

Description

E-T-A's ESX10-TC extends our product group of electronic overcurrent protection devices for DC 12 V applications.

ESX10-T helps to save time and costs. The track-mountable circuit protector's standard version provides one channel in the current ratings 1 A through 10 A. By means of busbars, the modular device allows construction of multi-channelled solutions and configuration of single or group signalling. E-T-A's ESX10-T electronic circuit protector is only 12.5 mm wide and selectively protects all DC 12 V load circuits, thereby increasing the uptime of machines and systems. This is achieved by a combination of active electronic current limitation in the event of a short circuit and overload disconnection typically from 1.1 times rated current. The ESX10-T responds faster than frequently used DC 12 V switch mode power supplies without tripping fast and thus prevents disastrous voltage dips of the supply. It works with a single trip curve for all loads. Even capacitive loads up to 75,000 µF can be handled very easily. The integral fail-safe element (fuse) is adjusted to the circuit breaker's rated current and can thus very easily be synchronised with the wired cable cross section. This makes planning much easier.



ESX10-TC

Features

- track-mountable
- active linear current limitation
- capacitive loads up to 75,000 µF
- fixed current ratings 1 A ... 10 A
- approvals: UL, DNV GL
- OPTION: Control inputs, signalling
- OPTION: ATEX and IECEx approval

Approvals



DNV·GL

Compliance



Your benefits

- Increases machine uptime through clear failure detection and stable power supply
- Reduces downtimes through quick fault resolution
- Simplifies planning through clear sizes and ratings
- Saves costs and time through fast and flexible mounting including integral power distribution solution

Instructions

Please observe separate user manual:
<http://www.e-t-a.de/q1007/>



Technical data ($T_{amb} = 25\text{ °C}$, $U_B = \text{DC } 12\text{ V}$)

Operating data

Operating voltage U_B	DC 12 V (9...18 V)
Current ratings I_N	1 A, 1 A, 2 A, 3 A, 4 A, 6 A, 10 A
Standby current I_0	in ON condition: typically 15 ... 20 mA
Visual status indication via	<ul style="list-style-type: none"> ● multicoloured LED: <ul style="list-style-type: none"> green: <ul style="list-style-type: none"> - device is ON ($S1 = \text{ON}$) - load circuit/Power-MOSFET connected orange: <ul style="list-style-type: none"> - overload or short circuit until electronic disconnection red: <ul style="list-style-type: none"> - device switched OFF electronically - load circuit/power MOSFET disconnected - undervoltage ($< 3.25\text{ V}$) - after switch-on until the end of the switch-on delay period OFF <ul style="list-style-type: none"> - manually switched off ($S1 = \text{OFF}$) or device is dead-voltage ● status output SF (optional) ● on/off position of the switch $S1$

Load circuit

Load output	power MOSFET switching output (plus switching)
Overload disconnection (OL)	typically $1.1 \times I_N$ ($1.05...1.35 \times I_N$)
Short circuit current I_{SC}	active current limitation (see table 1)
Trip times	see time/current characteristic for electronic disconnection typically 3 s at $I_{load} > 1.1 \times I_N$ typically 50 ms ... 3 s at $I_{load} > 1.8 \times I_N$ (or $1.5 \times I_N$)
Temperature disconnection	internal temperature monitoring with electronic disconnection
Low voltage monitoring of load output	with hysteresis, at voltage dips $< 500\text{ mV}$ no reset required: load »OFF« at $U_B < 3.2\text{ V}$
Switch-on delay t_{Start}	typically 10 ms after each ON operation, after reset and after applying of U_B
Disconnection of load circuit	electronic disconnection upon overload / short circuit
Free-wheeling diode	external free-wheeling diode recommended for inductive load
Parallel connection of several load outputs	not permitted

Status output SF ESX10-T.-114/-124

Electrical data	plus-switching signal output, switches U_B to terminal 23 Current ratings: DC 12 V/max. 0.2 A (short circuit proof) The status output is connected internally with a 10 kOhm resistor against 0 V.
Status OUT	ESX10-TC-114/-124 (Signal Status OUT), + 12 V = switch $S1$ is ON, load output ON 0 V = $S1$ is ON, load output locked and/ or switch $S1$ is OFF red LED lighted
OFF condition	0 V level at status output whenever: <ul style="list-style-type: none"> ● switch $S1$ is in ON position, but device is still in ON delay ● Switch $S1$ in OFF position, or control signal OFF, device is switched off ● No operating voltage U_B

Technical data ($T_{amb} = 25\text{ °C}$, $U_B = \text{DC } 12\text{ V}$)

