 A	L/R = 13 ms
1	DC 110 V	5,000 A	3,500 A	L/R = 5 ms
2	DC 110 V	5,000 A	3,000 A	L/R = 13 ms
2	DC 110 V	10,000 A	6,000 A	L/R = 0 ms
2	DC 220 V	2,000 A	2,000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

Standard current ratings and typical internal resistance values

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

Approvals

Authority	Voltage ratings	Current ratings
LRoS	3 AC 415 V	
BV (except type 530)	AC 240 V, DC 110 V	16...125 A



Technical data

Voltage rating	AC 240 V, 3 AC 415 V, 3 AC 500 V, 3 AC 660 V (50/60 Hz), DC 110 V; DC 220 V series connection	
Current rating range	10...125 A (EN 60947), curves 01/02/04/05 7...100 A (EN 60898), curves B3/C3	
Auxiliary circuit	6 A, AC 240 V or DC 28 V; 1 A, DC 110 V	
Typical life	10,000 operations at $1xI_N$ 20,000 operations mechanical	
Ambient temperature	-20...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 6 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage operating area AC 3300 V pole/pole AC 3300 V main circuit/aux.circuit AC 2200 V aux. circuit 11-12/13-14 AC 1000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
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 68-2-6, 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 68-2-7, Test Ea	
Corrosion	96 hours at 5 % salt mist, to IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, 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 B5-DIN 46288 (curves B3/C3, 32-63 A)
	80-125 A terminal screw DIN 46206, sheet 2, form A, M6 thread
Mounting	
1	surface mounting
3	rail mounting (DIN EN 50 022-35x7.5) or panel mounting
2	rail mounting on G profile (DIN EN 5035-G32) or panel mounting
4	panel mounting with cylinder head screw M3.5
5	mounting brackets
Magnetic trip curves	
01	2.1-3xI _N (thyristor and rectifier protection)
02	7-10xI _N (motor and generator protection to EN 60947)
04	3.5-x5xI _N (cable protection to EN 60947)
05	4-6xI _N (generator protection to EN 60947)
B3	3-5xI _N (cable protection to EN 60898)
C3	5-10xI _N (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

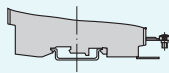
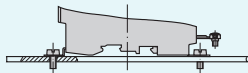
520 - K - 1 - 01 - - 10 A ordering example

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

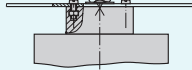
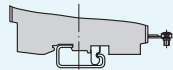
Surface mounting

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

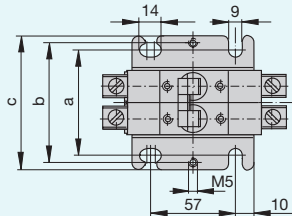


rail mounting on G profile
(DIN EN 50 035-G32)
-3

panel mounting
-4

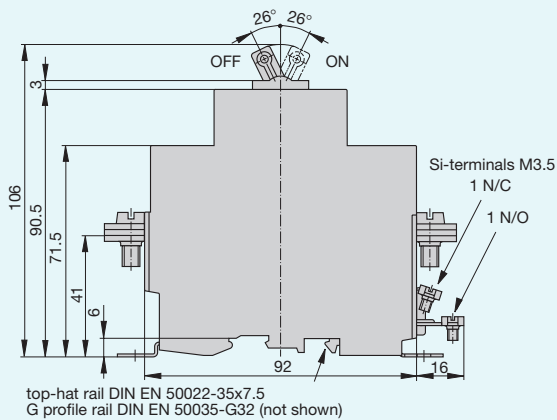


surface mounting
with mounting brackets
-5

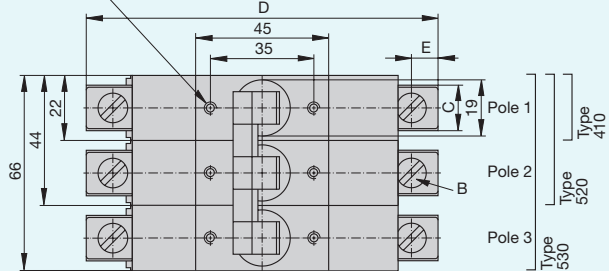


	a	b	c
Type 410	50	61.5	70
Type 520	72	83.5	92
Type 530	94	105.5	114

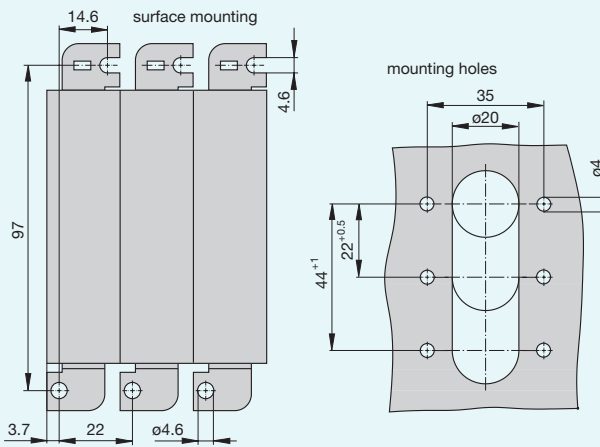
Dimensions



M3.5 - thread max. 9 mm deep
tightening torque max. 0.55 Nm

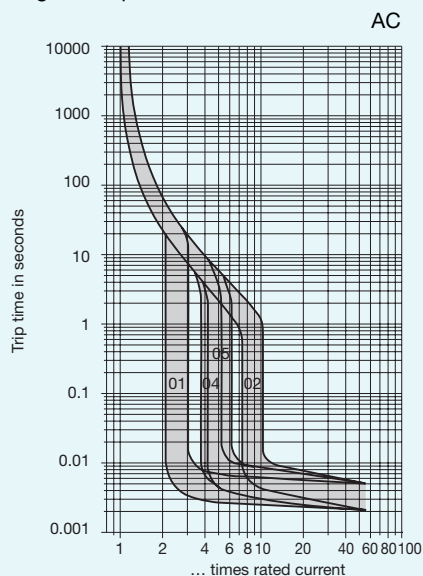


Current rating	Dimensions				Terminal	Max. tightening torque
	B	C	D	E		
≤ 32A	M5	13	114	7	pressure plate	2.0 Nm
≤ 63A	M6	15.4	120	9	pressure plate	2.5 Nm
≤ 125A	M6	15.4	120	9	terminal screw	2.5 Nm

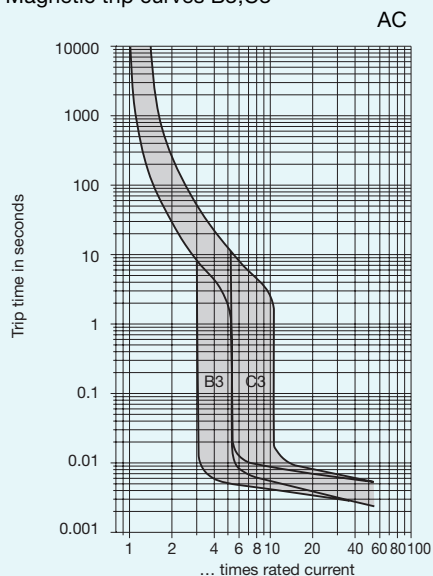


Typical time/current characteristics at 23 °C

Magnetic trip curves 01,02,04,05



Magnetic trip curves B3,C3

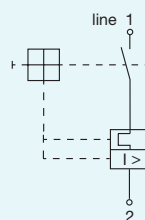


N.B.

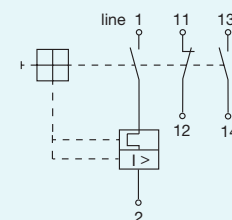
Magnetic tripping currents are increased by 20% on DC supplies.

Internal connection diagram

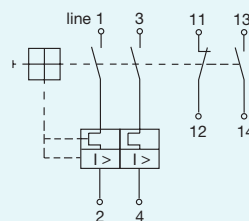
Type 410-K



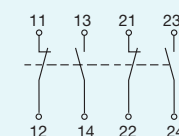
Type 410-K-Si



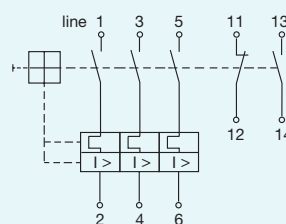
Type 520-K-Si



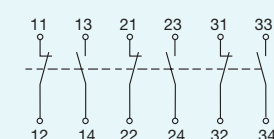
Type 520-K-2Si



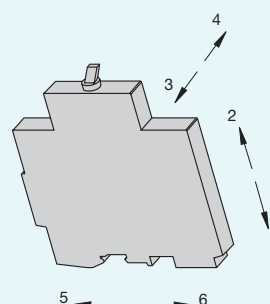
Type 530-K-Si



Type 530-K-3Si

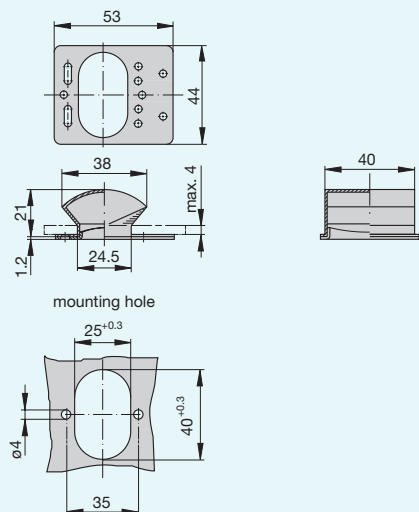


Shock directions

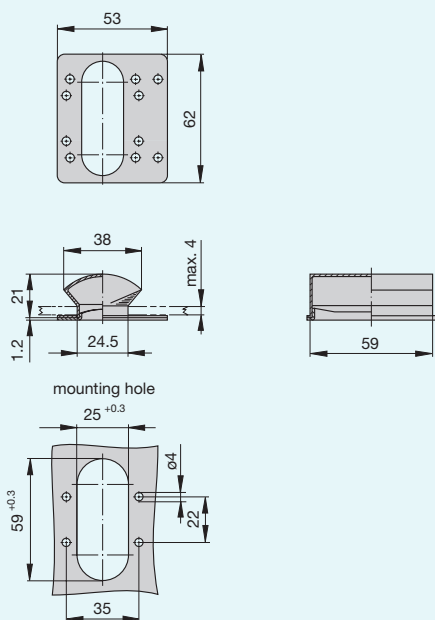


Accessories

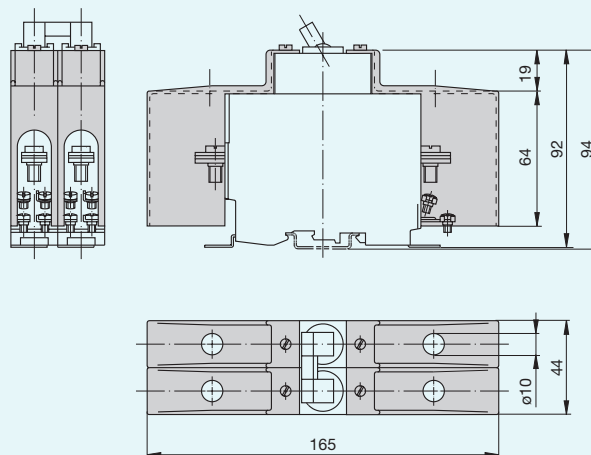
**Water splash cover with fixing plate (IP 54)
for type 410
X 211 118 01**



**Water splash cover with fixing plate (IP 54)
for type 520
X 211 119 01**



**Terminal insulation cover for types 410/520/530-K
X 211 705 01 (1 set = 2 pcs per pole)**



E-T-A® High Performance Thermal Circuit Breaker 412-...

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 shows clearly 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.

Accessories

X 200 801 08	Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
X 200 801 03	As above but blackened finish.
X 200 802 01	Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
X 200 802 02	As above but blackened finish.
X 200 803 01	Screw-tightened clamp-on actuator extension to aid manual operation.

Ordering information

Type No.	
412	threadneck panel mounting
Terminal design	
K14	screw terminals M4 (to aircraft specs.)
K54	screw terminals M4 sealed housing (to vehicle specs.)
Version	
FN2	vehicle application
LN2	aircraft application
N2	general application
Current ratings	
6...25 A (-FN2)	
7.5...35 A (-LN2/N2)	

412 - K14 - LN2 - 10 A ordering example

Standard current ratings and typical voltage drop values

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
LROs	DC 28 V	6...25 A



412-...

Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	6...25 A (-FN) 7.5...35 A (-LN/-N), lower current ratings to special order	
Typical life	4,000 operations at 2 x I _N	
Ambient temperature	-55...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 115 V (400 Hz): 1000 A DC 28 V: 6000 A	
Interrupting capacity (UL 1077)	DC 28 V: 6000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	10 g (56-500 Hz) ±0.76 mm (10-55 Hz) to VG 95210, sheet 19/ MIL-STD-202, meth. 204/ IEC 68-2-6, test Fc	
Shock	25 g (11 ms) to VG 95210, sheet 28/ MIL-STD-202, meth. 213/ IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to VG 95210, sheet 2/ MIL-STD-202, meth. 101/ IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/ MIL-STD-202, meth. 106/ IEC 68-2-3, test Ca	
Mass	approx. 40 g	

High Performance Thermal Circuit Breaker 412-...

Dimensions

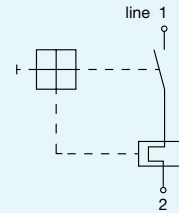
412-K54-FN2/N2

412-K14/K54-FN2/N2

412-K14-LN2

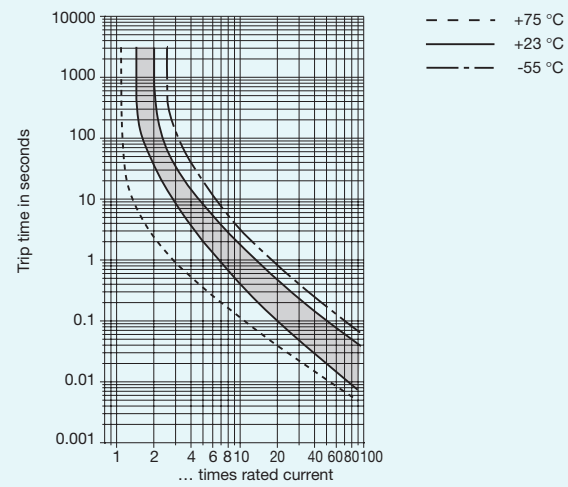
412-K14/K54-LN2

Internal connection diagram

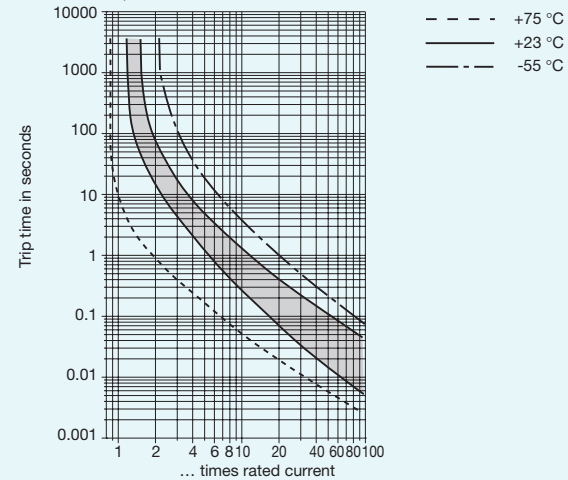


Typical time/current characteristics

412-...-FN 6...25 A



412-...LN 7,5...35 A



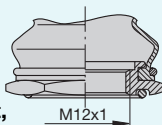
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Accessories (approved to VG 95345, part 23)

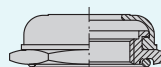
Splash cover/hex nut assembly
with O ring (IP 66)

X 200 801 08
nickel plated nut,
translucent cover
X 200 801 03
matt black finish nut,
black cover



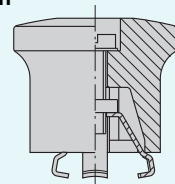
Splash cover black/hex nut assembly
with O ring (IP 54)

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



Actuator extension
(black)

X 200 803 01



ETA® High Performance Thermal Circuit Breaker 413-...

Description

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

Accessories

X 200 801 08	Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
X 200 801 03	As above but blackened finish.
X 200 802 01	Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
X 200 802 02	As above but blackened finish.
X 200 803 01	Screw-tightened clamp-on actuator extension to aid manual operation.

Ordering information

Type No.	
413	threadneck panel mounting
Terminal design	
K14	screw terminals M6 (to aircraft specs.)
K34	reinforced screw terminals M6 (to vehicle specs.)
K54	as K34, but housing sealed
Version	
FN2	vehicle application
LN2	aircraft application
N2	general application
Current ratings	
30...50 A (-FN2)	
30...70 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	50	≤ 200	≤ 200
35	≤ 250	≤ 250	60	≤ 200	-
40	≤ 200	≤ 200	70	≤ 200	-
45	≤ 200	≤ 200			

Approvals

Test authority	Voltage ratings	Current ratings
UL	DC 28 V	30...70 A
LROs, BV	DC 28 V	30...70 A
QPL Sweden	DC 28 V	30...50 A



413-...

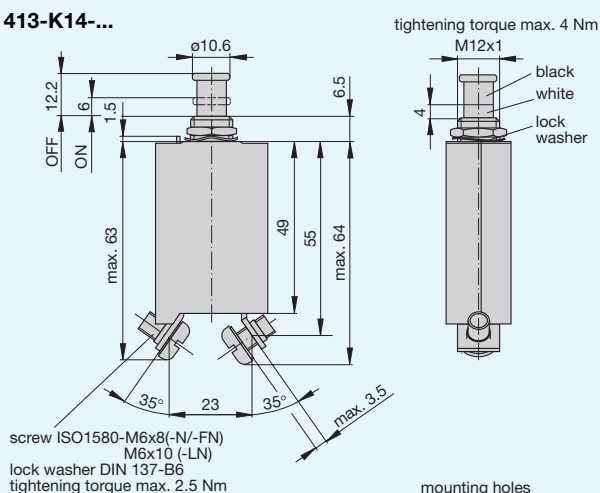
Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	30...50 A (-FN) 30...70 A (-LN/-N),	
Typical life	2,000 operations at 1 x I _N	
Ambient temperature	-55...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 115 V (400 Hz): 1000 A DC 28 V: 6000 A	
Interrupting capacity (UL 1077)	DC 28 V: 6000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	10 g (56-500 Hz) ±0.76 mm (10-55 Hz) to VG 95210, sheet 19/ MIL-STD-202, meth. 204/ IEC 68-2-6, test Fc	
Shock	50 g (11 ms) to VG 95210, sheet 28/ MIL-STD-202, meth. 213/ IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist, to VG 95210, sheet 2/ MIL-STD-202, meth. 101/ IEC 68-2-11, Test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/ MIL-STD-202, meth. 106/ IEC 68-2-3, test Ca	
Mass	approx. 65 g	

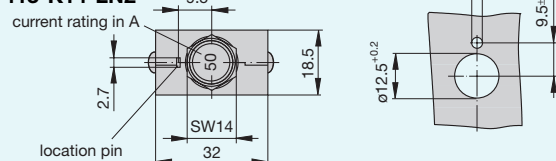
High Performance Thermal Circuit Breaker 413-...

Dimensions

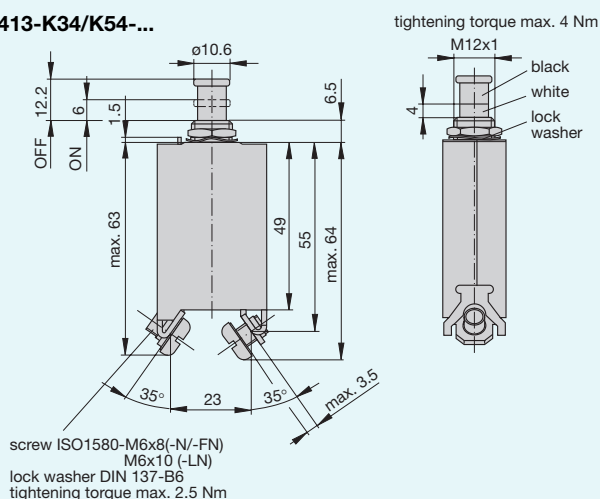
413-K14-...



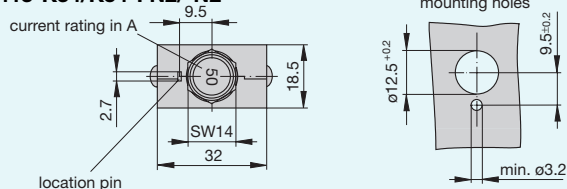
413-K14-LN2



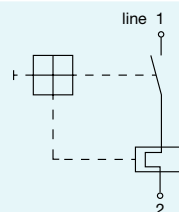
413-K34/K54-...



413-K34/K54-FN2/-N2

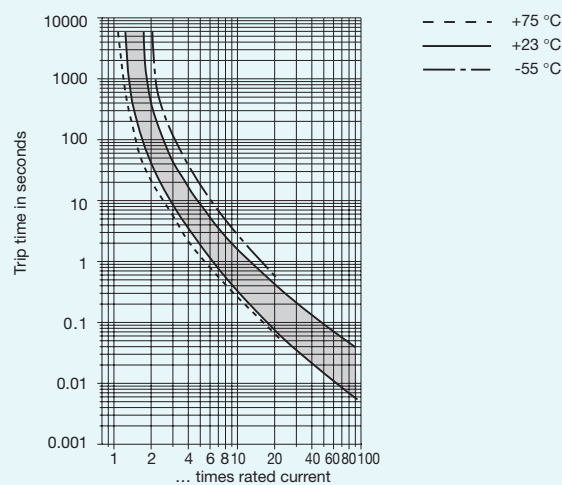


Internal connection diagram

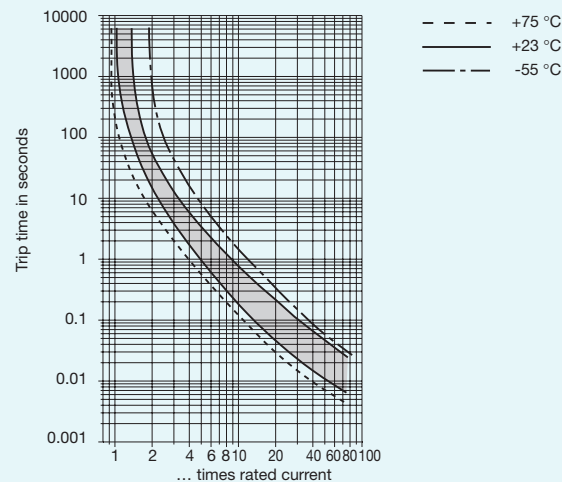


Typical time/current characteristics

413-...-FN 30...50 A



413-...LN/N 30...70 A



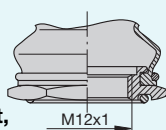
Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

Accessories (approved to VG 95345, part 23)

Splash cover/hex nut assembly with O ring (IP 66)

X 200 801 08
 nickel plated nut,
 translucent cover
 X 200 801 03
 matt black finish nut,
 black cover



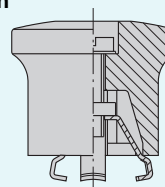
Splash cover black/hex nut assembly with O ring (IP 54)

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



Actuator extension (black)

X 200 803 01



E-T-A® High Performance Thermal-Magnetic Circuit Breaker 428-...

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.

Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Extra low voltage systems, control equipment.

Accessories

10R-K10	Modular snap-together surface mounted sockets, each accommodating two plug-in circuit breakers. With screw terminals.
10R-P10	As above but with push-on terminals.
10R-A10	As above but with a combination of screw and push-on terminals.
Y 301 166 02	Two-way brass connecting/bus bar links for type 10 sockets
Y 301 166 01	Four-way brass connecting/bus bar links for type 10 sockets
16	Single socket for symmetric EN rail mounting.
X 200 409 01	Adapter for mounting socket type 16 to asymmetric rail (G-profile)
Y 301 477 01	Blanking plug with insulated pins, for socket 10.
X 210 589 01	50-way 1.5mm ² cable links with pre-fitted connection lugs for type 10F-K10/-A10 sockets.
X 210 589 02	As above but with 2.5mm ² cable links.
X 210 588 01	100-way 1.5mm ² cable links, brown, with pre-fitted push-on connectors for type 10F-P10 sockets.
X 210 588 02	As above but with 2.5mm ² cable links, black
X 210 588 03	As above, but red
X 210 588 04	As above, but blue
X 200 800 10	Terminal for mounting rack

Ordering information

Type No.	
428	plug-in
Terminal design	
AG	silver-plated plug-in terminals
Current ratings	
0.05...25 A	
428	- AG - 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



428-...

Technical data

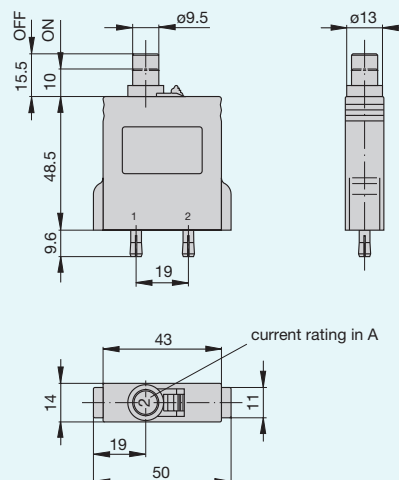
Voltage rating	AC 250 V (50/60 Hz); DC 28 V	
Current rating range	0.05...25 A	
Typical life	4,000 operations at 2 x I _N	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.05...5 A 5.5...7.5 A 8...25 A	400 A 750 A 1500 A (with back-up fuse NH 40 A to VDE 0636)
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 50 g	

Approvals

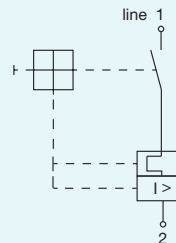
Authority	Voltage ratings	Current ratings
VDE	AC 250 V, DC 28 V	0.05...25 A

High Performance Thermal-Magnetic Circuit Breaker 428-...

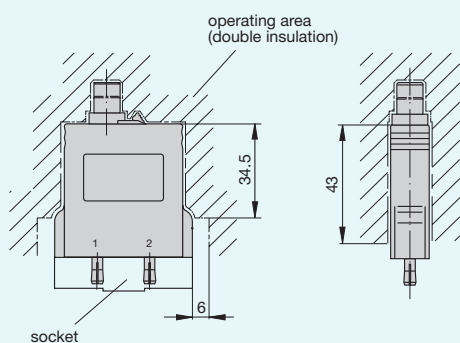
Dimensions



Internal connection diagram



Installation drawing



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

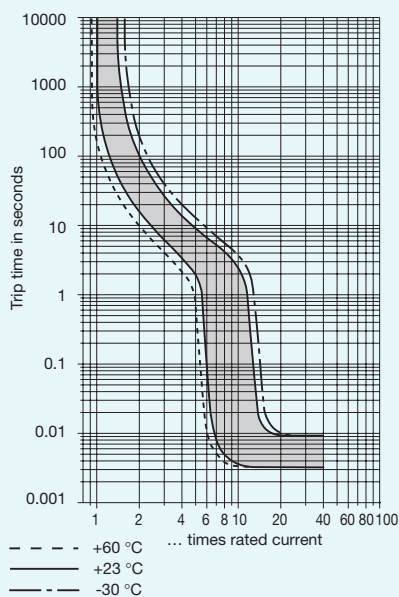
N.B.

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

Typical time/current characteristics

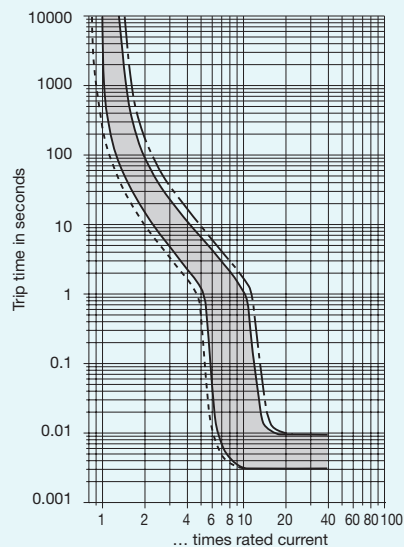
0,05...7 A

AC



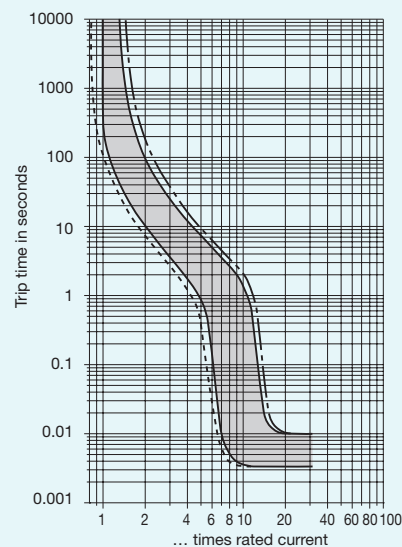
8...16 A

AC



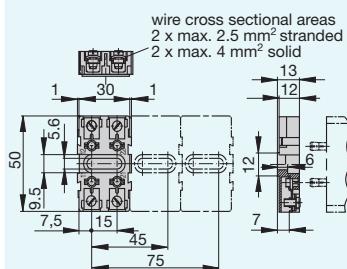
18...25 A (for $I_N > 20$ A 50% ON duty)

AC

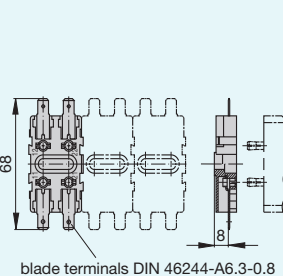


Accessories

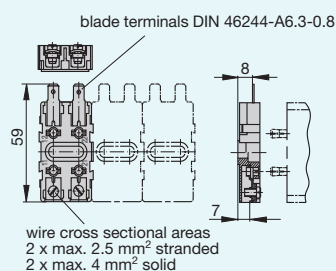
10R-K10



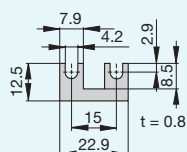
10R-P10



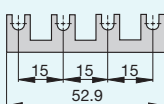
10R-A10



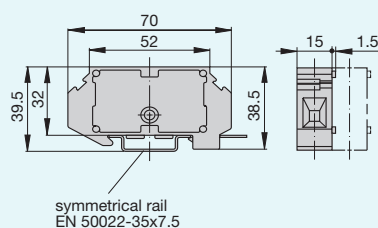
Bus bars for sockets 10-... Y301 166 02 (2-way)



301 166 01 (4-way)

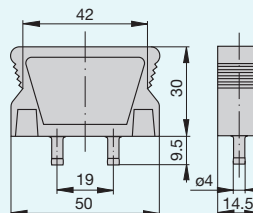


Socket 16

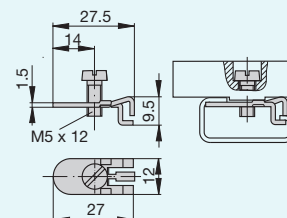


Adapter
for EN rail 50035-G32
(specified as a separate
item)
X 200 409 01
for socket 16
available on request

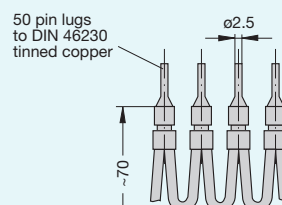
Blanking plug Y 301 477 01 for sockets 10R-P10/K10



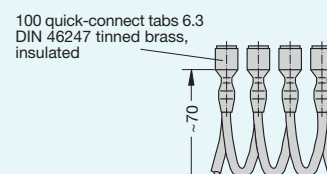
Terminal for mounting rack X 200 800 01 for socket 10R, on EN rail 50035-G32



Connector bus link -K10 X 210 589 01/2.5mm² black X 210 589 02/1.5mm² brown for sockets 10R-K10/-A10 and 16



Connector bus link -P10 X 210 588 01/1.5mm² brown X 210 588 02/2.5mm² black X 210 588 03/2.5mm² red X 210 588 04/2.5mm² blue for sockets 10R-P10, 10R-A10



Description

Single pole high performance versions of types 3300 and 3400 (section 2) 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 433 and 434 - both with threadneck panel mounting. Options include a separate shunt tap terminal (-A3), and pull-to-trip manual release (-H). Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Industrial equipment, control systems, power supplies.

Accessories

X 201 296 01	Concertina style splash cover/hex nut assembly for version with press-to-reset only (-IG2), without O-ring.
X 200 801 08	As above, but translucent, with O-ring
X 210 663 01	Splash seal/knurled nut assembly, allowing full visibility of the push button actuator, for version with press-to-reset only (-IG2).

Ordering information

Type No.	
433	fast magnetic trip
434	delayed trip
Mounting	
IG2	moulded threadneck M12x1, protection class II, not with -H
	leave blank for metal threadneck (required for -H)
Terminal design	
P10	blade terminals 6.3-0.8
K20	screw terminals M3.5x5.5 (not with -A3)
Manual release (optional)	
H	manual release facility ((pull) for M12x1 metal threadneck only.
Shunt terminal (optional, not with -K20)	
A3	up to $I_N = 7$ A max. load 5 A
Current ratings	
	0.05... 16 A

433 - IG2 - P10 - - - 5 A	ordering example, without manual release and with moulded threadneck
433 - - P10 - H - - 5 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 rating (A)	Internal resistance (Ω)		Current rating (A)	Internal resistance (Ω)	
	433-... (fast acting)	434-... (standard)		433-... (fast acting)	434-... (standard)
0.05	477	447	2.5	0.27	0.24
0.1	131	131	3	0.183	0.19
0.2	41	39.6	4	0.109	0.090
0.3	32	19.3	5	0.066	0.061
0.4	10.3	10.4	6	0.046	0.041
0.5	7.2	7.1	7	0.032	0.034
0.6	4.8	4.3	8	≤ 0.02	≤ 0.02
0.8	2.50	2.5	10	≤ 0.02	≤ 0.02
1	1.93	1.67	12	≤ 0.02	≤ 0.02
1.5	0.81	0.60	15	≤ 0.02	≤ 0.02
2	0.44	0.38	16	≤ 0.02	≤ 0.02



433-... 434-...

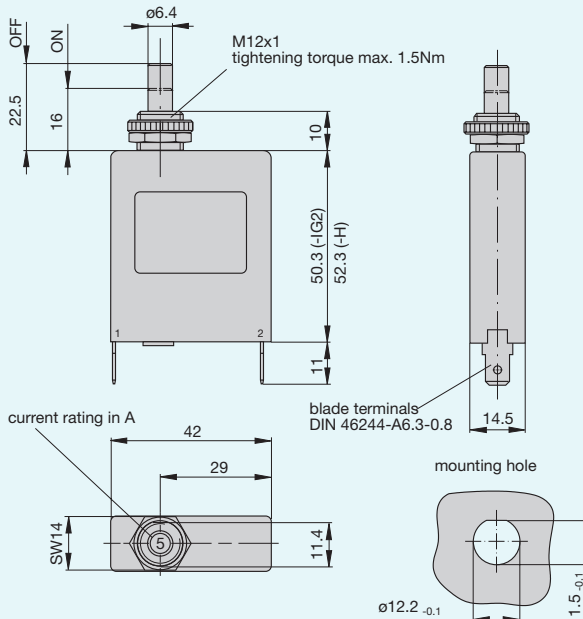
Technical data

Voltage rating	AC 250 V (50/60 Hz); DC 28 V	
Current rating range	0.05...16 A	
Typical life	4,000 operations at $2 \times I_N$	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage	Pollution degree 2
	2.5 kV	reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V	
Insulation resistance	>100 M Ω (DC 500 V)	
Interrupting capacity I_{cn}	0.05...5 A	400 A
	5.5...7.5 A	750 A
	8...16 A	1000 A (in accordance with VDE 0636/IEC 269)
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	type 433: approx. 55 g type 434: approx. 50 g	

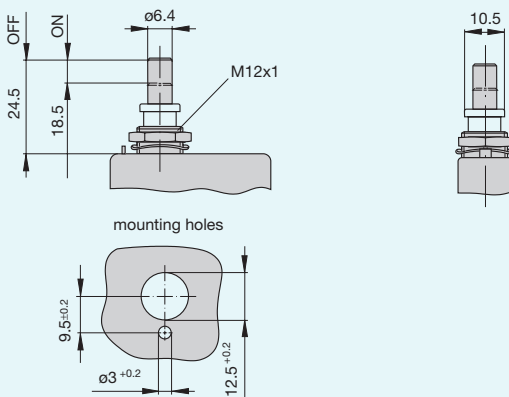
Approvals

Authority	Voltage ratings	Current ratings
VDE, Demko	AC 250 V, DC 28 V	0.05...16 A

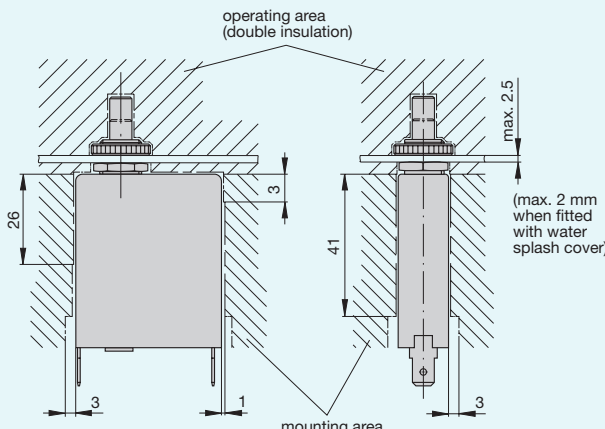
Dimensions

Version -IG2-P10

Version -H

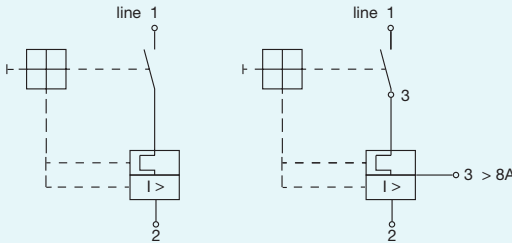


Installation drawing

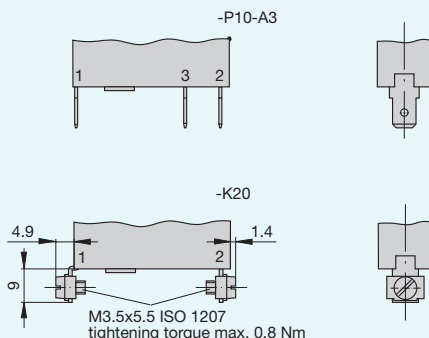


Internal connection diagrams

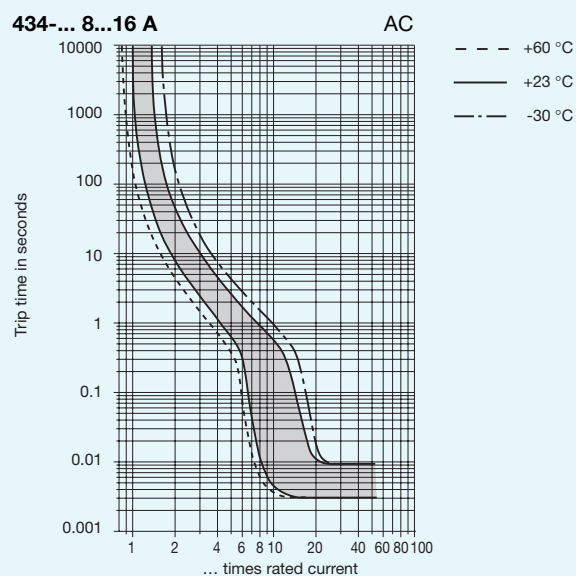
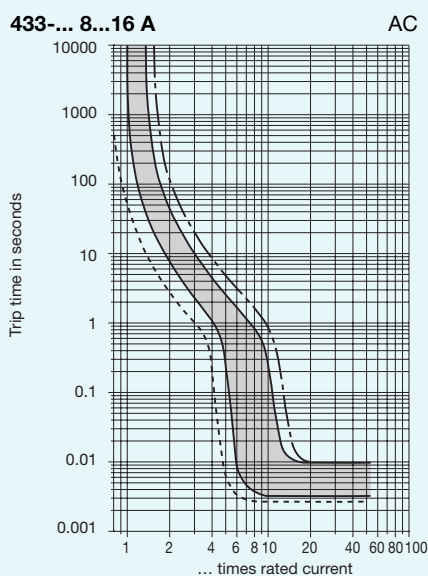
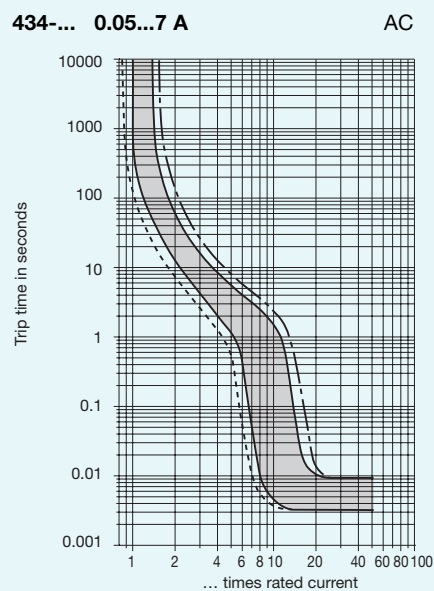
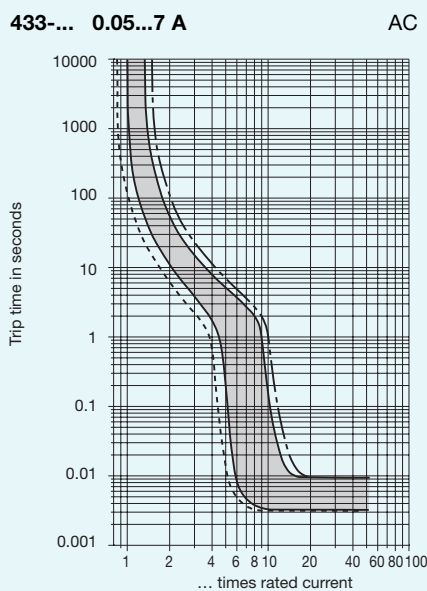
with shunt terminal -A3



Terminal design



Typical time/current characteristics



Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

N.B.

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

Accessories

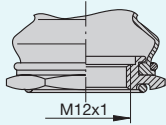
For push buttons with moulded threadneck M12 (-IG2)
(not with manual release -H)

Splash cover black with hex nut assembly

X 201 296 01 without O-ring (IP 64)

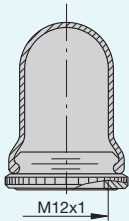
Splash cover translucent with nickel-plated hex nut

X 200 801 08 with O ring (IP 66)



Splash cover (translucent) with knurled nut assembly

X 210 663 01 (IP 64)



E-T-A® High Performance Thermal-Magnetic Circuit Breaker 437-...

Description

Single pole high performance thermal magnetic circuit breaker with 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.

Typical applications

Battery and cable protection for all types of vehicles (including electric), battery powered systems.

Ordering information

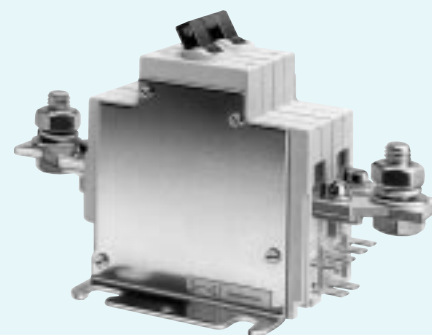
Type No.	
437	single pole, toggle actuator
Enclosure design (optional)	
B3	moulded, high environmental protection degree, without operating knob
B31	moulded, high environmental protection degree, with operating knob
B35	as B31, but for remote disconnection and re-connection facility
Terminal design	
K12	flat screw terminals M10, for enclosure B3, B31 or B35
K60	flat screw terminals DIN 46 206, form A, thread M10
Mounting	
1	lugs
5	brackets
Characteristic curve	
06	fast trip
07	delayed trip
Auxiliary contacts (blade terminals 6.3x08)	
Si	one each N/O and N/C
Si1	one N/C (11/12)
Si2	one N/O (13/14)
2Si2	two N/O
Remote trip	
FA	electrical remote disconnection
FC	electrical remote disconnection (FA) and re-connection (FE)
BC-FA	electrical remote disconnection (FA) and manual/remote re-connection not for enclosure B.
Coil voltage	
12	DC 12 V
24	DC 24 V
Current ratings	
40...240 A	
Voltage ratings	
≤ DC 110 V	
> DC 110 V	

437 - B31 - K12 - 5 - 06 - 2Si2 - FA 24 - 50 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)
40	< 0.001	120	< 0.001
50	< 0.001	160	< 0.001
63	< 0.001	200	< 0.001
80	< 0.001	240	< 0.001
100	< 0.001		



437-...

