

Operating Instructions

Electronic Circuit Protector ESX10-TC-DC 12 V



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-TA-/TB.

Installation instructions
The type ESX10-TA-/TB can be snapped onto mounting rails EN 50022-35x7.5. Please observe the marking of the ESX10-T. 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 to be observed for installation.

Safety
This device is not protected against reversed polarity of the input voltage. It has to be protected against overvoltage >18 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)	1	2	3	4	6	8	10
Max. Load (A)	1	2	3	4	5	7	9

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
ATEX	IEC/EN60079-0 /-14/-15 Ⓜ II 3G Ex nA II B T4 Gc X

Ordering information

Type No.	ESX10	Electronic Circuit Protector, with current limitation
Mounting and design	TC	rail mounting, with signal contact and slot for busbars and jumpers
Version	1	standard, without physical isolation
Signal input	1	with control input IN+
	2	with reset input RE
Signal output	4	status output SF
Operating voltage	DC 12 V	rated voltage DC 12 V
Current rating	1...10 A	Current rating
Approvals	E	ATEX
Ordering example	ESX10 -TC 1 2 4 -DC 12 V-6 A-E	

1 Description

Electronic circuit protector type ESX10-TC is designed to ensure **selective** disconnection of DC 12 V load systems because it responds much faster to overload or short circuit conditions than the switch-mode power supply. This is achieved by active current limitation. The ESX10-T limits the highest possible current to 1.3 to 1.8 times the selected rated current of the circuit protector. Thus it is possible to switch on **capacitive loads of up to 20,000 µF**, but they are disconnected only in the event of an overload or short circuit. For optimal alignment with the characteristics of the application the current rating of the ESX10-TC can be selected in fixed values from 1 A...10 A. Failure and status indication are provided by a multicolour LED and an integral short-circuit-proof status output. 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.**

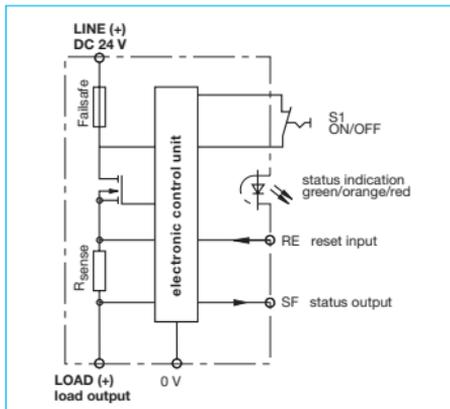
2 Technical Data (T_{ambient} = 25 °C, U_S = DC 24 V)

Operating data	
Operating voltage U _S	DC 12 V (9...18 V)
Current rating I _N	fixed current ratings: 1 A, 2 A, 3 A, 4 A, 6 A, 10 A
Closed current I _C	ON condition: typically 15...20 mA
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 12 V ORANGE: - in the event of overload or short circuit until electronic disconnection RED: - unit electronically disconnected - load circuit/Power-MOSFET OFF - low voltage (< 3.25 V) - after switch-on until end of switch-on delay OFF: - manually switched off (S1 = OFF) - or device is dead - undervoltage • status output SF (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 _{load} > 1.1 x I _N typically 50 ms...3 s at I _{load} > 1.8 x I _N (or 1.5 x I _N)
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring load output	with hysteresis at voltage dips < 500 ms, no reset required: load "OFF" at U _S < 3.2 V
Starting delay t _{start}	typically 10 ms
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	
Status output SF	ESX10-T-114/124
Electrical data	plus-switching signal output, connects U _S to terminal 12 of module 1 plus nominal data: DC 12 V/max. 0.2 A (short circuit proof) status output is internally connected to GND with a 10 kΩ resistor
Status OUT	ESX10-TC-114/-124 (signal status OUT), +12 V = S1 is ON, load output connected through 0V = S1 is ON, load output blocked and/or switch S1 is OFF red LED lighted

