

### Description

The plug-in type ESX10 electronic circuit protector selectively disconnects DC 24 V load circuits by responding faster than the switch mode power supply to overload conditions. The manual ON/OFF switch on the device itself allows start-up of certain individual load circuits. As soon as the ESX10 detects overload or short circuit in its load circuit, it blocks the load output transistor and disconnects the current flow in the faulty circuit. After remedy of the failure, the load output of the ESX10 is re-activated by applying the operating voltage or manually by actuating the ON/OFF button.

**US patent number:** US 6,490,141 B2



### Features

- Approval to ATEX:
  - ⊕ II 3G Ex ec IIC T4 Gc (devices without relay)
  - ⊕ II 3G Ex ec nC IIC T4 Gc (devices with relay)
- Installation width: max 12.5 mm
- Fixed current rating 16 A
- Temperature range:
  - 20...+70 °C version ESX10-100 without signal output
  - 20...+60 °C version ESX10-105 with signal output to EN 60204-1, without condensation
- Pluggable design suitable for modular power distribution systems  
Module 17plus and Module 18plus

### Your benefits

- Wider range of applications due to Ex-zone approval ATEX zone 2 and current ratings up to 16 A
- Saves space in the control cabinet due to its slim design
- Enhances system availability by means of a clear failure detection and stable voltage supply
- Reduces downtimes through quick fault resolution
- Simplifies planning through clear sizes and ratings at active current limitation

### Approvals



### Compliances



**Technical data** ( $T_{amb} = 25\text{ °C}$ ,  $U_B = DC\ 24\ V$ )

For further details please see: [www.e-t-a.de/ti\\_e](http://www.e-t-a.de/ti_e)

**Operating data**

|                              |   |
|------------------------------|---|
| Operating voltage $U_B$      | DC 24 V $\pm$ 24 V (18...30 V)  |
| Current rating $I_N$         | fixed rating 16 A   |
| Quiescent current $I_0$      | in ON condition: typically 4 mA / without signal output<br>in ON condition: typically 8 mA / with signal output   |
| Visual status indication via | <ul style="list-style-type: none"> <li>● multicoloured LED:</li> <li><b>green:</b></li> <li>- device is ON (S1 = ON)</li> <li>load circuit/Power-MOSFET connected</li> <li><b>orange:</b></li> <li>- overload up to electronic disconnection</li> <li><b>red:</b></li> <li>- after disconnection due to overload or short circuit</li> <li>- short circuit up to electronic disconnection</li> <li>- at undervoltage</li> <li><b>OFF:</b></li> <li>- manually switched off (S1 = OFF) or device is dead-voltage, status output</li> <li>● SF potential-free Signal output contact F (option)</li> <li>● ON/OFF position of the switch S1</li> </ul> |

**Load circuit**

|  |   |
|--|---|
| Load output                                      | power MOSFET switching output (plus switching)  |
| Overload and short circuit disconnection         | typically 1.15 x $I_N$ with active current limitation   |
| Trip times                                       | see time/current characteristic typically 100 ms at overload or short circuit (see table 1)         |
| Temperature disconnection                        | internal temperature monitoring with electronic disconnection                                       |
| operating voltage with regard to low voltage     | OFF at typically $U_B < 14\ V$<br>ON at typically $U_B > 17\ V$ with automatic ON and OFF switching |
| Switch-on delay $t_{Start}$                      | typically 2 ms after each ON operation, after reset and after applying of $U_B$                     |
| Disconnection of load circuit                    | electronic disconnection without physical isolation   |
| Leakage current in load circuit in OFF condition | typically 1 mA  |
| Capacitive loads                                 | up to 20,000 $\mu F$  |
| Free-wheeling diode                              | external free-wheeling diode recommended for inductive load   |
| Parallel connection of several load outputs      | not allowed   |

