

Operating Instructions Electronic Circuit Protector ESX10



Warning
This device is only suitable for operation at 24 VDC (safety extra-low voltage). Direct connection of this device to a 110 V, 230 V or 400 V power system, or to power systems with a higher voltage, may consequently result in death, severe personal injury or substantial property damage. Only qualified personnel should work on or around this equipment. The product will function correctly and safely only if it is transported, stored, set up and installed as intended.

Caution
Electrostatic sensitive devices (ESD) – the device must be opened only by the manufacturer.

Disposal guideline
Packaging and packing aids can be recycled and should always be returned to use.

Note
More detailed information can be obtained from local E-T-A subsidiaries or from the homepage www.e-t-a.de. The product is subject to technical modifications. In case of doubt the German text takes precedence. If used under Ex conditions, this device must only be actuated of the immediate environment is verifiably not classified as a hazardous area. Automatic start-up of machinery after shut down must be prevented (Machinery Directive 2006/42/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10.

Installation instructions

The type ESX10 can be plugged into terminal block Module 17plus which can be snapped onto mounting rails EN 50022-35x7.5. The device must only be pulled out or plugged with power off. Please observe the marking of the ESX10 signal inputs and outputs, connection diagrams etc. Before power up the cables have to be marked so as to prevent reverse polarity. The user should ensure that the cable cross sections of the relevant load circuit are suitable for the current rating of the ESX10-T used. In the event of Ex applications it has to be ensured that protection class IP 54 is achieved after installation in a UV-protected, fully enclosed room / control cabinet. IEC/EN60079-0 and IEC/EN 60079-14 have been observed for installation.

Safety
This device is not protected against reversed polarity of the input voltage. It has to be protected against overvoltage > 32 V.
Danger of explosion: Incorrect connection of cables can cause ignition. The output and the device are protected by an internal, non-exchangeable blade fuse. Use in aggressive mixed media was not tested. When mounted side-by-side without convection, the devices should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.

Table

Current rating (A)	0.5	1	2	3	4	6	8	10	12
Max. load (A)	0.5	1	2	3	4	5	7	9	10.8

Specifications:

Protection class	to EN60529 housing IP30, terminals IP00
EMC	emitted interference to EN 61000-6-3 noise immunity to EN 61000-6-2
Insulation co-ordination	0.5 kV / pollution degree 2, re-inforced insulation in operating area to IEC60934 / IEC60664
CE logo	to 2004/108/EG and 94/9/EG
UL	UL2367, File No E306740 UL508, File No E322549 UL 1604, File No E320024
CSA	CSA C22.2 No 14, File LR16186 CSA C22.2 No 142, File No LR16186 CSA C22.2 No 213, File No LR 16186
ATEX	IEC/EN60079-0 /-14/-15 Ⓔ II 3G Ex nA II B T4 Gc X

Ordering information

Type No.	ESX10
Version	1 standard, without physical isolation in the event of a failure
Signal input	0 without signal input
	1 with control input IN+
	2 with reset input RE
Signal outputs	0 without
	3 signal output F (group signal, change-over)
	4 status output SF
	5 signal output F (group signal, N/O)
Operating voltage	DC 24 V rated voltage DC 24 V
Current rating	0.5...12 A
Approvals	E ATEX
ESX10 - 1 0 5 - DC 24 V - 6 A	E ordering example

1 Description

Electronic circuit protector type ESX10 is designed to ensure selective disconnection of DC 24 V load systems because it responds much faster to overload or short circuit conditions than a switch-mode power supply. This is achieved by active current limitation. The ESX10 limits the highest possible current to 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on capacitive loads of up to 20,000 µF, but they are disconnected only in the event of an overload or short circuit. For optimal alignment with the characteristics of the application the current rating of the ESX10 can be selected in fixed values from 0.5 A...12 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output or a potential-free signal contact. Remote operation is possible by means of a remote reset signal or a remote ON/OFF control signal. The manual ON/OFF button allows separate actuation of individual load circuits. Upon detection of overload or short circuit in the load circuit, the MOSFET of the load output will be blocked to interrupt the current flow. The load circuit can be re-activated via the remote electronic reset input, control input or manually by means of the ON/OFF button.

