

# Overcurrent Protection 2216-S and REF16-S for AC and DC Control Circuits



AC 240 V/DC 50 V



DC 24 V



**Reliable overcurrent protection  
for industry and  
building automation**



## 2216-S and REF16-S

### Two innovative technologies – one compact design

Only 12.5 mm width and 70 mm depth – the slim design of the new thermal-magnetic circuit breaker type 2216-S and the new electronic overcurrent protector REF16-S is significantly space-saving, attractively styled and provides clear arrangements in control cabinets. The will-proven plug-in technology of both units reduces wiring and installation time and increases flexibility of the electrical design and logistics.

The new series 2216-S is a single or double pole thermal-magnetic circuit breaker, designed for AC voltages up to 240 V (50/60 Hz) and DC voltages up to 50 V (single pole version) or 80 V (double pole version).

The REF16-S is a single pole electronic overcurrent protector with a purely electronic trip characteristic. Its major feature is an active current limitation

for selective protection of load circuits powered by DC 24 V power supply. In the event of an overload or short circuit the REF16-S will only disconnect the faulty path without any repercussions on the DC 24 V supply. This will prevent a voltage dip in a single load circuit and it will prevent a failure of all loads connected to the power supply.

Thanks to the identical housing and terminal design, both units fit into the one-way terminal blocks 80plus (with screwless connectors) and 81plus (with screw terminals), which are new parts of the E-T-A product range. An integral retaining clip ensures a tight fit of the new E-T-A products even with increased shock and vibration values.

Accessories include various busbars, marking labels and coding pins. By means of the coding pins, the current

rating of a slot can be coded individually. Afterwards it is no longer possible to plug in a breaker with a higher rating so that inadvertent use of wrong ratings is excluded.



Thermal-magnetic circuit breaker **2216-S**



Electronic overcurrent protector **REF16-S**

REF16-S  
2216-S

## Thermal-magnetic circuit breaker 2216-S

### Three trip curves for optimum adjustment to loads and lines

The new single or double pole circuit breaker 2216-S is available in different current ratings from 0.5A to 16A. Auxiliary contacts are optionally available (change-over contacts) for initiating alarm circuits and subsequent switching operations or for status indication of the main contacts. Type 2216-S has been designed for AC voltages up to 240 V (50/60Hz) and for DC voltages up to 50 V (single pole version) and 80 V (2 pole version). Three different trip curves are available. They allow perfect adjustment to the load and line requirements. The instantaneous F1 curve for DC circuits corresponds to the standard A characteristic of circuit breakers. The fast trip curve F2 and the medium delay curve M1 are suitable for both AC and DC applications. The F2 curve corresponds

to trip characteristic B and the M1 curve corresponds to the C characteristic to IEC/EN 60898/1 (DIN VDE 0641-11). The new circuit breaker type 2216-S will carry approvals to IEC EN 60934, UL 1077 and UL 508 and is therefore suitable for international use.

#### Your benefit

- Reliable overcurrent protection for AC and DC control circuits
- Three different trip curves for perfect adjustment to loads
- Space-saving design: 12.5 x 90 x 70 mm (including socket)
- User-friendly plug-in type terminals for ease of installation
- Coding pins for clear and easy assignment of breaker and socket



Thermal-magnetic circuit breaker 2216-S

- Integral retaining clip to ensure a tight fit in the socket
- International approvals for global use

## Electronic overcurrent protector REF16-S

### Selective load protection – artless and clear

Available current ratings of the selective load protection of type REF16-S are 1A, 2A, 3A, 4A and 6A. The REF16-S only disconnects the faulty path in the event of an overload or short circuit in the load circuit without any repercussions on the DC 24 V supply. Thus voltage dips are prevented in the event of a failure in one single circuit which would lead to a failure of all loads connected to the switch-mode power supply. Even a complete machine stoppage could be the consequence.

Type REF16-S limits the short circuit current to typically 1.25 times rated current and disconnects the faulty path after 800 ms at the latest. However, inrush current peaks or peaks during normal operation will be tolerated. It is therefore no problem to switch capacitive loads up to 20,000 µF. In the event of an overload the integral power MOSFET disconnects promptly from 1.25 times

rated current.