Technical data

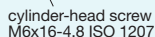
Voltage rating		DC 144 V (higher voltage ratings to special order)
Current rating range		40...240 A
Auxiliary contact rating		6 A max. at DC 28 V; 0.2 A at DC 180 V
Electrical remote disconnection (-FA)		
operating voltage		DC 12 V or DC 24 V
operating current		approx. 18 A or 12 A
max. pulse time		10 ms < t _{ON} < 20 ms / t _{OFF} > 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 _{ON} < 1.2 s / t _{OFF} > 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
Insulation co-ordination (IEC 664 and 664 A)		Rated impulse withstand voltage 6 kV Pollution degree 3
Dielectric strength (IEC 664 and 664 A)		
operating area		Test voltage AC 3300 V
main to aux. circuit		AC 2200 V
aux. circuits 11-12 to 13-14		AC 1000 V
Insulation resistance		> 100 MΩ (DC 500 V)
Interrupting capacity I _{cn}		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 529/DIN 40050)		operating area IP 40, terminal area IP 00 (IP 54 with enclosure B...)
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 68-2-6, test Fc, 10 frequency cycles/axis
Shock	Curve 06:	20 g (11 ms)
	Curve 07:	25 g (11 ms) to IEC 68-2-27, test Ea
Corrosion		48 hours at 5 % salt mist to IEC 68-2-11, test Ka
Humidity		240 hours at 95 % RH, to IEC 68-2-3, test Ca
Mass		approx. 1000 g (with remote disconnection) approx. 1400 g (with remote disconnection and re-connection)

Approvals

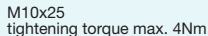
Authority	Voltage ratings	Current ratings
LRoS, ABS, BV	DC 180 V	40...240 A

Dimensions

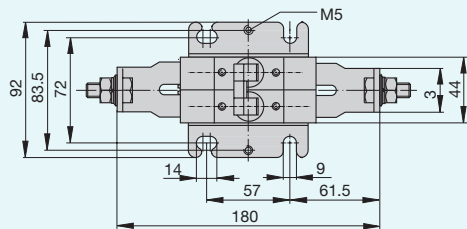
Housing -B3



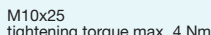
437-K12-5-Si10-...-FA



blade terminal
DIN 46244-A6.3-0.8-Bz
2 terminals for remote
disconnection
2 terminals for Si1 (N/C)
2 terminals for Si2 (N/O)



437-K60-1-...-FA



- blade terminal
- DIN 46244-A6.3-0.8-Bz
- 2 terminals for remote disconnection
- 2 terminals for Si1 (N/C)

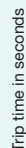
- location pin for top-hat rail
DIN EN 50022-35x7.5
- location pin for G profile
DIN EN 50035-G32
(not shown)

M3.5-9 depth
tightening torque max. 0.8 Nm

-BC-FA operating range see type 921-...-BC-FA
-FC coil shown with type 922-...-FC

Typical time/current characteristics at 23 °C

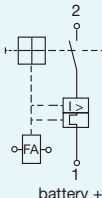
Curve 06 (fast trip)



Curve 07 (delayed trip)



Internal connection diagram

$$I_N \leq 125 \text{ A}$$
$$I_N > 125 \text{ A}$$


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, defence equipment.

Ordering information

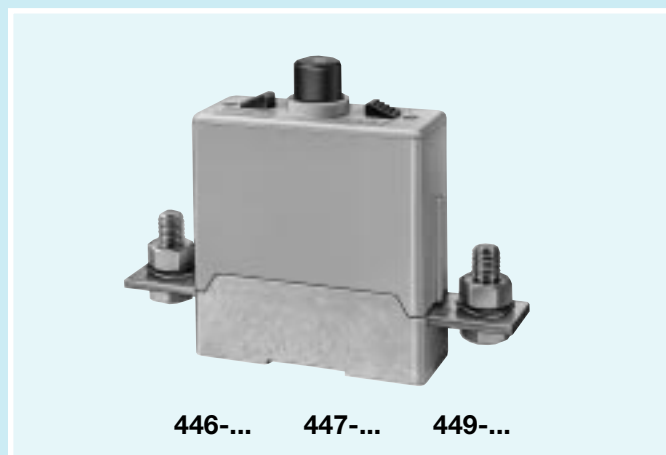
Type No.	
446 / 447 / 449	single pole base mounting
Terminal design	
K	screw terminals M12
Manual release	
H	standard
Version	
N	general application (excluding type 449)
FN	vehicle application (excluding type 446)
Auxiliary contacts (optional)	
Si	2 electrically separate auxiliary contacts
Remote trip (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] - [] - [] - [200 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)
446		447	
30	0.006	100	< 0.002
40	0.0048	125	< 0.001
50	0.0038	160	< 0.001
60	0.0028	225	< 0.001
70	0.0025	300	< 0.001
80	0.0023	400	< 0.001
90	0.0019	449	
100	0.0016	125	< 0.001
125	< 0.001	160	< 0.001
150	< 0.001	225	< 0.001
170	< 0.001	315	< 0.001
200	< 0.001	350	< 0.001
225	< 0.001	400	< 0.001
250	< 0.001	500	< 0.001
300	< 0.001	only with 50 % ON duty	
350	< 0.001		
400	< 0.001		



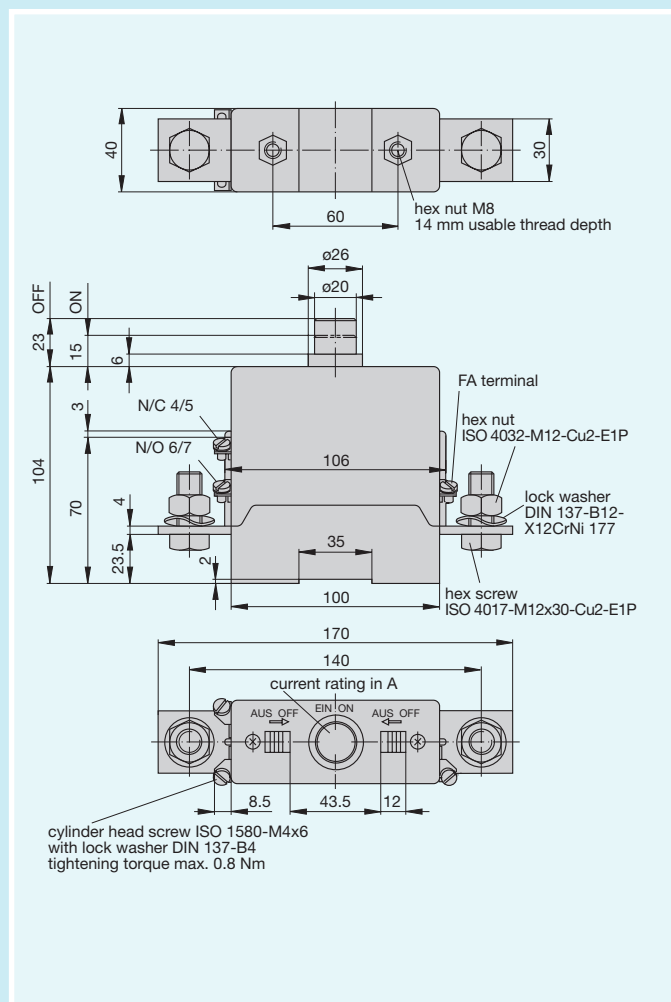
Technical data

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 _{ON} < 20 ms / t _{OFF} > 10 s switching time < 20 ms	
Typical life	1000 operations at I _N 2000 operations mechanical	
Ambient temperature	-55...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage AC 1000 V	
operating area main circuit to auxiliary contacts	AC 1000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	10,000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	without auxiliary 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) to VG 95210, sheet 19/IEC 68-2-6, test Fc	
Shock	without auxiliary contacts: 50 g (11 ms) with auxiliary contacts: 20 g (11 ms) to VG 95210, sheet 28/IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to VG 95210, sheet 2/IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/IEC 68-2-3, test C	
Mass	approx. 850 g	

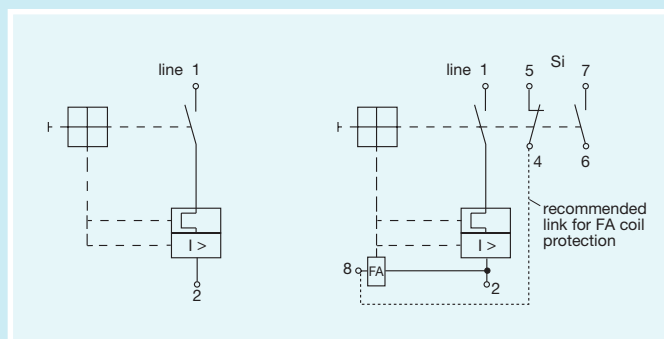
Approvals

Authority	Voltage ratings	Current ratings
Type 449:		
VG 95345, part 15	DC 28 V	125...500 A
Type 447:		
QPL Sweden	DC 28 V	125...400 A

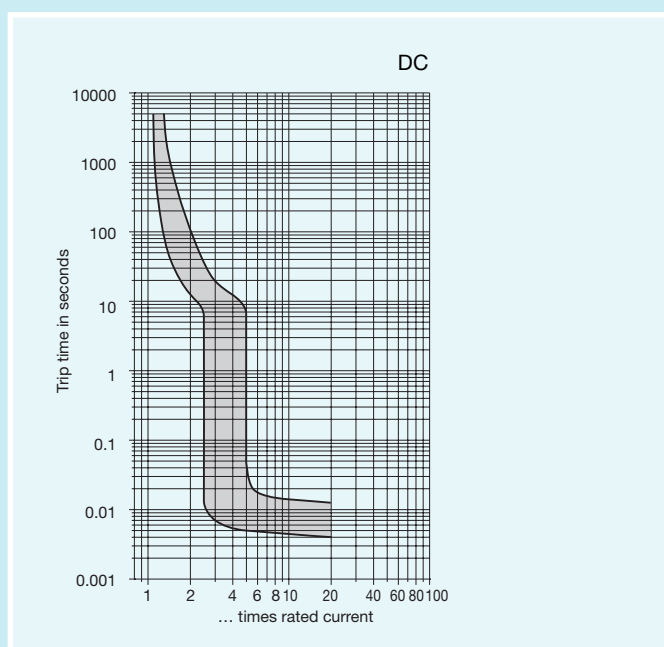
Dimensions



Internal wiring diagrams

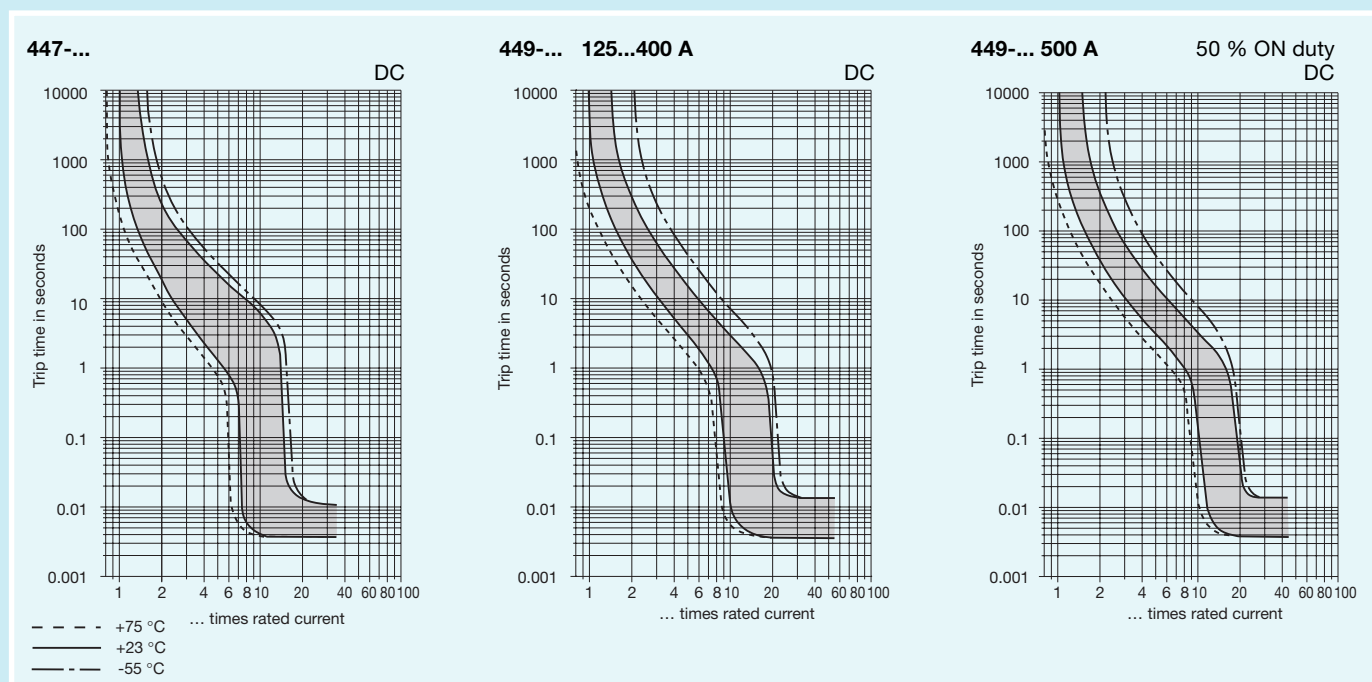


Typical time/current characteristics of type 446-...



Circuit breakers with remote disconnection facility will trip 10 % faster.

Typical time/current characteristics



E-T-A® High Performance Thermal-Magnetic Circuit Breaker 452-...

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 shows clearly the tripped/off position. Threadneck panel mounted in tracked vehicle and aircraft/general purpose versions, with optional fast acting magnetic characteristics.

Typical applications

Extra low voltage wiring systems on all types of vehicle for land, sea and air; defence equipment; battery powered machines.

Accessories

X 200 801 08	Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
X 200 801 03	As above but matt black finish.
X 200 802 01	Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
X 200 802 02	As above but blackened finish.
X 200 803 01	Screw-tightened clamp-on actuator extension to aid manual operation.

Ordering information

Type No.	
452	standard delay curve
452-2	fast trip curve
Terminal design	
K14	screw terminals M6
K34	screw terminals M6, reinforced
AS13	screw terminals 8-32 UNC-3B with hex screw 8-32 UNJC-3A (NAS 1801-08-6) and washer (MS 35 338-137)
AS14	screw terminals 1/4-28UNF-2B with hex screw 1/4 28UNF-2A (MS 90726-2), spring washer (MS 35 338-44) and washer (NAS 1149 F0432P)
AS03	screw terminal 8-32UNC-3B, without screws
AS04	screw terminal 1/4-28 UNF-2B, without screws
Version	
FN2	vehicle application
LN2	aircraft/general application
LN3	aircraft application, front panel mounting with insulating barrier
Current ratings	
50...100 A	

452 - K14 - LN2 - 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	100	80	135
60	120	90	145
70	125	100	150
75	130		



Technical data

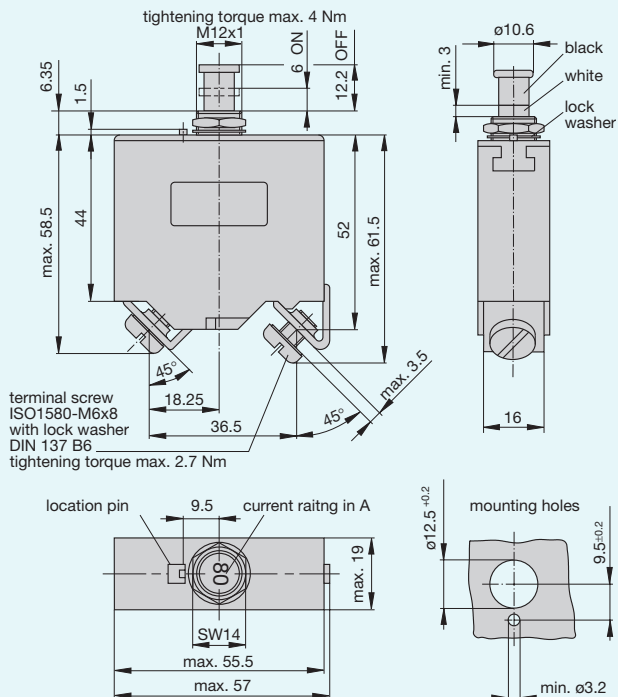
Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	50...100 A	
Typical life	2,500 operations at I _N	
Ambient temperature	-55...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 1500 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 115 V: 1500 A DC 28 V: 6000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	10 g (55-2000 Hz) ±0.76 mm (10-55 Hz) to VG 95210, sheet 19/IEC 68-2-6, test Fc	
Shock	50 g (11 ms) to VG 95210, sheet 28/IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to VG 95210, sheet 2/IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/IEC 68-2-3, test C	
Explosion	to VG 95210, sheet 10/MIL-STD-202, meth. 109	
Mass	approx. 122 g	

Approvals

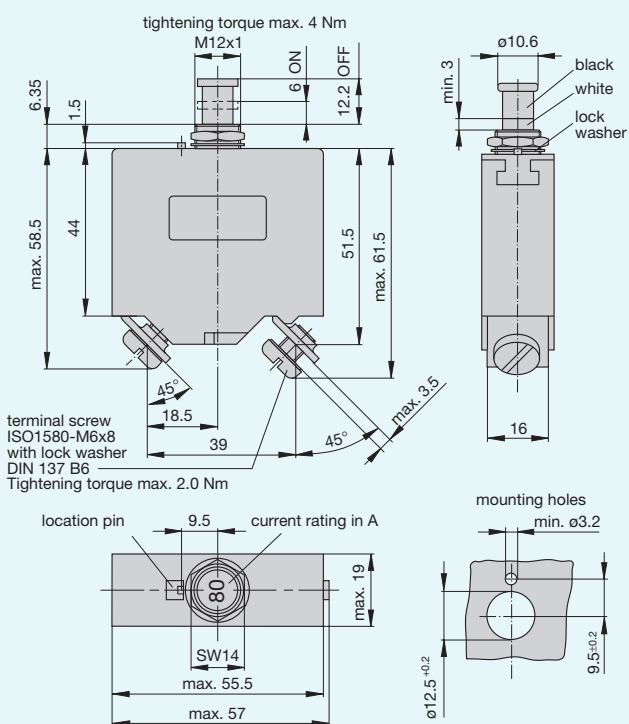
Authority	Voltage ratings	Current ratings
VG 95345, part 17	DC 28 V	60...100 A
QPL, Canada	DC 28 V	60...100 A
QPL, Sweden	DC 28 V	60...100 A (452-K34-FN)
LROs, BV	DC 28 V	50...100 A

Dimensions 452-K...-...

452-K34-FN2

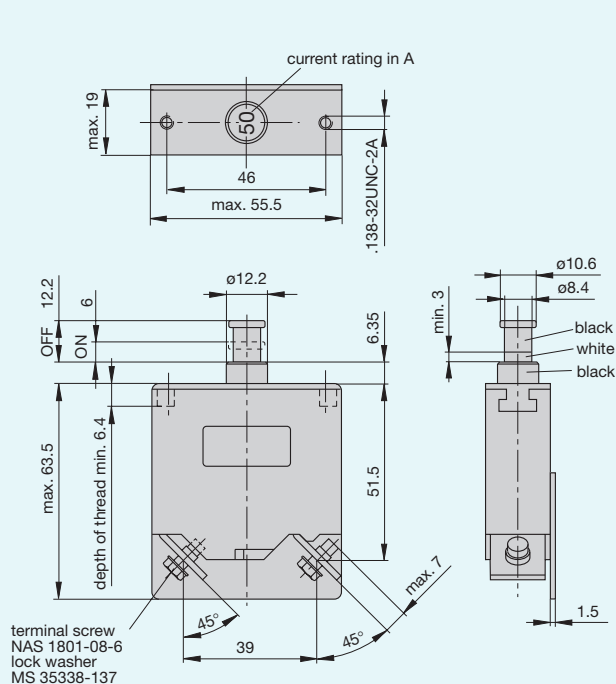


452-K14-LN2

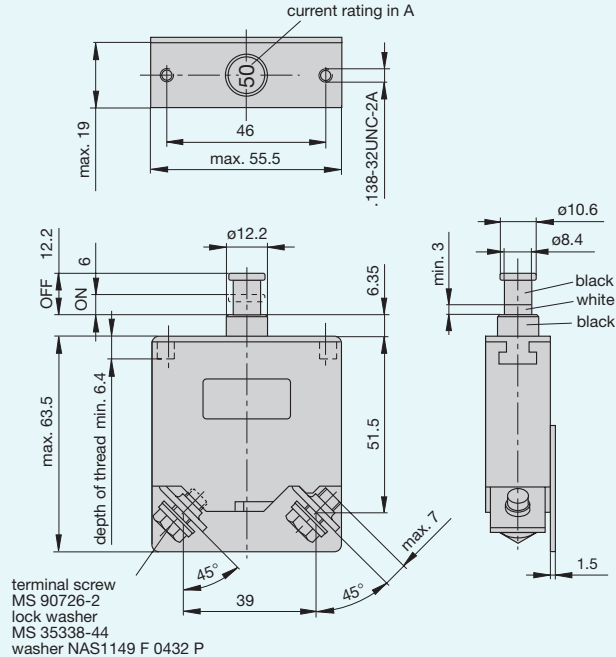


Dimensions 452-AS...-LN3

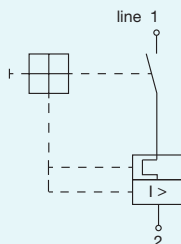
452-AS13-LN3



452-AS14-LN3

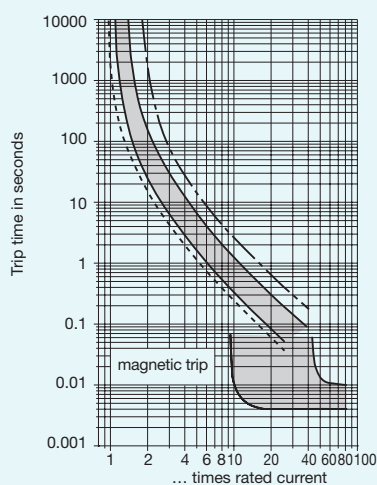


Internal connection diagram



Typical time/current characteristics

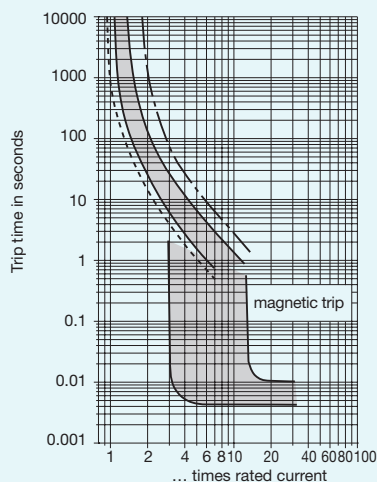
452-... (standard delay)



--- +75 °C
+167 °F
— +23 °C
+73.4 °F
--- -55 °C
-67 °F

magnetic trip		
temp. (°C)	magn. holding current (A)	magn. trip current (A)
DC		
-55	≤1280	≥2160
+23	≤1250	≥2090
+75	≤1140	≥2020
AC		
-55	≤1070	≥1800
+23	≤1010	≥1740
+75	≤950	≥1680

452-2-... (fast trip)



--- +75 °C
+167 °F
— +23 °C
+73.4 °F
--- -55 °C
-67 °F

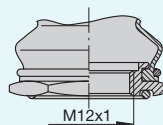
magnetic trip		
temp. (°C)	magn. holding current (A)	magn. trip current (A)
DC		
-55	≤415	≥640
+23	≤390	≥615
+75	≤365	≥590
AC		
-55	≤345	≥530
+23	≤325	≥510
+75	≤305	≥490

Accessories (approved to VG 95345, part 23)

Splash cover/hex nut assembly with O ring (IP 66)

X 200 801 08 nickel plated nut, translucent cover

X 200 801 03 matt black finish nut, black cover



Splash cover black/hex nut assembly with O ring (IP 54)

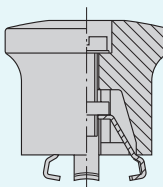
X 200 802 01 nickel plated nut

X 200 802 02 matt black finish nut



Actuator extension (black)

X 200 803 01



ET-A® High Performance Thermal Circuit Breaker 482-...

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 shows clearly 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; defence equipment; battery powered machines.

Accessories

- X 200 801 08 Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
X 200 801 03 As above but blackened finish.
X 200 802 01 Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
X 200 802 02 As above but blackened finish.
X 200 803 01 Screw-tightened clamp-on actuator extension to aid manual operation.

Ordering information

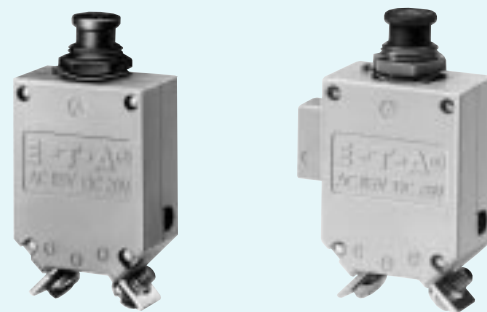
Type No.	482	single pole thermal circuit breaker
Mounting	G	threadneck panel mounting
Threadneck design	1	M12x1 nickel plated
	2	M12x1 black
	3	15/32-UNS-2A black
Hardware - washer for threadneck	0	without hardware
	1	corrugated washer 12/15
	2	serrated lock washer 12/15, fitted
	3	serrated lock washer 12/15, bulk shipped
Hardware - hex nut for threadneck	0	without hardware
	1	hex nut M12x1 nickel plated
	2	hex nut M12x1 black
	3	hex nut 15/32-UNS-2B black, fitted
	4	hex nut 15/32-UNS-2B black, bulk shipped
Terminal design (main terminals)	K1	screw terminals with metric thread M4
	J1	screw terminals with inch thread 8-32-UNC-2B
	J2	screw terminals with inch thread 8-32-UNC-3B
Characteristic curve	M1	thermal 1.15-1.4 I _N
Terminal screws	A	flat head screw M4x6, ISO 1580
	B	Phillips screw 8-32UNC-2Ax6
	E	hex screw 1640-32UNJC-3Ax11,1 bulk shipped (NAS 1801-08-7)
Terminal washers	0	without lock washer
	1	lock washer DIN 137-B4
	2	lock washer 4.3, fitted
	3	lock washer 4.3, bulk shipped (MS 35 338-137)
Auxiliary contact	S0	without auxiliary contacts
	S1	with auxiliary contact NC
	S5	with polarized aux. contact NC
Barrier		blank: without barrier
	T	with barrier, 31 mm wide
Current ratings		0.1...50 A

482 - G 1 1 1 - K1 M1 - A 1 S1 T - 10 A ordering example

Previous ordering codes:

482-N-MS = 482-G111-K1M1-A1S0-...A vehicle circuit breaker

482-MS = 482-G212-K1M1-A1S0-...A aircraft circuit breaker



482-G1/G2...

without aux. contacts

with aux. contacts

Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
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 _N	
Ambient temperature	-55...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage AC 1500 V operating area main to aux. circuit AC 1500 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.1...2.5 A 15 x I _N 3...3.5 A 250 A DC / 150 A AC 4...7 A 500 A 7.5...50 A 6000 A DC / 1000 A AC 35...50 A 3000 A DC / 1000 A AC	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	10 g (55-2000 Hz) ±0.76 mm (10-55 Hz) to VG 95210, sheet 19/IEC 68-2-6, test Fc	
Shock	50 g (11 ms) to VG 95210, sheet 28/IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist to VG 95210, sheet 2/IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/IEC 68-2-3, test C	
Explosion	to VG 95210, sheet 10/MIL-STD-202, meth. 109	
Mass	approx. 43 g without aux. contact approx. 46 g with aux. contact	

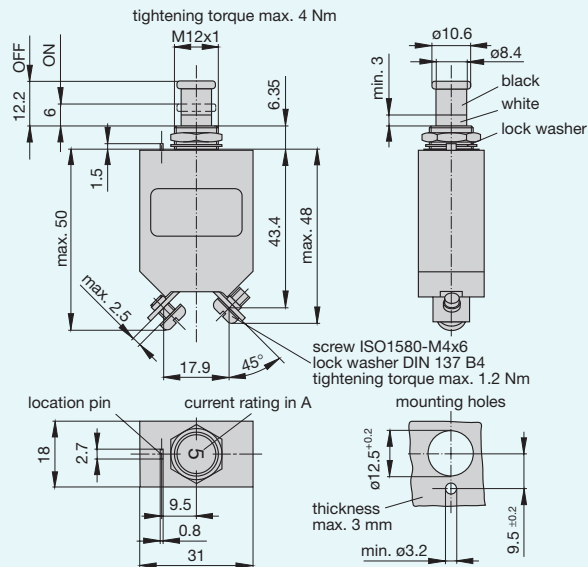
Approvals

Authority	Voltage ratings	Current ratings
VG 95345, part 21	DC 28 V	0.1...50 A for 482-MS/-N-MS
QPL, Canada	DC 28 V	0.5...35 A
LRoS	DC 28 V	0.1...50 A

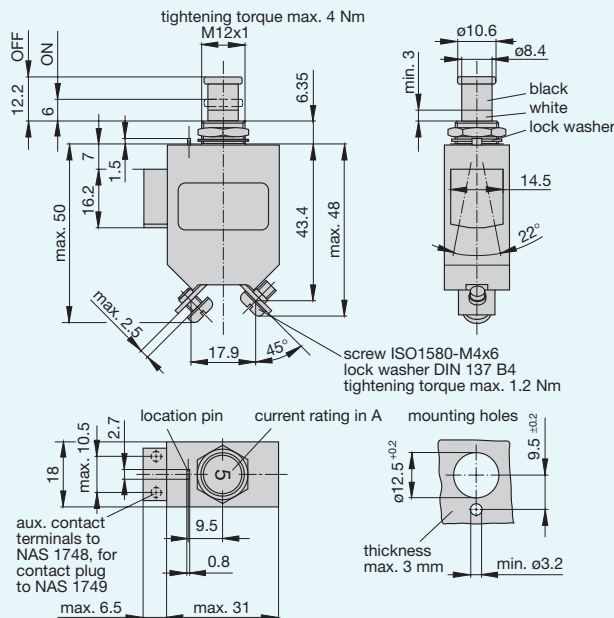
High Performance Thermal Circuit Breaker 482-...

Dimensions 482-G1/-G2...

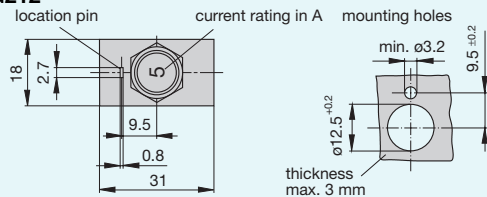
482-G111-K1M1-A1S0



482-G111-K1M1-A1S1 482-G111-K1M1-A1S5

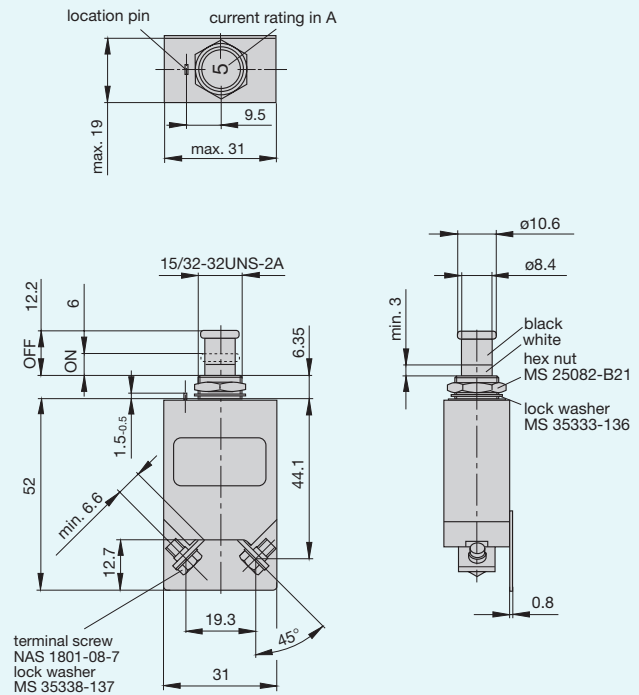


482-G212



Dimensions 482-G3...

482-G...-J2M2-...

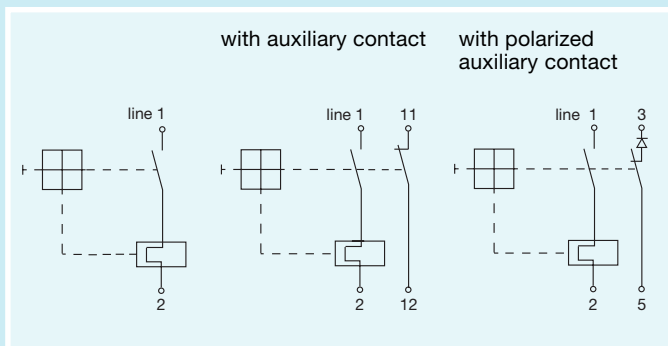


Standard current ratings and typical volt drop values

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		

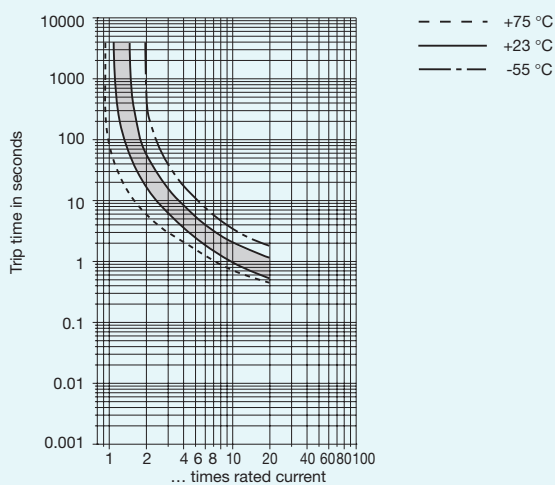
High Performance Thermal Circuit Breaker 482-...

Internal connection diagrams

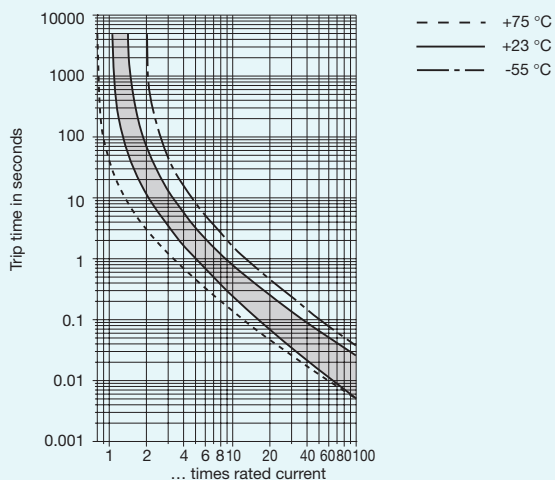


Typical time/current characteristics

0.1...2.5 A



3...50 A

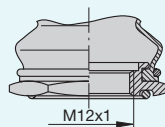


Accessories (approved to VG 95345, part 23)

Splash cover/hex nut assembly with O ring (IP 66)

X 200 801 08 nickel plated nut, translucent cover

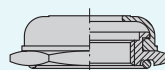
X 200 801 03 matt black finish nut, black cover



Splash cover black/hex nut assembly with O ring (IP 54)

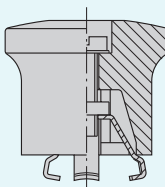
X 200 802 01 nickel plated nut

X 200 802 02 matt black finish nut



Actuator extension (black)

X 200 803 01



E-T-A® High Performance Thermal Circuit Breaker 483-...

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 shows clearly 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 military 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.

Accessories

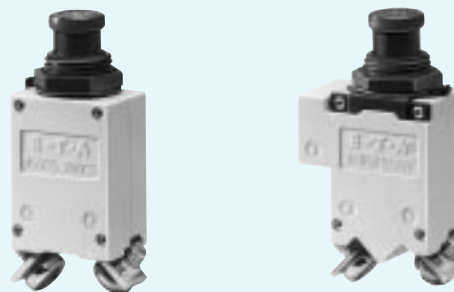
- X 200 801 08 Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
- X 200 801 03 As above but blackened finish.
- X 200 801 09 As above, but hex nut 7/16-32, black finish
- X 200 802 01 Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
- X 200 802 02 As above but blackened finish.
- X 200 803 01 Screw-tightened clamp-on actuator extension to aid manual operation.

Standard current ratings and typical volt drop values

Current rating (A)	Volt drop (mV)	Current rating (A)	Volt drop (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		

Approvals

LN 29886
VG 95345, part 06
prEN 2995
MS 3320,
QPL USA, Canada, UK, Sweden



483-...
without auxiliary contact with auxiliary contact

Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	1...25 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	20,000 operations mechanical or 10,000 operations at I _N	
Ambient temperature	-55...+125 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) operating area main to aux. circuit	Test voltage AC 1500 V AC 1500 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 115 V (400 Hz): ≤ 4 A 1000 A 5 A 2000 A 7.5...25 A 2500 A DC 28 V: 1...25 A 6000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration (sinusoidal)	15 g (70-2000 Hz) ±0.76 mm (5-70 Hz) to VG 95210, sheet 19/ IEC 68-2-6, test Fc/ISO 7137	
Vibration (random)	16.4 g rms, 0.2 g ² /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 68-2-27, 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 68-2-11, test Ka/ISO 7137	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/ IEC 68-2-3, 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 with aluminium threadneck: max. 26 g with auxiliary contact	

High Performance Thermal Circuit Breaker 483-...

Ordering information

Type No.	
483	single pole, with temperature compensation
Mounting	
G	threadneck panel mounting, standard
L	threadneck panel mounting, extended push button
V	threadneck panel mounting, high vibration performance
W	threadneck panel mounting, extended push button and high vibration performances
Threadneck design	
1	M12x1x6.4x8.8 dia. with mounting plate (aux.contact version)
2	15/32-32UNSX6.4x7.8 dia. (without aux. contact)
3	MJ12x6.4x8.8 dia. (without aux. contact)
4	M12x1x6.4x8.8 dia. (without aux. contact)
5	7/16-32UNSX6.4x7.8 dia. (without aux. contact)
6	M12x1x9.4x8.8 dia. (without aux. contact)
7	7/16-32 UN SX6.4x7.8 dia. with mounting plate (aux.contact version)
8	as 483-G1...but with aluminium threadneck
Hardware for threadneck (washers)	
0	without hardware
1	wave washer 12/15 - mounted
2	mounted washer 12.1/17.2 - mounted
3	mounted washer 11.3/14.9 - mounted
4	mounted washer 12/15 - mounted
5	tooth washer 12.1/17.2, bulk shipped
Hardware for threadneck (nuts)	
0	without hardware
1	hex nut M12x1
2	hex nut 15/32-32UNS
3	hex nut 7/16-32UNS
5	hex nut MJ12x1 (only with threadneck design 3)
6	hex nut M12x1, brass, bulk shipped, threadneck design 1,4,6
Terminal design (main terminals)	
K	screws terminals with metric thread
1	K14 (M4, MJ4)
J	screw terminals with inch thread
1	J14 (8-32UNC-2B)
2	J17 (8-32UNC-2B)
3	J25 (6-32UNC-2B)
Characteristic curve	
M1	thermal, 1.15-1.38 I _N for military aircraft
C1	thermal, 1.15-1.38 I _N for civil aircraft
Terminal screws	
A	Phillips screw M4x6
B	Phillips screw 8-32UNC-2Ax6
C	Phillips screw 6-32UNC-2Ax6
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 (ASN E0736)
L	Phillips screw MJ4x6
M	as "K" but bulk shipped
Z	without accessories
Terminal washers	
0	without lock washer
1	lock washer B4
2	lock washer 4.3
3	lock washer B4 and washer 4.4/9.5
4	lock washer 3.7
5	lock washer 4.3/9 (ASN A2553)
Auxiliary contact	
S0	without auxiliary contact
S1	with auxiliary contact (connector to NAS1749 and LN 65093, size 20)
S5	with polarized auxiliary contact
Barrier	
Z	without barrier (standard)
Colour of the push button	
blank:	black (standard) /white (e.g. 7.5)
A	green/white (e.g. 7.5)
G	green/white, marking to EN (e.g. 7 1/2)
N	black/white, marking to EN (e.g. 7 1/2)
Current ratings	
1...25	A

483 - G 4 1 1 - K1 M1 - A 1 S0 Z - 5 A ordering example

Ordering information for approved devices

483-G411-K1M1-A1S0ZN (483-96-TC-K14)

Metric threadneck M12x1 and terminal design -K14 (M4x6), listed by the German Materialamt der Bundeswehr to VG 95345, part 6.

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, part 6.

483-G533-J1M1-B2S0Z (MS 3320)

Threadneck size 7/16-32UNSX6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320.

483-L533-J1M1-B2S0Z (MS 3320-L)

Threadneck size 7/16-32UNSX6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-L.

483-V533-J1M1-B2S0Z (MS 3320-V)

Threadneck size 7/16-32UNSX6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-V.

483-W533-J1M1-B2S0Z (MS 3320-VL)

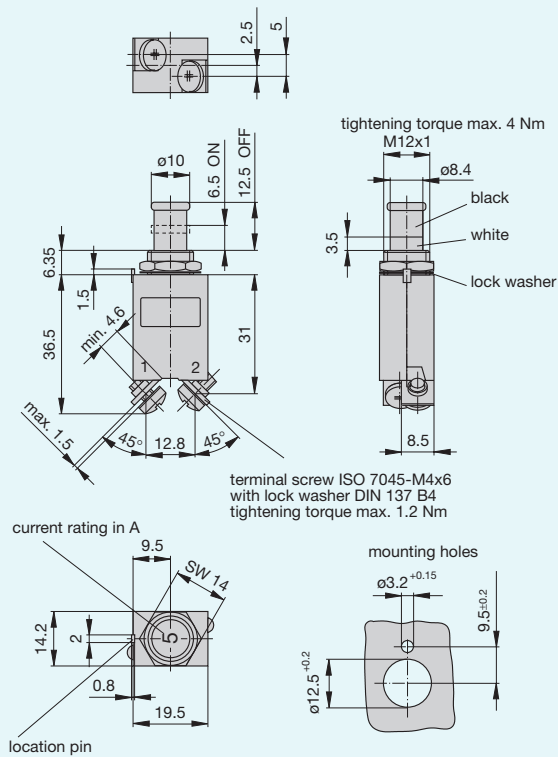
Threadneck size 7/16-32UNSX6.4 and terminal design -J14 (inch thread 8-32), approved to MS 3320-VL.

483-G533-J3M1-C4S0Z (483-TC-G11-J25)

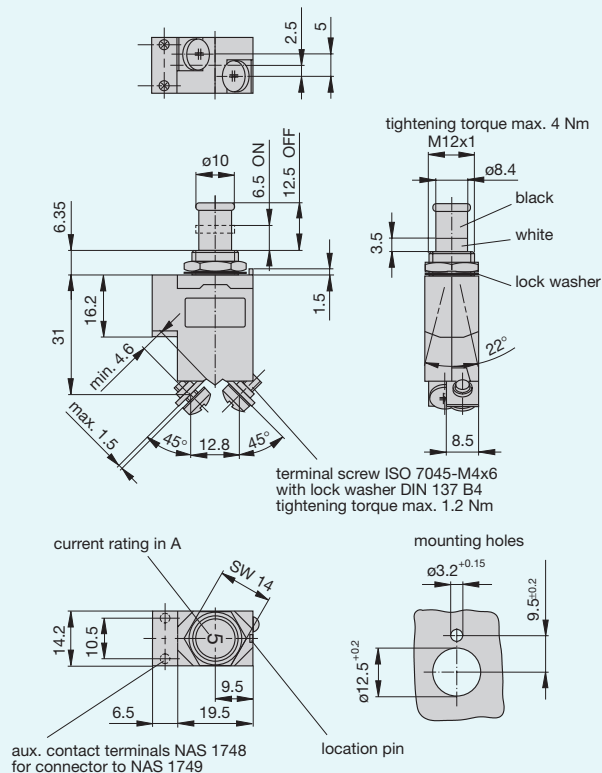
Threadneck size 7/16-32UNSX6.4 and terminal design -J25 (inch thread 6-32), listed by the German Materialamt der Bundeswehr to VG 95345, part 6.

ET-A® High Performance Thermal Circuit Breaker 483-...

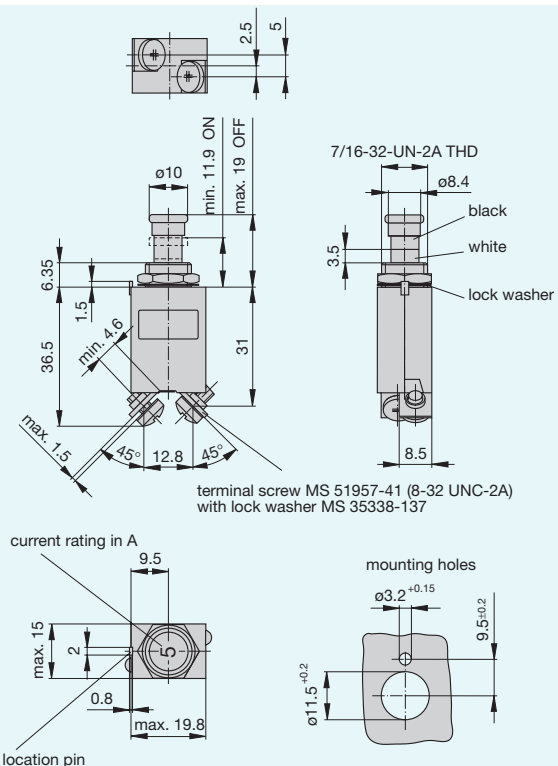
Dimensions 483-G411-K1M1-A1S0ZN (483-96-TC-K14)



Dimensions 483-G111-K1M1-A1S1ZN

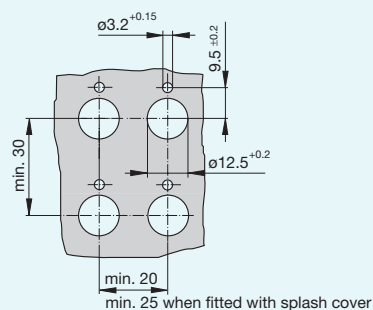


Dimensions 483-G533-J1M1-B2S0Z (MS 3320)

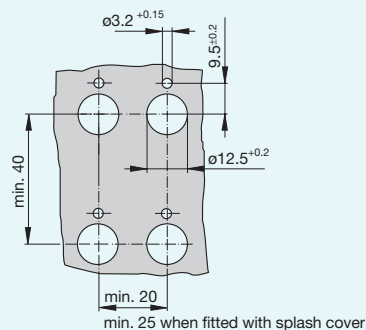


Mounting holes

Mounting holes without auxiliary contact



Mounting holes with auxiliary contact (Si)



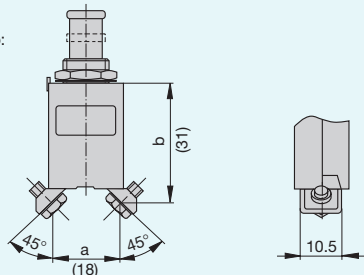
High Performance Thermal Circuit Breaker 483-...