Reset input RE

ESX10-T.-124

Electrical data	voltage max. DC 18 V high $> \text{DC } 4.5\text{ V} \leq \text{DC } 18\text{ V}$ low $\leq \text{DC } 2.5\text{ V} > 0\text{ V}$ current consumption typically 1.4 mA (DC 12 V) min. pulse duration 10 ms
Reset signal RE terminal 22	with the falling edge of a + DC 12 V pulse the electronically blocked ESX10-TC-124 can be remotely controlled via an external switch. A joint reset signal can also be applied to more than one device at a time. Devices in ON condition will remain unaffected.
Control input IN+	ESX10-TC-114
Electrical data	as reset input RE
Control signal IN+ Terminal 21	12 V level (HIGH): device is switched on by a remote ON/OFF signal. 0 V level (LOW) device is switched off by a remote ON/OFF signal.
Switch $S1$ ON/OFF	device can only be switched on with $S1$ when a HIGH level is applied to IN+

General data

Fail-safe element	back-up fuse for ESX10-T not required, since there is an integral redundant fail-safe element (protective element)
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Screw terminals

LINE+/LOAD+/0V

Screw terminals	M4
max. cable cross section	
rigid and flexible	0.5 - 16 mm ²
flexible with wire end ferrule w/wo plastic sleeve	0.5 mm – 10 mm ²
multi-lead connection (2 identical cables)	
rigid / flexible	0.5- 4 mm ²
flexible with wire end ferrule	
without plastic sleeve	0.5 – 2.5 mm ²
flexible with TWIN wire end ferrule	
with plastic sleeve	0.5- 6 mm ²
stripping length	10 mm
Tightening torque (EN60934)	1.5- 1.8 Nm

Terminals

signal terminals

Screw terminals	M3
max. cable cross section	
flexible with wire end ferrule	
w/wo plastic sleeve	0.25 – 2.5 mm ²
Stripping length	8 mm
Tightening torque (EN60934)	0.5- 0.6 Nm

Housing material	moulded
Mounting	symmetrical rail to EN 60715-35x7.5
Ambient temperature	-25...60 °C ¹⁾ (without condensation, cf. EN 60204-1) ¹⁾ ambient temperature range can differ depending on approvals.
Storage temperature	-40...70 °C
Humidity	96 hrs / 95% RH 40°C to IEC 60068-2-78, test Cab climate class 3K3 to EN60721
Vibration	3g test to IEC 60068-2-6, test Fc
Protection class	housing IP20 EN60529 terminals IP20 DIN 60529

Technical data (T_{amb} = 25 °C, U_B = DC 12 V)

EMC requirements (EMC directive, CE marking)	noise emission EN 61000-6-3 noise immunity: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV / pollution degree 2 reinforced insulation at operating area
Dielectric strength	max. DC 18 V (load circuit)
Insulation resistance (OFF condition:)	n/a, only electronic disconnection
Conformity	CE marking to 2014/30/EU
Dimensions (w x h x d)	12.5 x 80 x 83 mm
Mass	approx. 65 g




Ordering information

Type no.	ESX10	Electronic Circuit Protector, with current limitation
Mounting	TC	rail mounting, with signal contact and hole for signal busbars
Version	1	without physical isolation
Signal input	1	with control input IN+ (only ESX10-T.-114)
	2	with control reset input RE (only ESX10--124)
Signal output	4	status output SF (only -114, -124)
Operating voltage	DC 12 V	voltage rating DC 12 V
Current ratings	1 A	
	2 A	
	3 A	
	4 A	
	6 A	
	10 A	
Approvals	E	ATEX/IECEX
ESX10 - TC - 1 2 4 - DC 12 V - 6 A - E ordering example		

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-T 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/EG 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-T.

Information on UL approvals

	ESX10-TC-... UL2367 Solid State Overcurrent Protectors UL File # E306740
	UL 121201 UL File E320024
	UL 508, CSA C22.2 No: 14 Auxiliary Devices - Industrial Control Equipment UL File E322549
	E322549 INDUSTRIAL CONTROL EQUIPMENT

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 – EXPLOSION HAZARD:

- Do not disconnect equipment unless power has been removed or the area is known to be non-hazardous.

This device is OPEN type equipment that must be used within a suitable end-use system enclosure, the interior of which is accessible only through the use of a tool. The suitability of the enclosure is subject to investigation by the local Authority Having Jurisdiction at the time of installation.