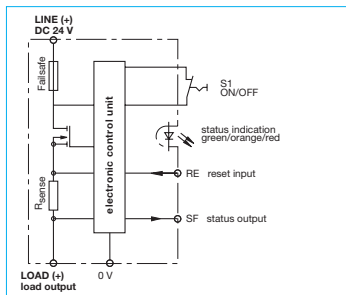
2 Technical Data (T_{ambient} = 25 °C, U_S = DC 24 V)

Operating data	
Operating voltage U _S	DC 24 V (18...32 V)
Current rating I _n	fixed current ratings: 0.5 A, 1 A, 2 A, 3 A, 4 A, 6 A, 8 A, 10 A, 12 A
Closed current I ₀	ON condition: typically 20...30 mA depending on signal output
Status indication by means of	<ul style="list-style-type: none"> • multicolour LED: GREEN: - unit is ON, power-MOSFET is switched on - status output SF ON, supplies +DC 24 V ORANGE: - in the event of overload or short circuit until electronic disconnection RED: - unit electronically disconnected - load circuit/Power-MOSFET OFF OFF: - manually switched off (S1 = OFF) or device is dead - undervoltage (U_S < 8 V) - after switch-on till the end of the delay period • status output SF (option) • potential-free signal contact F (option) • ON/OFF condition of switch S1
Load circuit	
Load output	Power-MOSFET switching output (high side switch)
Overload disconnection	typically 1.1 x I _n (1.05...1.35 x I _n)
Short-circuit current I _{sc}	active current limitation (see table 1)
Trip time for electronic disconnection	see time/current characteristics typically 3 s at I _{sc} > 1.1 x I _n typically 3 s...100 ms at I _{sc} > 1.8 x I _n (or 1.5 x I _n /1.3 x I _n)
Low voltage monitoring load output	with hysteresis, no reset necessary load "OFF" at U _S < 8 V
Starting delay t _{start}	typically 0.5 sec after every switch-on and after applying U _S
Disconnection of load circuit	electronic disconnection
Free-wheeling circuit	external free-wheeling diode recommended with inductive load
Several load outputs must not be connected in parallel	

2 Technical Data (T_{ambient} = 25 °C, U_S = DC 24 V)

Status output SF	ESX10-104/-124
Electrical data	plus-switching signal output, connects U _S to terminal 12 of module 17plus nominal data: DC 24 V / max. 0.2 A (short circuit proof) status output is internally connected to GND with a 10 kOhm resistor
Status OUT	ESX10-104/-106/-124 (signal status OUT), at U _S = +24 V; +24 V = S1 is ON, load output connected through 0V = S1 is ON, load output blocked and/or switch S1 is OFF
OFF condition	0 V level at status output when: <ul style="list-style-type: none"> • switch S1 is in ON position, but device is still in switch-on delay • switch S1 is OFF, or control signal OFF, device is switched off • no operating voltage U_S
Signal output F	ESX10-103/-115/-125
Electrical data	potential-free signal contact max. DC 30 V/0.5 A, min. 10 V/10 mA
ON condition LED green	voltage U _S applied, switch S1 is in ON position no overload, no short circuit
OFF condition LED off	<ul style="list-style-type: none"> • device switched off (switch S1 is in OFF position) • no voltage U_S applied
Fault condition LED orange	overload condition > 1.1 x I _n up to electronic disconnection
Fault condition LED red	electronic disconnection upon overload or short circuit device switched off with control signal (switch S1 is in ON position)
ESX10-103	group signal change-over contact contact SC-SO open, SC-SI closed
ESX10-115/-125	group signal, make contact contact SC-SO open
Fault	signal output fault conditions: <ul style="list-style-type: none"> • no operating voltage U_S • ON/OFF switch S1 is in OFF position • red LED lighted (electronic disconnection)
Reset input RE	ESX10-124/-125
Electrical data	voltage: max. + DC 32 V high > DC 8 V > DC 32 V low < DC 3 V > 0 V power consumption typically 2.6 mA (+DC 24 V) min. pulse duration typically 10 ms
Reset signal RE	The reset signal will be fed in terminal 13, 14 or 12 of Module 17plus and is internally pre-wired.
Control input IN+	ESX10-115
Electrical data	see reset input RE
Control signal IN+	+24 V level (HIGH): device will be switched on by a remote ON/OFF signal 0 V level (LOW): device will be switched off by a remote ON/OFF signal
Switch S1 ON/OFF	unit can only be switched on with S1 if a HIGH level is applied to IN+
General data	
Fail-safe element:	backup fuse for ESX10 <u>not required</u> because of the integral redundant fail-safe element
Blade terminals	6.3 mm to DIN 46244-A6.3-0.8
Housing	moulded
Mounting	plug-in mounting utilising power distribution system Module 17plus or SVSxx