**Technical data** ( $T_{amb} = 25\text{ °C}$ ,  $U_B = DC\ 24\ V$ )

| Signal output F                       | ESX10-105  |
|---------------------------------------|--|
| Electrical data                       | potential-free signal output<br>max. DC 30 V / 0.2 A min. 10 V / 1 mA  |
| ESX10-105                             | single signal, make contact<br>terminal design: 13 (SC) – 14 (SO)<br>normal condition: closed<br>fault condition: open   |
| Signal delay of signal output (F)     | in operating condition typically 20 ms<br>in fault condition typically 220 ms  |
| Error                                 | signal output is in fault condition, if the device is OFF<br>- because of an overcurrent trip<br>- because of lacking operating voltage $U_B$<br>- in the event of an undervoltage<br>- because it was manually switched off |
| <b>General data</b>                   |  |
| Fail-safe-element                     | integral fail-safe element (fuse)<br>see table 1   |
| Blade terminals                       | 6.3 mm to EN 60934-A6.3-0.8  |
| Housing material                      | moulded  |
| Mounting                              | pluggable into power distribution systems for side-by-side mounting (module 17plus or 18plus by E-T-A)   |
| Ambient temperature                   | to EN60204-1, without condensation<br>-20 ... +70 °C, version ESX10-100 without signal output<br>-20 ... +60°C version ESX10-105 with signal output  |
| Storage temperature                   | -40...+70 °C   |
| Humidity                              | 96 hrs / 95% RH Humidity/40°C to IEC 60068-2-78, test Cab<br>climate class 3K3 to EN60721  |
| Vibration                             | 3g test to IEC 60068-2-6, test Fc  |
| Degree of protection                  | to EN60529, DIN 40050, enclosure IP30, terminals IP00  |
| EMC requirements                      | noise emission: EN 61000-6-3<br>noise immunity: EN 61000-6-2   |
| Insulation co-ordination (IEC 60934)  | 0.5 kV / pollution degree 2<br>reinforced insulation in operating area   |
| Dielectric strength                   | max. DC 30 V (load circuit)  |
| Insulation resistance (OFF condition) | n/a, only electronic disconnection   |
| CE marking                            | to 2014/30/EU<br>2014/34/EU<br>2011/65/EU  |
| Dimensions (w x h x d)                | 60 x 70.5 x 12.3 mm (tolerances to DIN ISO 286 part 1 IT13)  |
| Mass                                  | approx. 38 g   |

4

## Order numbering code

|   |                            |
|---|----------------------------|
| <b>Type No.</b>   |                            |
| ESX10 Electronic Circuit Protector, with current limitation |                            |
| <b>Version</b>  |                            |
| 1   | without physical isolation |
| <b>Signal input</b>   |                            |
| 0   | without                    |
| <b>Signal output</b>  |                            |
| 0   | without                    |
| 5   | signal output make contact |
| <b>Operating voltage</b>                                    |                            |
| DC 24 V   | voltage rating             |
| <b>Rated current</b>  |                            |
| 16 A  |                            |
| <b>Approval</b>   |                            |
| E   | ATEX                       |
| ESX10 - 1 0 5 DC 24 V - 16 A - E ordering example           |                            |

Please be informed that we have minimum ordering quantities to be observed.

## Notes

- The user has to ensure that the cable cross section of the load circuit in question complies with the current rating of the ESX10 used.
- In addition special precautions must be taken in the system or machine (e.g. use of a safety PLC) which reliably prevent an automatic re-start of parts of the system (cf. Machinery Directive 2006/42/EC and EN 60204-1, Safety of Machinery). In the event of a failure (short circuit/overload) the load circuit will be disconnected electronically by the ESX10.

## Approvals

| ESX10-10x-DC24V-16A-E   |  |  |               |                 |
|-------------------------|--|--|---------------|-----------------|
| Authority               | Standard   | File/certificate no.                               | Rated voltage | Current ratings |
| Bureau Veritas          | ATEX 2014/34/EU<br>EN 60079-0<br>EN 60079-7<br>EN 60079-15<br>⊕ II 3G Ex ec IIC T4 Gc (without signal output)<br>⊕ II 3G Ex ec nC IIC T4 Gc (with signal output) | EPS 18 ATEX 1 127 X                                | 24 DC V       | 16 A            |
| Bureau Veritas<br>IECEX | IEC 60079-0<br>IEC 60079-7<br>IEC 60079-15<br>Ex ec IIC T4 Gc (without signal output)<br>Ex ec nC IIC T4 Gc (with signal output)                                 | IECEX EPS 18.0059X                                 | 24 DC V       | 16 A            |
| UL                      | UL 2367<br>UL508 / CSA C22.2 No. 14<br>UL 121201   | File # E306740<br>File # E322549<br>File # E320024 | 24 DC V       | 16 A            |