Other main terminal designs

-J2

Terminal distances to:

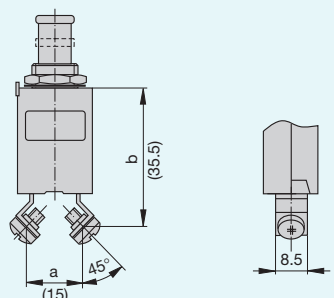
MS 14 105 (a, b)
MS 14 153 (a, b)
MS 22 073 (a)
MS 22 074 (a)
MS 25 244 (a)
MS 25 373 (a, b)



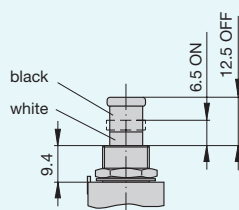
-J3

Terminal distances to:

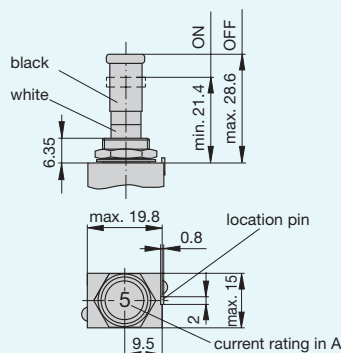
MS 26 574 (a, b)



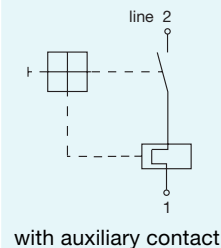
-G6



-L2/5/7 -W2/5/7

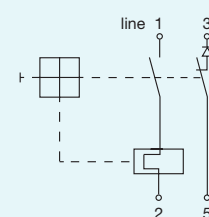
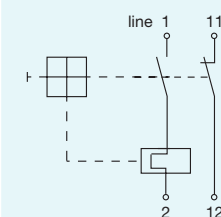


Internal connection diagrams

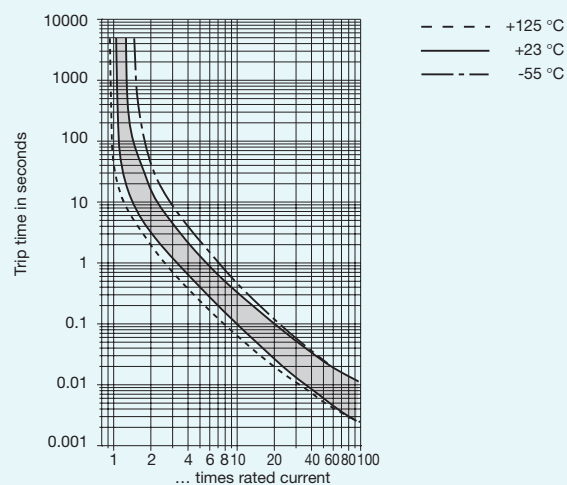


with auxiliary contact

with polarized auxiliary contact



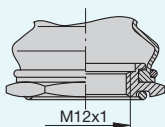
Typical time/current characteristics



Accessories (approved to VG 95345, part 23)

Splash cover/hex nut assembly with O ring (IP 66)

X 200 801 08 nickel plated nut M 12x1, translucent cover
X 200 801 03 matt black finish nut M 12x1, black cover
X 200 801 09 matt black finish nut 7/16-32, black cover

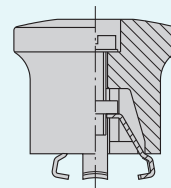


Splash cover black/hex nut assembly with O ring (IP 54)

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



Actuator extension (black)
X 200 803 01



ET-A® High Performance Thermal Circuit Breaker 4120-...

Description

Single pole, miniaturised thermal circuit breaker with snap action 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.

Accessories

- X 200 801 08 Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
X 200 801 03 As above but blackened finish.
X 200 803 01 Screw-tightened clamp-on actuator extension to aid manual operation.

Ordering information

Type No.	
4120	single pole, with temperature compensation
Mounting	
G	threadneck panel mounting
Threadneck design	
1	M12x1x6.3 (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
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)
Characteristic curve	
M1	thermal, 1.15 - 1.38 IN
Terminal screws	
A	Phillips screw M4x6, fitted
B	Phillips screw 8-32UNC-2Ax6, fitted
D	slotted flat head screw M5x6, fitted
K	hex screw with Phillips head 8-32UNC-3Ax7.6 (ASN E0736), fitted
M	hex screw with Phillips head 8-32UNC-3Ax7.6 (ASN E0736), bulk shipped
Z	without terminal hardware
Terminal washers	
0	without lock washer
1	lock washer A4, fitted
2	lock washer 4.3, fitted
5	lock washer 4.3/9 (ASN A2553), fitted
6	lock washer 4.3/9 (ASN A2553), bulk shipped
Auxiliary contact	
S0	without auxiliary contact
S1	with auxiliary contact (connector EN3155-016M2018 (NC))
S5	with polarized auxiliary contact (NC)
Barrier	
Z	without barrier
Colour of the push button	
G	green to EN
N	black to EN
S	black, with white marking
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

Approvals (configurations)

EN 2495
EN 3773
prEN 2995



4120-...

Technical data

Voltage rating	AC 115 V (400 Hz); DC 28 V	
Current rating range	1...25 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	20,000 operations mechanical, or 5,000 operations mechanical and 2,500 operations at I _N	
Ambient temperature	-55°C ...+125°C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) operating area main to aux. circuit	Test voltage AC 1500 V AC 1500 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	AC 115 V (400 Hz): 1... 3 A 1,000 A 5...25 A 2,000 A DC 28 V: 1...25 A 6,000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	10 g (57-2000 Hz), ±0.76 mm (5-57 Hz) 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

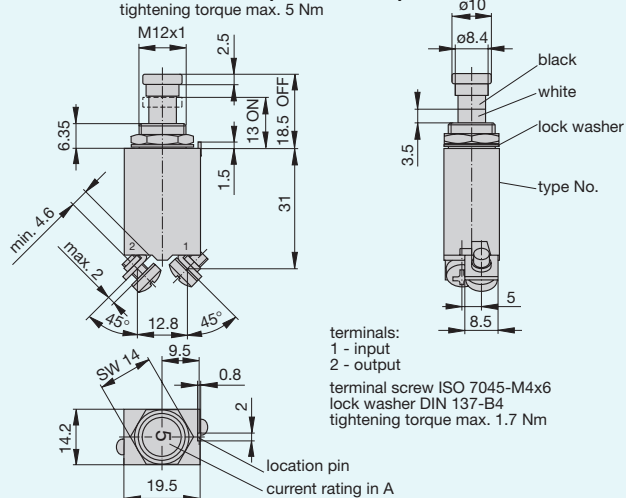
Current rating (A)	Volt drop (mV)	Current rating (A)	Volt drop (mV)
1	1100	7.5	250
2	550	10	230
2.5	460	15	200
3	440	20	190
5	260	25	190

High Performance Thermal Circuit Breaker 4120-...

Dimensions

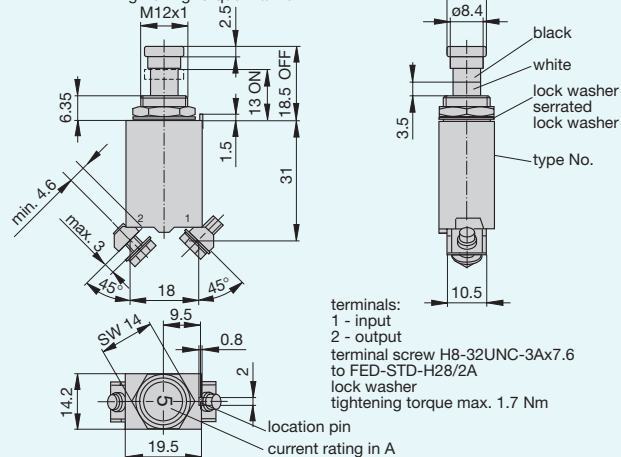
4120-G111-K1M1-A1S0ZN (EN2495-...M)

tightening torque max. 5 Nm



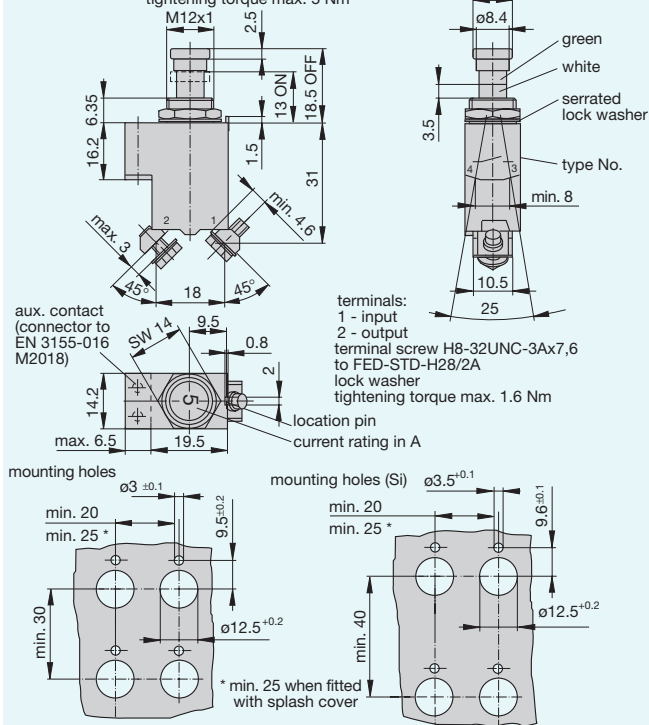
4120-G11-J2M1-K5S0ZN (EN2495-...U, EN3773-004 D...)

tightening torque max. 5 Nm

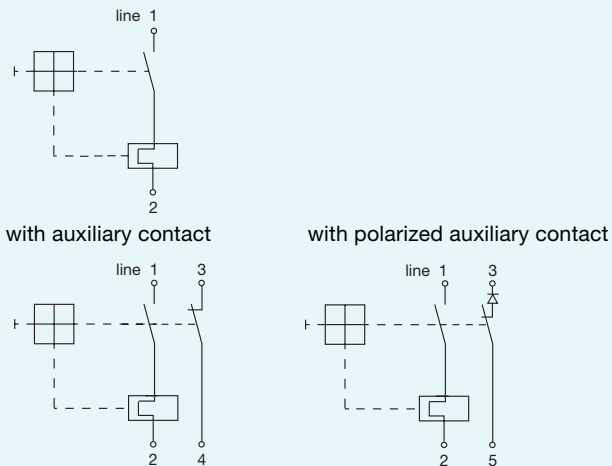


4120-G112-J2M1-K5S1ZG - 4120-G112-J2M1-K5S5ZG

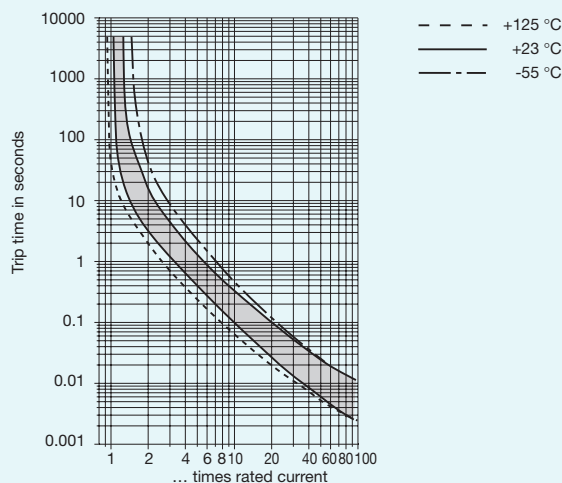
tightening torque max. 5 Nm



Internal connection diagram

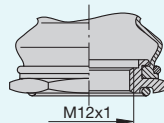


Typical time/current characteristics

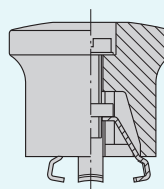


Accessories (approved to VG 95 345, part 23)

Splash cover/hex nut assembly with O ring (IP 66)
X 200 801 08 nickel plated nut, translucent cover
X 200 801 03 matt black finish nut, black cover



Actuator extension (black)
X 200 803 01



E-T-A® High Performance Thermal-Magnetic Circuit Breaker 4201-...

Description

Single pole high performance version of type 201 (catalogue section 2) thermal-magnetic circuit breaker with tease-free, trip-free, snap action mechanism and two button operation (M-type TM CBE to EN 60934). Standard EN rail mounting, recessed terminals and enhanced short circuit performance.

Complies with CBE standard EN 60934 (IEC 934).

Typical applications

Control systems, industrial equipment.

Accessories

X 200 409 01 Mounting adapters for asymmetric rail (G-profile).

Ordering information

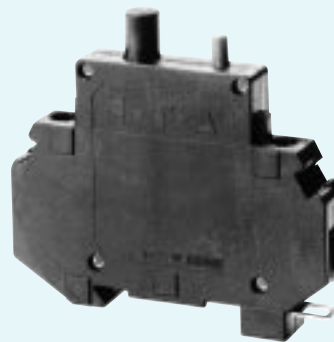
Type No.	
4201	single pole, rail mounted (EN 50022x35x7.5)
Special version (optional)	
2705	fitted with adapter X 200 409 01 for G profile to EN 50035-G32
Current ratings	
0.05...16 A	

4201 - [] - 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	447	3	0.19
0.1	131	4	0.090
0.2	39.6	5	0.061
0.3	19.3	6	0.041
0.4	10.4	7	0.034
0.5	7.1	8	≤ 0.02
0.6	4.3	10	≤ 0.02
0.8	2.5	12	≤ 0.02
1	1.67	14	≤ 0.02
1.5	0.60	15	≤ 0.02
2	0.38	16	≤ 0.02
2.5	0.24		



4201-...

Technical data

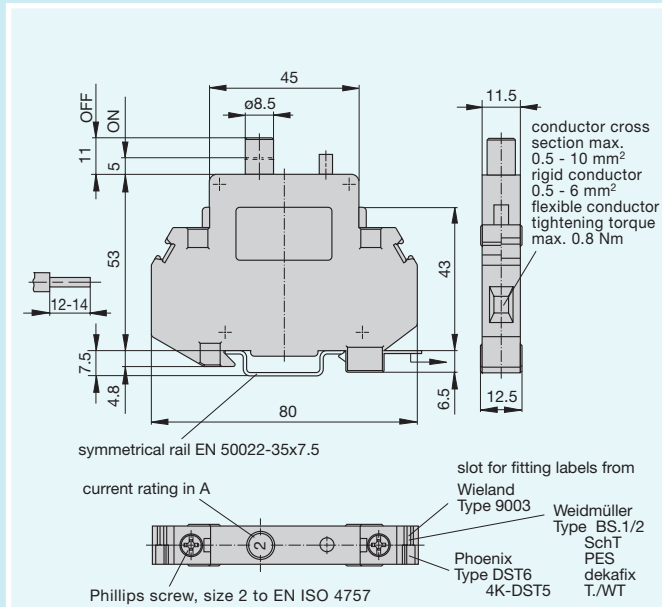
Voltage rating	AC 250 V (50/60 Hz); DC 28 V	
Current rating range	0.05...16 A	
Typical life	4,000 operations at 2 x I _N	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664A) operating area	Test voltage AC 3000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity I _{cn}	0.05...5 A 5.5...7.5 A 8...16 A	400 A 750 A 1000 A (in accordance with VDE 0636)
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 60 g	

Approvals

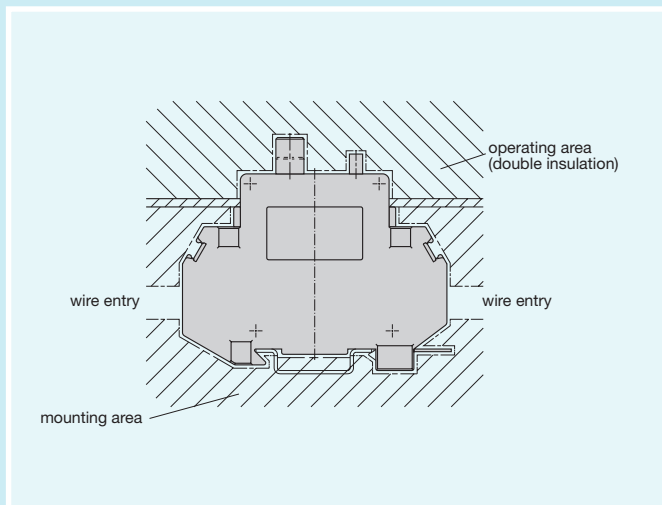
Authority	Voltage ratings	Current ratings
VDE, Demko	AC 250 V, DC 28 V	0.05...16 A

ET-A® High Performance Thermal-Magnetic Circuit Breaker 4201-...

Dimensions



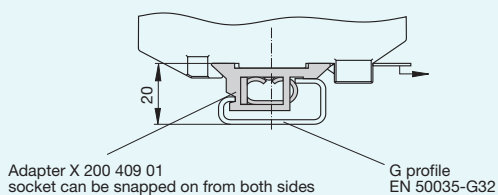
Installation drawing



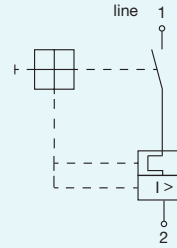
Accessories

Adapter X 200 409 01

for EN rail 50035-G32 specified as a separate item



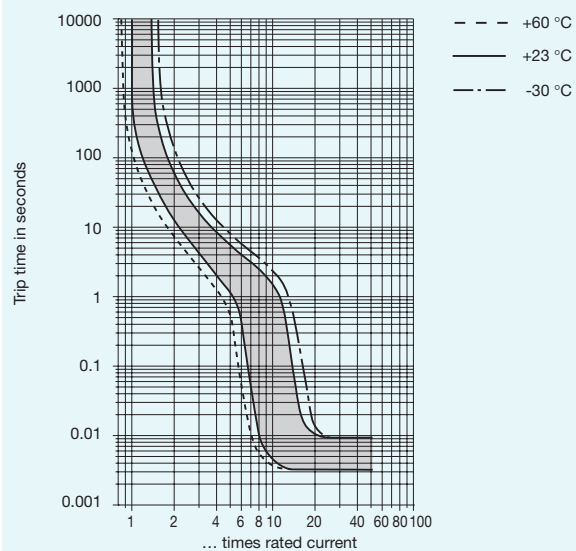
Internal connection diagram



Typical time/current characteristics

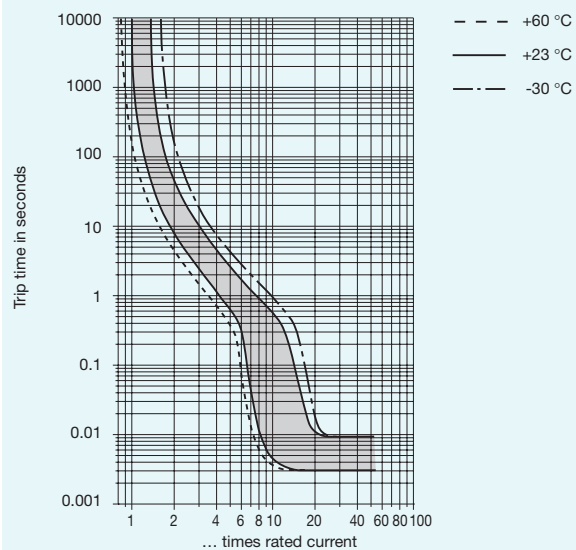
0.05...7 A

AC



8...16 A

AC



N.B.

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

Time/current characteristics are calibrated at 23°C (see page 8). For operation at other temperatures please apply the factors below to determine the circuit breaker rating required.

Ambient temperature °C	-20	-10	0	+23	+40	+50	+60
Multiplication factor	0.76	0.84	0.92	1	1.08	1.16	1.24

ET-A® High Performance Thermal Circuit Breaker 583-...

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 shows clearly the tripped/off position. Threadneck panel mounted, available in metric and US (MS 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.

Accessories

- X 200 801 08 Water splash cover/hex nut assembly. The concertina design is extended when the button trips to the OFF position. Plated finish.
- X 200 801 03 As above but blackened finish.
- X 200 801 09 As above, but hex nut 7/16-32, black finish
- X 200 802 01 Splash seal/hex nut assembly, allowing full visibility of the push button actuator. Plated finish.
- X 200 802 02 As above but blackened finish.
- X 200 803 01 Screw-tightened clamp-on actuator extension to aid manual operation.

Standard current ratings and typical volt drop values

Current rating (A)	Volt drop (mV)	Current rating (A)	Volt drop (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		

Approvals

Approvals:

LN 29887

VG 95345, part 11

prEN 2996

MS 14154

QPL USA, Canada, UK, Sweden



Technical data

Voltage rating	3 AC 200 V (400 Hz); DC 28 V	
Current rating range	1...25 A	
Auxiliary circuit	0.5 A, DC 28 V	
Typical life	20,000 operations mechanical 10,000 operations at I_N	
Ambient temperature	-55...+125 °C (≤ 15 A) -55...+ 90 °C (> 15 A)	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 1.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage operating area AC 1500 V pole/pole AC 1500 V main to aux. circuit AC 1500 V	
Insulation resistance	>100 M Ω (DC 500 V)	
Interrupting capacity I_{cn}	3 AC 200 V (400 Hz): ≤ 4 A 1,000 A 5 A 2,000 A 7.5...25 A 2,500 A DC 28 V: 1...25 A 6,000 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00	
Vibration (sinusoidal)	10 g (57-2000 Hz) ± 0.76 mm (5-57 Hz) to VG 95210, sheet 19/ IEC 68-2-6, test Fc/ISO 7137	
Vibration (random)	16.4 g rms, 0.2 g ² /Hz ± 1.5 dB to VG 95210, sheet 29/ IEC 68-2-6, test Fc/ISO 7137	
Acceleration	17 g, to ISO 2669	
Shock	50 g (11 ms) to VG 95210, sheet 28/ IEC 68-2-27, test Ea/ISO 7137	
Corrosion	96 hours at 5 % salt mist 48 hours at 20 % salt mist to VG 95210, sheet 2/ IEC 68-2-11, test Ka/ISO 7137	
Humidity	240 hours at 95 % RH to VG 95210, sheet 7/ IEC 68-2-3, 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	

High Performance Thermal Circuit Breaker 583-...

Ordering information

Type No.	
583	three pole, with temperature compensation
Mounting	
G	threadneck panel mounting
Threadneck design	
1	M12x1x6.4x8.8 dia. with mounting plate (aux. contact version)
2	15/32-32UNSx6.4x7.8 dia. (only without aux. contact)
3	MJ12x1x6.4x8.8 dia. (only without aux. contact)
4	M12x1x6.4x8.8 dia. (only without aux. contact)
5	7/16-32UNSx6.4x7.8 (only without aux. contact)
6	M12x1x9.4x8.8 dia. (without aux. contact)
7	7/16-32 UNSx6.4x7.8 dia. with mounting plate (aux.contact version)
Hardware for threadneck (washers)	
0	without hardware
1	corrugated washer 12/15, fitted
2	serrated lock washer 12.1/17.2, fitted
3	serrated lock washer 11.3/14.9, fitted
4	serrated lock washer 12/15, fitted
Hardware for threadneck (nuts)	
0	without hardware
1	hex nut M12x1
2	hex nut 15/32-32UNS
3	hex nut 7/16-32UNS
5	hex nut MJ12x1 (only with threadneck design 3)
Terminal design (main terminals)	
K	screw terminals with metric thread
1	K14 (M4, MJ4)
J	screw terminals with inch thread
1	J14 (8-32UNC-2B)
2	J17 (8-32UNC-2B)
3	J25 (6-32UNC-2B)
Characteristic curve	
M1	thermal, 1.15-1.38 I _N for military aircraft
C1	thermal, 1.15-1.38 I _N for civil aircraft
Terminal screws	
A	Phillips screw M4x6
B	Phillips screw 8-32UNC-2Ax6
C	Phillips screw 6-32UNC-2Ax6
D	slotted flat head screw M5x6
E	hex screw with Phillips head 8-32UNC-3Ax9.5
K	hex screw with Phillips head 8-32UNC-3Ax7.6 (ASN E0736)
L	Phillips screw MJ4x6
Z	without accessories
Terminal washers	
0	without lock washer
1	lock washer B4
2	lock washer 4.3
3	lock washer B4 and washer 4.4/9.5
4	lock washer 3.7
5	lock washer 4.3/9 (ASN A2553)
Auxiliary contact	
S0	without auxiliary contact
S1	with auxiliary contact (connector to NAS1749 and LN 65093, size 20)
S5	with polarized auxiliary contact
Barrier	
T	barrier 25.5 mm wide (S0 only)
U	barrier 19.5 mm wide, 37.7 mm long
V	barrier 25.5 mm wide, colour marking between the terminals (-S0 only)
X	barrier 19.5 mm wide, 34.1 mm long
Colour of the push button	
	blank: black (standard) /white (e.g. 7.5)
A	green/white (e.g. 7.5)
G	green/white to EN (e.g. 7 1/2)
N	black/white to EN (e.g. 7 1/2)
Current ratings	
	1...25 A

583 - G 4 1 1 - K1 M1 - A 1 S0 T - 5 A 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, part 11.

583-G111-K1M1-A1S1UN

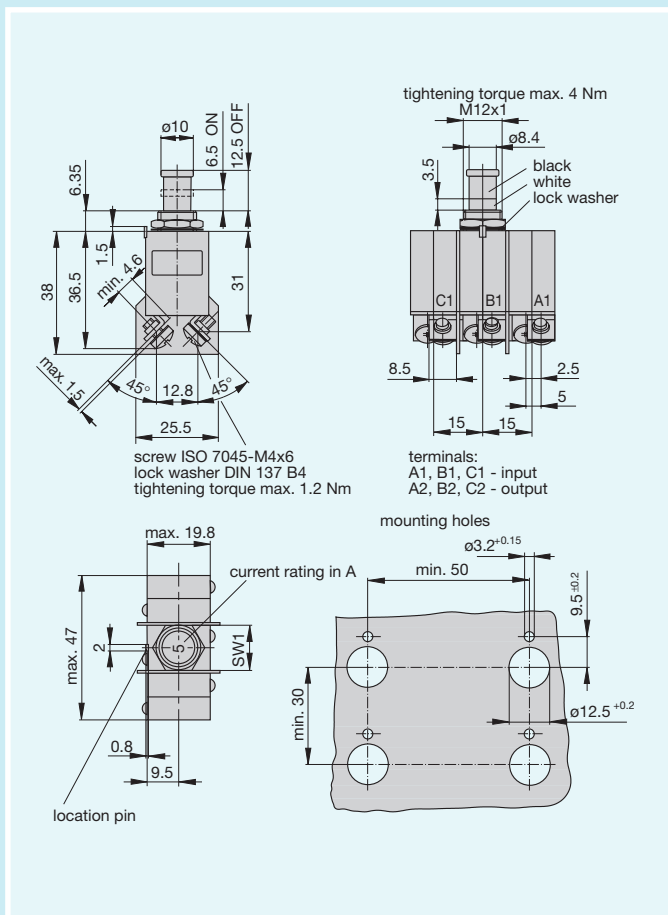
Metric threadneck M12x1 and terminal design -K14 (M4x6) with auxiliary contact -Si, listed by the German Materialamt der Bundeswehr to VG 95345, part 11.

583-G533-J1M1-B2S0X (MS 14154)

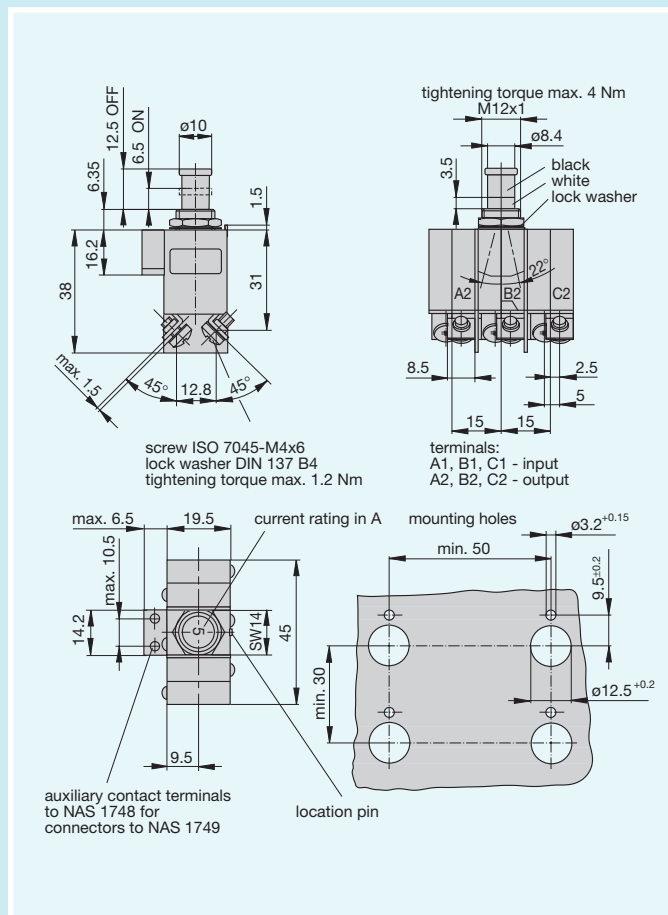
Threadneck size 7/16-32UNSx6.4 and terminal design -J14 (inch thread 8-32), approved to MS 14154.

ET-A® High Performance Thermal Circuit Breaker 583-...

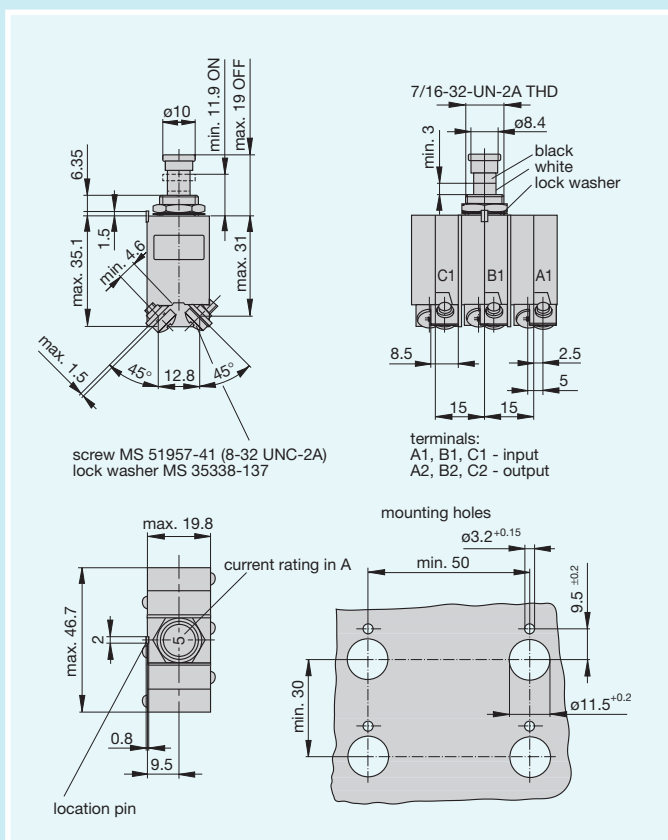
Dimensions 583-G411-K1M1-A1S0TN (583-96-TC-K14)



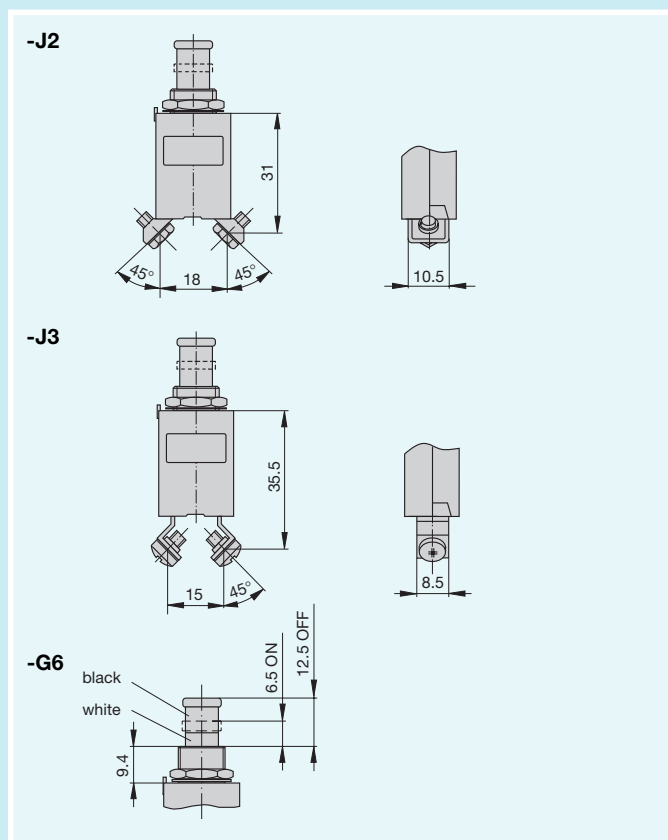
Dimensions 583-G111-K1M1-A1S1UN



Dimensions 583-G533-J1M1-B2S0X (MS 14154)

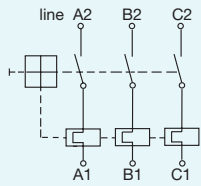


Other main terminal designs



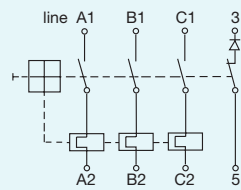
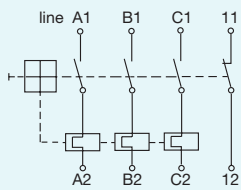
High Performance Thermal Circuit Breaker 583-...

Internal connection diagrams

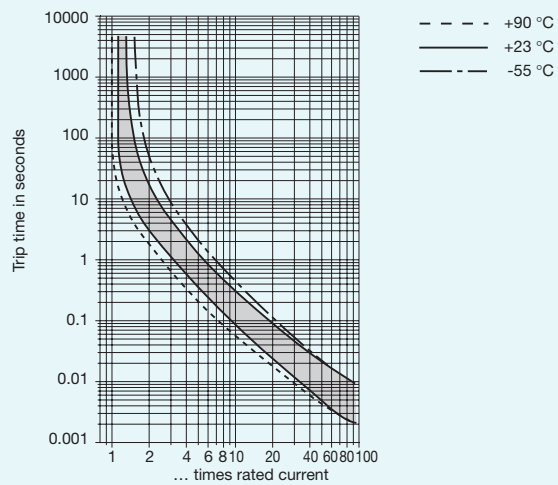


with auxiliary contact

with polarized auxiliary contact

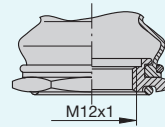


Typical time/current characteristics

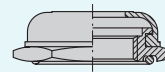


Accessories (approved to VG 95345, part 23)

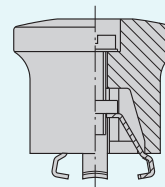
Splash cover/hex nut assembly with O ring (IP 66)
 X 200 801 08 nickel plated nut M12x1, translucent cover
 X 200 801 03 matt black finish nut M12x1, black cover
 X 200 801 09 matt black finish nut 7/16-32, black cover



Splash cover black/hex nut assembly with O ring (IP 54)
 X 200 802 01 nickel plated nut
 X 200 802 02 matt black finish nut



Actuator extension (black)
 X 200 803 01



E-T-A® Isolation Switches 911/912/913/914-...

Description

Single, two, three and four pole isolators to EN 60947 / IEC 947 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.

Accessories

- X 211 118 01 Single pole splash cover with fixing plate.
- X 211 119 01 Two pole splash cover with fixing plate.
- X 211 705 01 Terminal insulation cover for use with types 410, 520 and 530 - two per pole required.

Ordering information

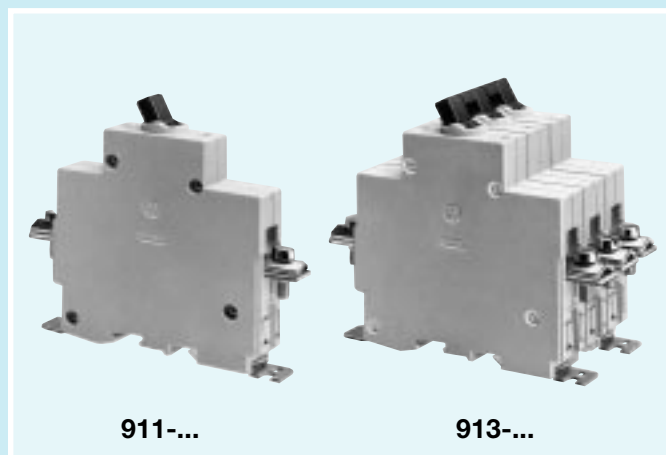
Type No.	
911	single pole switch
912	double pole switch
913	three pole switch
914	four pole switch
Terminal design	
K main terminal	
up to 32 A: pressure plate B5-DIN 46288	
up to 63 A: pressure plate B6-DIN 46288	
up to 125 A: terminal screws DIN 46206, form A, thread M6	
up to 240 A: terminal screws DIN 46206, form A, thread M10 (single pole only)	
Mounting	
1	surface mounting
2	rail or panel mounting (rail DIN EN 50022-35x7.5)
3	rail or panel mounting (rail DIN EN 50035-G32)
4	panel mounting only
5	mounting brackets- surface mounting
Auxiliary contacts (terminals M3.5)	
Si	one each N/O and N/C
Si1	one N/C (11,12)
Si2	one N/O (13,14)
2Si	two each N/O and N/C – types 912, 913, 914 only
3Si	three each N/O and N/C – types 913, 914 only
4Si	four each N/O and N/C – type 914 only
Remote trip (optional)	
FA12	remote disconnection, for DC 12 V
FA24	remote disconnection, for DC 24 V
Current ratings	
32, 63, 125 A (240 A single pole only)	

914 - 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 pro Pol
63	≤ 0.002 pro Pol
125	≤ 0.002 pro Pol



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 (up to 240 A single pole only)	
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 _{ON} < 20 ms / t _{OFF} > 10 s
	switching time	< 20 msec
Typical life	10,000 operations at I _N 20,000 operations mechanical	
Ambient temperature	-40...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage	Pollution degree
	6 kV	3
Dielectric strength (IEC 664 and 664A)	Test voltage	
	operating area	AC 3300 V
	pole/pole	AC 3300 V
	main to aux. circuit	AC 2200 V
	aux. circuit 11-12 to 13-14	AC 1000 V
Insulation resistance	>100 MΩ (DC 500 V)	
Short-circuit protection	back up fuse max. 125 A	
Degree of protection (IEC 529/DIN 40050)	operating area IP 40	terminal area IP 00
Vibration	5 g (57-200 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 220 g single pole ≤ 125 A approx. 440 g single pole > 125 A approx. 440 g double pole approx. 660 g three pole approx. 880 g four pole	

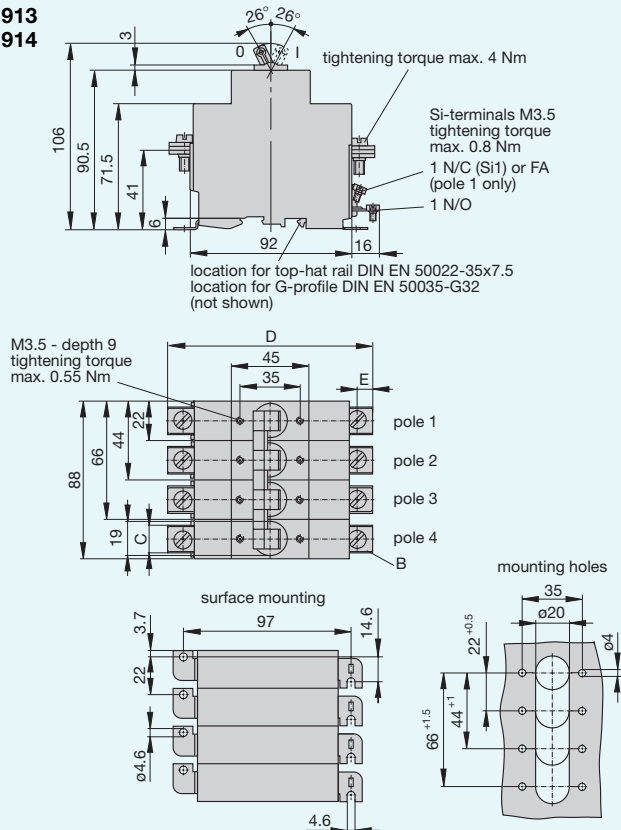
Dimensions

911 ≤ 125 A

912

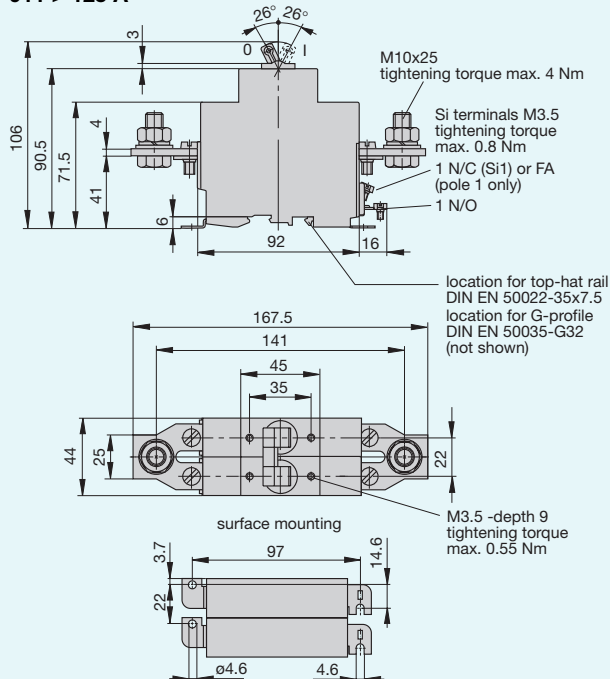
913

914



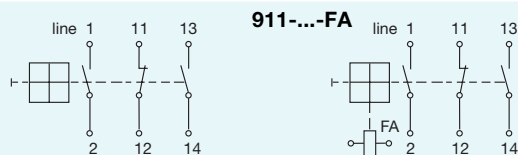
Current rating	Dimensions				Terminal	tightening torque max.
	B	C	D	E		
32 A	M5	13	114	7	pressure plate	2.0 Nm
63 A	M6	15.4	120	9	pressure plate	2.5 Nm
125 A	M6	15.4	120	9	terminal screw	2.5 Nm

911 > 125 A

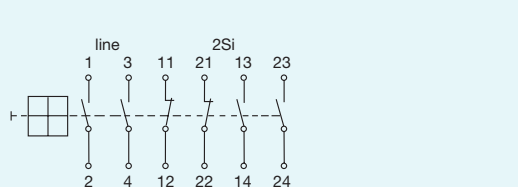


Internal connection diagrams

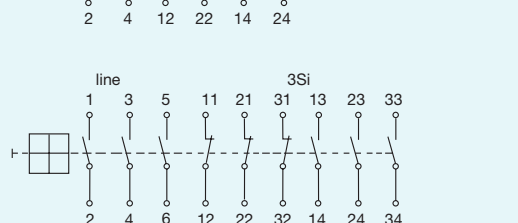
911



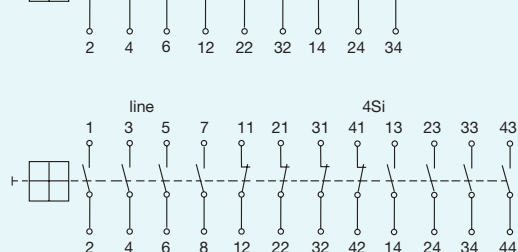
912



913

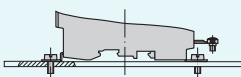


914

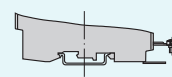


Mounting method

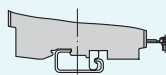
Surface mounting
suffix: -1



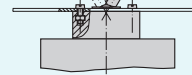
Rail mounting
(DIN EN 50022-35x7.5)
suffix: -2



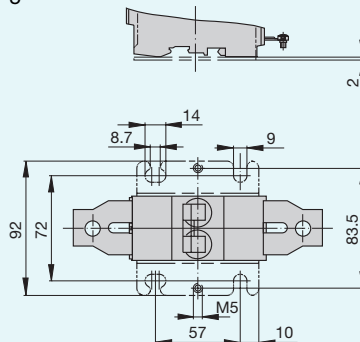
Rail mounting
(EN 50035-G32) suffix: -3



Panel mounting
suffix: -4

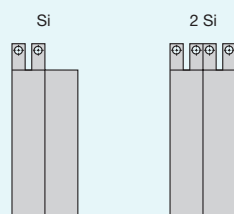


Mounting brackets - surface mounting
suffix: -5

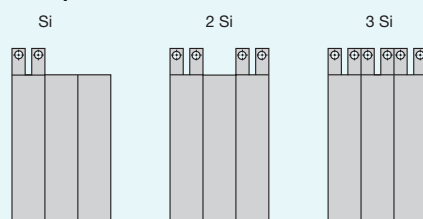


Auxiliary contact arrangement with multi pole switches

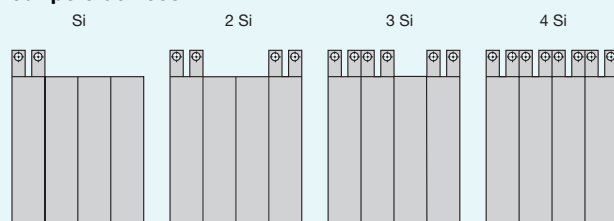
double pole devices



three pole devices



four pole devices

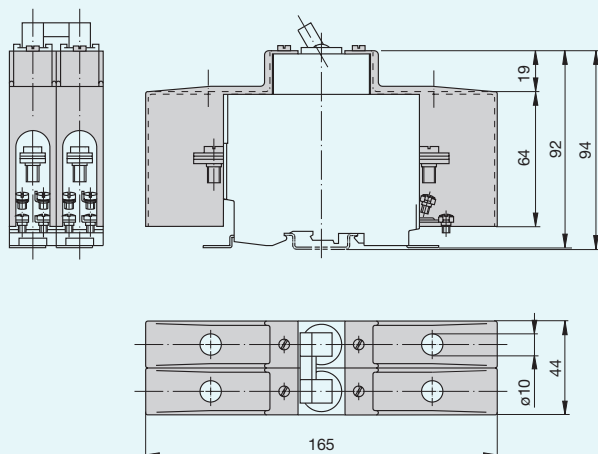


Accessories

Terminal insulation cover

(1set = 2 pcs per pole)

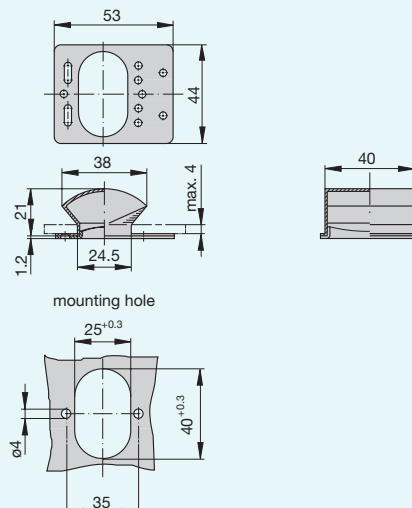
X 211 705 01



Accessories

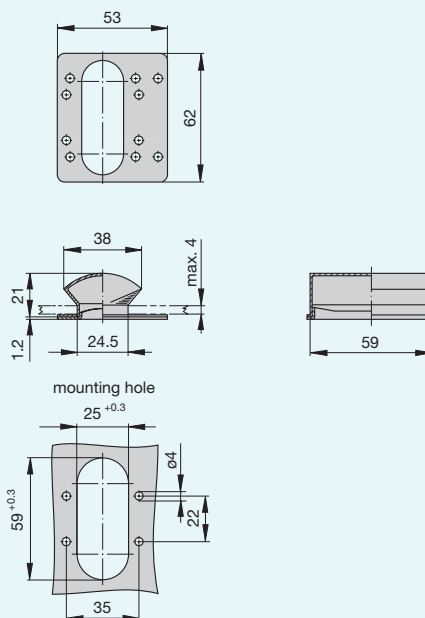
For series 911 $\leq$ 125 A

Water splash cover translucent with fixing plate (IP 54)
X 211 118 01



For series 911 > 125 A, 912

Water splash cover translucent with fixing plate (IP 54)
X 211 119 01



ET-A® Battery Isolation Switches 921/922

Description

Single or two pole isolation switches to 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

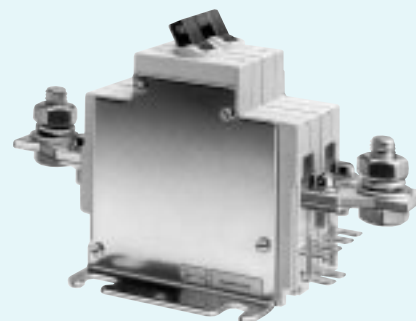
Type No.	
921	single pole switch
922	double pole switch
Enclosure design (optional)	
B3	without external operating knob, for use only with single pole devices
B31	with external operating knob, for use only with single pole devices
B32	without external operating knob, for use only with double pole devices
B33	with external operating knob, for use only with double pole devices
B34	with external operating knob, for use only with double pole devices*
B35	without external operating knob, for use only with single pole devices* *with remote-re-connection facility
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
K72	for double pole version, enclosures B32, B33, B34
Mounting	
5	mounting brackets - surface mounting
Auxiliary contacts (blade terminals 6.3x0.8)	
Si2	one N/O
Si1	one N/C
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..)
Coil voltage	
12	AC/DC 12 V
24	AC/DC 24 V
Current ratings	
240 A	(type 921)
120 A	(type 922)

921 - B31 - K12 - 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.