Wiring to or from this device, which enters or leaves the system enclosure, must utilize wiring methods suitable for Class I, Division 2 Hazardous Locations, as appropriate for the installation.

Approvals ESX10-TC-DC12 V-xxx

Approval authority	Standard	File certificate no.	Voltage ratings	Current rating range
UL	UL 2367	E306740	DC 12 V	1 A ... 10 A
UL	UL 121201 (Class ☆, Division 2, Groups A, B, C, D)	E320024	DC 12 V	1 A ... 10 A
UL	UL 508 CSA C22.2 No.14	E322549	DC 12 V	1 A ... 10 A
DNV GL	CG-0339 (classes: temperature, vibration: B*); humidity, EMC: A*) with busbars and jumpers	TAE000025Y	DC 12 V	1 A ... 10 A
Bureau Veritas	ATEX (EU Directive 2014/34/EU) EN 60079-0 EN 60079-7 EN 60079-15	EPS 18 ATEX 1 127 X	DC 12 V	1 A ... 10 A
IECEX	IEC 60079-0 IEC 60079-7 IEC 60079-15	IECEX EPS 18.0059X	DC 12 V	1 A ... 10 A

Declaration of Conformity for ATEX version ESX10-TC-...-E

E-T-A
ENGINEERING TECHNOLOGY

E-T-A Elektrotechnische Apparate GmbH

EU-Konformitätserklärung Nr. 100.218.1053-01
Declaration of Conformity

Wir **E-T-A Elektrotechnische Apparate GmbH**
We Industriestraße 2-8, D-90518 Altdorf, Germany
(Name und Anschrift des Anbieters / supplier's name and address)

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

Elektronische Schutzschalter / Electronic circuit-breaker
Type/type:

ESX10-1...-E
ESX10-TA...-E
ESX10-TB...-E
ESX10-TC...-E

(Bezeichnung, Typ/Model, evtl. Spezifikation/ name, type/model, optionally specification)

auf das sich diese Erklärung bezieht, mit den wesentlichen Anforderungen
folgender Richtlinie(n) übereinstimmt:
to which this declaration relates, is in conformity with the essential requirements of following Directive(s)

2014/30/EU	EMV-Richtlinie
2014/30/EU	EMC directive
2014/34/EU	ATEX-Richtlinie
2014/34/EU	ATEX directive
2011/65/EU	Beschränkung bestimmter gefährlicher Stoffe (RoHS)
2011/65/EU	Restriction of hazardous substances (RoHS)

Zur Beurteilung der Übereinstimmung wurde(n) folgende Norm(en) oder
normativen Dokumente herangezogen:
For evaluation of the conformity following standard(s) or normative document(s) were consulted:

EN 61000-6-2: 2005 Elektromagnetische Verträglichkeit (EMV)
Teil 6-2: Fachgrundnormen – Störfestigkeit für Industriebereiche
Electromagnetic compatibility (EMC) Part 6-2: Generic standards – Immunity for industrial environments

EN 61000-6-3: 2007 + A1:2011 Elektromagnetische Verträglichkeit (EMV)
Teil 6-3: Fachgrundnormen – Störaussendung für Wohnbereich, Geschäfts- und
Gewerbebereiche sowie Kleinbetriebe
Electromagnetic compatibility (EMC) Part 6-3: Generic standards – Emission standard for
residential, commercial and light-industrial environments

EN 60079-0:2012+A11:2013 Explosionsgefährdete Bereiche - Teil 0:
Betriebsmittel - Allgemeine Anforderungen/ Explosive atmospheres - Part 0: Equipment
- General requirements

EN 60079-7: 2015 - Explosionsfähige Atmosphäre - Teil 7: Geräteschutz durch
erhöhte Sicherheit "e" / Explosive atmospheres - Part 7: Equipment protection by increased
safety "e"

EN 60079-15:2010 Explosionsfähige Atmosphäre - Teil 15: Geräteschutz
durch Zündschutzart "n" / Explosive atmospheres - Part 15: Equipment protection by type of
protection "n"

This Declaration of Conformity is following the basic requirements of the standard EN (ISO/IEC 17050-1:2010) Conformity assessment - Supplier's declaration of conformity - Part 1: General requirements.