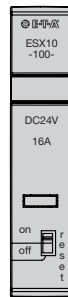
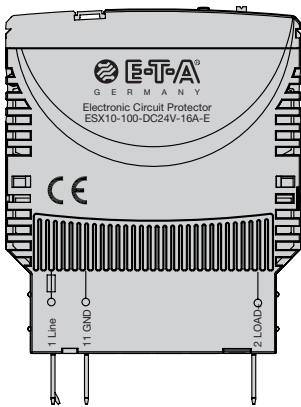
Table 1: Voltage drop, power loss, current limitation, trip times, fail-safe element, max. load current

| current rating $I_N$                               | typical voltage drop $U_{ON}$ at $I_N$ | typical power loss $P_V$ at $I_N$ and DC24V | active current limitation typically | trip time $I_{KS}$ | Fail-safe element | max. load current at 100 % ON duty |                          |                          |                          |                          |
|--|--|---|-------------------------------------|--------------------|-------------------|------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|  |  |   |                                     |                    |                   | side-by-side mounting              |                          |                          |                          |                          |
|  | typically                              | typically                                   | typically                           | typically          |                   | $T_{amb} = 25\text{ °C}$           | $T_{amb} = 40\text{ °C}$ | $T_{amb} = 50\text{ °C}$ | $T_{amb} = 60\text{ °C}$ | $T_{amb} = 70\text{ °C}$ |
| <b>ESX10-100-DC24V-16A-E without signal output</b> |  |   |                                     |                    |                   |                                    |                          |                          |                          |                          |
| 16 A   | 110 mV                                 | 1.9 W                                       | $1.15 \times I_N$                   | 100 ms             | 25 A              | 16 A                               | 16 A                     | 16 A                     | 16 A                     | 15 A                     |
|  |  |   |                                     |                    |                   | 15 A                               | 14 A                     | 13 A                     | 12 A                     | 9 A                      |
| <b>ESX10-105-DC24V-16A-E with signal output</b>    |  |   |                                     |                    |                   |                                    |                          |                          |                          |                          |
| 16 A   | 110 mV                                 | 2.0 W                                       | $1.15 \times I_N$                   | 100 ms             | 25 A              | 16 A                               | 16 A                     | 16 A                     | 16 A                     | -                        |
|  |  |   |                                     |                    |                   | 14 A                               | 13 A                     | 11 A                     | 9 A                      | -                        |

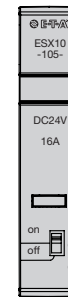
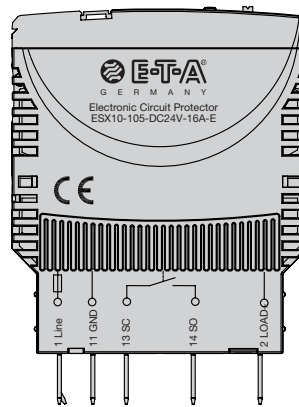
**Note:** When mounted side by side without convection cooling, performance may be thermally affected with continuous duty. Ambient temperature and load current can be different depending on approvals.