Approvals

Authority	Voltage rating	Type
LROs	DC 28 V	921, 922
BASEEFA	DC 12 V, DC 24 V	922-B33-K72-5-...



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 24 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 _{ON} < 20 ms / t _{OFF} > 10 s	
switching time	< 20 s	
Electrical remote re-connection (-FC):		
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 _{ON} < 1.2 s / t _{OFF} > 60 s	
switching time	< 100 ms	
Typical life	10,000 operations at I _N 20,000 operations mechanical	
Ambient temperature	-40...+75 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 6 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage	
operating area	AC 3300 V	
pole/pole	AC 3300 V	
main to aux. circuit	AC 2200 V	
aux. circuits 11-12 to 13-14	AC 1000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Switching capacity	Type 921 2500 A for 1 s at +23°C 600 A for 1 min at +23°C 600 A for 2 min at -23°C 600 A for 90 s at 0°C	Type 922 1500 A for 1 s at +23°C 600 A for 30 s at +23°C 600 A for 1 min at -23°C 600 A for 45 s at 0°C
Degree of protection (IEC 529/DIN 40050)	operating area IP 40 terminal area IP 00 IP 54 with additional enclosure -B..	
Vibration	5 g (57-200 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 1000 g with remote disconnection approx. 1400 g with remote disconnection and re-connection	

Issue C

E-T-A® Battery Emergency Switch E-1032-...

Description

For vehicles carrying dangerous goods the European guideline ADR (European agreement concerning the international carriage of dangerous goods by road) requires that a Battery Emergency Switch should be fitted between the battery and the vehicle electrical system which in an emergency can be operated from the driver's cab. Once the emergency has been remedied or if the switch was operated by error, the switch must also be resettable from the driver's cab.

Typical applications

Commercial vehicles carrying dangerous goods

Ordering information

Type No.	
E-1032	
Version	
NA1	single pole
NA2	double pole
Enclosure	
C	with moulded enclosure IP65 (GGVS/ADR)
Isolation switch	
921	single pole switch
922	double pole switch
Voltage rating	
DC 24 V	
DC 12 V	
Variant No.	
e.g. special versions, mounting plate. Designation determined by manufacturer	

E-1032	-	NA1	-	C	921	-	DC 24 V	-	...
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Approvals

Authority	Requirement	Approval mark No.
TÜV	Appendix B2 of ADR DIN/EN 40050	TÜ.EGG.030-97

Technical data

Terminals	
Main terminals	blade terminals with cable lugs for M10 terminal studs (IP 00)
Control cable	connector to DIN 72 585
Auxiliary contact for auxiliary relay (D±31)	max. 6 A (circuit not protected)
Mass	approx. 3500 g with enclosure, single pole approx. 3700 g with enclosure, double pole



E-1032-...

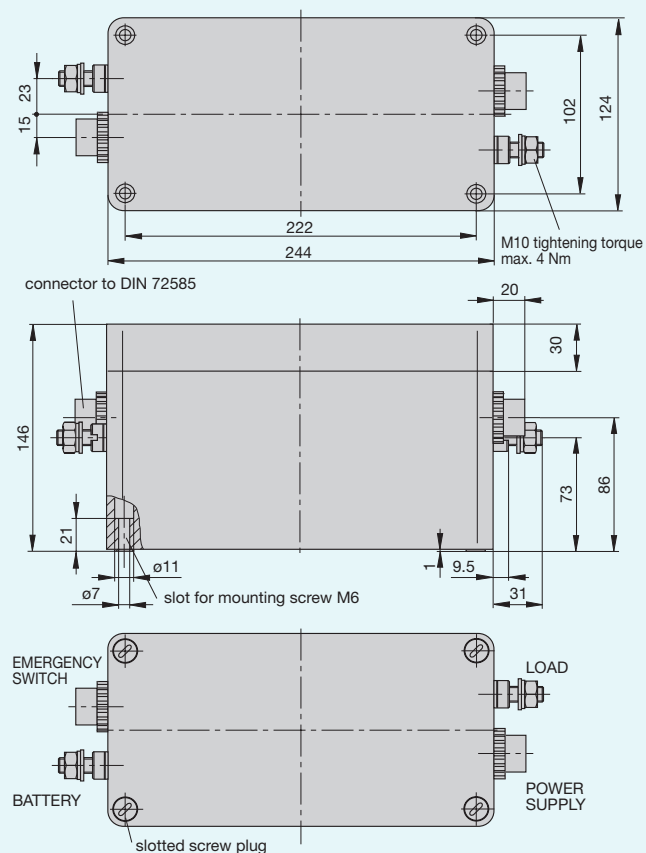
Technical data

Voltage rating	DC 24 V	DC 12 V
Voltage range	ON: 18-32 V OFF: 15-32 V	9-16 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 _N	ON	approx. 15A/100 ms
	OFF	approx. 12A/100 ms
Control circuit (Ex) (PTB No.III B/E-29861S)	0 - 2 mA OFF 4 - 6 mA ON 9 - 11 mA OFF rated to VDE 0171, protection (Ex) i G5 „intrinsically safe“	
Control switch (accessory)	to GGVS with coding resistance 1 kΩ with coding resistance 330 Ω to ADR for external actuation	
Temperature range	-40...+75 °C	
Reverse polarity protection	If polarized incorrectly, the Emergency 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 Emergency Switch is mechanically switched off, it will be reset immediately by the electronics.	
Typical life	10,000 operations at I _N 20,000 operations, mechanical	
Degree of protection IEC 529/DIN40050) with enclosure	IP 54 when connected to GGVS or ADR	
Vibration	5 g (57-200 Hz), ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) direction 1-4 15 g (11 ms) direction 5-6 to IEC 68-2-27, test Ea	
Corrosion	96 h at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 h at 95 RH to IEC 68-2-3, test Ca	

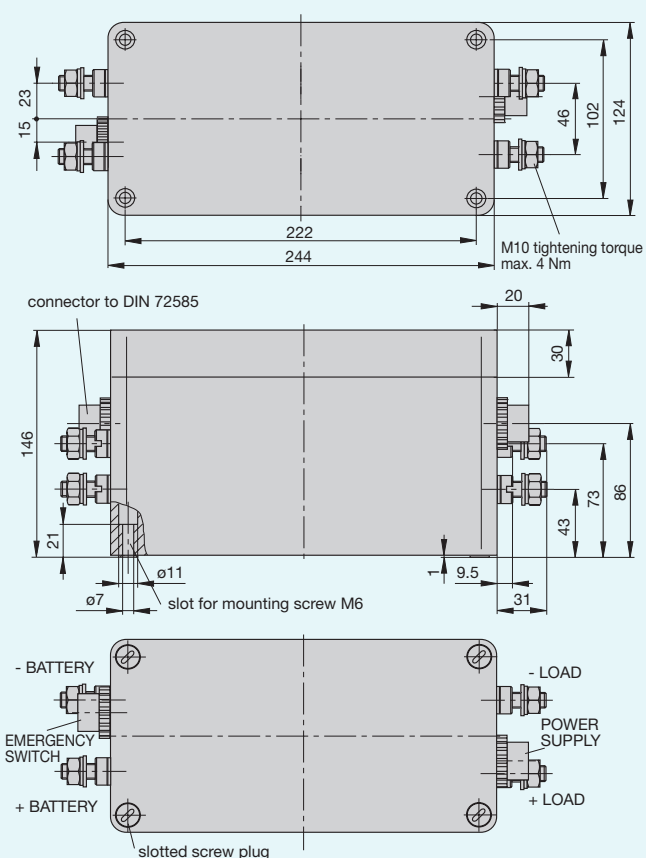
Battery Emergency Switch E-1032-...

Dimensions

E-1032-NA1-... 1.. pole

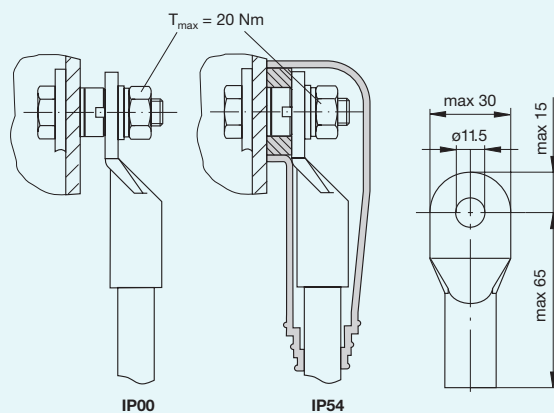


E-1032-NA2-... 2 pole

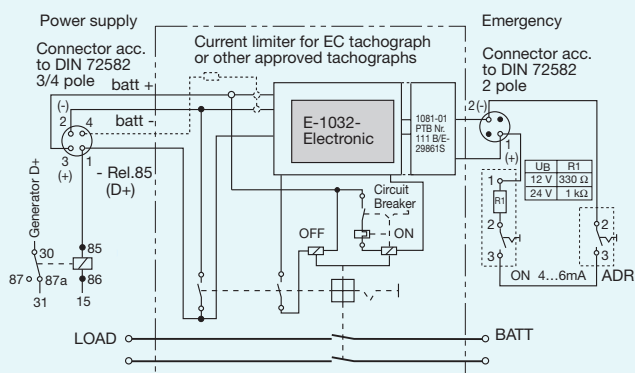


Rubber cap

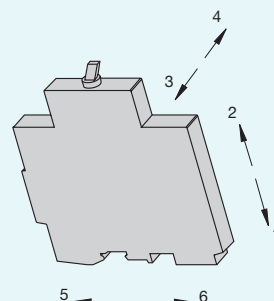
supplied with enclosure C



Internal connection diagrams

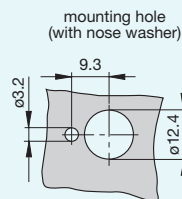
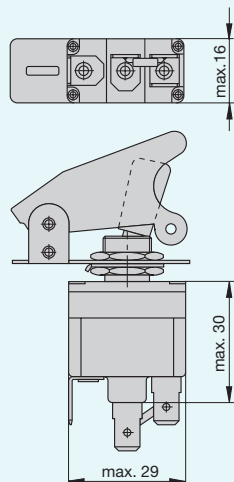


Shock direction

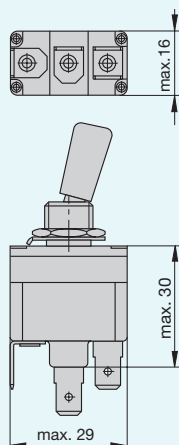


Accessories

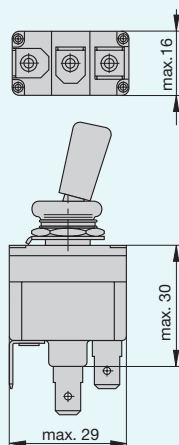
ADR switch with lid
0Z223Z000141 12 V
0Z223Z000142 24 V



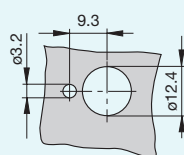
ADR switch without bellows
0Z223Z000143



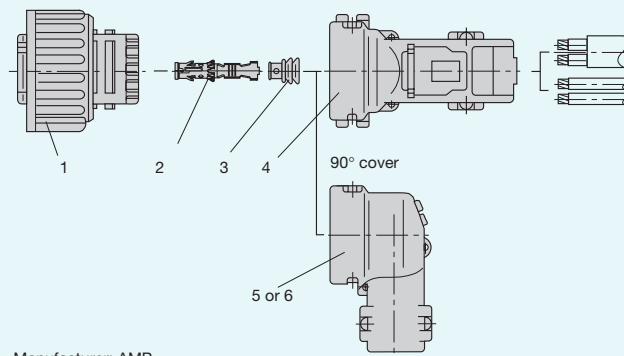
ADR switch with bellows
0Z223Z000144



mounting hole
(with nose washer)

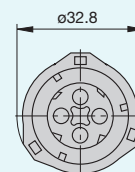
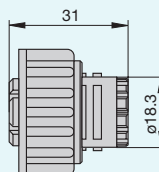


female connector jack for female single wire 180° cover for sheathed cable
connector connector sealing

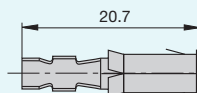


Manufacturer: AMP

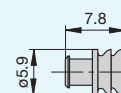
1. Female connector SW
0Z112Z000146 2-way
0Z112Z000127 3-way
0Z112Z000147 4-way



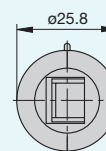
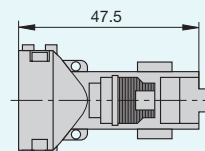
2. Jack for female connector
0Z112Z000126



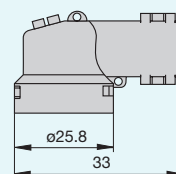
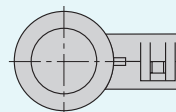
3. Single wire sealing
0Z112Z000134



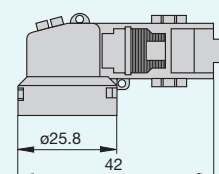
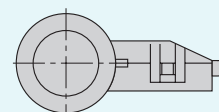
4. 180° cover for sheathed cable
0Z112Z000135



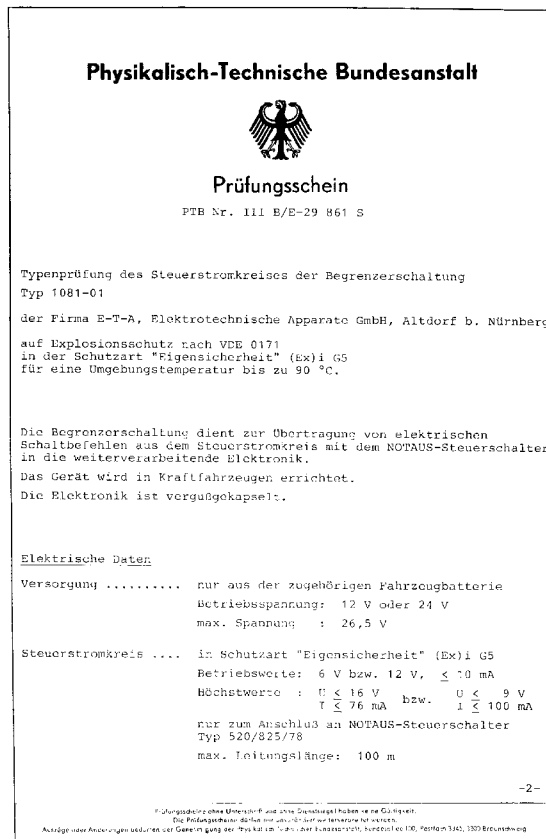
5. 90° cover for corrugated tube NW10
0Z112Z000136



6. 90° cover for sheathed cable
0Z112Z000145



Approvals / Certificates



4

VdTÜV-Merkblatt

VdTÜV	Bauteilgeprüfte Elektrische Einrichtung Bauteilprüfnummer 030-97	Elektrische Einrichtungen Beförderung gefährlicher Güter 030
Ausgabe: 05.1997		
1. Hersteller:	ETA Elektrotechnische Apparate Postfach 1961 90514 Altdorf/Nürnberg	
2. Baueinheit:	Gehäuse mit Batteriestromschalter	
3. Typbezeichnung:	Trennschalter: ETA E-1032 in Gehäuse Roloc PT 124-U/O	
4. Prüfanforderungen:	- Anhang B2 ADR (Stand 13, Änderung V) - DIN EN 40050	
5. Aufgaben des Sachverständigen bei der Abnahmeprüfung der elektrischen Einrichtung:	- Prüfen der Kennzeichnung mit dem Bauteilkennzeichen - Prüfen der Eignung der Anschlüsse - Einbau nur unter der Batterieabdeckung zulässig - Kontrolle des Steuerstromkreises	
6. Kennzeichnung:	außen auf Aufkleber - E-T-A electronic - Battery Emergency Switch E-1032 - Type No. E-1032 NA1 -C 921 -DC 12V oder E-1032 NA2 -C 922 -DC 12V oder E-1032 NA1 -C 921 -DC 24V oder E-1032 NA2 -C 922 -DC 24V - Serial No. xx - Power DC 12V oder 24V Bauteilkennzeichen: TÜV EGG.030-97 innen auf Gehäusesteilen - Roloc PT 124 U/O	
7. Bemerkungen:	- Die Steckerschlösser sind nicht Gegenstand dieses Bauteilkennzeichens. - Wahlweise kann zusätzlich im Gehäuse der Strombegrenzer des Fahrzeugschreibers (EG-Kontrollgerät) angeordnet werden. - Die Stromanschlüsse der Batterie werden durch Gummifüllungen isoliert. Diese Isolierung entspricht nicht der Schutzart IP 54. Deshalb ist der Einbau nur unter der Batterieabdeckung zulässig. - Der Steuerstromkreis muß dem PTB Prüfungschein Nr. III B/E-29 861 S entsprechen.	
8. Gültigkeit des Bauteilkennzeichens:	31.05.2002	

Nach Prüfbericht des TÜV Südwest e.V. vom 27.03.1997

Herausgeber: Verband der Technischen Überwachungs-Vereine e.V., Essen

Blatt 2 zum Prüfungschein PTB Nr. III B/E-29 861 S

Prüfungsunterlagen

- Beschreibung (2 Blatt))
- Zeichnung Nr. 10.041.619)
10.041.608) unterschrieben am 10.2.1981
10.023.278)
520/825/78)

3. Prüfmuster

Die Anlagen zu diesem Prüfungschein (Unterlagen zu 1. und 2.) wurden zur Festlegung der Bauart und der Ausführung mit dem Dienstsegel der Physikalisch-Technischen Bundesanstalt versehen.

Beurteilung

Der Steuerstromkreis der Begrenzerschaltung Typ 1081-01 entspricht in seiner Bauart den Bestimmungen VDE 0171/1.69; er ist ohne Einschränkung durch eine Explosionsklasse oder Zündgruppe zum Einsatz in explosionsgefährdeten Betriebsstätten geeignet.

Da nur der Steuerstromkreis eigensicher ist, muß die Begrenzerschaltung außerhalb des explosionsgefährdeten Bereiches errichtet werden.

Für die Errichtung des eigensicheren Steuerstromkreises sind die Bestimmungen VDE 0165 zu beachten (z.B. Einhaltung der Höchstwerte von Induktivität und Kapazität).

Weiterhin ist bei der Errichtung des eigensicheren Steuerstromkreises zu beachten, daß die Grenztemperatur der jeweiligen Zündgruppe stets auch unter Berücksichtigung der Eigenwärmerzeugung der angeschlossenen Betriebsmittel infolge Stromwärme nicht überschritten werden darf.

Dieser Prüfungschein gilt für jede Begrenzerschaltung des genannten Typs, für die eine Stückprüfung gemäß VDE 0171 erfolgreich durchgeführt worden ist.

Physikalisch-Technische Bundesanstalt

Im Auftrag

Braunschweig, 17.8.1981

(Dr.-Ing. Scheffner)
Oberregierungsrat



E-T-A® Battery Isolation Switches E-1073-437 and E-1073-921/-922

Description

Single pole circuit breaker type 437 or single/two pole isolation switches types 921/922 featuring an additional electronic function module which limits the duration of the supply to the remote disconnect and reconnect coils, avoiding damage in the event of unusual operating circumstances. Available with undervoltage monitoring option to protect batteries from the effects of deep discharge, status output for undervoltage, auto reset feature.

Typical applications

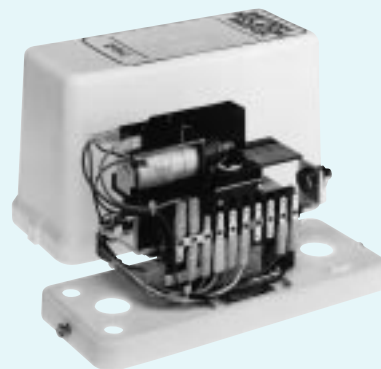
Battery and cable protection for all types of vehicle (including electric), battery powered systems.

Ordering information

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
Additional function	
00	none
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
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 devices
B34	moulded housing, external operating knob, for use with double pole devices (not with auto reset)
B35	moulded housing, external operating knob, for use with single pole devices (not with auto reset)
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, 240 A
921:	240 A
922:	120 A

E-1073-1102-437-B3-K12-07-Si01-240A 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.



E-1073-437

Technical data – Electronic module

Voltage rating	DC 12 V	DC 24 V
Voltage rating range	ON 10.3 - 16 V OFF 9 - 16 V	18 - 32 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	
Operating current	ON approx. 30 A OFF approx. 10 A	approx. 15 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	max. 32 V	
ON (high)	> 8 V	
OFF (low)	< 3 V	
Power consumption	typically 1 mA	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	optional with E-1073-.1..	
switching thresholds	11.0 V ±0.2 V	22.8 V ±0.2 V
hysteresis	typically 0.5 V	
trip time	typically 40 sec	
Undervoltage status output('UST'), optional with E-1073-.1..	transistor output minus switching current load 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	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	

Technical data of switch or circuit breaker

see types 437, 921 or 922

Features

- Multiple functions in one unit
 - High performance circuit breaker providing battery and cable protection from overloads and short-circuits.
 - Master switch for ON/OFF operation
 - Electrical remote control
 - Undervoltage protection with status output
 - Auxiliary contacts (e.g. for generator disconnection)
 - Active reverse polarity protection of the entire vehicle electrical system
- Current ratings to 240 A
- 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

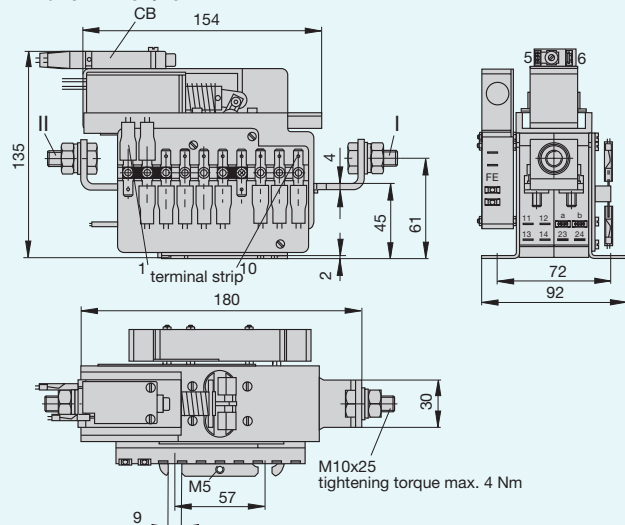
The circuit breaker should be in the OFF condition when connecting or replacing the battery.

Observe Instructions for Installation TM 9/9.3 D/E!

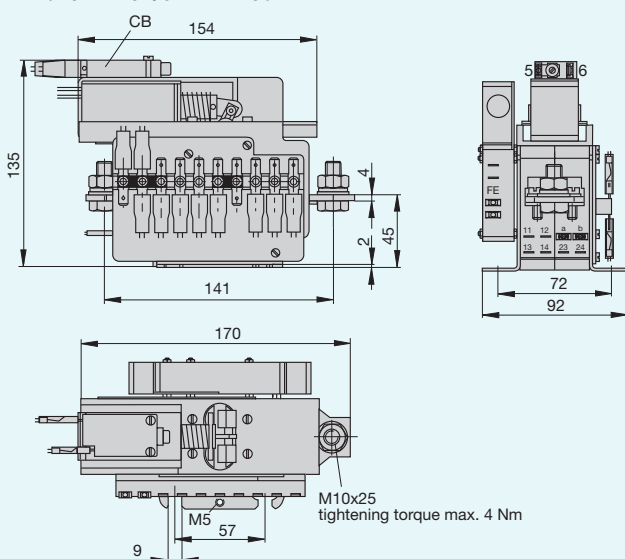
Battery Isolation Switches E-1073-437 and E-1073-921/-922

Dimensions

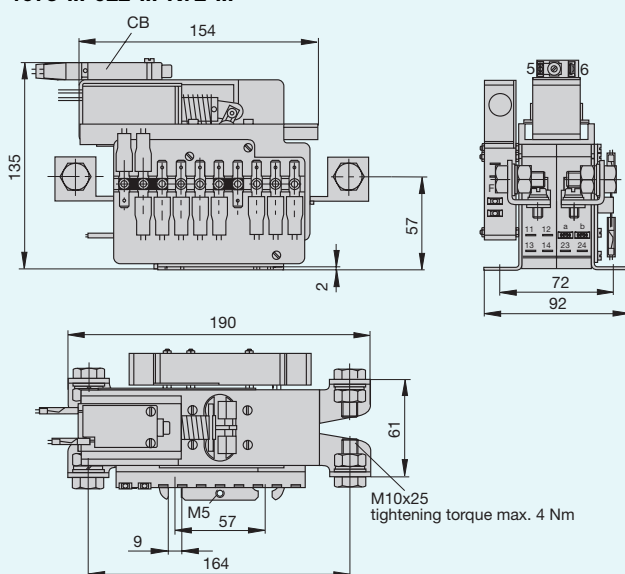
E-1073-...-437/-921-...-K12-...



E-1073-...-437/921-...-K60-...

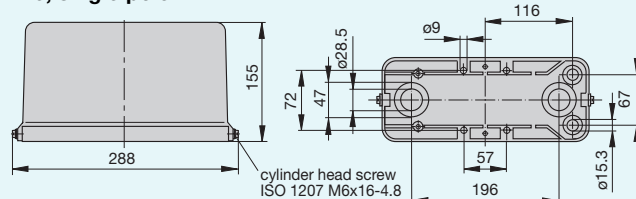


1073-...-922-...-K72-...



Dimensions Enclosures

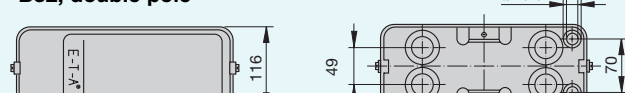
-B3, single pole



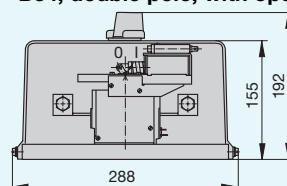
-B35, single pole with operating knob



-B32, double pole

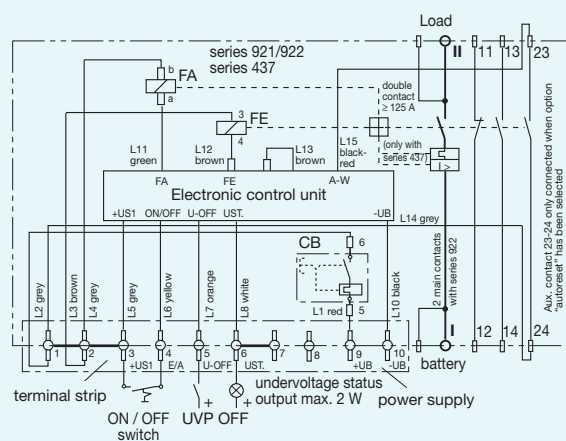


-B34, double pole, with operating knob

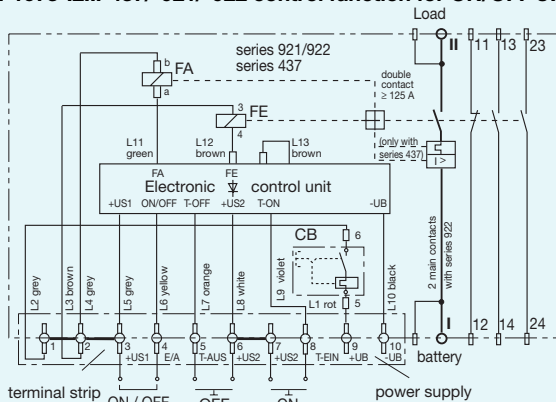


Connection diagrams

E-1073-1...-437/-921/-922 control function for ON/OFF switch



E-1073-2...-437/-921/-922 control function for ON/OFF switch



Typical applications

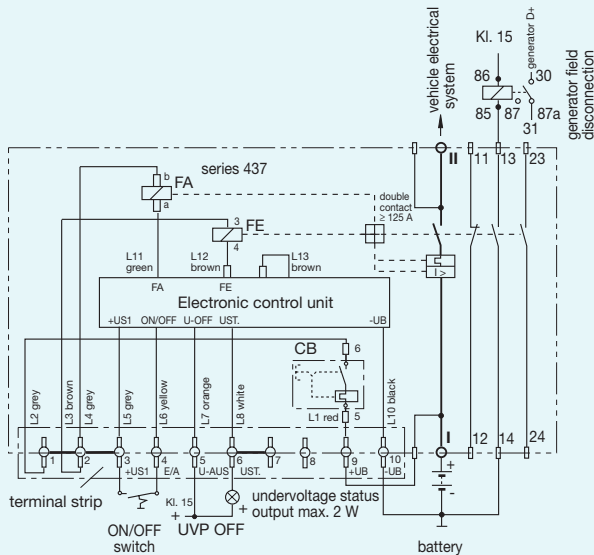
For road vehicles, e.g. buses and coaches

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 40 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

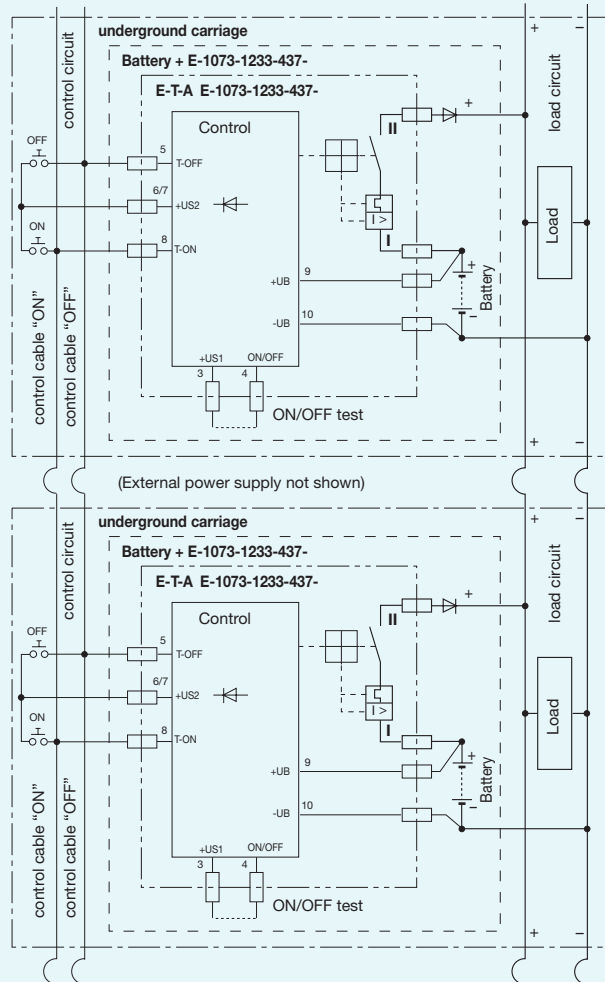
Series E-1073-1233-437-K60-06-Si01-200 A

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.



ET-A® Remote Control Circuit Breaker 4910 (RCCB)

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. Applying the system voltage across the input will switch the RCCB ON, disconnection of the input will cause it to switch OFF. Remote control is achieved through the use of a conventional single pole manually operated aircraft style thermal circuit breaker to connect the supply to the control input of the RCCB. Complies with the requirements of MIL-C-83383.

Typical applications

Aircraft electrical systems and equipment, and other high performance applications.

Ordering information

Type No.	
4910	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	
4910 - 01 - 5 A	ordering example

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	200
7.5	360	50	200
10	347	60	200
15	225	75	200
20	200	80	200
25	200	100	200
35	200		

Approvals

MIL-C-83383 pending



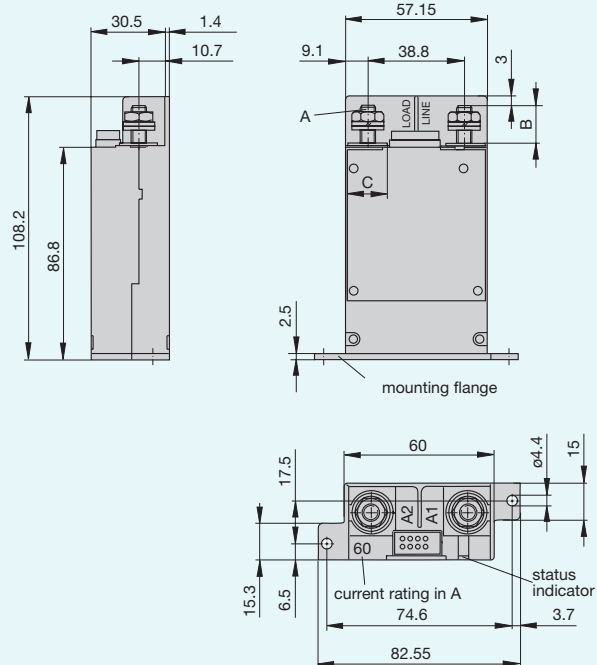
4910 (RCCB)

Technical data

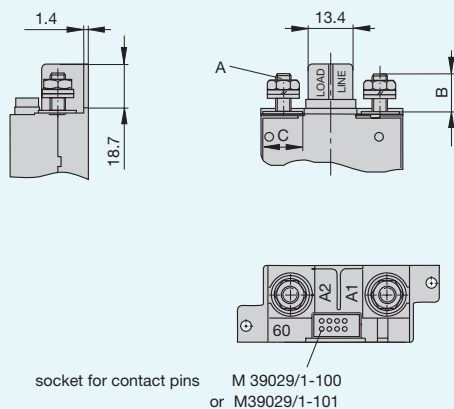
Voltage rating	DC 28 V (DC 18...36 V)
Current rating range	5... 100 A
Auxiliary circuit	3 A, DC 28 V, AC 115 V (400 Hz)
Bias current	2.5 mA max
Switching current/ switching period	2.8 A/ 25 ms
Trigger current for ICU ("TRIP FREE"-mode)/ duration	approx. 3.2 A /5 s max
Typical life	50,000 operations at I _N (inductive or resistive)
Ambient temperature	-54...+71 °C
Dielectric strength (IEC 664 and 664A)	Test voltage between main terminals AC 1500 V main terminal to mounting area AC 1500 V
Insulation resistance	> 100 MΩ (DC 500 V)
Interrupting capacity	DC 28 V: 6000 A
Vibration (sinusoidal)	10 g (55-2000 Hz), ±0.76 mm (10-55 Hz) to MIL-STD 202, method 204, condition C
Vibration (random)	10-2000 Hz, spectral power density 0.15 g ² /Hz, rms value 13.5 g; 5 h/axis loaded with 0.9 I _N
Shock	25 g (11 ms) 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)
Altitude	< 15,000 m above sea level
Mass	approx. 300 g

Internal onnection diagrams

Type 4910 - 01
- 03



Type 4910 - 02
- 04

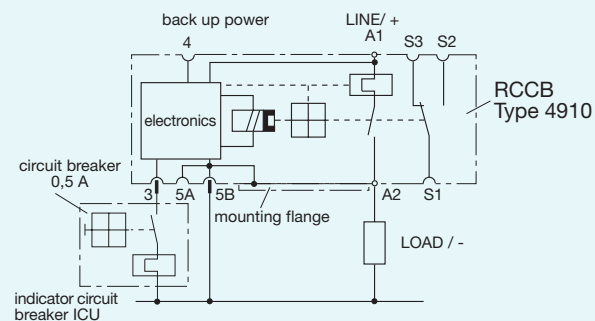


current rating (A)	5 ... 25	35 ... 100
thread A	0.190-32 UNF-2A	0.250-28 UNF-2A
mounting torque	2 Nm	4.1 Nm
B (mm)	12.7	15.5
C (mm)	12.7	15.5
nut	AN315-3R	AN315-4R
lock washer	MS 35338-43	MS 35338-44
washer	AN 960-10L	AN 960-416

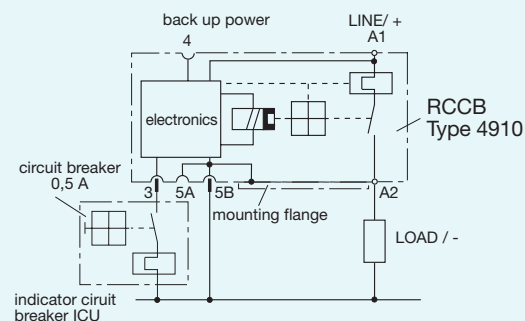
mounting flanges mate as shown



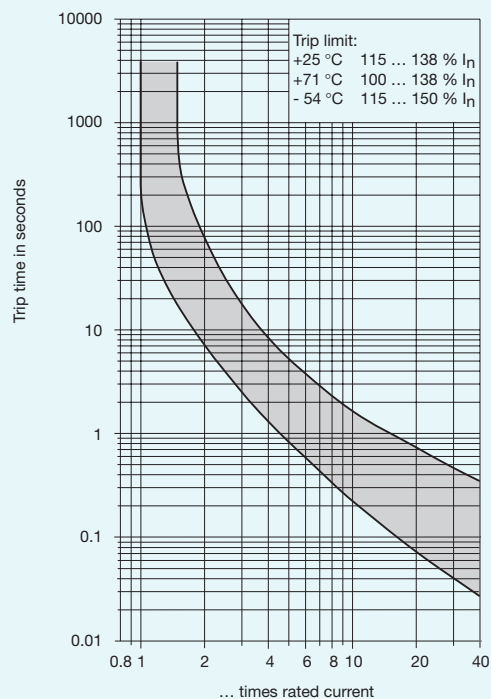
Type 4910 - 01 / - 02 (with auxiliary contacts)



Type 4910 - 03 / - 04 (without auxiliary contacts)



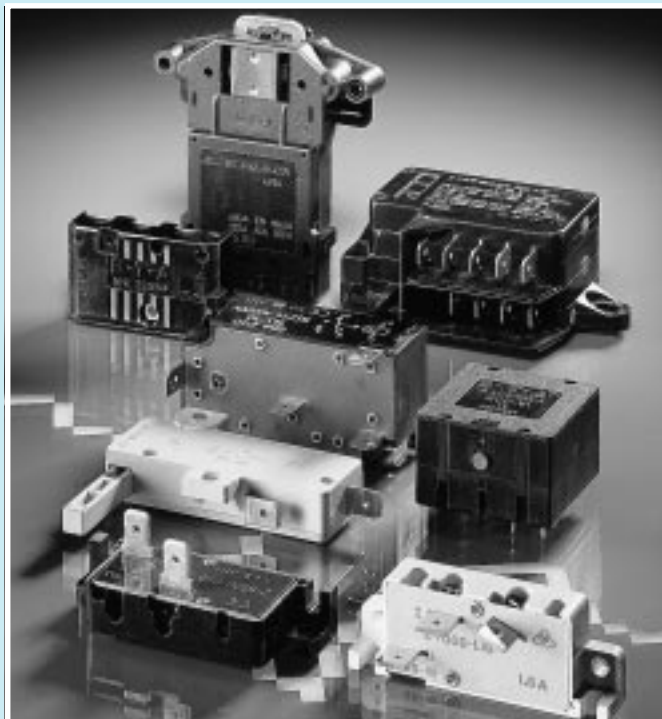
Typical time/current characteristics



Door Locking Relays Time Delay Relays Motor Protection Controls Motor Start Switches

Voltage ratings max. 3 AC 400 V, AC 250 V
DC 28 V

Current ratings 0.1...16 A



Door Locking Relays

E-T-A door locking relays are designed to increase the safety of washing machines, dishwashers, microwave ovens and similar appliances. By ensuring that their doors cannot be opened whilst the machine is operating, users are protected from moving parts, high temperatures, steam, harmful radiation and other hazards.

Suited both to domestic and heavy duty professional equipment, these relays offer a choice of thermal or magnetic sensing element, with versions for current and voltage control.

Energising the relay activates the door locking mechanism, while de-energisation keeps the door locked for a pre-determined time until it is safe to be opened again.

The E-T-A door locking relay series 6510 has been specifically developed to comply with the requirements of IEC 335-2-25 (Safety for Household and Similar appliances). The product is in modular form and offers door closed signalling and locking possibilities for applications such as microwave ovens with pyrolytic cleaning.

The choice of door locking relays available provides flexibility for the designer while ensuring that the legislative demands of different markets can be successfully satisfied.

Time Delay Relays

The E-T-A series 664 is a voltage activated thermal time delay relay suitable for a wide range of applications and process control applications. The excitation circuit and load switching changeover contacts are electrically separate. Delay times can be specified in fixed steps up to sixty seconds.