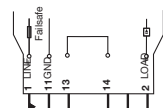
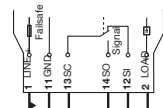
Ambient temperature	0...+50 °C (without condensation, see EN 60204-1)
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP30 DIN 40050 terminals: IP00 DIN 40050
EMC (EMC directive, CE logo)	susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 pollution degree 2 re-inforced insulation in operating area
dielectric strength	max. DC 32 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Dimensions (W x H x D)	12.5 x 70 x 60 mm
Mass	approx. 40 g

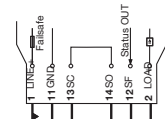


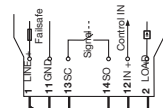
ESX10 Signal inputs / outputs (wiring diagram)

ESX10 signal inputs / outputs (wiring diagrams)

Signal contacts are shown in the OFF or fault condition.

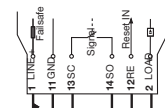
ESX10-100
without signal input/output

ESX10-103
without signal input
with signal output F
(group signal, change-over)

 operating condition: SC/SO closed, SC-SI open
fault condition: SC/SO open, SC-SI closed

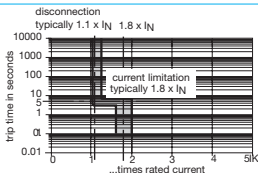
ESX10-104
without signal input
with status output SF (+24 V = load output ON)

 operating condition: SF +24 V = OK
fault condition: SF 0V

ESX10-115-...
with control input IN+ (+DC 24 V)
with signal output F (group signal, N/O)

 operating condition: SC-SO closed
fault condition: SC-SO open

ESX10-124-...
with reset input RE (+DC 24 V)
with status output SF
(+24V = load output ON)

 operating condition: SF +24V = OK
fault condition: SF 0V

ESX10-125-...
with reset input RE (+DC 24 V)
with signal output F
(group signal, N/O)

 operating condition: SC-SO closed
fault condition: SC-SO open

 Time/Current characteristic curve (T_A = 25 °C)


- The trip time is typically 3 s in the range between 1.1 and 1.8 x I_N¹⁰.
- Electronic current limitation occurs at typically 1.8 x I_N¹⁰ which means that under all overload conditions (independent of the power supply and the resistance of the load circuit) the max. overload before disconnection will not exceed 1.8 x I_N¹⁰ times the current rating. Trip time is between 100 ms (short circuit current I_{sc}) and 3 sec (at overload with high line attenuation).
- Without this current limitation a considerably higher overload current would flow in the event of an overload or short circuit.