A multi-coloured LED provides visual status and failure indications. Signalling can optionally be made available by an integral short-circuit-proof status output or auxiliary contacts. Remote operation is also possible via a remote reset signal or a remote control signal ON/OFF. The manual ON/OFF button on the device allows intentional start-up of individual load circuits. The new REF16-S will be tested according to UL2367, UL508 and CSA 22.2 and will then be internationally approved as “Electronic Overcurrent Protector“.

#### Your benefit

- Selective overcurrent disconnection at 1.25 x I<sub>N</sub>, even with long load lines or small cable cross sections (0.14 mm<sup>2</sup> plus)
- Current limitation from 1.25 x I<sub>N</sub> during start-up and in the event of overload/short circuit, keeps the



Electronic circuit protector REF16-S

- control voltage stable
- Switching of capacitive loads up to 20,000 µF
- Signalling via LED and signal output
- Remotely controllable: RESET or ON/OFF
- Space-saving design: 12.5 x 90 x 70 mm (including socket)
- User-friendly plug-in type terminals for ease of installation
- Coding pins for clear and easy assignment of breaker and socket
- Integral retaining clip for a tight fit in the socket

## Socket 80plus and 81plus

### Compact design – efficient power distribution

The new one-way and side-by-side mountable sockets 80plus and 81plus feature - just like the devices 2216-S and REF16-S – a space-saving overall width of only 12.5mm and can easily be snapped on to a DIN rail. Plug-in type jumpers allow reliable and time-saving group supply and at the same time connection in series or in parallel of auxiliary contacts, which is often required in practice. In addition, so-called coding pins allow a customer-individual coding of the current rating of the slots. Devices with higher current ratings can no longer erroneously be inserted so that

any hazards caused by wrong current ratings are excluded. Both new E-T-A sockets have been designed for voltages up to AC 277 V and DC 80 V and will be approved to UL 1059.



### Socket 80plus

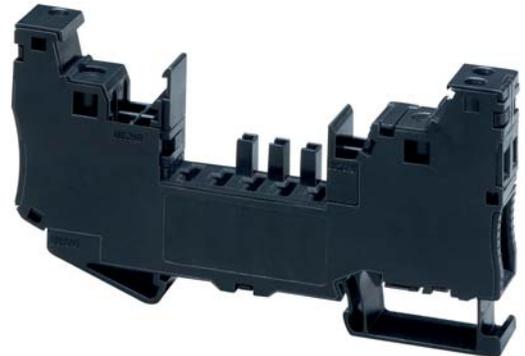
The new socket type 80plus is the first E-T-A socket with innovative push-in technology for direct line connection. This means: rigid, flexible or compressed wires can directly be pushed into the terminals without any additional tools. The new socket type 80plus has a 6 mm<sup>2</sup> supply terminal, two 4 mm<sup>2</sup> load output terminals and three 1.5 mm<sup>2</sup> signalling terminals.



### Socket 81plus

Socket type 81plus features well-proven screw terminal technology for multi-conductor connection. The terminals are made of superior copper alloys, enabling highest contact forces in minimum space. Screws are inserted by means of a slotted or a star screwdriver.

Socket 81plus has a 10 mm<sup>2</sup> supply terminal, a 10 mm<sup>2</sup> load output terminal and three 2.5 mm<sup>2</sup> signalling terminals.