Motor Protection Controls

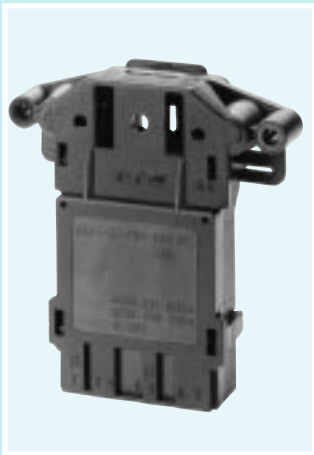
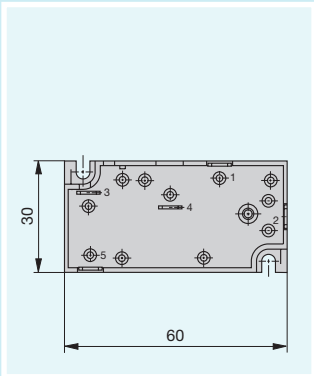
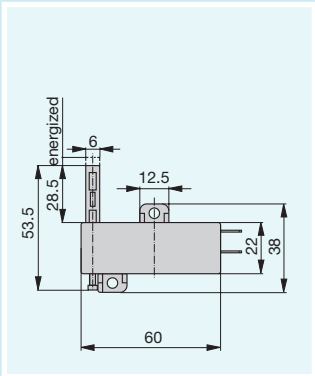
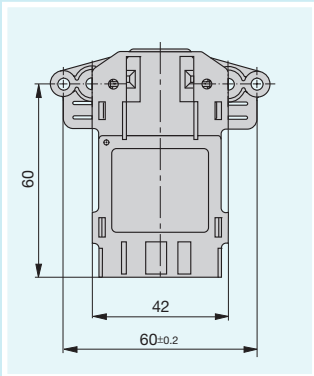
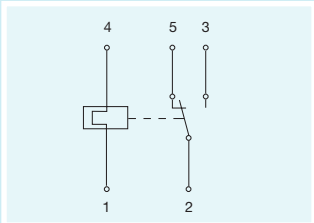
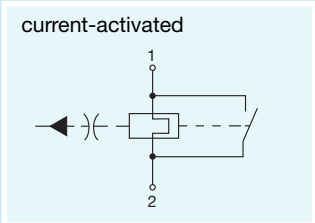
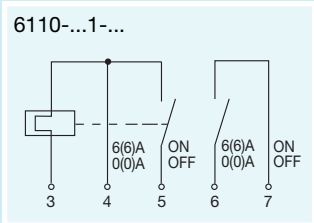
Series 2-6500 and 2-6700 over current protection devices with automatic reset actuation are particularly suitable for motor control and similar applications. They are designed to distinguish between temporary overloads, for example motor start conditions, and sustained faults such as locked rotor. A reset delay provides an opportunity for the equipment protected to cool before power is re-applied, and the need for operator intervention is avoided.

Motor Start Switches

E-T-A Motor Start Switches offer a simple and rugged method of disconnecting the auxiliary windings and start capacitors of single phase AC motors. Featuring current sensitive bimetal controlled mechanisms, their switching time is a function of the starting current and its duration.

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.

Time Delay Relays - Door Locking Systems

Type No.	664-...	683-...	6110-...
			
Description	Bimetal operated voltage activated time delay relay, with change over contact and snap action mechanism. Excitation circuit and switching circuit are electrically separate	Bimetal operated voltage or current activated door locking relay. Choice of actuator lengths. Aux. contact optional	Bimetal operated voltage activated door lock for washing machines
Max. voltage rating	AC 250 V (50/60 Hz); DC 24 V	AC 250 V (50/60 Hz)	AC 250 V (50/60 Hz)
Current rating of switching circuit/auxiliary contact	5 (2A)	2 (0.3) A 16 (4) A switch on only	4-5/6-7 6A (6A) switch-on only
Operating voltages or currents	AC 4...240 V	0.1...5 A AC 24...240 V	AC 120...240 V
Typical life	100,000 operations with 1 x I _N	10,000 operations with 1 x I _N	5,000 operations with 1 x I _N for circuit 4-5 5,000 operations with 1 x I _N for circuit 6-7
Overexcitation or interrupting capacity	1.4 U _N continuously up to 3 U _N short-time		
Approvals		VDE, Demko, Nemko, Semko, Fimko, Kema, SEV, ÖVE, IMQ, UTE	VDE, KEMA, SEV, Fimko, Demko, Nemko, IMQ
Available options	see pages 267 - 268	see pages 269 - 270	see pages 271 - 272
Dimensions			
Internal wiring diagrams			

Door Locking Relays - Motor Protection Controls

6510-F...



Magnetic door lock for cookers with pyrolytic cleaning and microwave ovens

AC 230 V (50/60 Hz)

13-14/33-34 16 A (6A)
23-24 10 A (4A)

AC 230...240 V

500 operations for circuit 33-34
100,000 operations for circuit 13-13
and 23-24

VDE, KEMA, Demko, Nemko,
Fimko, ÖVE, IMQ, Semko

see pages 273 - 274

2-6500-...



Single pole bimetal operated motor protection control, surface mounting with flange, automatic re-set type

AC 250 V (50/60 Hz); DC 28 V

0.1...10 A

100,000 operations with $2 \times I_N$

$8 \times I_N$

VDE, Semko, UL

see pages 275 - 276

2-6700-...



Single pole bimetal operated motor protection control, surface mounting, automatic re-set type

AC 250 V (50/60 Hz); DC 28 V

0.1...10 A

100,000 operations with $2 \times I_N$

$8 \times I_N$

VDE

see pages 275 - 276

3620-...



Three pole, voltage-sensitive thermal relay with bimetal operation and auxiliary contact

3 AC 400 V (50/60 Hz)

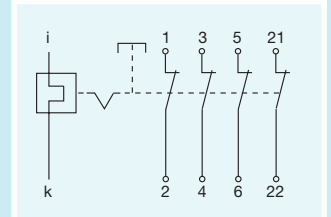
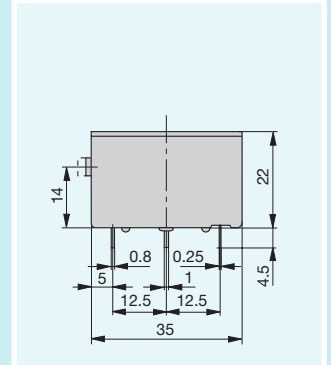
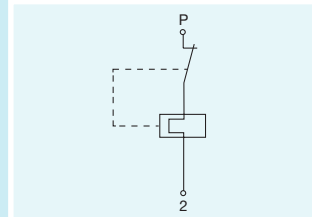
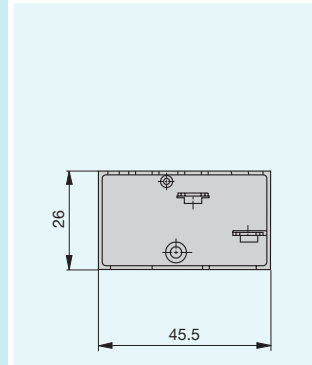
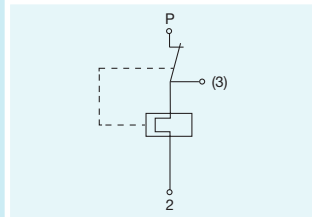
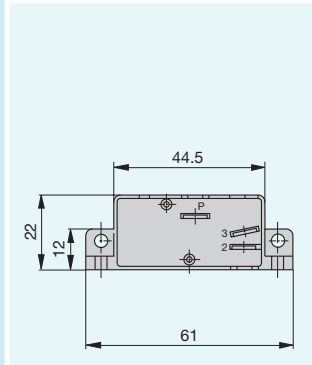
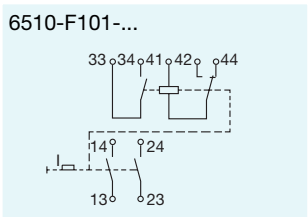
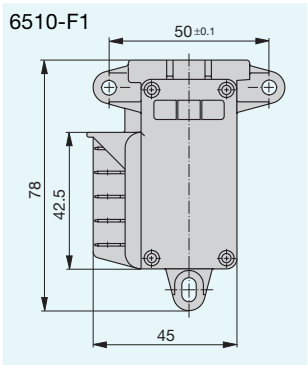
≤ 10 A

$\leq$ AC 230 V (50/60 Hz)

1,000 operations at I_N

300 operations with 20 A

see pages 277 - 278

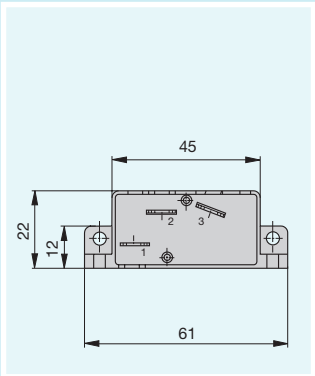


Type No. 2-7000-...

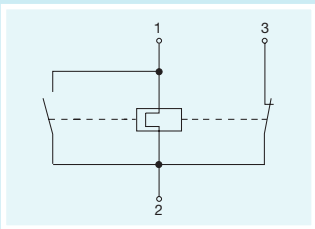


Description	Current sensitive bimetal operated relay for disconnecting auxiliary windings and start capacitors
Max. voltage rating	AC 250 V (50/60 Hz)
Current rating of switching circuit	10 (5) A
Operating voltages or currents	0.2...10 A
Typical life	100,000 operations at 1 x I _N
Interrupting capacity	4 I _N , max. 20 A
Approvals	VDE
Available options	see pages 279 - 280

Dimensions



Internal wiring diagrams



Time Delay Relay 664-...

Description

Voltage activated bimetal operated time delay relay with changeover contact and snap action mechanism, excitation circuit and switching circuit electrically separate, operation independent of mounting attitude. High shock resistance. Delay times can be factory-preset as desired. The continuous excitation voltage may be up to 1.4 times the rated value. To shorten the switching time the excitation voltage may be increased to 3 times the rated value but only for that switching time period.

Typical applications

Process control, diesel engine pre-heaters

Ordering information

Type No.	
664	thermal time delay relay with changeover contact
Terminal design	
P10	5 blade terminals 6.3x0.8
P19	printed circuit board pins
Operating voltage*	
AC 4...240 V	
Switching time*	
20...60 sec	
Reset time*	
20...60 sec	

664 - P10 - 230 V - 20 - 40 ordering example

*Please indicate the desired switching time, reset time and operating voltage when ordering. The sum of switching and reset time should be between 60 and 120 s.

Standard operating voltages and typical internal resistance values

Operating voltage (V)	Internal resistance (Ω)	Operating voltage (V)	Internal resistance (Ω)
4	3.4	24	200
6	7.6	48	725
8	16	60	1,200
10	26.5	115	4,000
12	40	230	16,700
16	73	240	16,700
20	134		



664-...

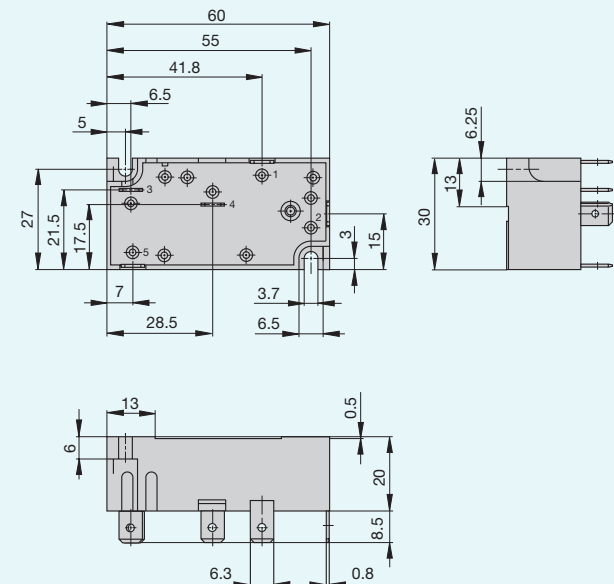
Technical data

Voltage rating	AC 250 V (50/60 Hz); DC 24 V	
Current rating of switching circuit	5 (2) A	
Operating voltages	AC 4...240 V	
Switching/ reset times in sec	approx. 20 approx. 25 approx. 30	approx. 40 approx. 50 approx. 60 The sum of switching time and reset time should be between 60 and 120 s
Typical life	100,000 operations at 1xI _N	
Ambient temperature	-30...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A) excitation circuit/ switching circuit	Test voltage AC 2,000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Overexcitation	1.4 U _N continuously up to 3 U _N short-time	
Degree of protection (IEC 529/DIN 40050)	housing IP 30 terminal area IP 00	
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH test to IEC 68-2-3, test Ca	
Mass	approx. 31 g	

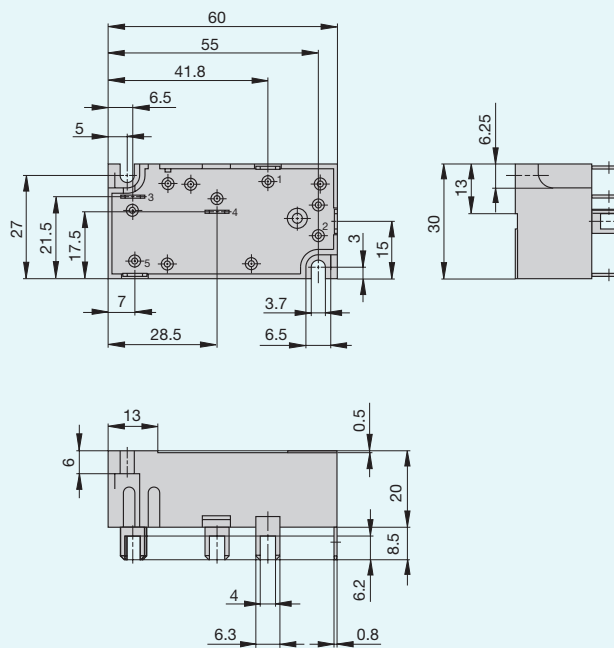
ET-A® Time Delay Relay 664-...

Dimensions

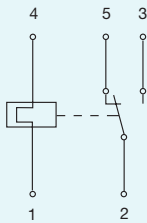
664-P10



664-P19



Internal wiring diagram



E-T-A® Door Locking Relay 683-...

Description

Voltage or current activated bimetal operated door locking relay in creepage resistant and flame retardant housing. Choice of actuator lengths. Auxiliary contacts optional.

Typical applications

Washing machines

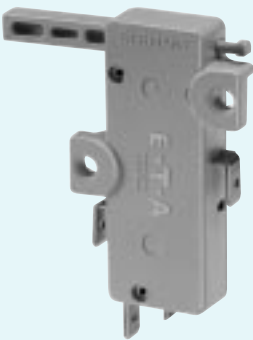
Ordering information

Type No.	
683	door locking relay
Terminal design	
P10	blade terminals 6.3-0.8
Auxiliary contacts	
Si1	current and voltage activated, 2 (0.3) A, N/O
Si2	current and voltage activated, N/C
Si50	voltage activated 16 (4) A, N/O
Housing	
KF	for tropical and high humidity conditions
Variant	
...	special suffix number for actuator length or style etc.
Operating current or voltage	
0.1...5 A	
AC 24...240 V	

683 - P10 - Si50 - KF - ... - 230 V ordering example

Approvals

Authority	Voltage rating	Current rating
VDE, Demko, Nemko, Semko, Fimko, Kema, SEV, ÖVE, IMQ, UTE	AC 250 V	2 (0.3)A, 16 (4)A



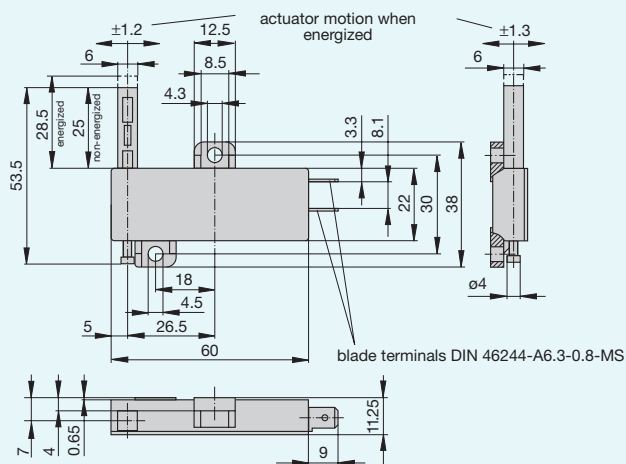
683-...

Technical data

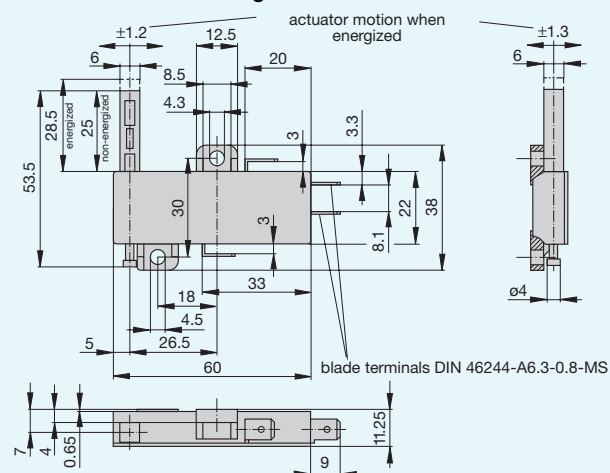
Voltage rating	AC 250 V (50/60 Hz)	
Current ratings:	circuit Si1, Si2	2 (0.3) A
	circuit Si50	16 (4) A switch on only
Operating voltages	AC 24...240 V	
Operating currents	0.1...5 A	
Typical life	10,000 operations at 1xI _N	
Ambient temperature	0... +80 °C (T 80)	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage	Pollution degree 3
	2.5 kV	
Dielectric strength (IEC 664 and 664A)	Test voltage AC 2,000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Locking time (23°C)	< 20 sec depending on excitation	
Release time (23°C)	> 40 sec depending on application	
Actuator travel	max. 3.5 mm	
Actuator force	max. 0.2 N	
Degree of protection (IEC 529/DIN 40050)	actuator area IP 20 terminal area IP 00	
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	15 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 22 g	

Dimensions

683-P10-KF-... current activated

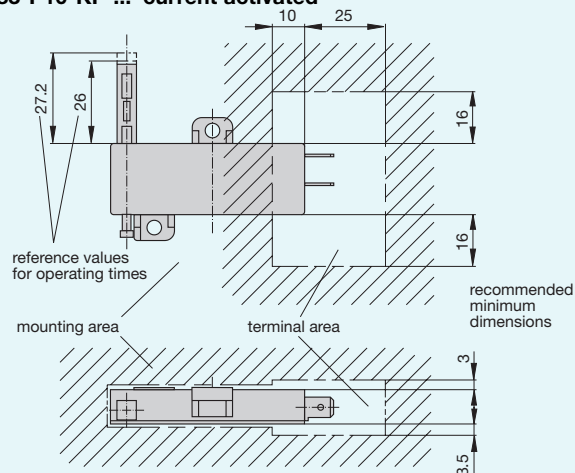


683-P10-Si50-KF-... voltage activated

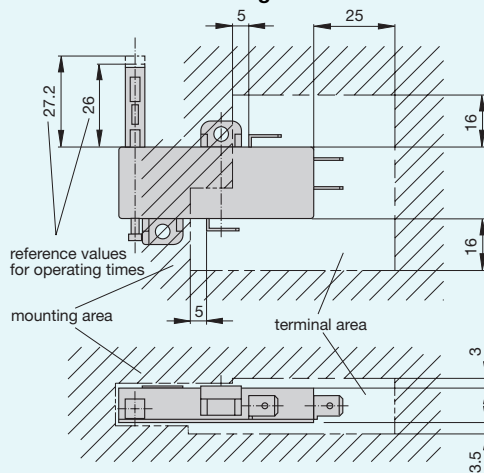


Installation drawings

683-P10-KF-... current activated

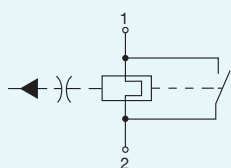


683-P10-Si50-KF-... voltage activated

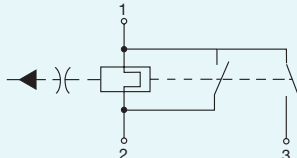


Internal wiring diagrams

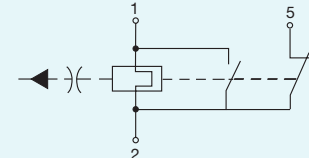
683-P10-KF current activated



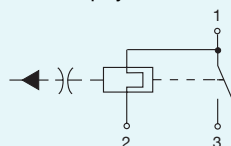
683-P10-Si1-KF current activated



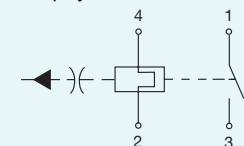
683-P10-Si2-KF current activated



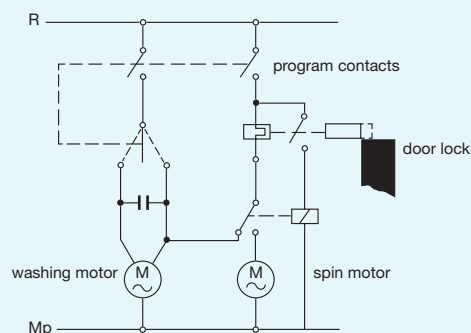
683-P10-Si50-KF voltage activated, without physical isolation



683-P10-Si50-KF voltage activated, with physical isolation



Application circuit 683-P10



ET-A® Door Locking Relay 6110-...

Description

Bimetal operated voltage activated door lock for washing machines, ensuring compulsory and permanent contact separation when the door is forced open. With standard keyed connectors.

Typical applications

Washing machines

Ordering information

Type No.	
6110	voltage activated door locking relay
Configuration/mounting method	
F	flange mounting
Lock	
1	for door catch
3	for door pin
Number of poles	
0	unprotected on all poles
Circuit variants	
1...6	see circuit variants shown overleaf
Terminal design	
P1	blade terminals 6.3-0.8
Characteristic curve	
X0	switch only (version -F.6) (without lock)
X2	standard curve: 230 V locking time ≤10 s release time: 40-100 s (at 23°C)
X3	standard curve: 110 V locking time: ≤16 s release time: 40-100 s (at 23°C)
Slide positioning	
R1	with locating position
Rating	
	operating voltage in V

6110

-

F

1

0

1

-

P1

X2

-

R1

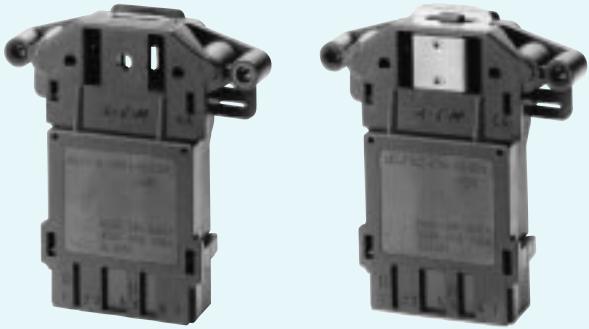
-

230 V

ordering example

Approvals

Authority	Voltage ratings	Current ratings
VDE, Kema, SEV,	AC 250 V	16 (6) A
Fimko, Demko, Nemko,		
IMQ		



6110-F10.-P1X.-...

6110-F30.-P1X.-...

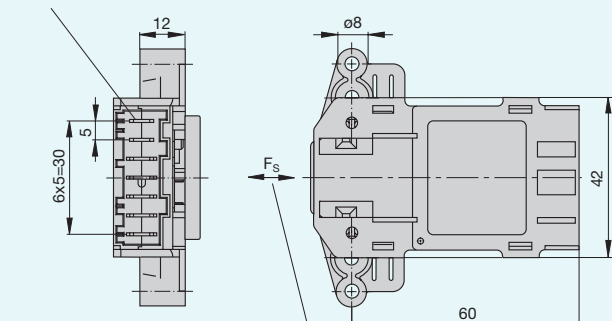
Technical data

Voltage rating	AC 250 V, 50/60 Hz	
Current ratings	for circuit 4-5 (μ)	6 A (6 A) switch on only
	for circuit 6-7	6 A (6 A) switch on only
Operating voltages 3-4	AC 120...AC 240 V	
Typical life	for circuits 4-5	5,000 operations at 1xI _N
	for circuits 6-7	5,000 operations at 1xI _N
Ambient temperature	0...+80 °C T 80	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage	Pollution degree 3
	2.5 kV	reinforced insulation at locking aperture
Dielectric strength (IEC 664 and 664A locking aperture circuit 3-4-5/6-7)	Test voltage AC 4,000 V AC 2,000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Degree of protection (IEC 529/DIN 40050)	locking aperture IP 33 terminal area IP 00	
Vibration	5 g (57-500 z), ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	15 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to IEC 68-2-3, test Ca	
Operating force	F1: 3...10 N F3: < 68 N	
Locking force	F1: ≥ 400 N F3: ≥ 200 N	
Mass	approx. 46 g	

ET-A® Door Locking Relay 6110-F10.-P1X.-...

Dimensions 6110-F10-... for door pin

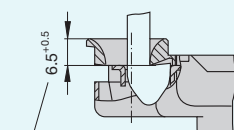
standard keyed connectors code W
for thermal door locking
blade terminals DIN 46244-A6.3-0.8-MS



door catch in
operating mode

operating force for slide:
locking force of the device:

3 - 10 N
min. 400 N

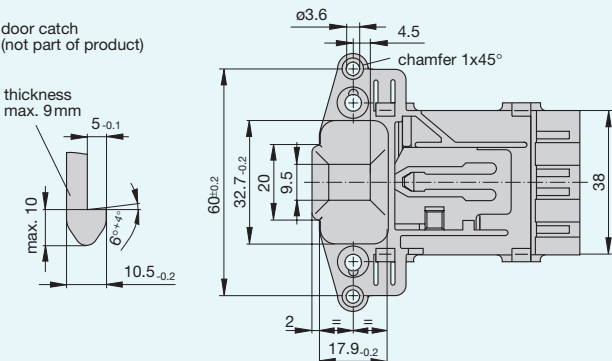


engaged length of
the door catch

4 - 5 mm slide movement in one
direction (→)

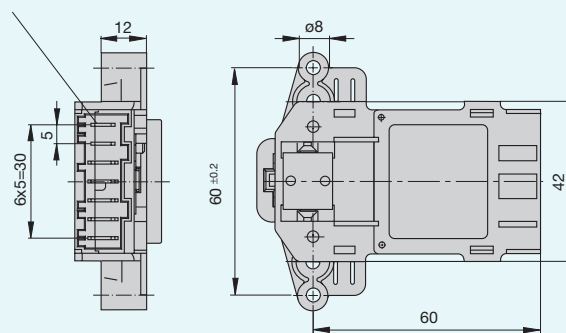
door catch
(not part of product)

thickness
max. 9 mm



Dimensions 6110-F30-... for door catch

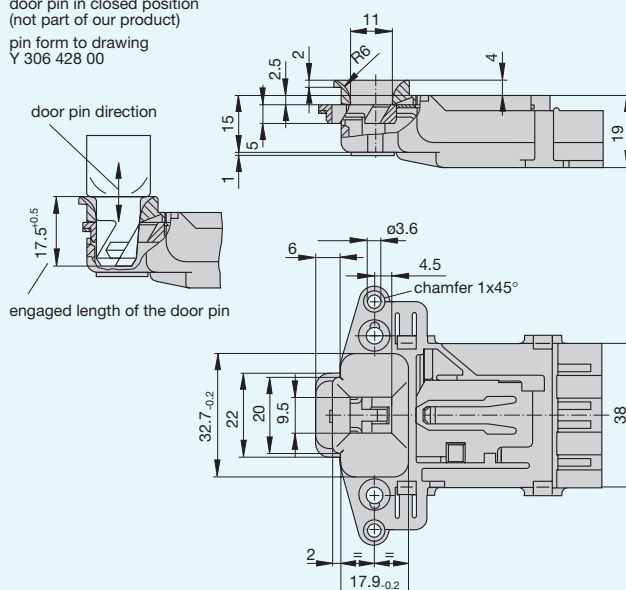
standard keyed connectors code W
for thermal door locking
blade terminals DIN 46244-A6.3-0.8-MS



door pin in closed position
(not part of our product)
pin form to drawing
Y 306 428 00

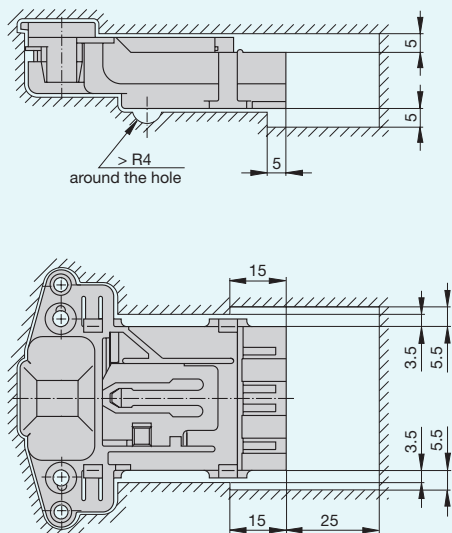
door pin direction

engaged length of the door pin



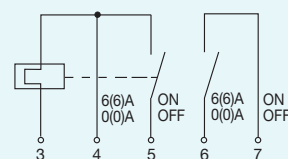
5

Installation drawing

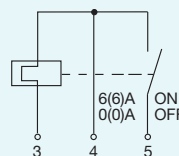


Circuit variants

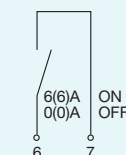
6110-...1-...



6110-...3-...



6110-...6-...



ET-A® Door Locking Relay 6510-...

Description

Safety systems for cookers with pyrolytic cleaning facility and microwave ovens according to IEC Standard 335-2-25.

6510-F2: contact system for application in microwave ovens, with one or two auxiliary contacts to monitor latching of the door striker.

6510-F1: same basic unit as type 6510-F2, with an additional bistable electro-magnetic locking mechanism to ensure that the door is closed during pyrolytic cleaning.

Operating temperatures up to +120°C.

Typical applications

Cookers with or without pyrolytic cleaning facility, microwave ovens

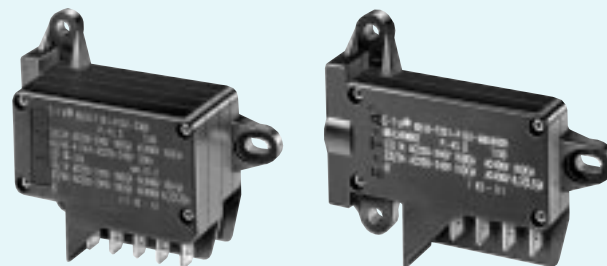
Ordering information

Type No.	
6510	door locking relay
Configuration/mounting method	
F	flange mounting
Size	
1	contact system with additional bistable electro-magnetic locking mechanism (for cookers with pyrolytic cleaning facility)
2	contact system for microwave ovens
Number of poles	
0	unprotected on all poles
Style, accessories (circuit variants)	
1	2 switch contacts (two NO contacts)
2	1 switch contact (one NO contact)
3	2 switch contacts (one each NO/NC contact)
Terminal design	
P1	blade terminals 6.3-0.8 mm
Characteristic data	
Q1	Switch: max. 500 magnetic locking and unlocking cycles switching contacts: max. 100,000 cycles Contact load: terminal 13-14: 16 (6) A terminal 33-34: 16 (6) A terminal 23-24: 10 (4) A
Q2	Switch: max. 500 magnetic locking and unlocking cycles switching contacts: max. 100,000 cycles Contact load: terminal 13-14: 16 (6) A terminal 33-34: 16 (6) A terminal 23-24: DC 5 V / 100 µA
Rating	
AC 230-240 V 1 % ON duty / 10 sec	

6510 - F 1 0 1 - P1 Q1 - 230 V ordering example

Approvals

Authority	Voltage ratings	Current ratings
VDE	AC 230 V	16 (6) A, 10 (4) A
Kema, Demko, Nemko, Fimko, ÖVE, IMQ Semko (only -F2)		



6510-F1...

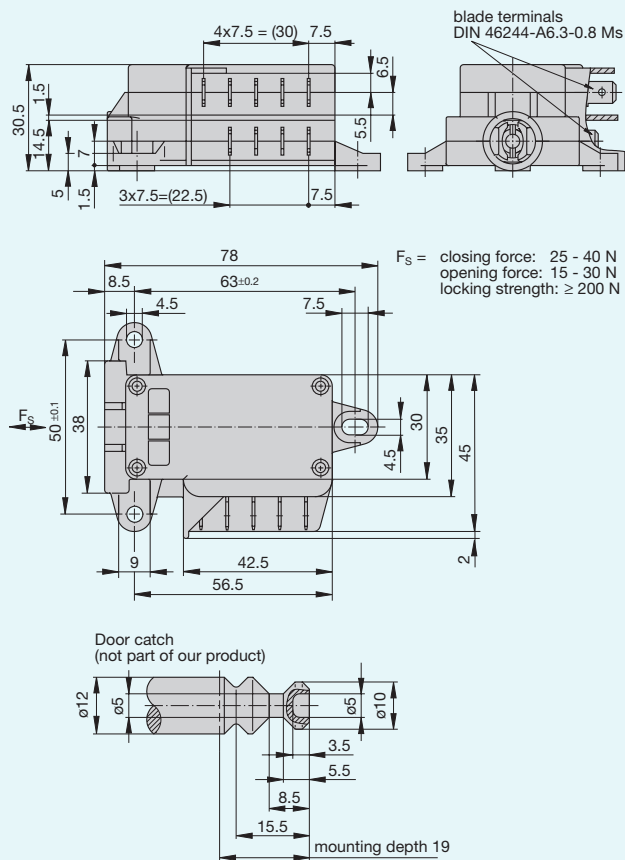
6510-F2...

Technical data

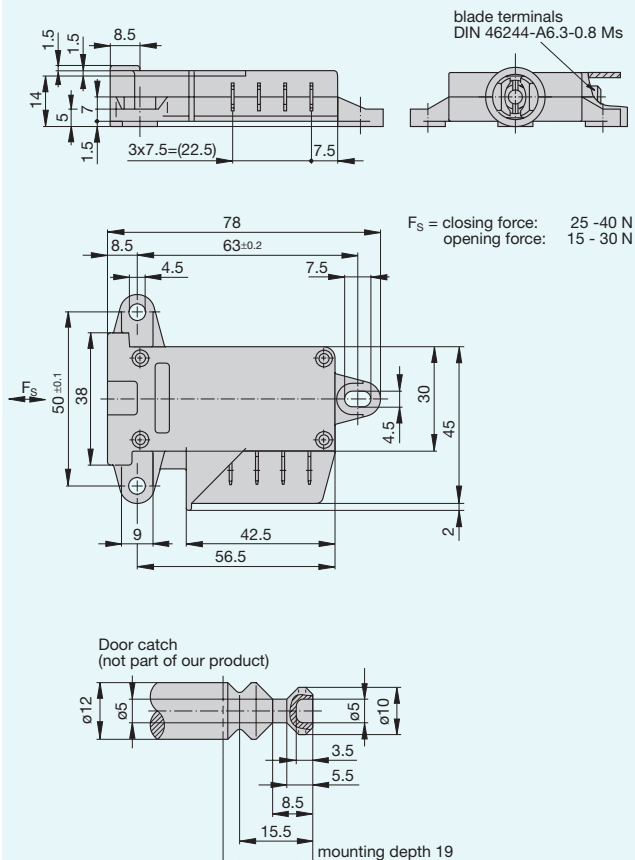
Voltage rating	AC 230 V, 50/60 Hz (other voltages to special order)	
Current ratings	circuits 13-14 (-F1/-F2) and 33-34 (-F1) 16 A (6 A) circuit 23-24 10 A (4 A)	
Coil (-F1 only) excitation	AC 230-240 V, approx. 8 A	
duty cycle	1 % ON duty / 10 s	
Typical life (VDE 0630)	100,000 operations at 1xI _N for circuits 13-14 and 23-24	
Typical life (VDE 0435)	500 operations at 1xI _N for circuit 33-34 (-F1 only) - pyrolysis	
Ambient temperature	0...150 °C (T 150) coil function temp. (-F1 only): +80...+120 °C	
Temperature at mounting means	max. +180 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 3 reinforced insulation at locking aperture
Dielectric strength (IEC 664 and 664A)	Test voltage locking aperture AC 4,000 V circuits 13-14/23-24 between circuits 13-14/23-24 and 33-34 (-F1 only) between circuits and energization (-F1 only)	AC 2,000 V AC 4,000 V AC 2,000 V
Insulation resistance	>100 MΩ (DC 500 V)	
Degree of protection (IEC 529/DIN 40050)	locking aperture IP 33 terminal area IP 00	
Vibration	5 g (57-500 z), ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	15 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	96 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH to DIN 40046, sheet 5, test Ca	
Locking strength (-F1)	≥ 200 N	
Mass	-F1: approx. 75 g	-F2: approx. 36 g

ET-A® Door Locking Relay 6510-...

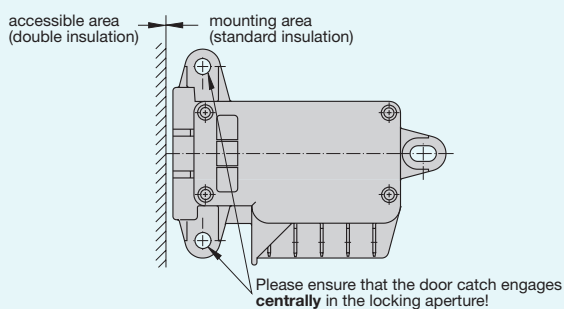
Dimensions 6510-F1



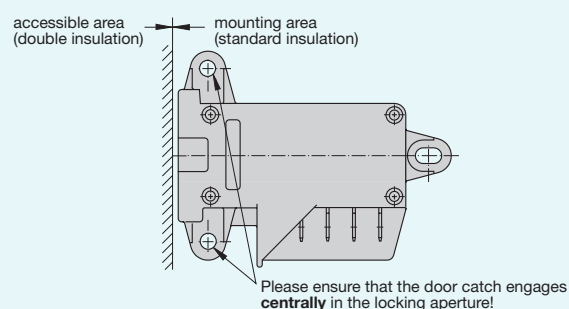
Dimensions 6510-F2



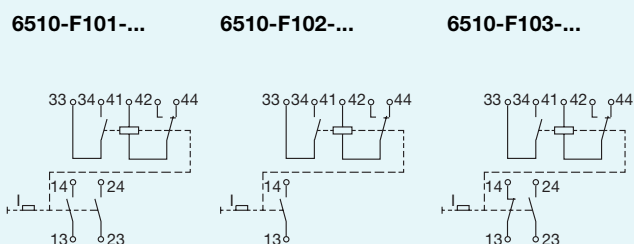
Installation drawing 6510-F1



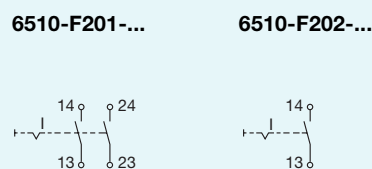
Installation drawing 6510-F2



Internal wiring diagrams 6510-F1..



Internal wiring diagrams 6510-F2..



E-T-A® Motor Protection Controls 2-6500-.../2-6700-...

Description

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

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

Typical applications

Motors, transformers, extra low voltage wiring

Ordering information

Type No.	
2-6500	surface type with flange
2-6700	surface type without flange
Terminal design	
P10	blade terminals 6.3-0.8
Shunt terminal (optional)	
A3	blade terminals or solder terminals; max. load 5 A
Current ratings	
0.1...10 A	

2-6500 - P10 - - 6 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)
0.1	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
VDE	AC 250 V	0.1...10 A
UL	AC 250 V, DC 28 V	0.1...15 A (2-6500 only)
Semko	AC 250 V	0.1...10 A (2-6500 only)

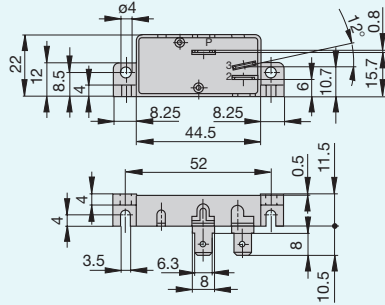


Technical data

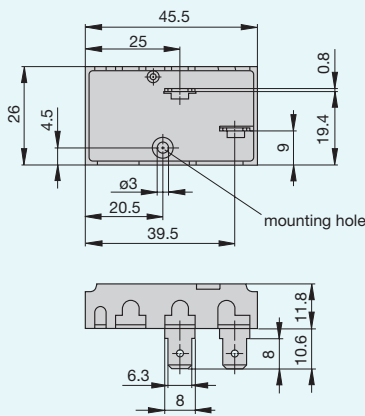
Voltage rating	AC 250 V, 50/60 Hz; DC 28 V	
Current ratings	0.1...10 A	
Typical life	100,000 operations at $2 \times I_N$ Protection is ensured for 18 days of continuous locked rotor condition with $I_k \leq 6 \times I_N$, max. 30 A, (unsupervised duty)	
Ambient temperature	-10...+60 °C	
Insulation co-ordination (IEC 664 and 664 A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage AC 2,000 V	
Insulation resistance	> 100 M Ω (DC 500 V)	
Interrupting capacity	8 x I_N (co-co-co)	
Degree of protection (IEC 529/DIN 40050)	housing IP 30 terminal area IP 00	
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	15 g (11 ms) test to IEC 68-2-27, Test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH test to IEC 68-2-3, test Ca	
Mass	2-6500: approx. 20 g 2-6700: approx. 25 g	

Dimensions

2-6500-P10 (A3)

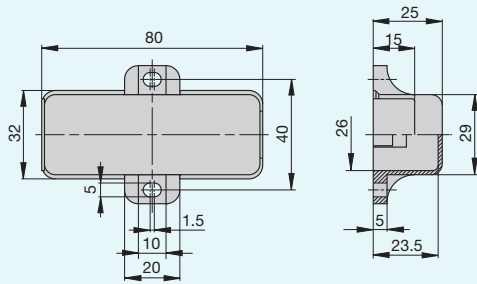


2-6700-P10



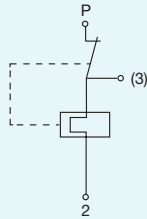
Accessories for type 2-6500

Water splash cover Y 302 151 01
with flange and holes that may be filed out for cable entry

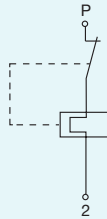


Internal wiring diagram

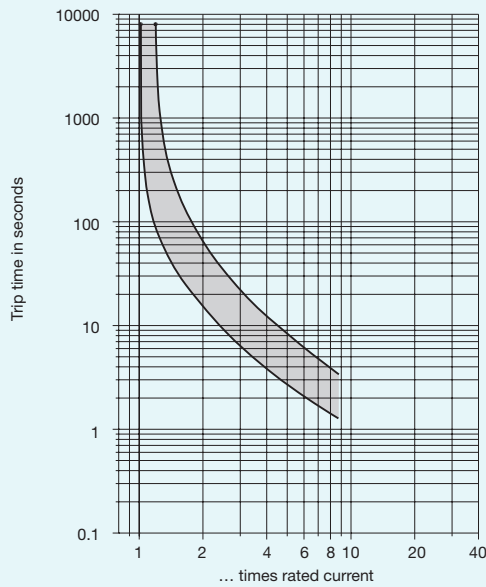
2-6500-...



2-6700-...



Typical time/current characteristics at 23 °C



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	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.84	0.92	1	1	1	1.08	1.16	1.24

Description

Three pole, voltage-sensitive thermal relay with bimetal operation, auxiliary circuit and manual reset button. Suitable for PCB mounting.

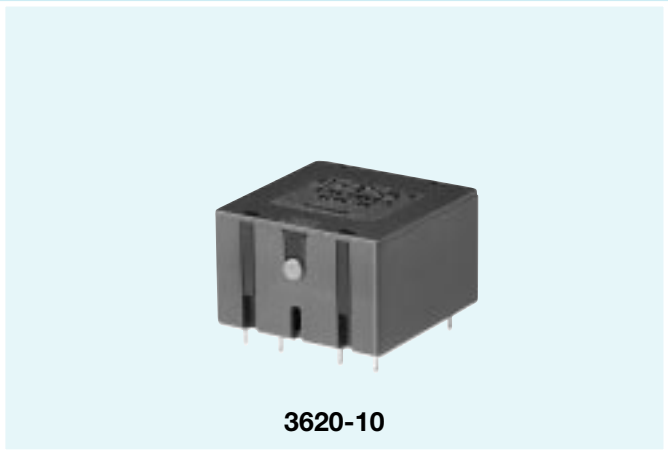
Typical applications

Motor protection

Ordering information

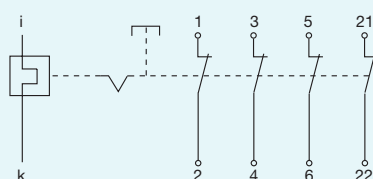
Type No.	
3620	Three pole thermal relay
Configuration	
10	standard version
Voltage rating	
400 V	

3620 - 10 - 400 V ordering example



Technical data

Voltage rating	3 AC 400 V (50/60 Hz)	
Current rating	≤ 10 A	
Auxiliary circuit	1 A AC 230 V	
Excitation voltage	≤ AC 230 V (50/60 Hz)	
Typical life	1,000 operations at I _N	
Ambient temperture	0...+100°C	
nsulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 2 reinforced insulation in operating area
Dielectric strength (IEC 664 and 664 A)	Test voltage operating area AC 4000 V mounting area AC 2000 V circuit/circuit AC 2000 V circuit/excitation AC 2000 V	
Insulation resistance	> 100 MΩ (DC 500 V)	
Trip time at 23 °C	< 30 sec	
Reset time at 23 °C (without load period)	< 80 sec	
Interrupting capacity	300 operations with 20 A	
Degree of protection (IEC 529/DIN 40050)	IP 00 terminal area IP 40 operating area	
Vibration	5 g (57-500 Hz), ± 0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc 10 frequency cycles/axis	
Shock	15 g (11 ms) to IEC 68-2-27, test Ea	
Corrosion	48 hours in 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	168 hours at 95 % RH to IEC 68-2-3, test Ca	
Mass	approx. 25 g	



E-T-A® Motor Start Switch 2-7000-...