¹⁰ current limitation typically 1.8 x I_N times rated current at I_N = 0.5 A...6 A
current limitation typically 1.5 x I_N times rated current at I_N = 8 A or 10 A
current limitation typically 1.3 x I_N times rated current at I_N = 12 A

3 Module 17plus

3.1 Description

Module 17plus is a power distribution system for use with electronic circuit protectors ESX10. Each module accommodates two protectors with an individual housing width of only 12.5 mm and fits onto all industry standard mounting rails. The two-way modules can be interconnected to provide as many ways as required with a terminal block fitted at each end for connection of signalling circuits. A distribution busbar can be fitted on the supply side of the modules (positive pole) though each pole of multipole circuit breakers must be individually connected. Electrical connections are by means of spring-loaded terminals. The reference potential for the ESX10 (GND pin 11) is also looped through and connected to the terminal blocks at the sides. The integral status output SF of the ESX10-104/-124 can be tapped at terminal 12 of the relevant channel (single signalisation). The reset input RE may be connected via terminal 13 or 14 (ESX10-124) or terminal 12 (ESX10-125). The integral control input IN+ of ESX10-115 is connected via terminal 12. Depending on the version a potential-free signal contact is available (ESX10-103/-104/-115/-125).

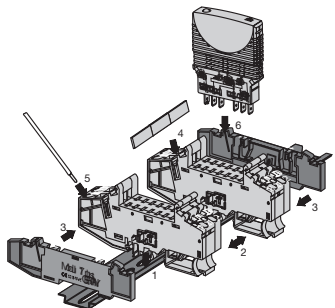
3.2 Approvals

Authority	Voltage ratings	Current ratings
UL 60950	AC 250 V; DC 80 V	50 A

3.3 Technical Data

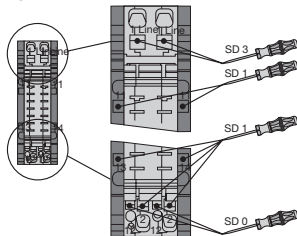
Connection	Spring-loaded terminals for solid conductors and stranded cables with and without wire end ferrules. Please use appropriate screw driver size (SD) for removing the spring loaded terminals.		
cable	cross section of connecting cable	screw driver	stripped length
Line feed (1)	1.5-10 mm ²	3 (1.0 x 5.5)	12 mm
Load output (2)	0.25-4 mm ²	1 (0.6 x 3.5)	12 mm
Signalisation terminals (11, 13, 14)	0.25-2.5 mm ²	1 (0.6 x 3.5)	10 mm
Signalisation terminal (12)	0.25-1.5 mm ²	0 (0.4 x 2.5)	9 mm
Current rating (without ESX10)	50 A LINE feed (1) 25 A LOAD output (2) Reference potential GND (11) 10 A single signal (12) 1 A (with ESX10: 0.5 A) Group signal (13-14) 1 A (with ESX10: 0.5 A)		
Internal resistance values (without ESX10)	LINE-LOAD (1-2) ≤ 5 mΩ Group signal (13-14) ≤ 8 mΩ per pole per module +5 mΩ for each additional module		
Vibration	5 g (57-500 Hz) ± 0.38 mm (10-57 Hz), to IEC 60068-2-6, test Fc, 10 frequency cycles/axis		
Shock	25 g (11 ms) to IEC 60068-2-27, test Ea 11 ms half sine		
Corrosion	96 hours at 5 % salt mist, to IEC 60068-2-11, test Ka		
Humidity	240 hours at 95 % RH to IEC 60068-2-78, test Cab		
Dielectric strength of Module 17plus (without ESX10)	between main circuits (without busbar): 1,500 V main circuit to auxiliary circuit: 1,500 V between auxiliary circuits: 1,500 V		
Mass:	Module 17plus (centre piece) approx. 85 g terminal blocks (pair) approx. 30 g		

Installation example



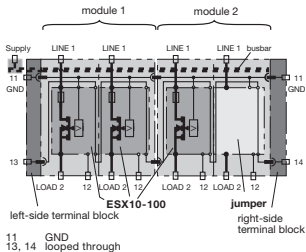
Installation:

- 1 Clip modules onto DIN rails.
- 2 Push modules together (side-by-side).
- 3 Snap on right-side and left-side terminal blocks.
- 4 Cut busbar to required length and fit on supply side of the modules.
- 5 Connect line feed with spring-loaded terminals.
- 6 Plug in ESX10.