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

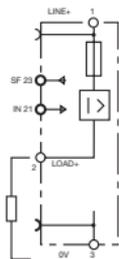
OFF condition	0 V level at status output when: <ul style="list-style-type: none"> • switch S1 is in ON position, but device is still in switch-on delay • switch S1 is OFF, or control signal OFF, device is switched off • no operating voltage U_S
Reset input RE	ESX10-T-124
Electrical data	voltage: max. +DC 32 V high > DC 4.5 V ≤ DC 18 V low ≤ DC 2.5 V > 0 V power consumption typically 1.4 mA (+DC 12 V) min. pulse duration typically 10 ms
Reset signal RE (terminal 22)	The electronically blocked ESX10-TC-124 may remotely be reset via an external momentary switch due to the falling edge of a + DC 12 V pulse. A common reset signal can be applied to several devices simultaneously. Switched on devices remain unaffected.
Control input IN+	ESX10-T-114
Electrical data	see reset input RE
Control signal IN+ (terminal 21)	+ 12 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-T <u>not required</u> because of the integral redundant fail-safe element
Terminals	
	LINE+ / LOAD+ / 0V
screw terminals	M4
max. cable cross section	
flexible with wire end ferrule w/o plastic sleeve	0.5 - 10 mm ²
multi-lead connection (2 identical cables)	
flexible with wire end ferrule without plastic sleeve	0.5 - 4 mm ²
flexible with TWIN wire end ferrule with plastic sleeve	0.5 - 2.5 mm ²
flexible with TWIN wire end ferrule with plastic sleeve	0.5 - 6 mm ²
wire stripping length	10 mm
tightening torque (EN 60934)	1.5 - 1.8 Nm
Terminals	
	aux. contacts
screw terminals	M3
max. cable cross section	
flexible with wire end ferrule w/o plastic sleeve	0.25 - 2.5 mm ²
wire stripping length	8 mm
tightening torque (EN 60934)	0.5 - 0.6 Nm
Housing material	moulded
Mounting	symmetrical rail to EN 50022-35x7.5
Ambient temperature	at DC 12 V: -20...+60 °C (without condensation, see EN 60204-1) with condensation upon request
Storage temperature	-20...+70 °C
Humidity	96 hrs/95 % RH/40 °C to IEC 60068-2-78, test Cab. climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	housing: IP20 DIN 40050 terminals: IP20 DIN 40050
EMC (EMC directive, CE logo)	emission: EN 61000-6-3 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV/2 pollution degree 2 re-inforced insulation in operating area
Dielectric strength	max. DC 18 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Dimensions (W x H x D)	12.5 x 80 x 83 mm
Mass	approx. 65 g

Schematic diagram ESX10-TB-124 (Example)



ESX10-T Signal inputs / outputs (wiring diagram)

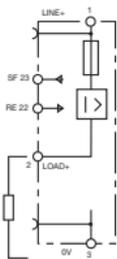
ESX10-TC-114-DC12V
with control input IN+
(+DC 12 V)
with status output SF
(+12 V = load output ON)



Operating condition:
SF +12 V = OK

fault condition:
SF 0 V

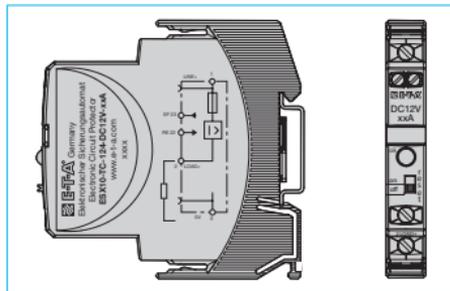
ESX10-TC-124-DC12V
with reset input RE
(+DC 12 V)
with status output SF
(+12 V = load output ON)



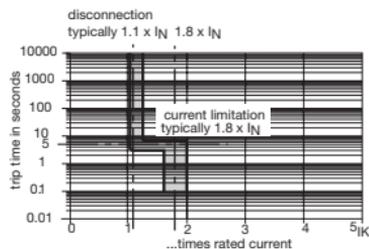
Operating condition:
SF +12 V = OK

fault condition:
SF 0 V

Terminal wiring diagram ESX10-TC-124-DC 12 V (Example)



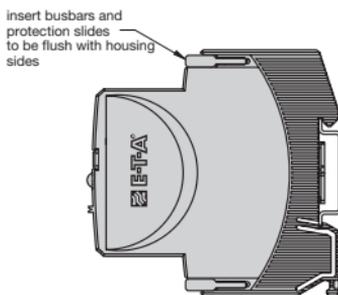
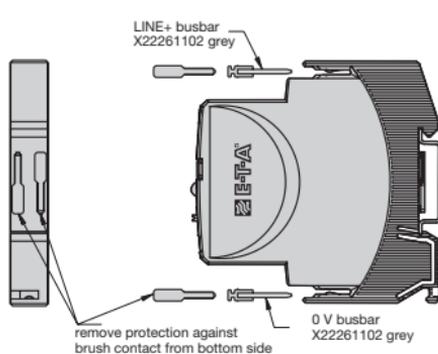
Time/Current characteristic curve ($T_A = 25^\circ\text{C}$)