Description

Bimetal operated current sensitive relay for disconnection of auxiliary windings and start capacitors of single phase AC motors. The operating time of the auxiliary winding is a function of the starting current and its duration. High contact pressure reduces sensitivity to shock and vibration - no contact sticking.

Other features: independent of mounting position and location. Under stalled motor conditions the auxiliary winding and/or the starting capacitor will remain disconnected avoiding damage to the motor.

See page 281 for additional information.

Typical applications

Single phase AC motors

Ordering information

Type No.	
2-7000	motor start switch
Terminal design	
P10	blade terminals 6.3-0.8
Housing (optional)	
KF	for tropical and high humidity conditions
Current ratings	
0.2...10 A	

2-7000 - P10 - KF - 6 A ordering example

Standard current ratings and typical internal resistance values

Current rating (A)	Internal resistance (Ω)	Current rating (A)	Internal resistance (Ω)
0.2	91	2.5	0.53
0.5	16	3	0.435
0.8	6	4	0.342
1	3.65	5	0.27
1.3	2.17	6	< 0.02
1.5	1.62	7	< 0.02
1.8	1.10	8	< 0.02
2	0.97	10	< 0.02

Approvals

Authority	Voltage rating	Current rating
VDE	AC 250 V	0.1...10 A



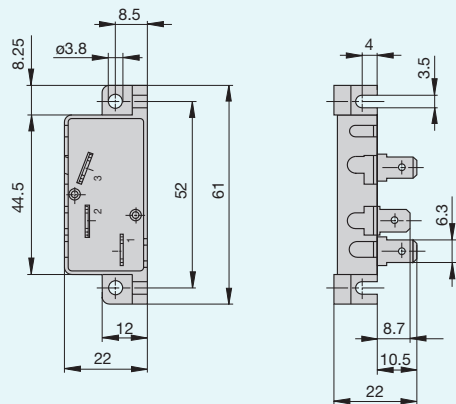
2-7000-...

Technical data

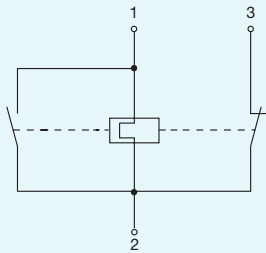
Voltage rating	AC 250 V, 50/60 Hz	
Current rating of switching circuit	10 (5) A	
Current rating of excitation circuit	0.2...10 A	
Typical life	100,000 operations at 1xI _N	
Ambient temperature	0...+60 °C	
Insulation co-ordination (IEC 664 and 664A)	Rated impulse withstand voltage 2.5 kV	Pollution degree 3
Dielectric strength (IEC 664 and 664A)	Test voltage AC 2,000 V	
Insulation resistance	>100 MΩ (DC 500 V)	
Interrupting capacity	4 x I _N (co-co-co)	
Degree of protection (IEC 529/DIN 40050)	housing IP 30 terminal area IP 00	
Vibration	5 g (57-500 Hz) ±0.38 mm (10-57 Hz) to IEC 68-2-6, test Fc, 10 frequency cycles/axis	
Shock	25 g (11 ms) test to IEC 68-2-27, Test Ea	
Corrosion	48 hours at 5 % salt mist to IEC 68-2-11, test Ka	
Humidity	240 hours at 95 % RH test to IEC 68-2-3, test Ca	
Mass	approx. 18 g	

ET-A® Motor Start Switch 2-7000-...

Dimensions

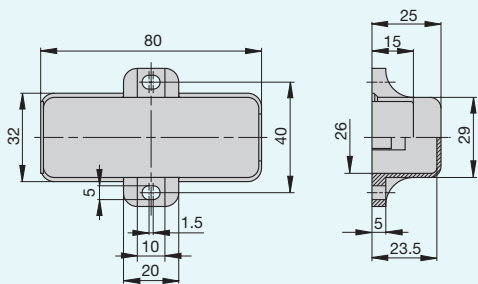


Internal wiring diagram

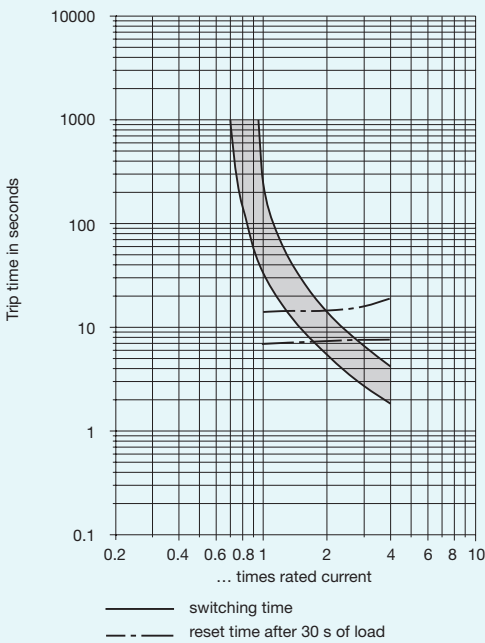


Accessory

Water splash cover
Y 302 151 01
with flange and holes that may be filed out for cable entry



Typical time/current characteristics at 23 °C



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	-10	0	+10	+23	+30	+40	+50	+60
Multiplication factor	0.84	0.92	1	1	1	1.08	1.16	1.24

Selection of the device

The contacts of type 2-7000 will open when energized so that the lowest possible motor current (e.g. the running current of the motor unloaded) must not be less than the current rating of the motor start switch to ensure that the switch will reconnect the auxiliary phase after completion of the starting process.

The current rating will determine both the switching characteristics and ratings of the contacts.

At the same time the highest possible motor current (short-circuit current at overvoltage) must not exceed 6 times the motor start switch current rating. Normally the A-P-S current rating should be approx. 1/5 of the running current of the motor (see the examples below).

Either wiring a or wiring b should be chosen, giving due consideration to these two extreme conditions.

Wiring information

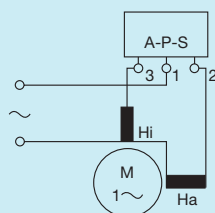
Wiring with motor start switch (A-P-S)

1. Wiring „a“:

For this standard connection please observe the following:

Mains input: terminal 1
Main phase: terminal 2
Auxiliary phase: terminal 3

The overall starting current of the motor determines the switching time of the motor start switch and must not exceed its max. current capacity.

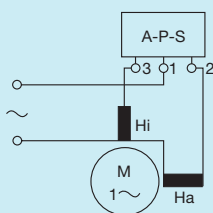


2. Wiring „b“:

This special connection is suitable for motors with relatively high short circuit currents:

Mains input: terminal 2
Main phase: terminal 1
Auxiliary phase: terminal 3

In this case it is only the main phase current that determines the switching time of the motor start switch.



Example for wiring „a“:

Current of the motor unloaded (current rating of the motor)

$$I_o = 2.6 \text{ A} = I_{\min}$$

$$I_N = 3.0 \text{ A}$$

Short-circuit current of the main phase

$$I_{k \text{ Ha}} = 7 \text{ A}$$

$$\text{of main and auxiliary phase } I_{k \text{ Ha} + \text{Hi}} = 12 \text{ A} = I_{\max}$$

Formula for the motor start switch:

$$\text{Current rating} = 1/5 I_{\max} = 1/5 \cdot 12 = 2.4 \text{ A}$$

i.e. a motor start switch current rating of 2.5 A (e.g. 2-7000-P10-KF-2.5 A) should be selected.

With wiring „a“ the overall current of the motor flows through the bimetal heater (terminal 1). The max. possible current of 12 A is lower than $6 \times 2.5 = 15 \text{ A}$, the highest admissible load for the motor start switch. Furthermore the lowest possible motor current (2.6 A) is higher than the motor start switch current rating, ensuring that the auxiliary phase will remain disconnected even when the motor is unloaded.

Example for wiring „b“:

$$\text{Current of the motor unloaded: } I_o = 1.5 \text{ A} = I_{\min}$$

Other motor data as indicated in example „a“.

As in this case the motor start switch current rating must be selected according to the lower minimum current value, only the short-circuit current of the main phase (7 A) may flow through the bimetal heater (terminal 1) in order to prevent overloading.

$$\text{Current rating} = 1/5 I_{k \text{ Ha}} = 1/5 \cdot 7 = 1.4 \text{ A}$$

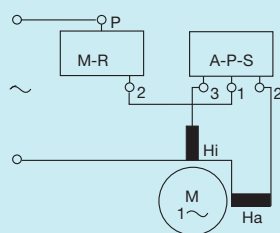
i.e. a motor start switch current rating of 1.5 A (e.g. 2-7000-P10-KF-1.5 A) should be selected.

The motor start switch rated at 1.5 A must be connected according to wiring „b“. In this case the max. possible load is 7 A, i.e. it is lower than $6 \times 1.5 \text{ A} = 9 \text{ A}$.

The current of the motor unloaded (1.5 A) equals the motor start switch current rating - the auxiliary phase will again remain disconnected.

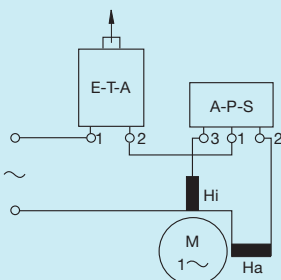
Wiring with Motor Protection Control (M-R):

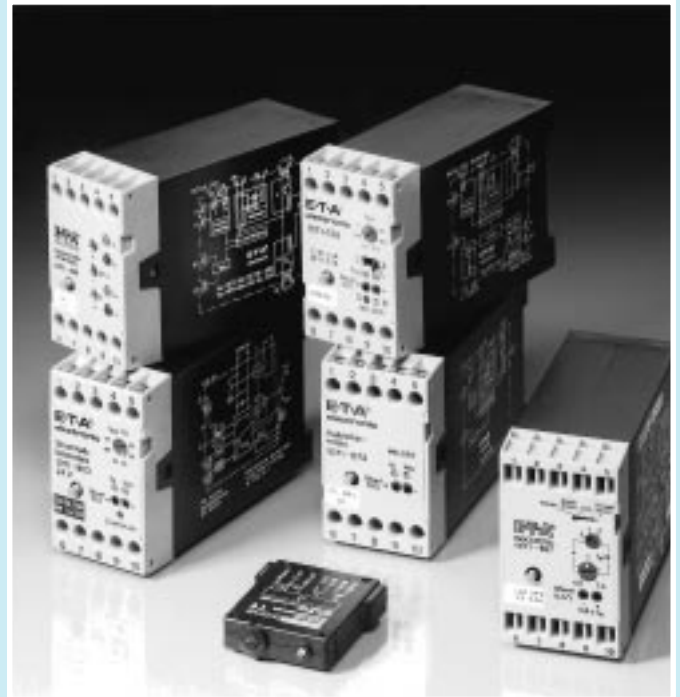
Once the motor has stopped, if an attempt is made to start it again before the motor start switch has reset, a stall condition will result causing the motor protection control to disconnect the supply. The motor start switch contacts will reset, and the motor may be re-started once the motor start switch has closed again automatically.



Wiring with E-T-A Circuit Breaker:

This configuration is recommended where the function of the device or equipment is supervised and resetting should only be made manually (e.g. circular saws). Operation of the motor start switch is otherwise the same.





E-T-A Solid State Remote Power Controllers (SSRPCs)

E-T-A solid state remote power controllers combine solid state switching with electronic overload protection and current limiting characteristics. Selected models also include electro-mechanical switching for applications which demand physical contact separation.

These products have been designed for the protection of programmable controller outputs, instrumentation, and process control switching circuits. Their performance characteristics are especially suitable for limiting the high in-rush currents associated with solenoids and other high resistance or inductive loads. Versions are also available for power management control in vehicles and marine craft.

Physical isolation between control and load circuits is assured through inclusion of an opto-coupler in most models, and all types provide fault status and wire break indication. Advanced thickfilm and hybrid circuitry specially developed and manufactured by E-T-A in-house make a significant contribution to the reliability of these products while ease of installation is achieved through convenient industry standard rail or socket mounting.

There is a suitable E-T-A solid state remote power controller for most process control and DC power distribution requirements and characteristics may also be tailored to special circumstances as necessary.

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.

Solid State Remote Power Controllers (SSRPCs)

Type No.	E-1048-600..	E-1071-073-...	E-1071-128-...
			
Voltage rating of load	DC 24 V	DC 24 V	DC 24 V
Current rating of load	0.5 A 1 A 2 A 4 A	0.2 - 3.0 A	0.2 - 3.0 A
Short-circuit limitation	25 A (0.5A/1A rating) 75 A (2 A/4 A rating)	approx. 2.5 x I _N	approx. 2.5 x I _N
Hold current of magnetic coil	N/A	N/A	N/A
Operating voltage of SSRPC	DC 18 ... 36 V	DC 20 ... 48 V	DC 20 ... 48 V
Display	ON indication fault indication	control current load current	control current minimum current ON indication fault indication
Status outputs	fault indication via opto coupler (N/O contact)	fault indication via auxiliary contact (N/O contact)	ON and fault indication via opto coupler
Physical isolation of load circuit (after electronic overload disconnection)		after approx. 5 s	after approx. 5 s
Temperature range	0 °C ... +60 °C	0 °C ... +60 °C	0 °C ... +60 °C
Housing			
- mounting dimensions (W/H/D)	12/50/65 mm (without socket) 12/80/89 mm (with socket type 17)	45 / 74 / 128 mm	45 / 74 / 128 mm
- mounting	rail to EN 50022-35x7.5 when used with socket 17-P-Si (accessory)	rail to EN 50022-35x7.5	rail to EN 50022-35x7.5
Other data	suitable for lamp load		monitoring of minimum current, adjustable between 0.1 and 2.1 A
Technical data	see pages 287 - 289	see pages 291 - 293	see pages 295 - 297

Solid State Remote Power Controllers (SSRPCs)

E-1071-343-...



E-1071-353-...



E-1071-603/607-...



E-1071-803-...



DC 48 V

DC 24 V

DC 24 V

DC 24 V

0.2 - 3.0 A
parallel operation: max. 4 A

0.2 - 3.0 A
parallel operation: max. 4 A

adjustable betw. 0.1 and 3.1 A

0.25 A (3 ... 6 W)
0.40 A (6 ... 10 W)
1 A (15 ... 30 W)
2 A (30 ... 50 W)
3 A (50 ... 75 W)

approx 2.5 x I_N

approx. 2.5 x I_N

approx. 3.5 x I_N

approx. 3.5 x I_N

N/A

N/A

adjustable between
0.06 A and 1.85 A

adjustable between
0.06 A and 0.18 A
0.1 A and 0.3 A
0.25 A and 0.75 A
0.5 A and 1.5 A
0.75 A and 2.25 A

DC 36 ... 60 V

DC 20 ... 48 V

max. DC 60 V

max. DC 60 V

control current
load current

control current
load current

control current
O.K.
wire break
fault

control current
load current
wire break

fault indication via auxiliary
contact (N/O)

fault indication via auxiliary
contact (N/O)

ON and fault indication via opto
coupler

fault indication via auxiliary
contact (N/O)

after approx. 5 s

after approx. 5 s

after approx. 5 s

after approx. 5 s

0 °C ... +60 °C

0 °C ... +60 °C

0 °C ... +60 °C

0 °C ... +60 °C

45 / 74 / 128 mm

45 / 74 / 128 mm

45 / 74 / 128 mm

45 / 74 / 128 mm

rail to EN 50022-35x7.5

rail to EN 50022-35x7.5

rail to EN 50022-35x7.5

rail to EN 50022-35x7.5

double unit

double unit

load current control

load current control

see pages 299 - 301

see pages 303 - 305

see pages 307 - 309

see pages 311 - 313

Solid State Remote Power Controllers (SSRPCs)

Selector chart

Type No.		E-1048-600	E-1071-073	E-1071-128	E-1071-343	E-1071-353	E-1071-603	E-1071-607	E-1071-803
Control circuit									
Control voltage DC 24 V		●	●	●	●	●	●	●	●
Max. switching frequency $f_{\max}$	1 Hz						●	●	●
	10 Hz			●					
	100 Hz		●		●	●			
	500 Hz	●							
Load circuit									
PNP transistor output, plus switching		●							
NPN transistor output, minus switching			●	●	●	●	●	●	●
Current rating	0.5 A	●							
	1 A	●							
	2 A	●							
	3 A		●	●	●	●			
	4 A	●							
Load current (adjustable, pulse-controlled hold current)	max. 0.25 A								●
	max. 0.4 A								●
	max. 1 A								●
	max. 2 A								●
	max. 3 A								●
	max. 3.1 A						●	●	
Short-circuit current, self-limiting		●	●	●	●	●	●	●	●
Physical isolation under fault conditions (short-circuit, overload)			●	●	●	●	●	●	●
Physical isolation by hand release			●	●	●	●	●	●	●
Reverse polarity protection U_B (terminal 1 - terminal 2)			●	●	●	●	●	●	●
Fault signal output									
Opto coupler		●		●			●	●	
Auxiliary contact (N/O)			●		●	●			●
LED		●	●	●	●	●	●	●	●
Constructional features									
Double unit					●	●			
Current measuring terminals			●	●	●	●	●	●	●
Connection									
Blade terminals		●							
Screw terminals			●	●	●	●	●		●
Screw-less connectors								●	

Solid State Remote Power Controller E-1048-600

Description

The E-T-A Solid State Remote Power Controller (SSRPC) E-1048-600 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.
- Fast short-circuit limitation and disconnection
- Time/current dependent overload disconnection
- Remote control
- Fault indication: LED and signal output for overload/short-circuit signalization, and wire break indication in the OFF condition.
- Physically isolated fault indication.
- Compact plug-in type

Ordering information

Type No.	
E-1048	Solid State Remote Power Controller
Version	
600	with physically isolated control input and fault indication output
Voltage rating	
DC 24 V	DC 24 V (standard)
Current ratings	
0.5 A	
1.0 A	
2.0 A	
4.0 A	

E-1048 - 600 DC24 V 1.0 A ordering example

Where wire break and LED indication is not required, please contact us for a thermal-magnetic circuit breaker (e.g. types 2210, 3600, 3900).



E-1048-600

Technical data ($T_A = 25^\circ\text{C}$; at U_N)

Load circuit

Voltage rating U_B	DC 24 V (18...36 V)
Current rating I_N	0.5 A; 1 A; 2 A, 4 A (other ratings to special order)
Closed-circuit current I_S	typically 0.3 mA
Min. load current	> 1 mA
Voltage drop U_{DSmax}	0.15 V; 0.3 V; 0.1 V; 0.2 V
Overload disconnection	approx. $1.4 \times I_N$ 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_E	DC 0 V < low level < 5 V DC 8.5 V < high level < 36 V
Input current I_E	1...10 mA (18...36 V)
Max. switching frequency f_{max}	500 Hz
Reset time after short-circuit/overload disconnection	1 ms

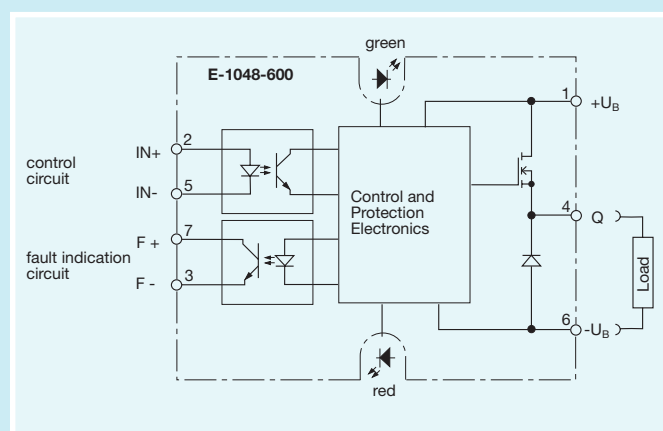
Fault indication output (opto coupler)

Voltage rating range	DC 5...36 V
Max. load current	100 mA ($\Delta U < 2\text{ V}$), with reverse polarity protection
Wire break indication	< 100 μA load current

General data

Temperature range	0 $^\circ\text{C}$... +60 $^\circ\text{C}$
Insulation voltage (IEC 664/VDE 0110)	2.5 kV rms
Mass	28 g

Connection diagram



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_B).

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 overload protection occurs at approx. 1.4 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.

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.

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 μ 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.

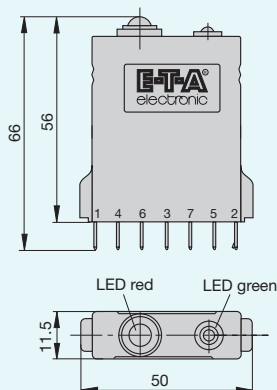
In the OFF condition (i.e. $0 < U_E < 5$ V), this circuit will provide wire break indication, with the transistor output being open.

In the ON condition, the circuit will provide short-circuit and overload monitoring and indication.

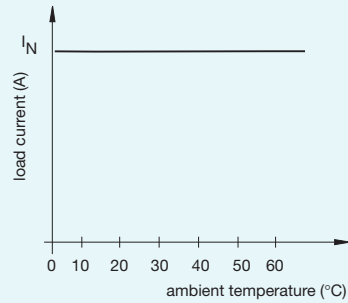
Status indication

Status indication	Fault indication output (opto coupler)	LED green	LED red
Non-conductive, no duty			
Conductive, normal duty			
Overload or short circuit at the output			
Wire break, in the OFF condition			

Dimensions

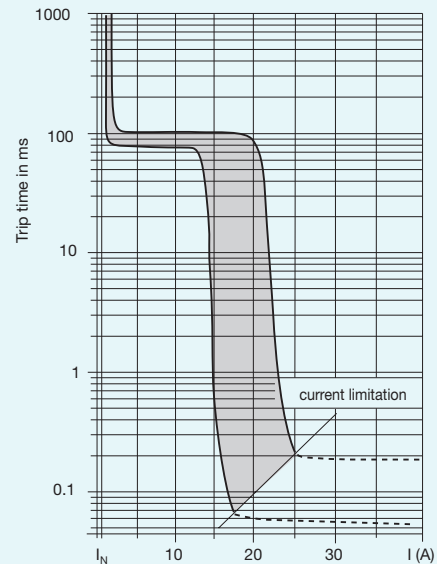


Derating curve

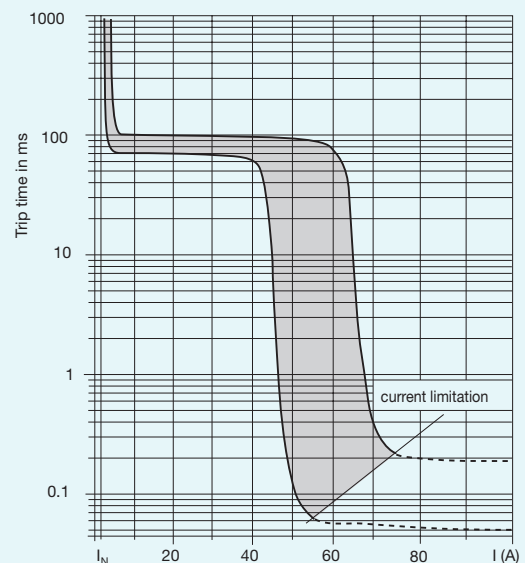


Typical time/current characteristics

0.5 A and 1 A



2 A and 4 A

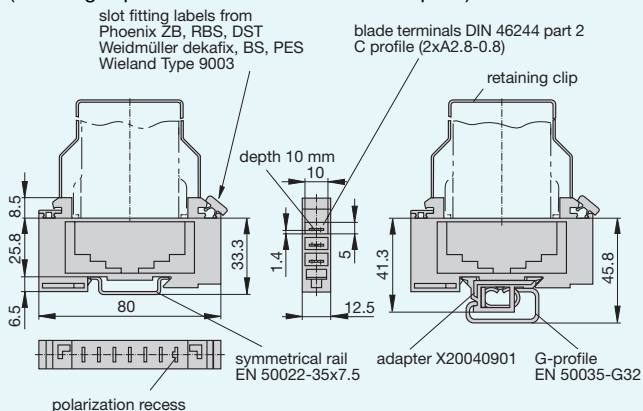


Accessories for E 1048-600

Single mounting sockets

17-P10-Si

(retaining clip Y 300 581 11 available on request)

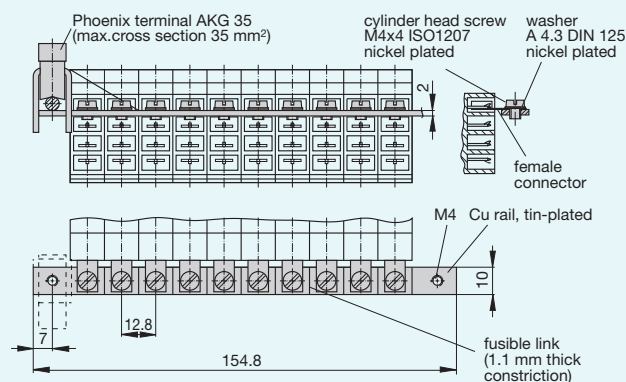


Single mounting sockets 17-P70-Si, same as 17-P10-Si, but with blade terminals to DIN 46 244-C-Ms (2x A 2.8 - 0.8)

Bus bar for type 17 socket (for max. 100 A continuous load)

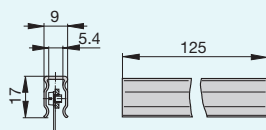
X 211 157 01 with terminal

X 211 157 02 without terminal



Insulated sleeving for bus bar

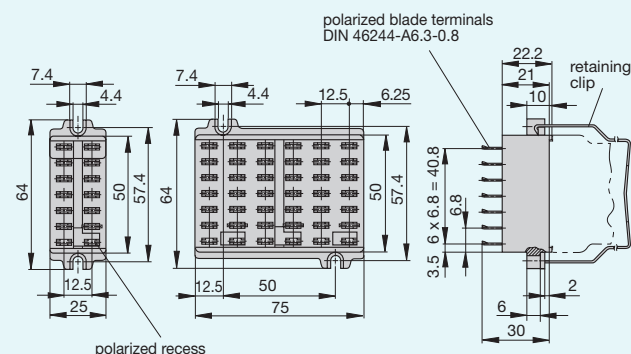
Y 303 824 01



2-way mounting socket 23-P10-Si

6-way mounting socket 63-P10-Si

(retaining clip Y300 581 03 available on request)



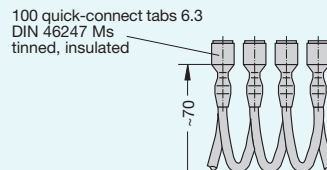
Connector bus links -P10

X 210 588 01/1.5 mm² brown

X 210 588 02/2.5 mm² black

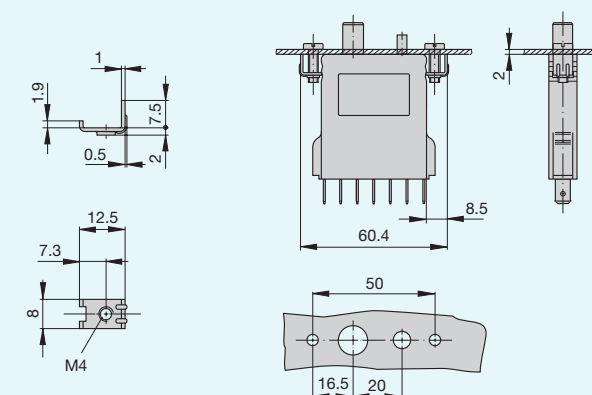
X 210 588 03/2.5 mm² red

X 210 588 04/2.5 mm² blue



2 mounting clips Y 300 504 02

Installation drawing with mounting clips Y 300 504 02



E-T-A® Solid State Remote Power Controller E-1071-073

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	
		Voltage rating of load	
		DC 24 V	
		Current rating	
		3.0 A	
E-1071	- 073	- DC 24 V	- 3.0 A ordering example



E-1071-073

Technical data ($T_A = 25^\circ\text{C}$, $U_B = \text{DC } 24\text{ V}$)

Voltage rating U_N	DC 24 V
Operating voltage U_B	DC 20...48 V
Current rating I_N	3 A
Current consumption ($U_B = \text{DC } 24\text{ V}$, $U_S = "0"$)	typically 17 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_B (terminal 1 - terminal 2)	double pole relay
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_N	max. 1.75 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 μs
Load current monitoring	GREEN LED (lights at $I_{\text{load}} > 0.2\text{ A}$)
Current measuring terminals	2 x 2 mm dia. (shunt $0.1\ \Omega \pm 1\%$)
Leakage current ($U_S = "0"$)	max. 3 mA
Free-wheeling diode	integral
Control circuit	
Control	opto coupler in control input
Control voltage U_S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current I_S	typically 5 mA
Switching frequency f_{max}	100 Hz
Control signal ($U_S = "1"$)	YELLOW 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 with the circuit breaker tripped

General data	
Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2x2.5 mm ² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black top-hat rail to DIN 50022-35 to UL 94: V = 0; VDE 0304: grade 1
Mounting	IP 20 housing, terminals (IEC 529/DIN 40050)
Self-extinguishing properties	45 x 74 x 128 mm
Degree of protection	Mass approx. 240 g
Mounting dimensions	
Mass	

Technical description

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 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 shunt in the load circuit.

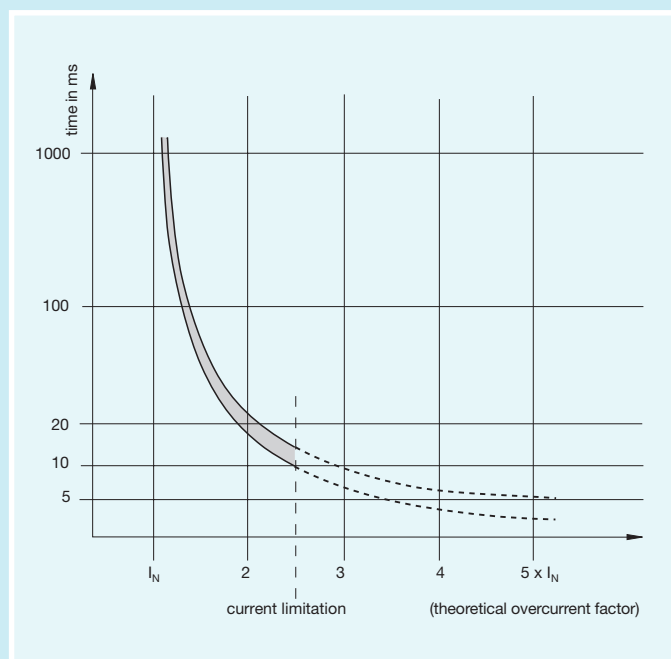
Operating modes

Operating status	Fault-free operation		Short-circuit of the load	Wire break	
Control input U_s	"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

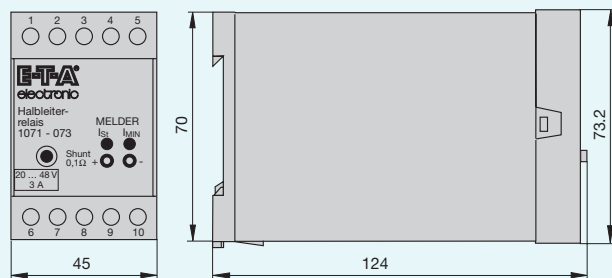
0 = LED does not indicate

Storage time characteristic curve

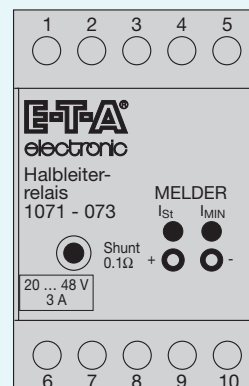


Solid State Remote Power Controller E-1071-073

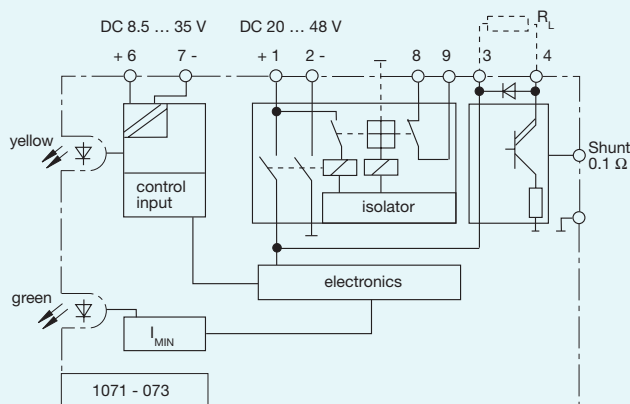
Dimensions



Terminal selection



Basic circuit diagram



Terminal

- 1 operating voltage $+U_B$: DC 20...48 V
- 2 operating voltage $-U_B$
- 3 load (+)
- 4 load (-)
- 5 not used
- 6 control voltage $+U_S$: max. DC 35 V
- 7 control voltage $-U_S$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 not used

E-T-A® Solid State Remote Power Controller E-1071-128

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 for the adjustable controller E-1071-603. 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 by 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_A = 25 °C, U_B = DC 24 V)

Voltage rating U _N	DC 24 V
Operating voltage U _B	DC 20...48 V
Current rating I _N	3 A
Current consumption (U _B = DC 24 V, U _S = "0")	typically 15 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U _B (terminal 1 - terminal 2)	double pole relay
Physical isolation	2-pole - by manual release (circuit breaker) - 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 _N	max. 2 V
Overload disconnection	approx. 1.1 x I _N
Storage time t _s (at 2xI _N)	typically 20 ms (see storage time curve)
Short-circuit limitation	approx. 2.5 x I _N
Short-circuit response delay	approx. 4 μs
Load current monitoring I _{min} (MIN monitoring, to be set by potentiometer at 50 % of the load current rating)	GREEN LED lights at I _{load} > 0.2 I _{min} . 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 _S = "0")	max. 3 mA
Free-wheeling diode	integral
Control circuit	
Control	opto coupler in control input
Control voltage U _S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current	typically 5 mA
Switching frequency f _{max}	10 Hz
Control signal (U _S = "1")	YELLOW LED lights (I _S flowing)
Protection	reverse polarity protection (diode)
Status outputs	
2 signal outputs	ON indication/fault indication - physically isolated by opto coupler - transistor outputs plus switching - max. DC 33 V/100 mA per output - integral free-wheeling diode - 20 ms time delay (eliminating false signals before the minimum current is reached)
ON indication (terminal 8)	U _S = "0": output non-conductive U _S = "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

General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2x2.5 mm ² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue cover: polycarbonate, black top-hat rail to DIN 50022-35
Mounting	to UL 94: V = 0; VDE 0304: grade 1
Burning behaviour (housing)	IP 20 housing, terminals (IEC 529/DIN 40050)
Degree of protection	45 x 74 x 128 mm
Mounting dimensions	approx. 320 g
Mass	

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 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 signalling 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

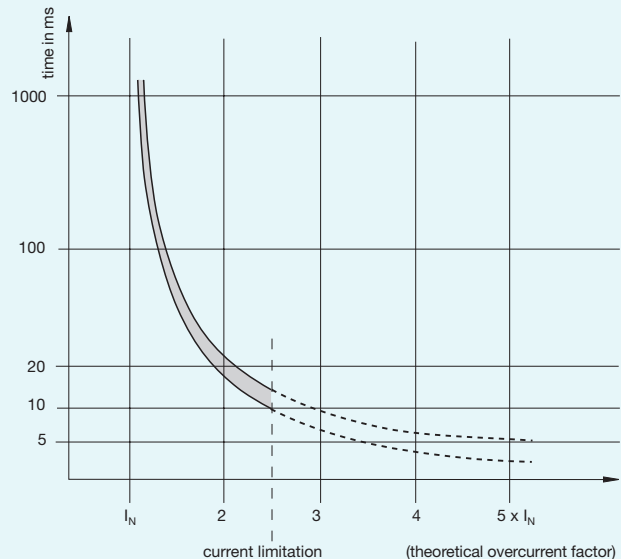
AND the load current is higher than the set minimum current
AND the circuit breaker has not tripped
AND there is no wire break.

- 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



Operating modes

Operating status	Fault-free operation		Short-circuit of 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	0	0	0	0	0
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

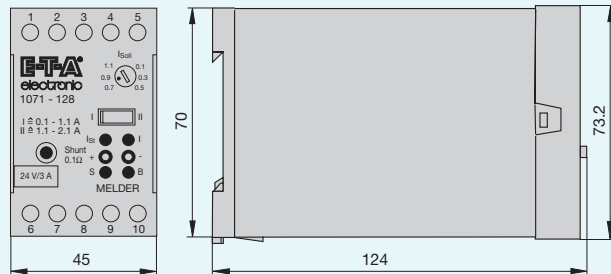
ON Terminal 8	Fault Terminal 9	Remark
0	0	wire break or load current < minimum current (switched on) or short-circuit (switched on)
0	1	fault-free operation (switched off)
1	1	fault-free operation (switched on)

1 - status output carries plus potential

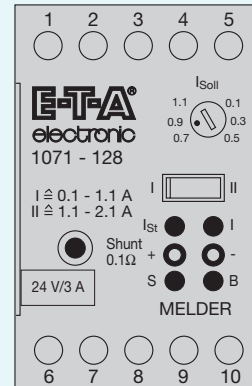
0 - status output carries minus potential

ETA® Solid State Remote Power Controller E-1071-128

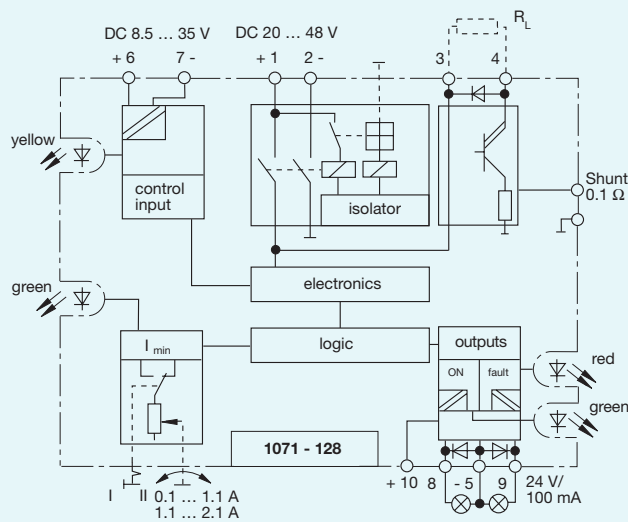
Dimensions



Terminal selection



Basic circuit diagram



Terminal

- 1 operating voltage $+U_B$: DC 20...48 V
- 2 operating voltage $-U_B$
- 3 load (+)
- 4 load (-)
- 5 auxiliary voltage $-U_A$ for status outputs
- 6 control voltage $+U_S$: max. DC 35 V
- 7 control voltage $-U_S$
- 8 ON status output (max. 100 mA)
- 9 fault status output (max. 100 mA)
- 10 auxiliary voltage $+U_A$ for status outputs: max. DC 33 V

Solid State Remote Power Controller E-1071-343

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	
		3A / 3A	
E-1071	- 343 -	DC 48 V -	3A / 3A ordering example



E-1071-343

Technical data (T_A = 25 °C, U_B = DC 48 V)

Voltage rating U _N	DC 48 V
Operating voltage U _B	DC 36...60 V
Current rating I _N	3 A/3 A (2 A + 2 A)
Current consumption (U _B = DC 48 V, U _S = "0")	typically 21 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U _B (terminal 1 - terminal 2)	double pole relay
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 parallel duty max. 4 A (e.g. 2 A + 2 A) max. 1.8 V
Voltage drop at I _N	approx. 1.1 x I _N
Overload disconnection	typically 20 ms (see storage time curve)
Storage time t _s (at 2xI _N)	approx. 2.5 x I _N
Short-circuit limitation	approx. 4 μs
Short-circuit response delay	GREEN LED lights at I _{load} > 0.1 A
Load current monitoring	3 x 4 mm dia. (0.1 Ω shunt)
Current measuring terminals	max. 3 mA
Leakage current (U _S = "0")	integral
Free-wheeling diode	

Control circuits (I/II)

Control	opto coupler in control input
Control voltage U _S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current	typically 5 mA
Switching frequency f _{max}	100 Hz
Control signal (U _S = "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
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General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	screw terminals 2x2.5 mm ² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue; cover: polycarbonate, black
Mounting	top-hat rail to DIN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP 20 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 is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuits (I/II)

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

Status outputs

Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

RED LED

ON indication (I/II)

The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED

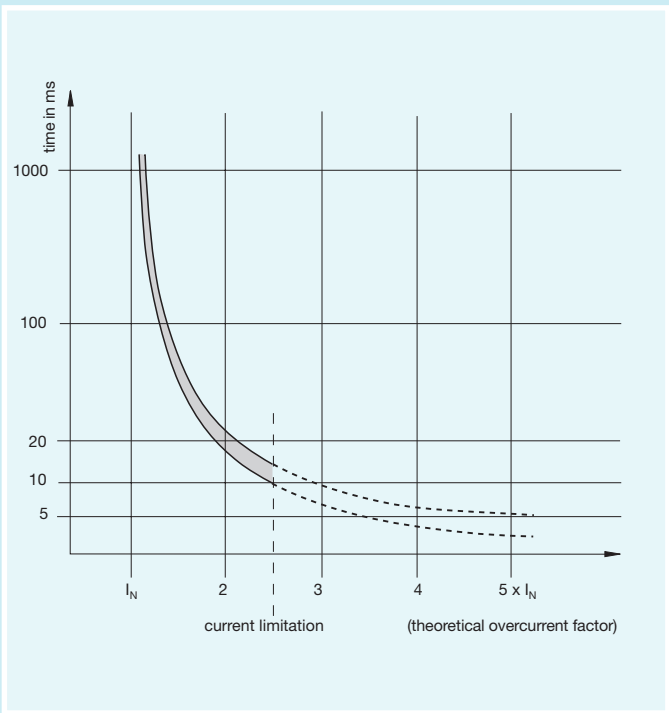
Current flow indication (I/II)

The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-343 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

Storage time characteristic curve

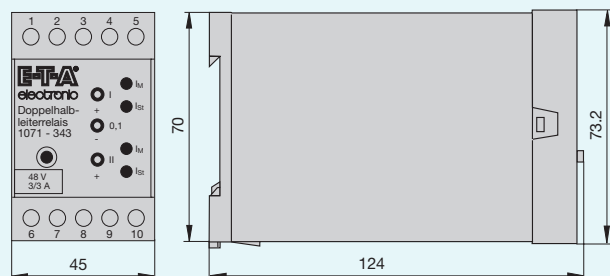


Operating modes

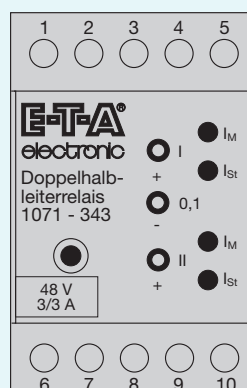
Operating status	Fault-free operation		Short-circuit on the load	Wire break	
	"0"	"1"		"0"	"1"
Control input	"0"	"1"	"1"	"0"	"1"
RED LED - Control current	0	1	1	0	1
GREEN LED - Load current monitoring	0	1	0	0	0
Auxiliary contact	open	open	closed	open	open
Remarks	load OFF	load ON	both load circuits disconnected		

1 - LED indicates
0 - LED does not indicate

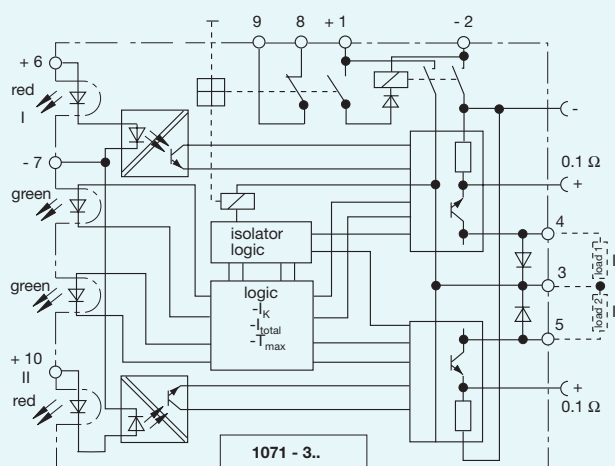
Dimensions



Terminal selection



Basic circuit diagram



Terminal

- 1 operating voltage $+U_B$: DC 36...60 V
- 2 operating voltage $-U_B$
- 3 load (+) (carrying plus potential)
CAUTION: Do not connect to GND/ $-U_B$
- 4 load I (-)
- 5 load II (-)
- 6 control voltage I $+U_S$: max. DC 35 V
- 7 control voltage I, II $-U_S$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 auxiliary voltage II $+U_S$: max. DC 35 V

E-T-A® Solid State Remote Power Controller E-1071-353

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	
3A / 3A	
E-1071	- 353 - DC 24 V - 3A / 3A ordering example



E-1071-353

Technical data ($T_A = 25\text{ °C}$, $U_B = \text{DC } 24\text{ V}$)

Voltage rating U_N	DC 24 V
Operating voltage U_B	DC 20...48 V
Current rating I_N	3 A/3 A (2 A + 2 A)
Current consumption ($U_B = \text{DC } 24\text{ V}$, $U_S = \text{"0"}$)	typically 30 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_B (terminal 1 - terminal 2)	double pole relay
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 24 V/0.2...3 A per channel parallel duty 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 μs
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 ($U_S = \text{"0"}$)	integral
Free-wheeling diode	

Control circuits (I/II)

Control	opto coupler in control input
Control voltage U_S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current I_S	typically 5 mA
Switching frequency f_{max}	100 Hz
Control signal ($U_S = \text{"1"}$)	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 2x2.5 mm ² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue; cover: polycarbonate, black top-hat rail to DIN 50022-35
Mounting	to UL 94: V = 0; VDE 0304: grade 1
Self-extinguishing properties	IP 20 housing, terminals
Degree of protection (IEC 529/DIN 40050)	45 x 74 x 128 mm
Mounting dimensions	approx. 320 g
Mass	

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 is applied at the input terminals (6 and 7, or 10 and 7). The opto coupler transmits the signal to the load circuit, at the same time switching the load transistor on. This signal is transmitted as a status signal to all monitoring circuits. The input protection diode protects the control voltage from incorrect polarization. Control current limitation is provided by a constant current diode.