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1/2 form: KE_01.12.2015

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ENGINEERING TECHNOLOGY

E-T-A Elektrotechnische Apparate GmbH

EN ISO/IEC 80079-34:2011 Explosionsgefährdete Bereiche - Teil 34:
Anwendung von Qualitätsmanagementsystemen für die Herstellung von Ex-
Produkten / Explosive atmospheres. Application of quality systems for equipment manufacture

EN 60581:2012 Technische Dokumentation zur Beurteilung von Elektro-
und Elektronikgeräten hinsichtlich der Beschränkung gefährlicher Stoffe
Technical documentation for the assessment of electrical and electronic products with respect to
the restriction of hazardous substances

(Titel und/oder Nr. sowie Ausgabedatum der Norm(en) oder der anderen normativen Dokumente / Title and
for number and date of issue of the standard(s) or other normative document(s))

Altdorf, 19. September 2018

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

ppa. Ralf Dietrich (Mitglied der Geschäftsleitung)
(Name, Position und Unterschrift oder gleichwertige
Kennzeichnung des Befehligen / name, position and
signature or equivalent of authorized person)

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Table 1: Voltage drop, current limitation, max. load current

current rating I_N	typical voltage drop U_{ON} at I_N	active current limitation typically	max. load current: at 100% ON duty	
			$T_{amb} = 40^\circ C$	$T_{amb} = 60^\circ C$
1 A	80 mV	$1.8 \times I_N$	1 A	1 A
2 A	130 mV	$1.8 \times I_N$	2 A	2 A
3 A	80 mV	$1.8 \times I_N$	3 A	3 A
4 A	100 mV	$1.8 \times I_N$	4 A	4 A
6 A	130 mV	$1.8 \times I_N$	6 A	6 A
10 A	150 mV	$1.5 \times I_N$	10 A	9 A

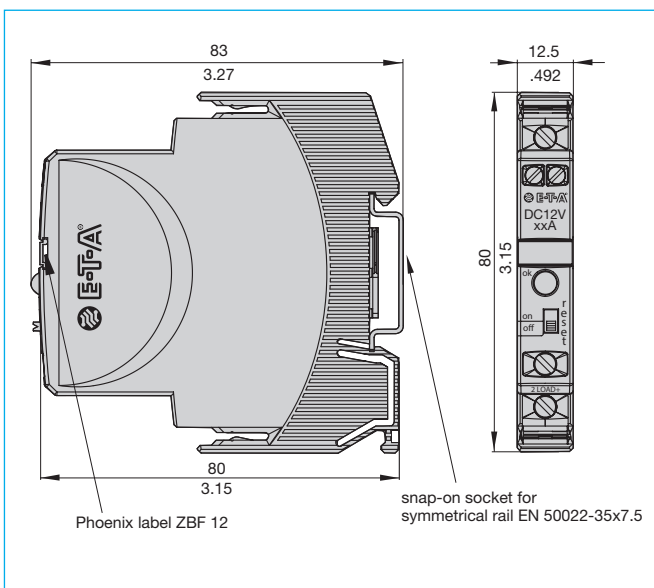
Note:

When mounted side-by-side without convection the devices can only carry max. 80 % of their rated current continuously (100 % ON duty) due to thermal effect.

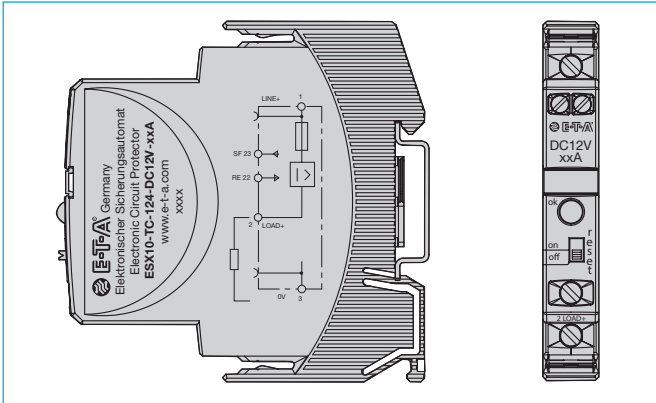
Table 2: ESX10-T - product versions

Version	Signal input		Signal output
ESX10-... DC 12 V	control input ON/OFF + 12 V Control IN+	reset input + 12 V ↓ RE	status output SGF OUT + 12 V = OK
-TC	-114	x	x
-TC	-124	x	x