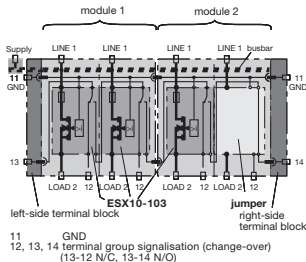


Connection and disconnection of cables with screw driver

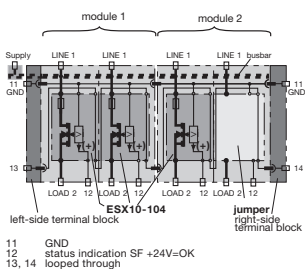
Module 17plus with ESX10-100



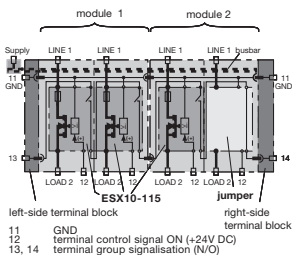
Module 17plus with ESX10-103



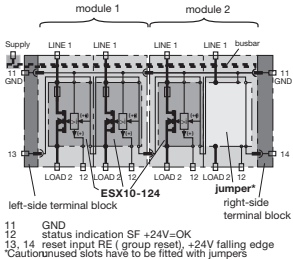
Module 17plus with ESX10-104



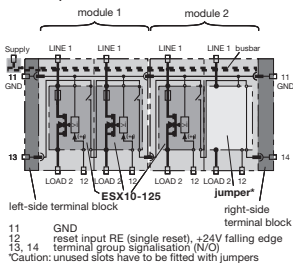
Module 17plus with ESX10-115



Module 17plus with ESX10-124



Module 17plus with ESX10-125



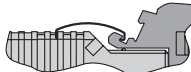
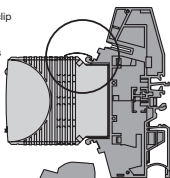
4 Accessories for ESX10

Use original E-T-A accessories only!

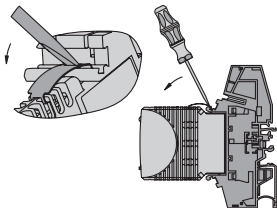
- **Busbar 32 A**
X 222 005 01 blue insulation, 500 mm
X 222 005 02 red insulation, 500 mm
X 222 005 03 grey insulation, 500 mm
 "up to 32 A continuous load"
- **Busbar 50 A**
Y 307 016 01 non-insulated, 500 mm/19.68 in.
 "up to 50 A continuous load; plugged in completely, protected against brush contact"
- **Busbar 50 A**
Y 307 016 11 non-insulated, 500 mm/19.68 in.
 "up to 50 A continuous load"
- **End bracket**
X 222 004 01
 Width 10 mm
- **Screw terminal for busbar**
X 211 156 01
 non insulated
- **Jumper**
SB-S11-P1-01-1-1A
- **Retaining clip Y 307 754 01**

Mounting of retaining clip

ESX10 with retaining clip
Y 307 754 01
 for power distribution
 system module 17plus



Removal of retaining clip Y 307 754 01



5 Informationen zu UL-Zulassungen/ CSA-Zulassungen

ESX10
 UL1604
 UL File # E320024

Operating Temperature Code T5

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only

WARNING:

- Exposure to some chemicals may degrade the sealing properties of materials used in the following device: relay

Sealant Material:

Generic Name: Modified diglycidyl ether of bisphenol A
 Supplier: Fine Polymers Corporation
 Type: Epi Fine 4616L-160PK

Casing Material:

Generic Name: Liquid Crystal Polymer
 Supplier: Sumitomo Chemical
 Type: E4008, E4009, or E6008

RECOMMENDATION:

- Periodically inspect the device named above for any degradation of properties and replace if degradation is found

WARNING – EXPLOSION HAZARD:

- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous
 - Substitution of any components may impair suitability for Class I, Division 2

ESX10
 UL2367
 Non-hazardous use - UL File # E306740

ESX10
 UL 508
 Non-hazardous use - UL File # E322549

ESX10
 CSA C22.2 No: 14 - File # 16186
 CSA C22.2 No: 142 - File # 16186
 CSA C22.2 No: 213 (Class I, Division 2) - File # 16186