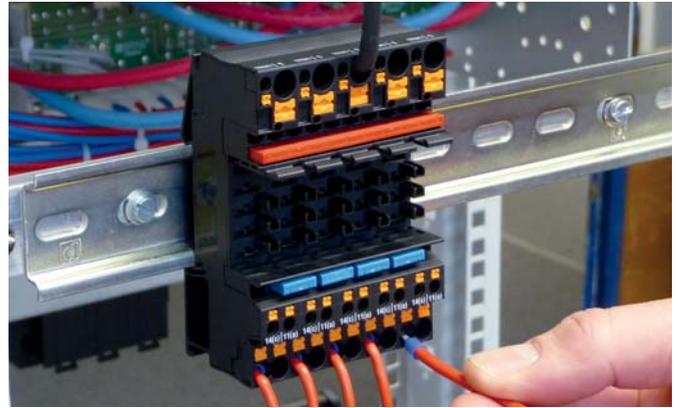
80plus  
81plus

# How it's done

## Example: 2216-S and 80plus



**1** Push in jumper for group supply



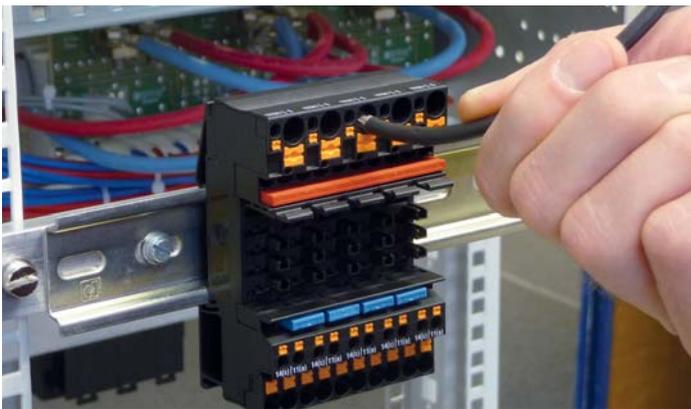
**4** Push in cable for load outputs



**2** Push in jumpers for group supply (here: series connection of auxiliary contacts)



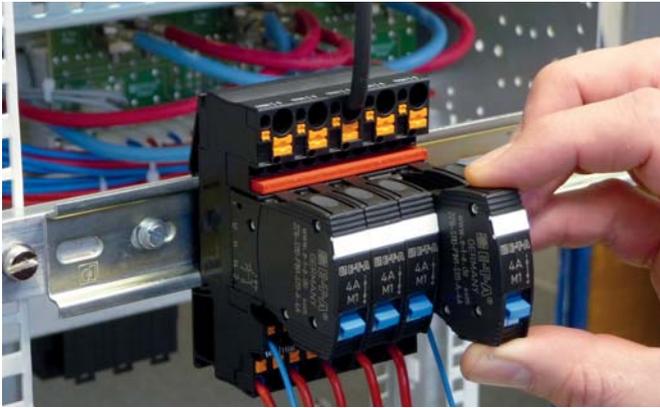
**5** Push in the two cables for the series connection of the auxiliary contacts



**3** Push in cable for power supply



**6** Plug in circuit breaker type 2216-S. Done!

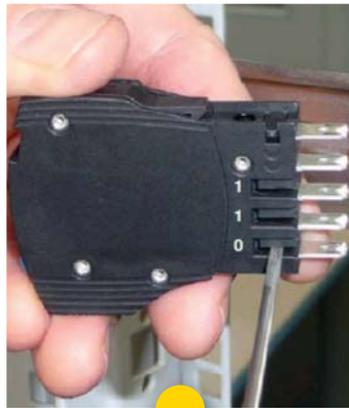


### Replacing a circuit breaker

1. Loosen the device by slightly pressing on the retaining clip.
2. Pull the circuit breaker out of the socket.
3. Plug in new breaker. Done!

Special advantage of the E-T-A system:

Hot-swap capability – the circuit breakers can be exchanged with the system live!



### Coding of circuit breakers and sockets

**Sockets:** Insert coding pins in accordance with coding table into receptacles of the sockets.



**Circuit breakers:** Remove coding pins in accordance with coding table by means of screw driver.



Breaker-socket-coding for the circuit breaker with the **highest** current rating

decreasing current rating

Breaker-socket-coding for the circuit breaker with the **lowest** current rating

Coding table

Breaker	1	1	1
Socket	0	0	0
Breaker	1	1	0
Socket	0	0	1
Breaker	1	0	1
Socket	0	1	0
Breaker	1	0	0
Socket	0	1	1
Breaker	0	1	1
Socket	1	0	0
Breaker	0	1	0
Socket	1	0	1
Breaker	0	0	1
Socket	1	1	0
Breaker	0	0	0
Socket	1	1	1

1: With PIN  
0: No PIN

### Example

- 10 A
- 8 A
- 6 A
- 5 A
- 4 A
- 3 A
- 2 A
- 1 A

### Coding example:

Avoid hazardous oversize current ratings

#### Your benefit:

Coded circuit breakers can no longer be inserted into slots with a lower current rating coding.

# E-T-A

## Worldwide Service Network



### Europe

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