Load circuits (I/II)

The load circuit is switched ON or OFF according to the control signal ("0" or "1"), with electronic circuits monitoring the load circuit for faults such as overload or short-circuit. Should one of these faults occur, the monitoring circuitry will immediately react, causing the load transistor to disconnect and the circuit breaker to trip. Transistor disconnection occurs according to the storage time characteristics. The storage time increases noise immunity avoiding disconnection of non-harmful peaks such as those caused by inrush currents from lamp load connection. Storage time is not a constant quantity but is inversely proportional to the overcurrent factor.

After expiration of the storage time (see diagram) the load circuit transistor will become non-conductive. After approx. 5 s the isolator will switch off so as to disconnect the two load circuits. The common auxiliary contact closes signalling the fault. After removal of the fault, the SSRPC can be reactivated by pushing the isolator button.

Status outputs

Status indication is provided by 4 LEDs (2 x RED, 2 x GREEN).

RED LED

ON indication (I/II)

The red LED indicates when the control voltage is higher than 8.5 V, with control current flowing.

GREEN LED

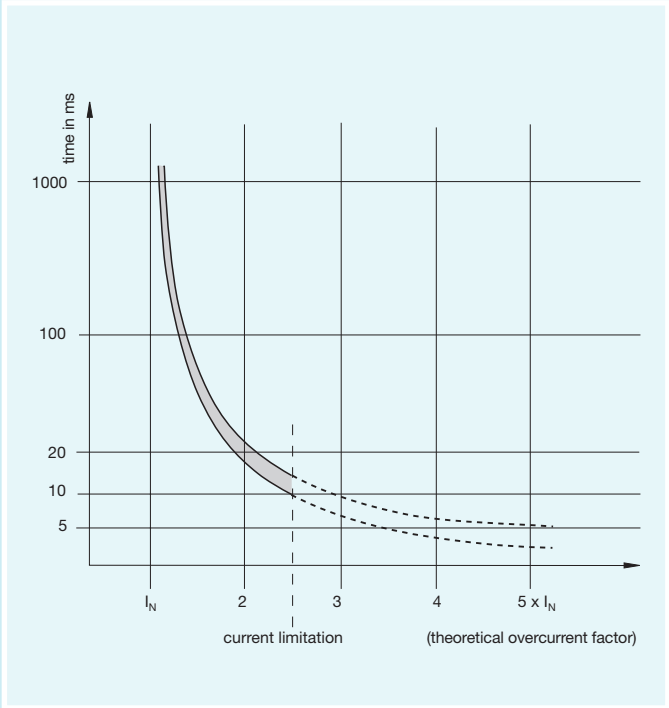
Current flow indication (I/II)

The green LED indicates when the load current is above 0.1 A.

Faults such as too high a resistance, wire break, poor contact, or overload/short-circuit, are available when only the red LED indicates.

The SSRPC E-1071-353 includes three current measuring terminals (4 mm dia.) on the front. These terminals provide for load current measurement in terms of voltage drop at the 0.1 Ω shunt in the load circuit (I/II).

Storage time characteristic curve



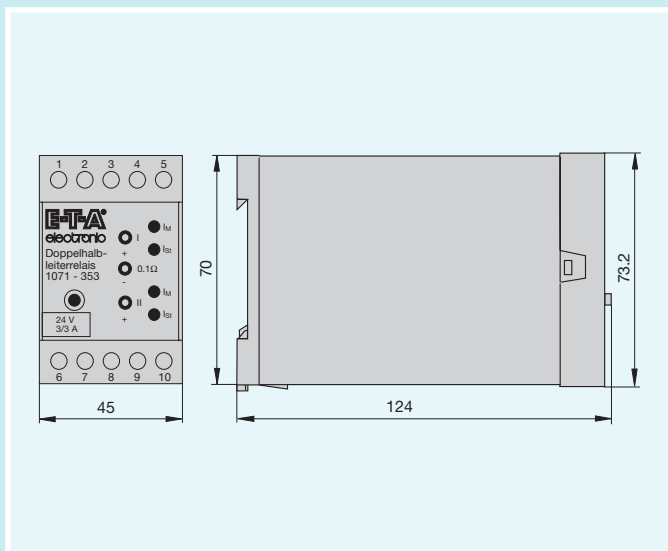
Operating modes

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		

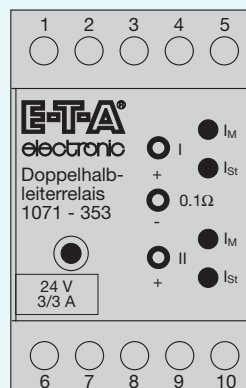
1 - LED indicates
0 - LED does not indicate

Solid State Remote Power Controller E-1071-353

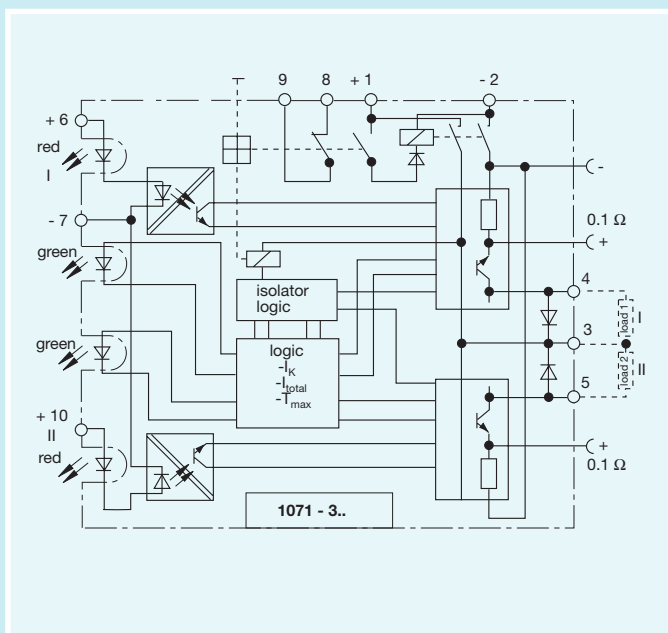
Dimensions



Terminal selection



Basic circuit diagram



Terminal

- 1 operating voltage $+U_B$: DC 20...48 V
- 2 operating voltage $-U_B$
- 3 load (+) (carrying plus potential)
CAUTION: Do not connect to GND/ $-U_B$
- 4 load I (-)
- 5 load II (-)
- 6 control voltage I $+U_S$: max. DC 35 V
- 7 control voltage I, II $-U_S$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 auxiliary voltage II $+U_S$: max. DC 35 V

Description

The E-T-A Solid State Remote Power Controllers E-1071-603/607 are electronic control modules suitable for inductive loads such as solenoids, magnetic brakes etc.

They are used

- for safe and quick switching of loads
- for monitoring the electrical condition of the loads
- for compensating different cable lengths

The load connected to the relay should be operated with a voltage higher than its rated voltage (DC 24 V) because the load current is controlled electronically (pulse-controlled characteristics). This is to ensure that in industrial plants with different cable lengths (supply cables, load cables) an increased inrush current can be applied to each load. During hold duty the load current is reduced to a smaller value (approx. 60 % of the current rating), thus reducing the operating temperature and extending the life of the loads.

Typical applications

Circuits with inductive load such as

- solenoids
- magnetic brakes etc.

in large plants, e.g. rolling mills where a very high availability is required.

Features

- **Designed for inductive loads (DC 24 V)**
- Individual adjustment to various load currents ($I_N = 0.1 \dots 3.1 \text{ A}$)
- Significant reduction of power loss in the load by pulse-controlled characteristics
- Short-circuit proof (short-circuit limitation); physical disconnection from supply after approx. 5 s
- Inrush current monitoring
- Physical isolation:
 - opto coupler in the control circuit
 - physical disconnection from supply
 - opto coupler for status outputs
- Reverse polarity and overvoltage protection in the control, load and status circuits
- Control current indication by YELLOW LED
- O.K. indication by GREEN LED
- Wire break indication by RED LED (load circuit)
- Fault indication by RED LED (incorrect setting etc.)
- Two status outputs for PLCs for function indication (function signal, ON signal)
- Temperature disconnection
- Quick disconnection (do not connect free-wheeling diodes to the load as the free-wheeling current is controlled electronically!)

Ordering information

Type No.	
E-1071	SSRPC
Terminals	
603	screw terminals
607	screw-less connectors to Wago licence
Voltage rating of load	
DC 24 V	
Current rating	
0.1 ... 3.1 A	

E-1071 - 603 - DC 24 V - 0.1 ... 3.1 A ordering example



E-1071-603

Technical data ($T_A = 25^\circ\text{C}$, $U_B = \text{DC } 36 \text{ V}$)

Max. operating voltage U_B	DC 60 V ($U_{B \min}$ see Technical description)
Current rating I_N	adjustable between 0.1 and 3.1 A (switch and potentiometer)
Current consumption ($U_B = \text{DC } 36 \text{ V}$, $U_S = "0"$)	typically 35 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_B (terminal 1 - terminal 2)	double pole relay
Physical isolation	2-pole - by manual circuit breaker release - approx. 5 s after overload disconnection - approx. 15 s after fault indication (RED LED) - approx. 0.5 s after thermal response
Load circuit	
Load output	NPN transistor, minus switching, pulse-controlled (approx. 180 Hz)
Load rating	DC 24 V/adjustable betw. 0.1 and 3.1 A
Switch-on current I_E (with short-circuit limitation)	U_B/R_{total} for approx. 400 ms
Hold current I_H	typically 60 % of the set current rating
Short-circuit limitation	approx. $3.5 \times I_N$
Short-circuit current $I_{K(rms)}$ (depending on U_B and I_N)	typically 10...400 mA
Wire break monitoring	in the ON and OFF condition (RED LED)
Current measuring terminals	2 x 2 mm dia. (shunt $0.1 \Omega \pm 1 \%$)
Leakage current ($U_S = 0$)	typically 1 mA
Free-wheeling circuitry (see Technical description)	integral electronic control with quick disconnection
Control circuit	
Control	opto coupler in control input
Control voltage U_S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current I_S	typically 5 mA
Switching frequency f_{max}	1 Hz
Control signal ($U_S = "1"$)	YELLOW LED lights (I_S flowing)
Protection	reverse polarity protection (diode) overvoltage protection (varistor)
Status outputs	
2 signal outputs	ON indication/function indication - physically isolated by opto coupler - transistor outputs, plus switching - auxiliary voltage U_A : DC 12...60 V - max. 50 mA per output - integral free-wheeling diode - reverse polarity and overvoltage protection
ON indication (terminal 8)	$U_S = "0"$: output non-conductive $U_S = "1"$: output connecting plus potential (term. 10) to term. 8
Function indication (terminal 9)	fault: output non-conductive no fault: output connecting plus potential (term. 10) to term. 9

Technical data

General data

Ambient temperature	0...+60 °C (without condensation)
Terminals	
E-1071-603:	screw terminals 2x2.5 mm ² to DIN 46288
E-1071-607:	screw-less connectors to Wago licence
Connection:	max. 2 x 2.5 mm ² to DIN 46288
Housing	clamping plate: polycarbonate GV, blue; cover: polycarbonate, black
Mounting	top-hat rail to DIN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection	IP 20 housing, terminals
(IEC 529/DIN 40050)	
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 320 g

Technical description

The max. admissible operating voltage of the SSRPC is approx. DC 60 V. The min. operating voltage is a function of the overall ohmic resistance in the load circuit. The switch-on current is reduced by

- the voltage drop on the load cable
- the load resistance increasing with the operating temperature of the load.

Minimum operating voltage $U_{B \min}$

I_N	Cable length	Cable size	$U_{B \min}$
1 A	2x50 m/ 2x100 m/ 2x200 m/ 2x300 m	1.5 mm ² 2.5 mm ²	33/35/37/40 V 32/33/35/37 V
2 A	2x50 m/ 2x100 m/ 2x200 m/ 2x300 m	1.5 mm ² 2.5 mm ²	35/38/44/49 V 34/35/39/42 V
3 A	2x50 m/ 2x100 m/ 2x200 m/ 2x300 m	1.5 mm ² 2.5 mm ²	37/41/50/58 V 35/38/42/48 V

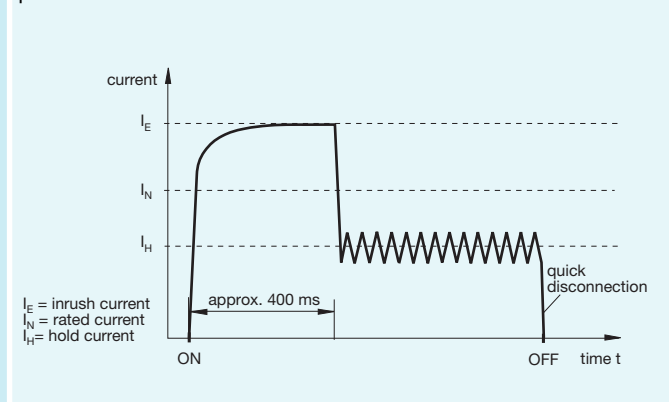
The load capacity is no longer ensured when the minimum operating voltage is under limits. The RED LED (fault) will indicate and the circuit breaker will trip after approx. 15 s.

Resistance increase in the load circuit:

- 1.5 mm² cable approx. 2.8 Ω /100 m distance
- 2.5 mm² cable approx. 1.6 Ω /100 m distance

Switch-on current

To reach the max. inrush current the output transistor connects the operating voltage to the inductive load for approx. 400 ms. After this period the load current is set back to hold current.



Rated current I_N , hold current I_H

The current rating of the applicable load at its rated voltage should be set between 0.1 and 3.1 A.

The hold current of the load is internally adjusted to 60 % of the set current rating. This hold current should be measured by means of a voltmeter connected to the 2 mm current measuring terminals (0.1 Ω shunt).

Technical description (cont'd)

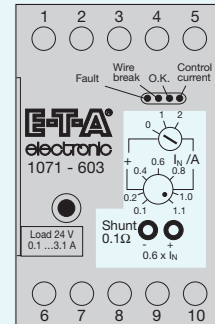
Setting the current rating

The current rating is set by means of a rotary switch (switch setting 0 A - 1 A - 2 A) and a 270° potentiometer (setting range between 0.1 and 1.1 A).

The sum of the two settings should equal the current rating of the load.

Example: 24 V load with $I_N = 1.1$ A

Setting: switch 0 A + potentiometer 1.1 A, or
switch 1 A + potentiometer 0.1 A



- Operating voltage (terminals 1 and 2): reverse polarity protected by means of a relay. The relay will only pick up and apply voltage to the device if the operating voltage is correctly polarised. This relay will then remain permanently energized, without being influenced by the control input.
- Control circuit (terminals 6 and 7): reverse polarity protected by means of a diode.
- Auxiliary voltage status outputs (terminals 10 and 5): reverse polarity protected by means of a diode.
- The load output (terminals 3-4) or the inductive load must not be fitted with a free-wheeling diode as the free-wheeling current is controlled electronically. This control also causes a very short fall time of the inductive load. The solenoid connector may be provided with means of visual indication (LED).

Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break		U_B too low/transistor short-circuit/incorrect setting
control input	"0"	"1"	"1"	"0"	"1"	"1"
YELLOW LED - control current	0	1	1	0	1	1
GREEN LED - O.K.	1	1	0	0	0	0
RED LED - wire break	0	0	0	1	1	0
RED LED - fault	0	0	0	0	0	1
Functional status (terminal 9)	1	1	0	0	0	0
Operating status (terminal 8)	0	1	0	0	0	0
Remarks	load OFF	load ON	physical isolation after approx. 5 s	no load connected/wire break		physical isolation after approx. 15 s

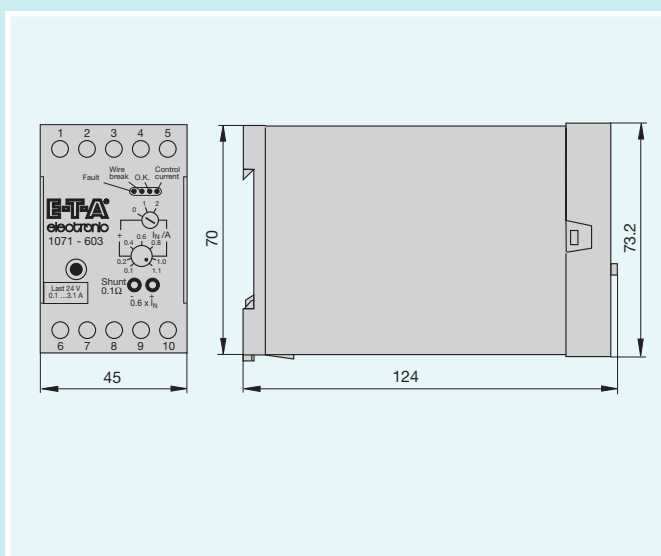
1 = LED lights; status output carries plus potential
0 = LED does not light; status output is non-conductive

Status outputs

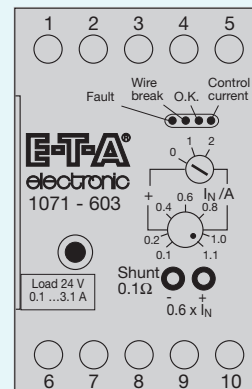
Operating status	Functional status	Remark
0	0	not operable no operation - CAUTION: FAULT
0	1	operable not switched on - O.K. - GREEN LED indicates
1	0	- CAUTION: FAULT
1	1	operable switched on - O.K. - GREEN LED lights

1 - status output carries plus potential
0 - status output is non-conductive

Dimensions



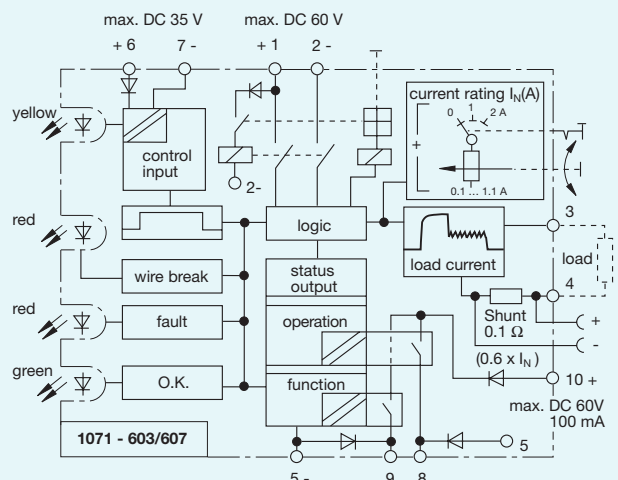
Terminal selection



Terminal

- operating voltage $+U_B$: max. DC 60 V
- operating voltage (-)
- load (+)
- load (-)
- auxiliary voltage $-U_A$ for status outputs
- control voltage $+U_S$: max. 35 V
- control voltage $-U_S$
- status output "operation" (max. 50 mA)
- status output "function" (max. 50 mA)
- auxiliary voltage $+U_A$ for status outputs: max. DC 60 V/100 mA

Basic circuit diagram



E-T-A® Solid State Remote Power Controller E-1071-803

Description

The E-T-A Solid State Remote Power Controllers E-1071-803 are electronic control modules suitable for inductive loads (DC 24 V) such as solenoids, magnetic brakes etc.

They are used

- for safe and quick switching of loads
- for monitoring the electrical condition of the loads
- for compensating for different cable lengths

The load connected to the relay should be operated with a voltage higher than its rated voltage (DC 24 V) because the load current is controlled electronically (pulse-controlled characteristics). This is to ensure that in industrial plants with different cable lengths (supply cables, load cables) an increased inrush current can be applied to each load. During hold duty the load current is reduced to a smaller value (between 25 % and 75 % of the current rating), thus reducing the operating temperature and extending the life of the loads.

Typical applications

Circuits with inductive load such as

- solenoids
- magnetic brakes etc.

where fast switching of inductive loads is required.

Features

- **Designed for inductive loads (DC 24 V)**
- Individual adjustment to various load currents ($I_N = 0.25 \text{ A}; 0.4 \text{ A}; 1 \text{ A}; 2 \text{ A}; 3 \text{ A}$)
- Significant reduction of power loss in the load by pulse-controlled characteristics
- Short-circuit proof; short-circuit limitation and physical disconnection from supply after approx. 5 s
- Inrush current monitoring
- Overload protection (current control)
- Fast disconnection (do not connect a free wheeling diode to the load as the free wheeling current is controlled electronically!)
- Physical isolation:
 - opto coupler in the control circuit
 - relay contacts in the load circuit
 - fault indication by means of auxiliary contact (N/O)
- Reverse polarity protection in the control and load circuits
- Control current indication by YELLOW LED
- Wire break indication by RED LED (load circuit)
- Minimum current indication by GREEN LED

Ordering information

Type No.	
E-1071	SSRPC
Operating mode	
803	pulse controlled
Voltage rating of load	
DC 24 V	
Current rating	
0.25 A	
0.4 A	
1 A	
2 A	
3 A	
E-1071 - 803 - DC 24 V - 1 A	ordering example



E-1071-803

Technical data ($T_A = 25 \text{ °C}$, $U_B = \text{DC } 36 \text{ V}$)

Operating voltage U_B	DC 36 V (28...60 V) (function maintained up to DC 18 V)
Current rating I_N	0.25 A/0.4 A/1 A/2 A/3 A
Current consumption ($U_B = \text{DC } 36 \text{ V}$, $U_S = "0"$)	typically 30 mA
Residual ripple for all voltages	max. 5 % (3 phase bridge)
Reverse polarity protection U_B (terminal 1 - terminal 2)	double pole relay
Physical isolation	2-pole - by manual circuit breaker release - approx. 5 s after short-circuit disconnection
Load circuit	
Load output	NPN transistor, minus switching, pulse-controlled (approx. 180 Hz)
Load rating	DC 24 V/0.25 A (3... 6 W) DC 24 V/0.4 A (6...10 W) DC 24 V/1 A (15...30 W) DC 24 V/2 A (30...50 W) DC 24 V/3 A (50...75 W)
Switch-on current I_E (with short-circuit limitation)	U_B/R_{total} for approx. 400 ms
Minimum current I_{min} ($\hat{=}$ hold current I_H)	adjustable between 25 and 75 % I_N (e.g. 0.5...1.5 A with the 2 A version)
Short-circuit limitation	approx. $2 \times I_N$
Short-circuit current $I_{K(\text{rms})}$ (depending on U_B and I_N)	typically 10 mA
Wire break indication	in the ON and OFF condition (RED LED)
Current measuring terminals	$2 \times 2 \text{ mm}$ dia. (shunt $0.1 \Omega \pm 1 \%$)
Leakage current ($U_S = "0"$)	typically 1 mA
Free-wheeling circuitry	integral electronic control with quick disconnection
Control circuit	
Control	opto coupler in control input
Control voltage U_S	"0" = 0 ... 5 V "1" = 8.5...35 V
Control current I_S	typically 5 mA
Switching frequency f_{max}	1 Hz
Control signal ($U_S = "1"$)	YELLOW LED lights (I_S flowing)
Protection	reverse polarity protection (diode)
Status outputs	
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	on top-hat rail to DIN 50022-35
Self-extinguishing properties	to UL 94: V = 0; VDE 0304: grade 1
Degree of protection (IEC 529/DIN 40050)	IP 20 housing, terminals
Mounting dimensions	45 x 74 x 128 mm
Mass	approx. 240 g

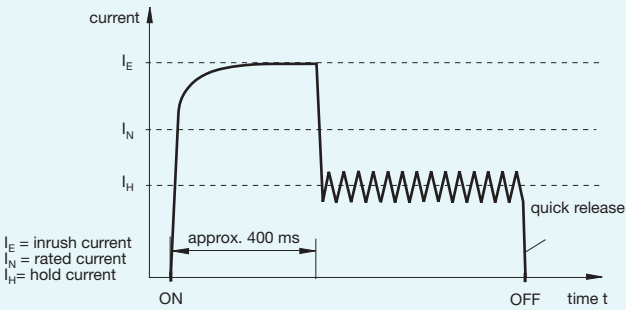
Technical description

Operating voltage U_B
The max. admissible operating voltage of the SSRPC is approx. DC 60 V.
The min. operating voltage is a function of the overall ohmic resistance in the load circuit. The switch-on current is reduced by

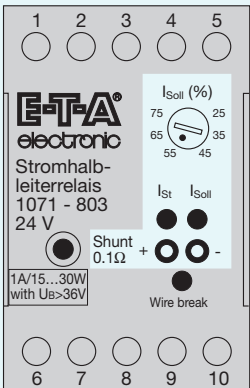
- the voltage drop on the load cable
- the load resistance increasing with the operating temperature of the load.

The function as shown below is no longer ensured when the minimum operating voltage (DC 28 V) is under limits. The output will then be continuously conductive, and the set minimum current may no longer be reached.

Switch-on current I_E
To reach the max. inrush current the output transistor connects the operating voltage to the inductive load for approx. 400 ms. After this period the load current is set back to hold current (= minimum current).



Setting of hold current I_H (= minimum current)
The hold current of the load is set between 25 % and 75 % I_N by the 270 ° potentiometer on the front. This hold current should be measured by means of a voltmeter connected to the 2 mm current measuring terminals (0.1 Ω shunt).



Technical description (cont'd)

- Operating voltage (terminals 1 and 2): reverse polarity protected by means of a relay. The relay will only pick up and apply voltage to the device if the operating voltage is correctly polarised. This relay will then remain permanently energized, without being influenced by the control input.
 - Control circuit (terminals 6 and 7): reverse polarity protected by means of a diode.
 - The load output (terminals 3-4) or the inductive load must not be fitted with a free-wheeling diode as the free-wheeling current is controlled electronically. This control also causes a very short fall time of the inductive load.
- The solenoid connector may be fitted with a visual indication means (LED).

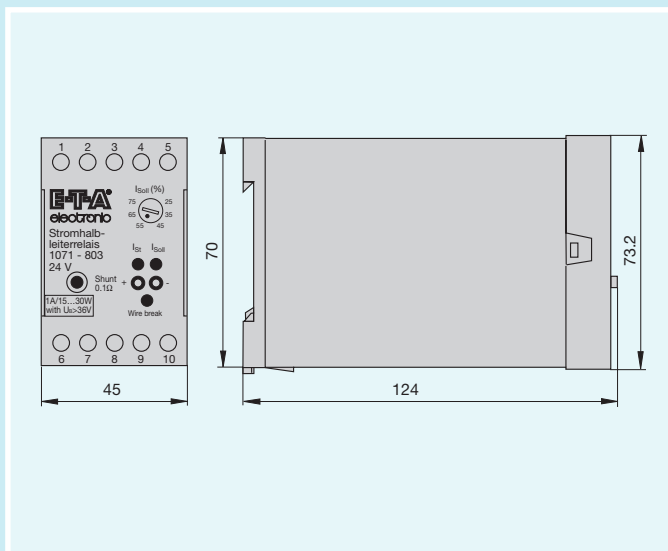
Operating modes

Operating status	Fault-free operation		Short-circuit on the load	Wire break		U_B too low/incorrect setting
control input	"0"	"1"	"1"	"0"	"1"	"1"
YELLOW LED - control current	1	1	0	1	1	1
GREEN LED - minimum current	0	1	0	0	0	0
RED LED - wire break	0	0	0	1	1	0
Auxiliary contact	open	open	closed	open	open	open
Remark	load OFF	load ON	physical isolation after approx. 5 s	no load connected	wire break	current cannot be adjusted

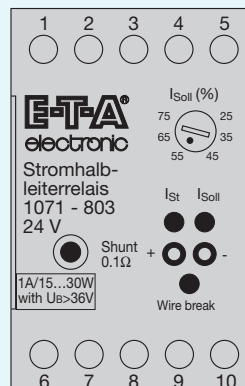
1 - LED lights
0 = LED does not light

Solid State Remote Power Controller E-1071-803

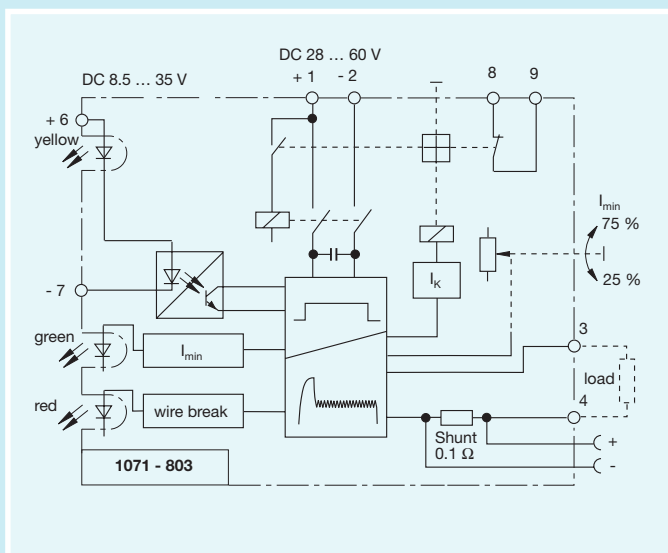
Dimensions



Terminal selection

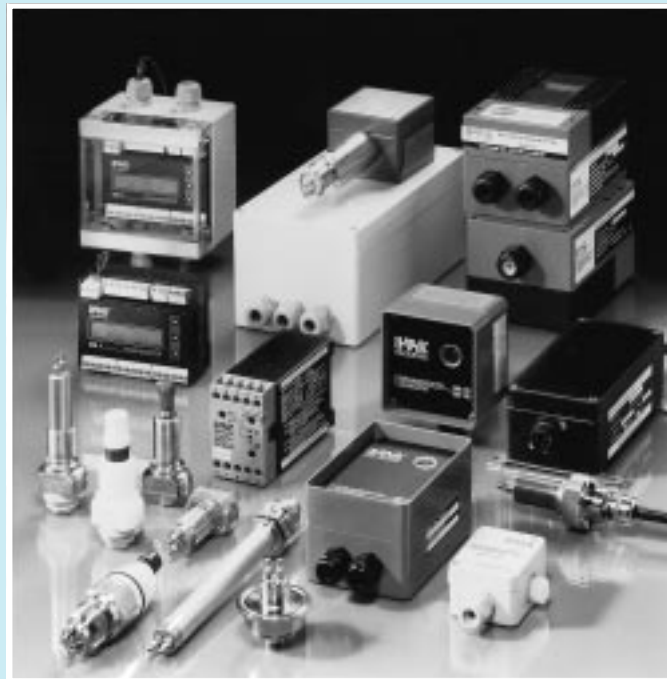


Basic circuit diagram



Terminal:

- 1 operating voltage $+U_B$: max. DC 60 V
- 2 operating voltage $-U_B$
- 3 load (+)
- 4 load (-)
- 5 not used
- 6 control voltage $+U_S$: max. 35 V
- 7 control voltage $-U_S$
- 8 auxiliary contact
- 9 auxiliary contact
- 10 not used



E-T-A Flow Meters and Flow Monitors

The E-T-A range of electronic flow metering and monitoring systems has been designed to measure and supervise the flow rate of gases and liquids in pipelines.

Models operating on the calorimetric principle avoid the need for moving parts in the flow stream and are therefore especially suitable for use with liquids of high viscosity, or containing particles or contaminants. Alternatively high precision turbine sensors are available for applications which demand accurate volumetric measurement.

Calorimetric models comprise a monitoring sensor head, installed in the pipeline, and an electronic controller which may be either integrated with the monitoring head or remotely sited, according to type. These systems provide an output to signal deviation of flow from a pre-set level. Temperature monitoring and continuous analogue output are additional functions which can be selected on some models.

The E-T-A flow meter/monitor programme offers a choice of specification, performance, size and cost to meet a wide variety of different uses and budget requirements. All models are maintenance-free ensuring fit-and-forget reliability, and benefit from E-T-A's investment in process sensor research and development spanning over 25 years.

Condensed Selector Chart

For liquids: SW 118, SW 119, (B)SFW 120, SFW 120-E, SW 201, SFW 209, FM 1

For air/gas: SW 112, SW 118, SW 119, SLW 120-E, SW 201, FM 1

For hazardous areas: FM1-Ex

For granules (powders): SW 201-F, SFW 209, SW 118, SW 119

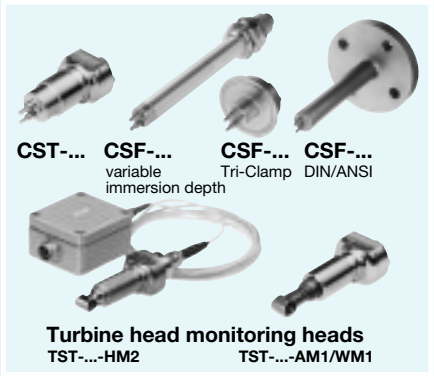
Typical applications

Applications for E-T-A flow monitors and meters extend across the entire industrial spectrum including:

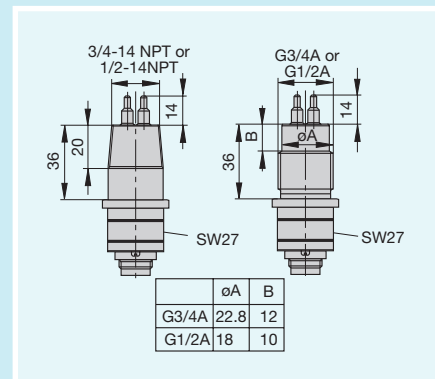
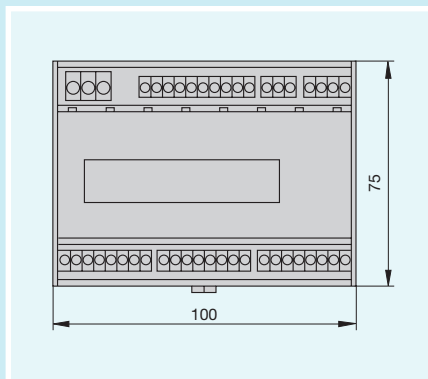
- Air conditioning systems, radiators and filtration equipment
- Gas and exhaust monitoring systems in heating and power plants, blast furnaces, and gas supply systems
- Welding equipment
- Food processing, brewing and dairy product applications
- Water and waste treatment plant
- Paper manufacturing
- Petrochemical processing
- Pump monitoring and protection
- Control of lubricating, hydraulic and cooling systems
- Agricultural equipment
- Marine and transportation requirements

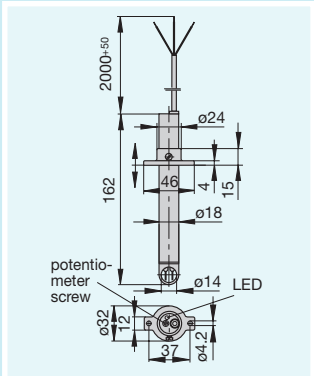
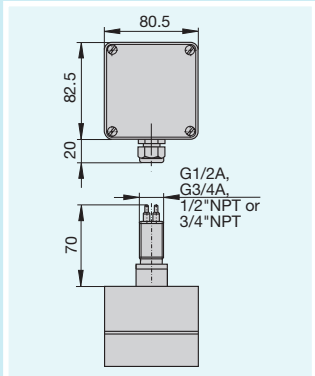
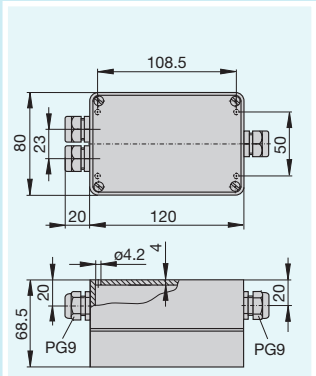


All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes.

Type No.	FM 1-...	Monitoring heads for FM 1-...
		
Media		gases, oil, liquids, powder
Features	menu control linear analogue outputs optional temperature monitoring medium temperature up to +125°C (up to +250°C with turbine head) relay outputs LED/bargraph display	linear analogue outputs optional temperature monitoring medium temperature up to +130°C
Flow rate range	0... 3 m/s for water 0... 5 m/s for oil 0...20 m/s for air/gases	
Temperature range of medium/ monitoring head		-40°C...+130°C (calorimetric head) -30°C...+140°C or 0°C...+250°C (turbine head)
Temperature range of electronic control unit	+10 °C...+50 °C	
Outputs	analogue outputs: 0/4-20 mA or 0/2-10 V or 0/1-5 V relay or transistor outputs	
Input voltage	DC 24 V (19...32 V) AC 24 V ±10%	
Type and size of monitoring head		CSF: flange-mounted heads to DIN 2500 or DIN/ISO 2825 CST, TST: thread-mounted heads G 1/2A, G 3/4A, 1/2"NPT or 3/4"NPT
Materials of monitoring head		sensor and fitting: 1.4571/AISI 316 Ti
Cable to electronic control unit		2 m standard, 100 m max.
Data sheet	see CPI cat. pages 13 - 15	see CPI cat. pages 16 - 18

Dimensions



Type No.	SW 112-...	SW 118-...	SW119-...
			
Media	air	gases, liquids, powder	gases, liquids, powder
Features	1 switch point (MIN) relay signal output LED status indication	1 switch point (MIN or MAX) non-linear trend outputs relay output LED status indication optional temperature monitoring medium selector switch	1 switch point (MIN or MAX) non-linear trend outputs relay output LED status indication temperature monitoring medium selector switch
Flow rate range	0.5 m/s...20 m/s	liquids: 0.01 m/s...2 m/s gases: 0.5 m/s...50 m/s	liquids: 0.01 m/s...2 m/s gases: 0.5 m/s...50 m/s
Temperature range of medium/monitoring head	-20 °C...+60 °C	-25°C...+70 °C	-25°C...+100 °C
Temperature range of electronic control unit	-20 °C...+50 °C	-25 °C...+50 °C	-25 °C...+50 °C
Outputs	1 relay max. load: 700 mA	1 relay (change over contact) AC 250 V, DC 30 V: 5 A overvoltage category II trend output 4-8 V	1 relay (change over contact) AC 250 V, DC 30 V: 5 A overvoltage category II trend output 4-8 V
Input voltage	AC 24 V + 10%/-15% DC 19...32 V	AC 230 V / 115 V / 24 V +10 %/-15 % DC 24 V ±10 %	AC 230 V / 115 V / 24 V +10 %/-15 % DC 24 V ±10 %
Type and size of monitoring head	monitoring head dia. 18 mm, integral with electronic control unit	monitoring heads G1/2A, G3/4A, 1/2"NPT or 3/4"NPT integral with the electronic control unit	monitoring heads G1/2A, G3/4A, 1/2"NPT or 3/4"NPT
Material of monitoring head	PVC, aluminium, polyamide	sensor and fitting: 1.4571/AISI 316 Ti,	sensor and fitting: 1.4571/AISI 316 Ti,
Cable length	with 2 m cable (standard), max. cable length 25 m, at relay output	without cable (standard), max. cable length 50 m, at relay output	with 2 m cable (standard), max. cable length 100 m, between monitoring head and electronic control unit
Available options	see CPI cat. pages 21 - 22	see CPI cat. pages 23 - 26	see CPI cat. pages 23 - 26
Dimensions			

(B)SFW 120-...



SFW/SLW 120-E-...

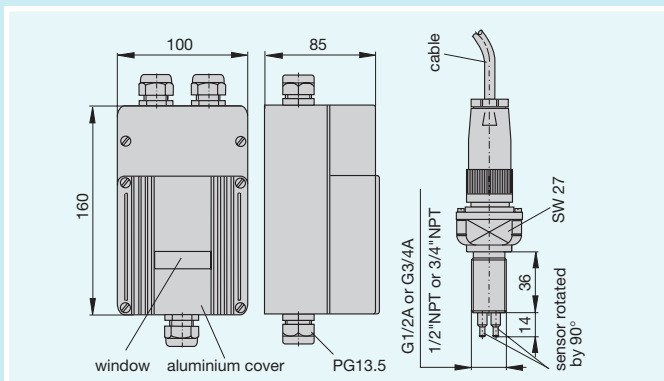
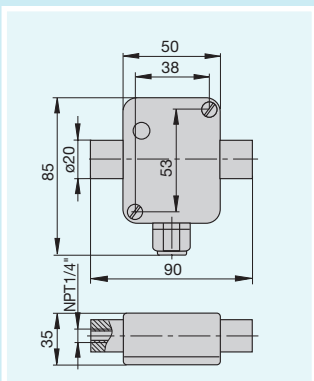
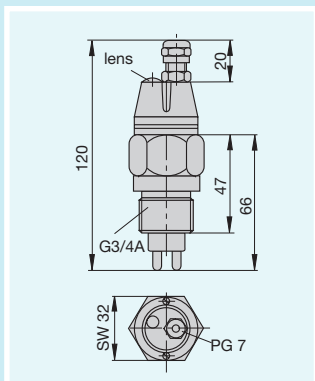


SW 201..



SWT 201..

liquids	gases, liquids	gases (air), liquids, powder	gases (air), liquids, powder
1 switch point (MIN or MAX) transistor output LED status indication SFW 120: industrial applications (MIN) BSFW 120: marine applications (MAX)	1 switch point (MIN or MAX) relay output LED status indication	1 switch point (MIN) non-linear analogue output relay outputs status indication by 2 LEDs medium selector switch	1 switch point (MIN) non-linear analogue output relay outputs status indication by 3 LEDs temperature monitoring medium selector switch
0.01 m/s...2 m/s	liquids: 0.1 l/min...10 l/min gases: 2.5 l/min...250 l/min	air: 0.5 m/s...100 m/s liquids: 0.01 m/s...5 m/s	air: 0.5 m/s...100 m/s liquids: 0.01 m/s...5 m/s
-10 °C...+60 °C	-10 °C...+60 °C	-40 °C...+100 °C	-40 °C...+100 °C
-10 °C...+60 °C	-10 °C...+60 °C	-10 °C...+45 °C	-10 °C...+45 °C
PNP transistor max. load: 0.3 A (DC12V) max. load: 50 mA (DC 24 V)	1 relay (change over contact) AC/DC 28 V: 1 A	a) 2 relays (change over contacts), AC 250 V, DC 28 V: 1 A overvoltage category II b) analogue output non-linear 0/4...20 mA	a) 3 relays (change over contacts) AC 250 V, DC 28 V: 1A overvoltage category II b) analogue output: non-linear 0/4...20 mA
DC 12 V (10.7...16 V) DC 24 V (12...26.4 V)	DC 24 V (18...32 V) AC 24 V +10%/-15%	AC 230/115/24 V +10%/-15% DC 24 V ± 10%	AC 230/115/24 V +10%/-15% DC 24 V ± 10%
G 3/4 A or 3/4"NPT sealing: Viton, teflon coated	Ermeto sizes EF6 to EF12, 1/4" NPT, G 3/8A sensor and electronic control unit comprised in one housing	monitoring heads G1/2A, G3/4A, 1/2"NPT or 3/4"NPT	monitoring heads G1/2A, G3/4A, 1/2"NPT or 3/4"NPT
sensor and fitting material: SFW 120: 1.4571/AISI 316 Ti; BSFW 120: AP1D	sensor material: AP1D sensor: PVDF; sealing rings: Viton®	sensor and fitting: 1.4571/AISI 316Ti,	sensor and fitting: 1.4571/AISI 316Ti,
without cable (standard) max. cable length 25m, at transistor output	without cable (standard) max. cable length 25m, at relay output	2 m cable (standard), max. cable length 100 m, between monitoring head and electronic control unit	2 m cable (standard), max. cable length 100 m, between monitoring head and electronic control unit
see CPI cat. pages 27 - 28	see CPI cat. pages 29 - 30	see CPI cat. pages 31 - 34	see CPI cat. pages 31 - 34



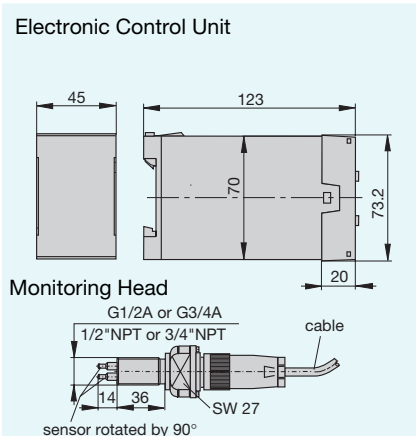
Type No.