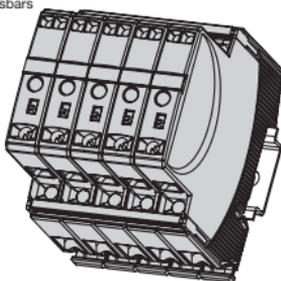
^{*)} current limitation typically $1.8 \times I_N$
times rated current at $I_N = 0.5 \text{ A} \dots 6 \text{ A}$

current limitation typically $1.5 \times I_N$
times rated current at $I_N = 8 \text{ A}$ or 10 A

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

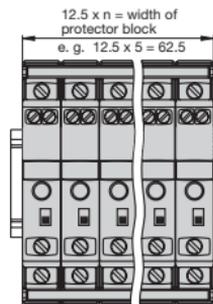
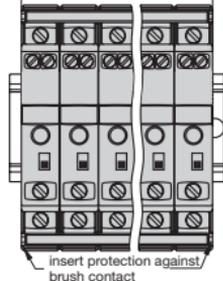


5 ESX10-TC
with busbars



continuous busbar
500 mm length, cut

$(12.5 \times n) - 3 = \text{length of busbars} \pm 0.5$
e. g. $(12.5 \times 5) - 3 = 59.5 \pm 0.5$



Mounting procedure:

Before wiring insert busbars into protector block.
Max. 10 insertion/removal cycles for busbars.

Recommendation:

Every 10 units busbars should be interrupted
and fed in anew.

Table of lengths for busbars
(X 222 611 02 see accessories)

No. of units	2	3	4	5	6	7	8	9	10
Length of busbar [mm] ± 0.5 mm	22	34.5	47	59.5	72	84.5	97	109.5	122

3 Informationen on UL-approvals

ESX10-TC

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-TC

UL2367
Non-hazardous use - UL File # E306740

ESX10-TC

UL 508
Non-hazardous use - UL File # E322549

Class 2

Meets requirement for Class 2 current limitation
(ESX10-TC.../1 A/2 A/3 A/4 A/6 A)

4 Accessories

4.1 Description

The ESX10-T features an integral power distribution system. The following wiring modes are possible with various pluggable current busbars:

- LINE +DC 12 V
 - 0 V
- Caution:** The electronic devices ESX10-T require a 0 V connection

4.2 Accessories

Use original E-T-A accessories only!

- **Busbars for LINE+ and 0 V**
max. load with one line entry (recommended: centre line entry)
max. load with two line entries
grey insulation, length: 500 mm
X 222 611 02
- **Busbars for LINE+ and 0 V**
grey insulation
max. number of plug-on operations 10:
X 222 611 34
(3-unit-block ESX10-T), length: 34.5 mm
X 222 611 47
(4-unit-block ESX10-T), length: 47 mm
X 222 611 59
(5-unit-block ESX10-T), length: 59.5 mm
X 222 611 97
(8-unit-block ESX10-T), length: 97 mm
X 222 611 12
(10-unit-block ESX10-T), length: 122 mm
- **Connector bus link –K10**
suitable for auxiliary contacts (series connection)
X 210 589 02 (1.5 mm², brown)



Electronic Circuit Protector ESX10-TC-DC 12 V

 UL1604
UL File # E320024

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.

 UL2367
Non-hazardous use
UL File # E306740

 UL508
Non-hazardous use
UL File # E322549

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

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EG-Konformitätserklärung Nr. 100.218.1018-01

Declaration of Conformity

Wir **E-T-A Elektrotechnische Apparate GmbH**

Wir (Name des Anbieters / supplier's name)

Industriestraße 2-8
D-90518 Altdorf
Germany

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

elektronischer Sicherungsautomat
electronic circuit protector

ESX10-TC (Hutschienenmontage rail mounting, DC12V)

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) (if/s 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 -20°C≤TAS≤+60°C
für Zone 2 (Gas-Atmosphäre)
for zone 2 (gas atmosphere)

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 Stan-
dard 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.

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)


(Stelle und Unterschrift oder gleichwertige Kennzeichnung des Befehlten / name and signature or equivalent of authorized person)