## Schematic diagram ESX10-100/-105-DC24V-16A-E (example)

ESX10-100-DC24V-16A-E

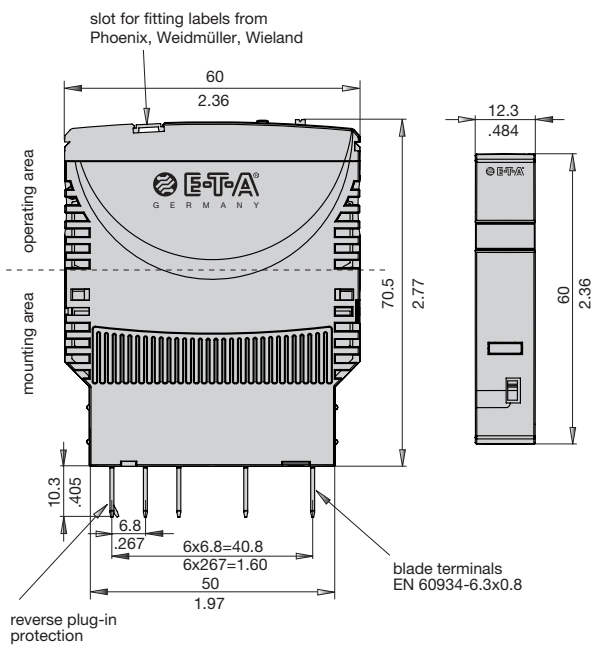


ESX10-105-DC24V-16A-E

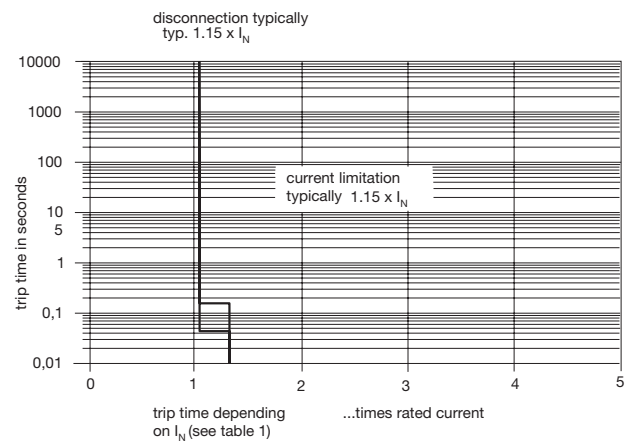


The auxiliary contacts are shown in the **OFF** or fault condition:  
 with signal output F:  
 operating condition: 13 (SC) – 14 (SO) closed  
 fault condition: 13 (SC) – 14 (SO) open

## Dimensions ESX10-105-DC24V-16A-E



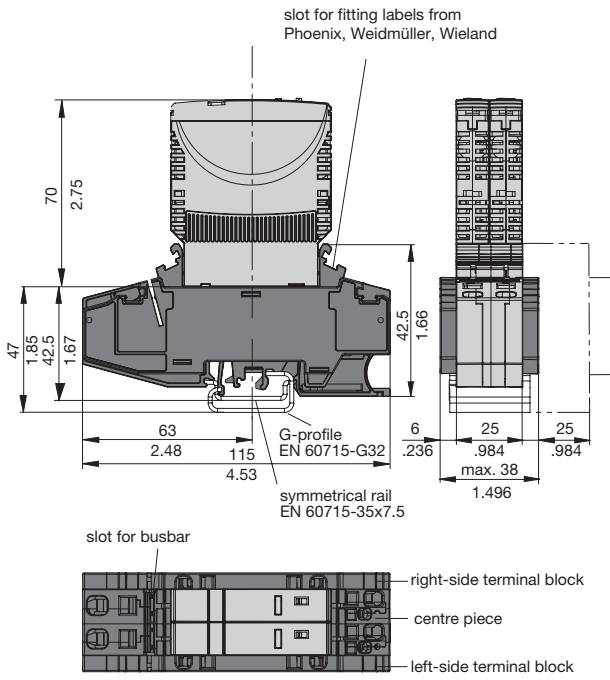
## Technical data ( $T_{amb} = 25\text{ °C}$ , $U_B = DC - 24\text{ V}$ )



- Electronic disconnection and/or current limitation begins at typically 1.15 times  $I_N$ . This means: under all overload conditions **typically 1.15 times rated current** is applied.
- Without the current limitation getting into effect at typically  $1.15 \times I_N$  there would be a much higher overcurrent in the event of an overload or short circuit.

**Accessories**

**Module 17plus**



**Module 18plus**