SFW 209



Media	liquids, gases, powder
Features	1 switch point (MIN or MAX) relay output status indication by 2 LEDs
Flow rate range	0.01 m/s...2 m/s with water 0.5 m/s...50 m/s with gases
Temperature range of medium/monitoring head	-25 °C...+100 °C
Temperature range of electronic control unit	-10 °C...+60 °C
Outputs	1 relay (change over contact) AC 250 V, DC 28 V: 2 A
Input voltage	AC 230 V / 115 V / 24 V +10%/-15% DC 24 V $\pm$ 10%
Type and size of monitoring head	monitoring heads G1/2A, G3/4A, 1/2"NPT or 3/4"NPT
Material of monitoring head	sensor and fitting: 1.4571/AISI 316Ti,
Cable length	2 m cable (standard), max. cable length 50 m
Available options	see CPI cat. pages 35 - 36

Dimensions



ETA® Flow Meter with Ex approval

FM 1-Ex



PTB approval; in conformance with EN 50014 and EN 50020 (Ex ibII)

CST-Ex



PTB approval No. Ex-88-B-2034 in conformance with EN 50014 and EN 50020 for Ex ib II C/II B

gases, liquids

menu control
two analogue outputs
relay or transistor outputs
for connection of calorimetric monitoring heads

water: 0... 3 m/s
oil: 0... 5 m/s
gases/air: 0...20 m/s

-40 °C...+90 °C

+5 °C...+33 °C

Analogue outputs:
0/4-20 mA or 0/2-10 V or 0/1-5 V
relay or transistor outputs

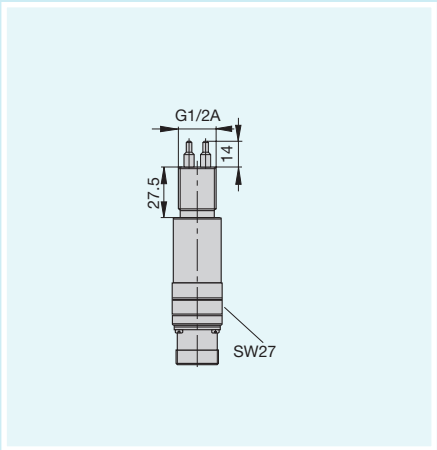
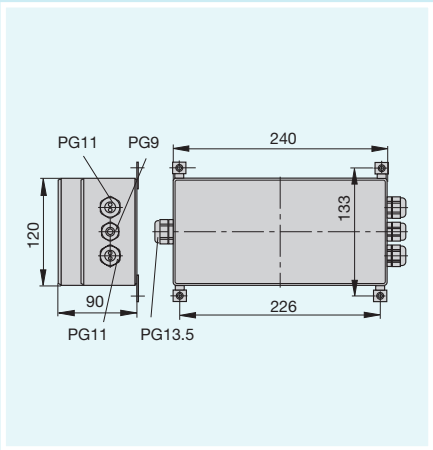
DC 24 V (19...32 V)
AC 24 V ± 10%

AC 230 V +10%/-15%

G 1/2A

sensor and fitting: 1.4571/AISI 316 Ti

2 m standard, max. cable length 100 m



Medium	Air/gases							Liquids							Granules/Powders				Ex version	
	SW 112	SW 118	SLW 119	SLW 120 E	SW 201-L	SFW 209	FM 1	SW 118	SW 119	SFW/BSFW 120	SFW 120 E	SW 201-F	SFW 209	FM 1	SW 118	SW 119	SW 201-F	SFW 209	FM1-Ex	
(●) = optionally																				
Input voltage																				
12 V DC										●										
24 V DC	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
24 V AC (50/60 Hz)	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
115 V AC (50/60 Hz)		●	●		●	●					●	●	●		●	●	●	●		
230 V AC (50/60 Hz)		●	●		●	●		●	●			●	●		●	●	●	●		
Medium temperature																				
-40 °C...+130 °C							●							●						
-40 °C...+125 °C							●				●					●				
-40 °C...+100 °C					●									●					●	
-40 °C...+90 °C							●							●						
-30 °C...+140 °C								●							●					
-25 °C...+70 °C		●							●			●				●	●			
-25 °C...+100 °C			●			●														
-20 °C...+100 °C																				
-20 °C...+60 °C	●																			
-10 °C...+60 °C				●						●	●									
0...+250 °C							●							●						
0...+140 °C							●							●						
Ambient temperature																				
-25 °C...+50 °C		●	●					●	●						●	●				
-20 °C...+50 °C	●																			
-10 °C...+60 °C				●		●			●	●		●					●		●	
-10 °C...+45 °C					●						●						●			
+10 °C...+50 °C							●							●					●	
Flow rate range																				
0.01...1 m/sec																				
0.01...2 m/sec								●	●	●			●		●	●		●		
0.01...3 m/sec														●						
0.01...5 m/sec												●		●			●		●	
0.05...100 m/sec																			●	
0.5...20 m/sec	●						●													
0.5...50 m/sec		●	●			●														
0.5...100 m/sec					●															
0.1...10 l/min											●									
2.5...250 l/min				●																
Monitoring head																				
G1/2A		●	●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	
G3/4A		●	●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	
NPT		●	●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	
Special	●			●						●										
Pressure resistance																				
1 bar / 14.7 PSI	●																			
20 bar / 294 PSI				●	●		●				●	●		●		●				
100 bar / 1470 PSI							●							●					●	
250 bar / 3675 PSI		●	●			●		●	●	●			●		●	●		●		
300 bar / 4410 PSI					●							●				●				
Output																				
transistor							●			●				●					●	
relay	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
0...20 mA non linear					●						●					●				
4...20 mA non linear					●						●					●				
0...20 mA linear							●							●					●	
4...20 mA linear							●							●					●	
0...5 V							●							●					●	
0...10 V							●							●					●	
1...5 V							●							●					●	
2...10 V							●							●					●	



E-T-A Capacitive Level Sensors

E-T-A level sensors are of high quality, practically maintenance free and have a wide operating temperature range. They respond to the change of capacitance occurring when an electrode surrounded by air is immersed into the medium to be monitored. This capacitance change causes a circuit to oscillate which is processed electronically.

The different versions can be used as MIN/MAX sensors with closed circuit principle. Power failure and wire break are indicated the same way as incorrect medium level.

Models NR 150, NR 160 and NR 200 allow the selection of minimum or maximum switching by means of an integral selector switch, whereas models NR 80, NR 60 and NR 100 are factory-preset as a minimum or maximum sensor.

Model NR 200 features a potential-free relay change over contact, models NR 100, NR 150 and NR 160 a short-circuit proof plus switching transistor output, and models NR 60 and NR 80 a minus switching transistor output.

First installation

The Level Sensors are factory preset for water.

1. Install the Level Sensor and connect it as shown on the connection diagram.
2. For sensitivity setting turn the potentiometer screw until the LED changes.
3. Adjust the potentiometer screw another half turn to compensate for any tolerances and to eliminate deposits on the sensor (allow for response delay!).

For other media it is necessary to readjust the sensors (make sure the medium to be monitored is available!).

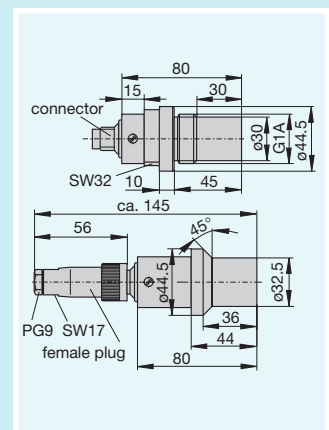
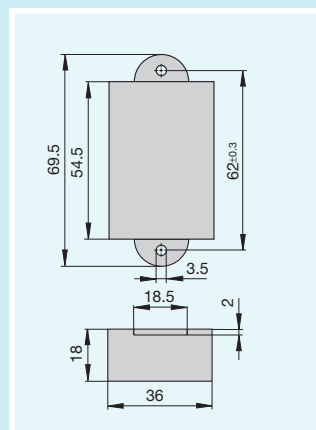
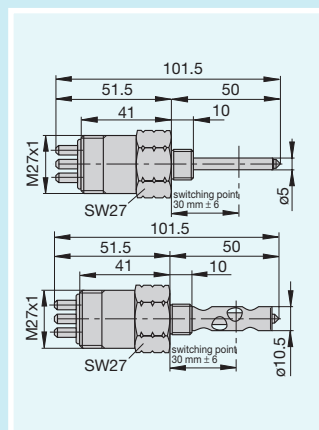
These instructions do not apply to model NR 60 because its sensitivity is factory preset.

For installation details please see the applicable Installation Instructions.

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.

Type No.	NR 60-...	NR 80-...	NR 100-...
			
Description	water, oil, fuels	water and liquids with similar electrical conductivity	powder, water and liquids with similar electrical conductivity, aggressive media
Input voltage/ power consumption	DC 9...36 V typically 6 mA or with power supply NG 03	DC 6...36 V typically 5 mA or with power supply NG 03	DC 24 V $\pm 25\%$ typically 30 mA or with power supply NG 03
Output	NPN transistor, low side switching, short-circuit and overload protected, with free-wheeling diode, voltage drop <300 mV	NPN transistor, low side switching, max. 100 mA, with free-wheeling diode, voltage drop approx 2 V	PNP transistor, high side switching, max. 0.3 A, short-circuit and overload protected, with free-wheeling diode, voltage drop approx. 2 V
Ambient temperature	-30 °C...+125°C	0 °C...+70 °C	-20°C...+85°C
Medium temperature	-30 °C...+125°C	0 °C...+70°C (max. 80 °C short-time)	-20 °C...+130°C (max. +150 °C short-time)
Pressure resistance	25 bar/367.5 PSI	N/A	2 bar/29.4 PSI (25 bar/367.5 PSI to special order)
Material probe fitting sealing (O ring) or sensor and fitting housing housing cover connector	Tefzel® ETFE nickel-plated brass, Ms CuZn39Pb3 Viton® nickel-plated brass, Ms CuZn39Pb3 - -	- - - ABS = Acrylonitrile butadiene styrene - -	PTFE = Teflon®/Polytetrafluoroethylene PTFE = Teflon®/Polytetrafluoroethylene - - - PBTP gv = Polybutylene Terephthalate with glass fibre
Technical data	see CPI cat. pages 57 - 58	see CPI cat. pages 59 - 60	see CPI cat. pages 61 - 62

Dimensions



NR 150-...



oil and media with low electrical conductivity

DC 9...36 V
typically 13 mA
or with power supply NG 03

PNP transistor,
high side switching, max. 0.3 A,
short circuit and overload
protected, with free-wheeling
diode, voltage drop approx. 2 V

-20°C...+85°C

-20 °C...+130°C
(max. +150 °C short-time)

25 bar/367.5 PSI

ETFE = Tefzel®
DIN 1.4305/AISI 303
Viton®
-
PA6-3T = Trogamide
-

see CPI cat. pages 63 - 64

NR 160-...



water and liquids with similar electrical conductivity

DC 9...36 V
typically 17 mA
or with power supply NG 03

PNP transistor,
high side switching, max. 0.3 A,
short circuit and overload
protected, with free-wheeling
diode, voltage drop approx. 2 V

-20°C...+85°C

-20 °C...+130°C
(max. +150 °C short-time)

25 bar/367.5 PSI

PA12-Gf = Polyamide 12 with glass fibre
DIN 1.4305/AISI 303
Viton®
-
PA6-3T = Trogamide
-

see CPI cat. pages 65 - 66

NR 200-...



oil and media with low electrical conductivity

AC 115/230/240 V
+10%/-15%
typically <4VA

relay output switching capacity:
DC 50...270 W
AC 2000 VA
switching voltage:
DC 300 V/AC 250 V
switching current: 6 A

-20°C...+70°C

-20 °C...+85°C
(max. +100 °C short-time)

25 bar/367.5 PSI

ETFE = Tefzel®
DIN 1.4305/AISI 303
Viton®
ABS = Acrylonitrile butadiene styrene
ABS = Acrylonitrile butadiene styrene
-

see CPI cat. pages 67 - 68

NG 03-...



power supply with relay output

AC 115/230/240 V
+10%/-15%
typically <4VA

for Level Sensors NR 60, NR 80,
NR 100, NR 150, NR 160
DC 24 V, 50 mA

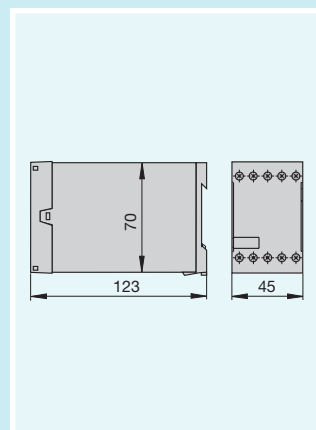
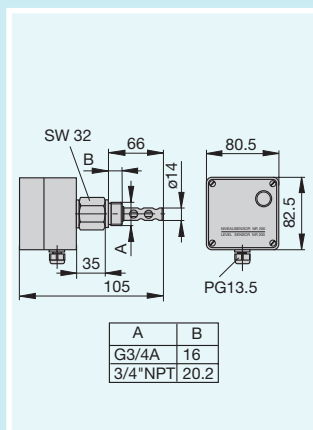
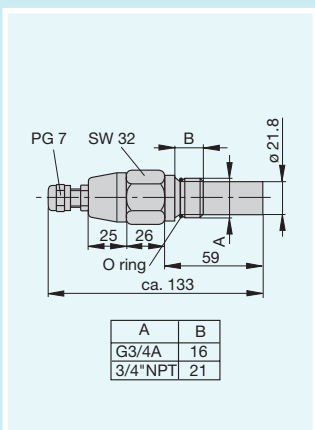
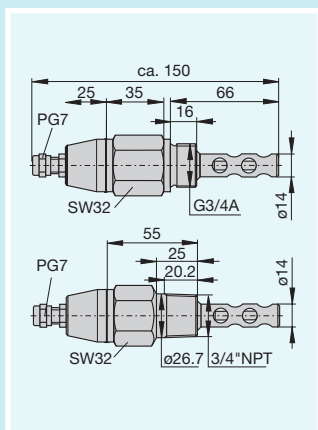
0 °C ... + 70 °C

N/A

N/A

N/A

see CPI cat. pages 69 - 70



Selector chart

	NR 60	NR 80	NR 100	NR 150	NR 160	NR 200
Medium						
water	●	●	●	●	●	●
oil	●			●		●
powder			●		●	
Sensitivity setting						
no	●					
yes		●	●	●	●	●
Mounting method						
invasive	●		●	●	●	●
non-invasive		● ¹⁾				
Function						
MIN or MAX	●	●	●			
MIN/MAX selector switch				●	●	●
Output						
relay						●
PNP transistor			●	●	●	
NPN transistor	●	●				
LED display						
yes		●	●	●	●	●
no	●					

¹⁾ non-metallic containers

	NR 60	NR 80	NR 100	NR 150	NR 160	NR 200
Input voltage						
DC 12 V	●	●		●	●	
DC 24 V	●	●	●	●	●	
AC 115 V						●
AC 230 V						●
AC 240 V						●
Medium temperature						
-20... + 85 °C (+125 °C) ²⁾						●
-20... + 130 °C (+150 °C) ²⁾			●	●	●	
-30... + 125 °C	●					
0 ... +70 °C		●				
Ambient temperature						
-20 ... +70 °C						●
-20 ... +85 °C			●	●	●	
-30 ... +125 °C	●					
0 ... +70 °C		●				
Process connector						
G3/4A (R3/4")				●	●	●
G1A (R1")			●			
3/4"NPT				●	●	●
1"NPT			●			
M14 x 1.5	●					
M18 x 1.5	●					
1/4" NPTF	●					
Compression nut			●			
Pressure resistance						
2 bar/29.4 PSI			●			
25 bar/367.5 PSI	●		○	●	●	●
N/A		●				

²⁾ short-time

○ on request



E-T-A Digital Panel Instruments

E-T-A digital panel meters are designed to measure, monitor and display electrical, thermal and mechanical values for a wide range of industrial applications.

The panel mounted instruments provide a choice of front face dimensions of 96 mm x 48 mm, 96 mm x 24 mm or 48 mm x 24 mm with a 2.5 to 5 digit 7-segment non-reflective LED display, designed for clarity under all lighting conditions.

The instruments are available for different supply voltages. Their versatility is further assured through optional features which include adjustable set points for alarm or control purposes and analogue output. Versions for current and voltage measurement can also provide true RMS readings.

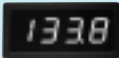
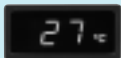
E-T-A pressure meters are suitable for use with all commercially available pressure transducers with standard signal output. A DC 24 V/20 mA output, physically isolated from the measuring input of the meter's power supply, ensures an interference-free auxiliary power supply for the transducers.

The E-T-A MDZ 480 is an intelligent frequency measuring instrument which can be connected to a wide range of circuit control sensors such as proximity switches, NAMUR sensors and tachogenerators. The appropriate function is user-selected at the time of installation.

All E-T-A panel meters are designed to internationally recognised DIN, VDE and IEC specifications.

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.

Type No.	MDA 241-...	MDV 241-...	MDC 241-...	MDK 241/MDR 241-...
				
Description	DC and AC current measuring instrument	DC and AC voltage measuring instrument	Temperature measuring instrument for Pt100 to IEC 751 2-conductor circuit	Measuring instruments with standard signal input and selectable display range. Pressure instrument MDR 241 with transmitter supply 24 V/20 mA
Accuracy	DC 0.1%, AC 0.2% of span	DC 0.1%, AC 0.2% of span	resolution 1 K: 0.3% 0.1 K: 0.1% of span	0.1 % of span
Supply voltage	DC: 12...26 V physically isolated from the measuring circuit	DC: 12...26 V physically isolated from the measuring circuit	DC: 12...26 V physically isolated from the measuring circuit	DC: 12...26 V physically isolated from the measuring circuit
Temperature range	0 °C...+50 °C	0 °C...+50 °C	0 °C...+50 °C	0 °C...+50 °C
Measuring range	0...2 mA 0...20 mA 0...200 mA 0...2 A	0...200 mV 0... 2 V 0... 20 V 0...200 V 0...600 V	0...+ 300 °C +250...+ 800 °C -200 ...+ 200 °C -100.0...+100.0 °C	Input: 0...±20 mA 4... 20 mA 0...±10 V 0... ±5 V
Display	3 1/2 digit 13 mm 7-segment LED	3 1/2 digit 13 mm 7-segment LED	3 1/2 digit 13 mm 7-segment LED	3 1/2 digit 13 mm 7-segment LED
Dimensions	96 x 24 x 89 mm	96 x 24 x 89 mm	96 x 24 x 89 mm	96 x 24 x 89 mm
Technical data	see CPI cat. pages 77 - 78	see CPI cat. pages 77 - 78	see CPI cat. pages 77 - 78	see CPI cat. pages 79 - 80

Type No.	MDA 245-...	MDV 245-...	MDC 245-...
			
Description	Instrument for standard signals (DC current)	Instrument for standard signals (DC voltage)	Temperature measuring instrument with temperature sensor KTY16-6
Accuracy	0.1% of span	0.1% of span	0.8 % of span
Supply voltage	DC: 4... 7 V 7...16 V 16...28 V (standard)	DC: 4... 7 V 7...16 V 16...28 V (standard)	DC: 4... 7 V 7...16 V 16...28 V (standard)
Temperature range	0 °C...+50 °C	0 °C...+50 °C	0 °C...+50 °C
Measuring range	Input: 0...±20 mA 4... 20 mA	Input: 0... ±5 V 0...±10 V	-30 °C...+100 °C
Display	3 1/2 digit 10 mm 7-segment LED selectable display range	3 1/2 digit 10 mm 7-segment LED selectable display range	2 1/2 digit 10 mm 7-segment LED
Dimensions	48 x 24 x 85 mm	48 x 24 x 85 mm	48 x 24 x 85 mm
Technical data	see CPI cat. pages 81 - 82	see CPI cat. pages 81 - 82	see CPI cat. pages 81 - 82

Type No.	MDA 480-...	MDV 480-...	MDC 480-...	MDK 480/MDR 480-...
				
Description	AC or DC current measuring instrument. Version for rms measurement for non-sinusoidal curves available. Special calibration if display needs to deviate from input quantity.	AC or DC voltage measuring instrument. Version for rms measurement for non-sinusoidal curves available. Special calibration if display needs to deviate from input quantity.	Temperature measuring instrument for RTDs or thermocouples.	Measuring instrument with normalized inputs and freely selectable display range. Pressure measuring instrument MDR 480 with transmitter supply 24 V/25 mA or for measuring bridge 1 mA or 10 V const.
Options	2 limit values 4 limit values 2 limit values + analogue output analogue output	2 limit values 4 limit values 2 limit values + analogue output analogue output	2 limit values 4 limit values 2 limit values + analogue output analogue output	2 limit values 4 limit values 2 limit values + analogue output analogue output
Supply voltage	AC 240 / 230 / 115 V AC 120 / 60 / 48 / 24 V DC 12...28 V physically isolated	AC 240 / 230 / 115 V AC 120 / 60 / 48 / 24 V DC 12...28 V physically isolated	AC 240 / 230 / 115 V AC 120 / 60 / 48 / 24 V DC 12...28 V physically isolated	AC 240 / 230 / 115 V AC 120 / 60 / 48 / 24 V DC 12...28 V physically isolated
Temperature range	0 °C...+50 °C	0 °C...+50 °C	0 °C...+50 °C	0 °C...+50 °C
Measuring range	individual: 0...2 mA 0...20 mA 0...200 mA 0...2 A 0...10 A multiple (DC only): 0...2 mA + 0...20 mA + 0...200 mA 0...2 A + 0...10 A special measuring ranges	individual: 0...200 mV 0...2 V 0...20 V 0...200 V 0...600 V multiple (DC only): 0...200 mV + 0...2000 mV 0...20 V + 0...200 V special measuring ranges	IEC 584: Cu-CuNi Fe-CuNi NiCr-CuNi NiCr-Ni Pt 13 % Rh-Pt Pt 10 % Rh-Pt DIN 43 710: Cu-CuNi Fe-CuNi IEC 751: Pt 100 DIN 43 760: Ni100	Input: 0...20 mA 4...20 mA 0...10 V 0... 5 V 1... 5 V 2...10 V 0...200 mV special measuring ranges
Display	3 1/2 or 4 1/2 digit 13 mm 7-segment LED	3 1/2 or 4 1/2 digit 13 mm 7-segment LED	3 1/2 digit 13 mm 7-segment LED	3 1/2 digit 13 mm 7-segment LED
Dimensions	96 x 48 x 166 mm	96 x 48 x 166 mm	96 x 48 x 166 mm	96 x 48 x 166 mm
Technical data	see CPI cat. pages 83 - 90	see CPI cat. pages 83 - 90	see CPI cat. pages 91 - 98	MDR: see CPI cat. pages 99 - 106 MDK: see CPI cat. pages 107 - 114

Type No.	MDZ 480-F...	MDZ 480-V...
		
Description	Instrument measuring the frequency of bipolar signals in the voltage ranges: AC 15 ... 50 V AC 50 ... 150 V AC 150 ... 430 V	Instrument measuring frequency, velocity or events (counting) of digital signals: TTL, 24 V-PLC, open collector, NAMUR Adjustable: function, input, measuring time, parameter (e.g. number of teeth), display
Options	---	2 limit values (1 relay) 2 peak values
Voltage supply	AC 230 V, AC 115 V	AC 230 V, AC 115 V
Temperature range	0 °C...+50 °C	0 °C...+50 °C
Measuring range	0.1 Hz ... 10 kHz	0.1 Hz ... 100 kHz (frequency measurement) 6 ... 99999 min ⁻¹ (velocity measurement) 1 ... 9999 ms (period measurement) 0 ... 499999 (forward/backward counter, f _{max} =1 kHz) 0.1 Hz... 100 kHz (special function)
Display	4 digit 13 mm 7-segment LED	5 digit 13 mm 7-segment LED
Dimensions	96 x 48 x 166 mm	96 x 48 x 166 mm
Technical data	see CPI cat. pages 115 - 120	see CPI cat. pages 115 - 120

Selector chart

Type No.		MDA245	MDC245	MDV245	MDA241	MDC241	MDK241	MDR241	MDV241	MDA480	MDC480	MDK480	MDR480	MDV480	MDZ480
Version															
Front dimensions	48 mm x 24 mm	●	●	●											
	96 mm x 24 mm				●	●	●	●	●						
	96 mm x 48 mm									●	●	●	●	●	●
Current measurement	DC 0 ... 2 mA				●					●					
	DC 0 ... 20 mA	●			●		●	●		●		●	●		
	DC 4 ... 20 mA	●					●	●				●	●		
	DC 0 ... 200 mA				●					●					
	DC 0 ... 2 A				●					●					
	DC 0 ... 10 A									●					
	AC 0 ... 2 mA				●					●					
	AC 0 ... 20 mA				●					●					
	AC 0 ... 200 mA				●					●					
	AC 0 ... 2 A				●					●					
	AC 0 ... 10 A									●					
Voltage measurement	DC 0 ... 200 mV								●					●	
	DC 0 ... 2 V								●					●	
	DC 0 ... 10 V			●			●	●				●	●		
	DC 0 ... 20 V								●					●	
	DC 0 ... 200 V								●					●	
	DC 0 ... 600 V								●					●	
	AC 0 ... 200 mV								●					●	
	AC 0 ... 2 V								●					●	
	AC 0 ... 20 V								●					●	
	AC 0 ... 200 V								●					●	
	AC 0 ... 600 V								●					●	
Temperature measurement	Pt100				●						●				
	Ni100										●				
	thermocouple										●				
	temperature sensor		●												
Frequency measurement	AC signals														●
	digital input														●
Display	2 1/2 digit		●												
	3 1/2 digit	●		●	●	●	●	●	●	●	●	●	●	●	
	4 1/2 digit									●				●	
	5 digit														●
Voltage supply	AC									●	●	●	●	●	●
	DC	●	●	●	●	●	●	●	●	●	●	●	●	●	
Sensor supply	DC 24 V							●					●		●
Options	true rms measurement									●				●	
	calibration of display	●		●			●	●				●	●		●
	peak value storage														●
	analogue output 0 ... 10 V									●	●	●	●	●	
	analogue output 0 ... 20 mA									●	●	●	●	●	
	analogue output 4 ... 20 mA									●	●	●	●	●	
	2 limit values with relay									●	●	●	●	●	●
	4 limit values with relay									●	●	●	●	●	



E-T-A Sensors

E-T-A Velocity Sensors MSZ... provide contactless sensing of mechanical motion such as the rotational speed of drives or rotating shafts. Pulses are generated at ferro-magnetic pick-up wheels (i.e. gears) whose teeth pass by the sensor. The electronic control circuitry and the sensor head are designed as an integral unit. The rectangular signal provided by the electronic control circuitry is independent of the pick-up geometry.

The instruments are available in a wide voltage supply and temperature range, and various dimensions and connection methods to allow a wide spread of applications in general and automotive industries.

E-T-A Pressure Sensors MSR 400 and MSR 450 are designed to convert nominal pressures up to 400 bar/5880 PSI into standard signals. The robust design of model MSR 400 (voltage supply, EMC, environmental protection, connector to DIN 72585) is perfectly suited to its application in commercial equipment and machinery/plant for the construction industry etc. Model MSR 450 featuring a stainless steel enclosure is designed for general industrial applications (connection method according to DIN 43650). Available with various threads (metric, imperial, NPT) fitting all commercial process connections.

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.



E-T-A Current and Voltage Monitors

E-T-A Current and Voltage Monitors series E-107.. are designed to monitor electrical circuits for current or voltage over limits.

- E-T-A Zero Current Monitors E-1076-SR signal a current flowing in the monitoring circuit when fixed current limits are exceeded. They feature a 17 mm wide rail mounted housing and may also be used to switch on an elapsed-hour meter. Internal power supply is by means of the input signal so that no additional wiring is needed.
- E-T-A Current Monitors E-1077 offer the possibility to individually set the MAX and/or MIN limit values by means of the digital switches provided on the front of the housing. The response delay may be selected. Relay contacts provide for potential-free signalization. Relay status and adjustment error is indicated by LEDs.
- E-T-A Current Protector E-1078 is designed for low voltage lighting systems. It monitors the lighting system rated current that is stored, when it is switched on, in the primary circuit of the low-voltage transformer. The rated load is stored either by operation of the push button on the device or via the light switch. A short-circuit in the lamp circuit or an overload will cause the Current Protector to immediately disconnect the system. The product is available with a rail mounted housing (for consumer unit installation) or in a housing for surface mounting at or in the transformer.
- E-T-A Combi Safety Protection E-1078-911 allows the simultaneous connection of two powerful loads such as a washing machine and a dryer to a 16 A socket with earthing contact. One of the two sockets has priority and is connected to the washing machine. When the current required by the washing machine exceeds a set limit of approx. 15.5 A (during heating), the second socket is disconnected, and reconnected only when the current falls to the set lower limit. Appliance combinations such as dishwasher and hot-water heater may also be operated this way.
- E-T-A Voltage Monitor E-1079 monitors set MAX and/or MIN voltage limits in a circuit. Limit value setting is by means of the digital switches provided on the front of the housing. Additional features are relay outputs, selectable response delay, LED status indication, and rail mounted housings.
- E-T-A Voltage Monitor E-1079-600 is available in a 12 mm wide housing for plug-in mounting utilising E-T-A socket 17-P10-Si. It is designed to monitor typical AC and DC supply voltages with set tolerances, e.g. DC 24 V $\pm$ 25 %. The actual voltage is indicated by two LEDs and a MOS output. This system, too, saves additional wiring by taking its internal power supply from the input signal.

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.

Type No.

E-1076-SR-...

E-1077-51-...



Description

monitors a MIN limit value in an AC circuit via a current transformer. If a set value is exceeded, the triac or transistor will enable the output, and the status is indicated by LED. The low power required by the Zero Current Monitor is taken from the input signal.

monitors a circuit by adjustable MIN and/or MAX limit values. The response values may be directly preset by means of digital switches in the front of the housing.

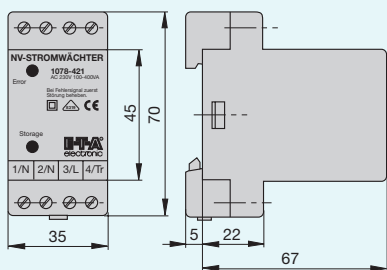
When set values are exceeded, the applicable relay (change over) will switch off. The response delay may be set between 0.2 and 30 sec. Relay status, operating voltage and adjustment error are indicated by LED.

Version	MIN limit value (Zero Current Monitor)	- 31: MAX limit value - 41: MIN limit value - 51: MAX and MIN limit value
Setting range (measuring range)	AC 5 A (response threshold: 100 mA) AC 16 A (response threshold: 1 A) Values cannot be set	AC 0.1 ... 19.9 A AC 0.01 ... 1.99 A DC 0.1 ... 19.9 mA
Internal resistance	–	approx. 1 mΩ (with AC 19.9 A) approx. 10 mΩ (with AC 1.99 A) 1 Ω (with DC 19.9 mA)
Accuracy	–	1 % ± 2 digits
Switching hysteresis	–	≤ 0.1 A (with AC 19.9 A) ≤ 0.01 A (with AC 1.99 A) ≤ 0.1 mA (with DC 19.9 mA)
Response delay	–	adjustable between 0.2...30 s
Supply voltage	AC 0...250 V rated voltage (= supply voltage)	AC 115 V (90 ... 135 V) AC 230 V (200 ... 244 V)
Output	AC: triac 250 V/200 mA DC: transistor 60 V/ 50 mA	relay with change over contact AC 250 V/5 A
Temperature range	0 ... +60 °C	0 ... +50 °C
Degree of protection	housing: IP 20 terminals: IP 20	housing: IP 50 terminals: IP 20
Mounting method	rail mounted on 35 mm symmetric rail to DIN 50 022 and DIN 50 035	rail mounted on 35 mm symmetric rail to DIN 50022
Dimensions	17 x 63 x 64 mm	74 x 45 x 124 mm
Technical data	see CPI cat. pages 135 - 136	see CPI cat. pages 137 - 138

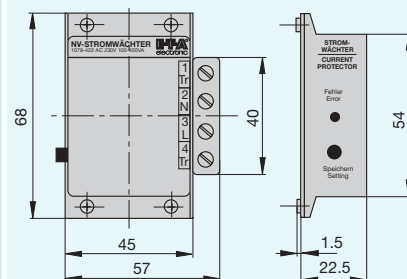
Type No.	E 1078-421-/ 431-...	E 1078-422-/ 432-/ 482-...
		
Description	The Current Protector is connected in the primary circuit before the low-voltage transformer (e.g. AC 230 V/12 V). Irregularities in the secondary circuit, such as overloads or short-circuits, will cause the Protector to immediately disconnect the system. Underload (e.g. defective terminal connections) also causes system disconnection. Error indication by red LED. After removal of the fault, the system can be reconnected by operation of the storage push button on the Protector or by operating the light switch.	Protection of lighting systems ● Available housing variants: - track mountable on 35 mm EN rails - housing for surface mounting in transformers Suitable for dimmer systems. ● Detecting defective terminal connections ● Line resistances, transformer and lamp tolerances are compensated for by the adjustment. ● VDE approval in place ● Option: load storage via light switch.
Variants	E 1078-421 (up to 400 W) E 1078-431 (up to 600 W)	E 1078-422 (up to 400 W) E 1078-432 (up to 600 W) E 1078-482 (up to 600 W) load storage via light switch
Protection from	short-circuit, overload, underload	short-circuit, overload, underload
Lamp capacity	60 - 300 W 100 - 400 W 300 - 600 W	60 - 300 W 100 - 400 W 300 - 600 W
Voltage rating	AC 230 V ± 10 % / 50 Hz	AC 230 V ± 10 % / 50 Hz AC 120 V ± 10 % / 60 Hz
Suitable for lighting systems with dimmers	yes	yes
Temperature range	0 ... +45 °C	0 ... +60 °C
Overload response	steplessly adjustable	steplessly adjustable
Typical trip times overload short-circuit underload	200 ms to 2 s (depending on overload) 200 ms 3 s	200 ms to 2 s (depending on overload) 200 ms 3 s
Technical data	see CPI cat. pages 139 - 140	see CPI cat. pages 141 - 142

Dimensions

Track-mountable housing



Surface housing



Type No.

E-1078-911



Description

Two powerful appliances such as a washing machine and a dryer may be connected to a European style 16 A household socket without overloading the circuit. The E-T-A Combi Safety Protector E-1078-911 connects one of the appliances continuously to power. The second appliance is disconnected from the supply for a short time when the total current consumption reaches approx. 15.5 A - during water haeating for example. Upon completion of the heating cycle of the first appliance, the second one will be automatically reconnected.

Upper response threshold	typically 15.5 A ± 1 A
Lower response threshold	typically 2.0 A ± 1 A
Supply voltage	N/A
Temperature range	0 ... +45 ° C
Environmental duty	for normal dry, clean domestic conditions
Dimensions	255 x 60 x 40 mm
Technical data	see CPI cat. page 143

Type No.

E-1079-51-...

E-1079-60-...



Description

Voltage Monitor E-1079-... monitors set MAX and/or MIN voltage limits. The response can be directly preset by the digital switches on the front of the housing. When the set limits are exceeded, the applicable relay (change over) will switch off. The response delay may be set between 0.2 and 30 s. Relay status, operating voltage and adjustment error are indicated by LEDs.

Voltage Monitor E-1079-600 monitors DC or AC voltages with set tolerances. Two LEDs indicate the operating status and over limits, with an opto coupler providing a physically isolated output signal. The power requirement of the Monitor is taken from the input signal.

Variants

-31: MAX limit value
-41: MIN limit value
-51: MAX and MIN limit values

MIN and MAX limit value
(not adjustable)

Setting range (measuring range)

DC 1... 199 mV
DC 0.01... 1.99 V
DC 0.1 ... 19.9 V

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)

Internal resistance

DC: $R_i = 20\text{ k}\Omega$ (with 199 mV)
DC: $R_i = 100\text{ k}\Omega$ (with 1.99 V and 19.9 V)

3 mA (DC/AC) load current

Accuracy

1 % ± 2 digits

$U_{\min} -10\% U_n \dots U_{\min}$
 $U_{\max} \dots U_{\max} +10\% U_n$

Switching hysteresis

1 digit
with -51: setting distance between MIN and
MAX limit value ≥ 5 digits

–

Response delay

0.2 ... 30 sec, adjustable

–

Supply voltage

AC 115 V (90 ... 135 V)
AC 230 V (200 ... 244 V)

N/A

Output

relay with change over contact AC 250 V/5 A

MOS output AC/DC 250 V/80 mA

Temperature range

0 ... $+50\text{ }^{\circ}\text{C}$

0 ... $+60\text{ }^{\circ}\text{C}$

Degree of protection

housing: IP 50
terminals: IP 20

housing: IP 50
terminals: IP 20

Mounting

rail mounted on 35 mm rail to DIN EN 50022

socket-mounted on E-T-A socket 17-P10-Si

Dimensions

74 x 45 x 124 mm

50 x 56 x 12 mm (without socket)

Technical data

see CPI cat. pages 145 - 146

see CPI cat. pages 147 - 150

Current and Voltage Monitors - Selector chart

Type		E-1076-SR	E-1077-31	E-1077-41	E-1077-51	E-1078-421	E-1078-431	E-1078-422	E-1078-432	E-1078-482	E-1078-911	E-1079-31	E-1079-41	E-1079-51	E-1079-600
Description															
Current Monitor		●	●	●	●										
Current Protector						●	●	●	●	●					
Combi Safety Protector											●				
Voltage Monitor												●	●	●	●
Function	MIN limit value	●		●		●	●	●	●	●			●		
	MAX limit value		●								●	●			
	MIN and MAX limit value				●									●	●
Limit value adjustment	digital switches		●	●	●							●	●	●	
	button					●	●	●	●						
	light switch									●					
	factory preset	●									●				●
Measuring ranges	AC 0... 5 A	●													
	AC 0... 16 A	●									●				
	AC 0... 1.99 A		●	●	●										
	AC 0... 19.99 A		●	●	●										
	DC 0... 19.9 mA		●	●	●										
	DC 0... 199.9 mV											●	●	●	
	DC 0... 1.99 V											●	●	●	
	DC 0... 19.9 V											●	●	●	
	DC 12 V ± 25 %														●
	DC 24 V ± 25 %														●
	DC 48 V ± 25 %														●
	DC 110 V +10 % / -15 %														●
	DC 220 V +10 % / -15 %														●
	AC 115 V +10 % / -15 %														●
	AC 230 V +10 % / -15 %														●
Low voltage lamp load	60... 300 W					●	●	●	●	●					
	100... 400 W					●	●	●	●	●					
	300... 600 W					●	●	●	●	●					
Priority circuit	I > 15.5 A AC										●				
Outputs	relay		●	●	●						●	●	●		
	transistor	●													
	MOS														●
	triac	●													
Supply voltage	AC 230 V		●	●	●							●	●	●	
	AC 115 V		●	●	●							●	●	●	
	= input signal	●				●	●	●	●	●	●				●

Type	VDE	DEMKO	NEMKO	SEMKO	FIMKO	KEMA	SEV	ÖVE	IMQ	UTE	UL	CSA	BWB (VG)	LRoS	BV
104	●	●	●	●	●	●	●	●			●	●			
105	●	●	●	●	●	●	●	●			●	●			
106	●	●	●	●	●	●	●	●			●	●			
110	●										●	●		●	
111	●										●	●		●	
120												●			
127	●			●							●	●		●	
129												●	●	●	
157	●			●							●	●		●	
158	●			●							●	●		●	
201	●	●									●	●		●	
410														●	●
412											●			●	
413											●			●	●
428	●														
433	●	●													
434	●	●													
437														●	●
449													●		
452													●	●	●
482													●	●	
483													●		
520														●	●
530														●	●
583													●		
683	●	●	●	●	●	●	●	●	●	●					
808											●	●			
809											●	●			
921														●	
922														●	
1110	●			●							●	●		●	●
1140	●			●		●					●	●			
1410	●										●	●			
2210	●	●		●							●	●		●	●
2215	●			●							●	●			
3120	●	●	●	●	●						●	●		●	●
3130	●			●							●	●			
3200	●											●		●	
3300	●	●	●	●							●	●		●	
3400	●	●	●	●							●	●		●	
3500	●	●	●	●							●	●		●	
3600	●	●	●	●								●		●	
3900	●	●	●	●										●	
4000	●	●	●	●								●		●	
4201	●	●													
2-4100	●			●							●	●			
2-5000	●		●	●			●				●	●		●	
2-5200				●										●	
2-5700	●		●	●			●				●	●		●	
6110	●	●	●		●	●	●		●						
2-6200	●	●		●							●	●			
2-6400	●	●		●							●	●			
2-6500	●			●							●				
6510	●	●	●	●	●	●	●	●	●						
2-6700	●														
2-7000	●														
8330											●	●			
8340	●										●	●		●	●
8350	●										●	●			
											</				

Type	VDE	UL	CSA	LRoS	BV
41-0				•	•
41-04	•	•	•		
41-05	•	•	•		
41-06	•	•	•		
41-10		•	•	•	
41-11		•	•	•	
41-20			•		
41-27	•		•	•	
41-29			•	•	
41-57	•		•	•	
41-58	•		•	•	
42-01	•	•	•	•	
41-2		•		•	
41-3		•		•	•
42-8	•				
43-3	•				
43-4	•				
45-2				•	•
45-20				•	•
45-30				•	•
43-200	•		•	•	
43-300	•	•	•	•	
43-400	•	•	•	•	
43-500	•	•	•	•	
43-600	•		•	•	
43-900	•		•	•	
44-000	•		•	•	
44-201	•				
44-100	•	•	•		
45-000	•	•	•	•	
45-200			•		
45-700	•	•	•	•	
46-200	•	•	•		
46-400	•	•	•		
46-500		•	•		

E-T-A Electronic Flow Monitors, Level Sensors etc.		
Type	PTB	GL
FM1-Ex	•	
BSFW 120		•
NR 100 GL		•
NR 150 GL		•

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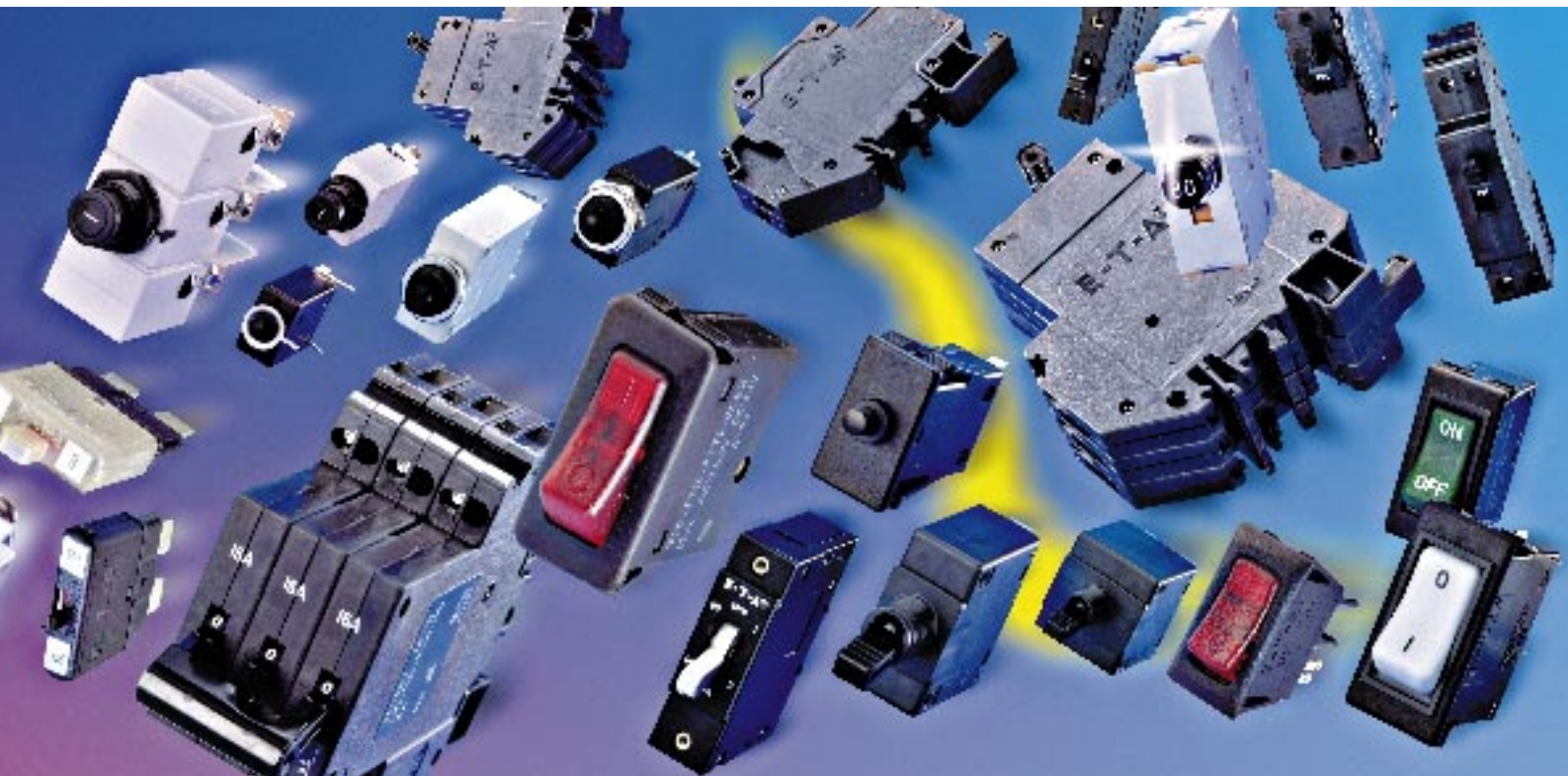
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