Class 2

Meets requirement for Class 2 current limitation
 (ESX10-T...-0.5 A/1 A/2 A/3 A)



Electronic Circuit Protector ESX10

UL UL1604
 UL File # E320024

CSA C22.2 No.213
 CSA File # 16186

This device is suitable for use in Class I, Div 2, Groups A, B, C, D; TC T5; Hazardous locations or nonhazardous locations only

Warnings:

1. Remove power before disconnecting device or the area is known to be nonhazardous.
 2. Components substitutions may impair suitability of Class I, Div 2.
 3. Chemical exposure may degrade internal relay's sealing property.

UL UL2367
 Non-hazardous use
 UL File # E306740

UL UL508
 Non-hazardous use
 UL File # E322549

CSA C22.2 No.14
 Non-hazardous use
 CSA File # 16186

Refer to data sheet / installation guidelines for installation and safety instructions.

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EG-Konformitätserklärung Nr. 100.218.1016-01
Declaration of Conformity

Wir **E-T-A Elektrotechnische Apparate GmbH**
Vie (Name des Anbieters / supplier's name)

Industriestraße 2-8
D-90518 Alldorf
Germany

erklären in alleiniger Verantwortung, dass das Produkt
declare under our sole responsibility that the single pole product

elektronischer Sicherungsautomat
electronic circuit protector

ESX10 (Steckmontage plug-in mounting, DC24V)
ESX10-TA (HutschieneMontage rail mounting, DC24V)
ESX10-TB (HutschieneMontage rail mounting, DC24V)

Diese Konformitätserklärung entspricht der Europäischen Norm DIN EN ISO/IEC 17050-1:2010 "Konformitätsbewertung - Konformitätserklärung von Anbietern - Teil 1: Allgemeine Anforderungen" und der internationalen Norm, ISO/IEC 17050-1:2004, Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements.

This Declaration of Conformity is suitable to the European Standard DIN EN ISO/IEC 17050-1:2010 "Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements" and the international Standard ISO/IEC 17050-1:2004, Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements.


auf das sich diese Erklärung bezieht, mit der/den folgenden Norm(en) oder normativen Dokument(en) übereinstimmt
to which this declaration relates is in conformity with the following standard(s) or other normative document(s).

EN 60079-0: 2009, Explosive Atmosphäre- Allgemeine Anforderungen
Explosive atmospheres - General requirements
EN 60079-15: 2011, Explosive Atmosphäre - Geräteschutz durch Zündschutzart „n“
Explosive atmospheres - Equipment protection by type of protection "n"

gemäß den Bestimmungen der Richtlinie(n)
Following the provisions of Directive(s) (falls zutreffend / if applicable)

94/9/EG ATEX-Richtlinie
94/9/EG ATEX directive

und der bestimmungsgemäßen Verwendung in explosionsgefährdeten Bereichen entspricht,
and meets the requirements of intended use in explosive areas

 II 3G Ex nA IIB T4 Gc X 0°C_{STAS}+50°C
für Zone 2 (Gas-Atmosphäre)
for zone 2 (gas atmosphere)

Die zugehörige Betriebsanleitung enthält wichtige sicherheitstechnische Hinweise und Vorschriften für die Inbetriebnahme der genannten Geräte gemäß der Richtlinie 94/9/EG (ATEX)

The pertinent user manual holds vital safety-related information and regulations for start-up of the described devices in accordance with directive 94/9/EG (ATEX).

Werden die Produkte in eine übergeordnete Maschine/Anlage eingebaut, so müssen die durch den Einbau entstehenden neuen Risiken durch den Hersteller der neuen Maschine /Anlage beurteilt werden.

Should the products be fitted into a superordinate machine or system, the newly developing risks have to be assessed by the manufacturer of the new machine/system.

Alldorf, 27. Oktober 2011

(Ort und Datum der
Ausstellung /
Place and date of issue)


/_____
(Name und Unterschrift oder gleichwertige Kennzeichnung des Befugten / name and signature or equivalent of authorized person)