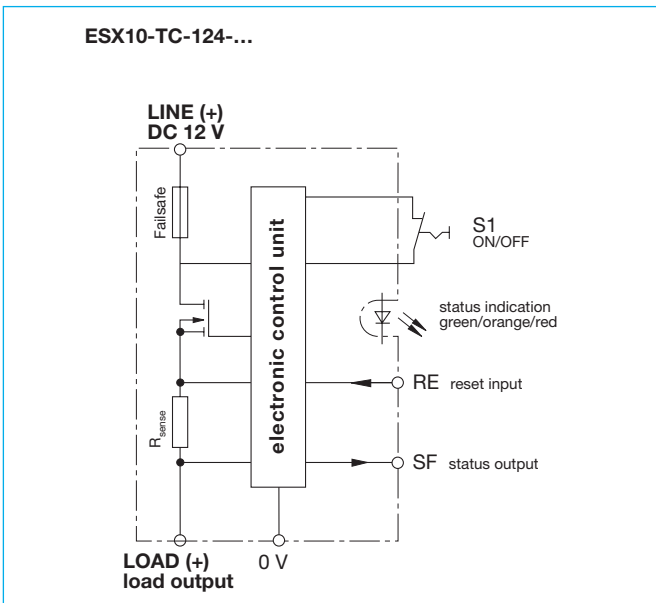
Dimensions



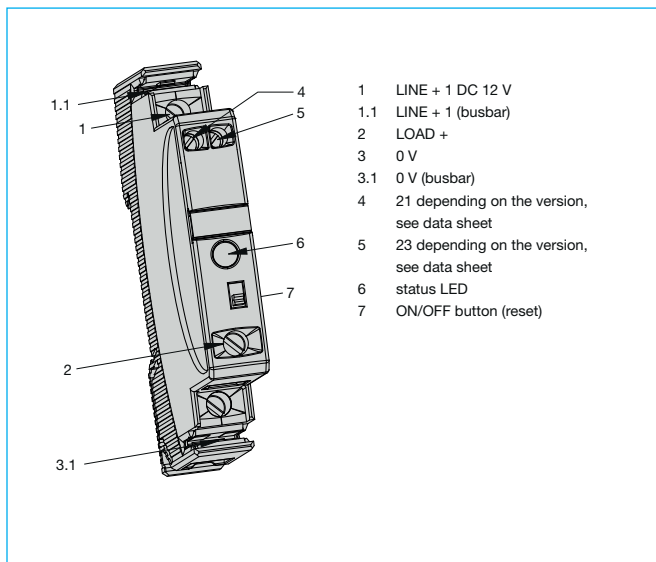
Connection diagram ESX10-TC-124 -DC 12 V (example)



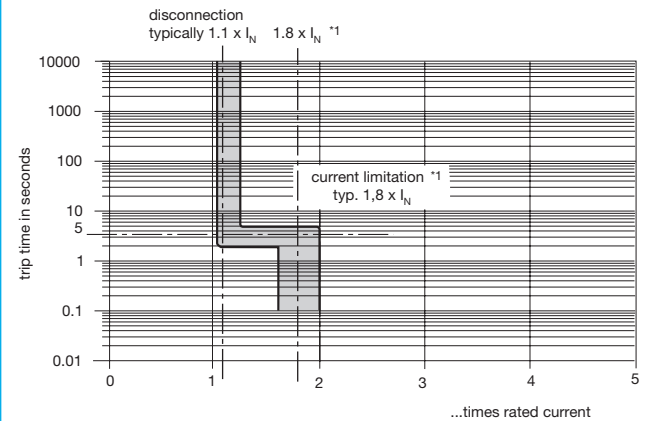
Schematic diagram ESX10-TC-124 voltage DC 12 V (example)



Connection and operation elements ESX10-TC



Time/current characteristic ($T_{amb} = 25^\circ C$)

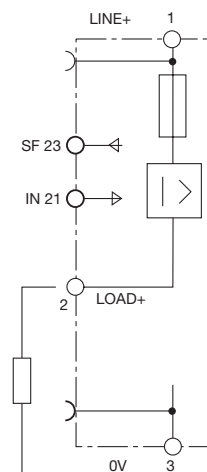


*1 current limitation typically $1.8 \times I_N$ at $I_N = 0.5 A \dots 6 A$
current limitation typically $1.5 \times I_N$ at $I_N = 8 A \dots 10 A$

- In a range of $1.1 \dots 1.8 \times I_N^{*1}$ the trip time is typically 3 s.
- The electronic current limitation typically begins in at $1.8 \times I_N$. This means: under all overload conditions (independent of power supply and load circuit resistance) typically 1.8 times rated current is applied until disconnection ^{*1}. The trip time varies between 50 ms and 3 s depending on the multiple of the current rating or at short circuit (I_k).
- Without the current limitation getting into effect at typically $1.8 \times I_N$ there would be a much higher overcurrent in the event of an overload or short circuit.

ESX10-T signal inputs / outputs / (wiring diagrams)

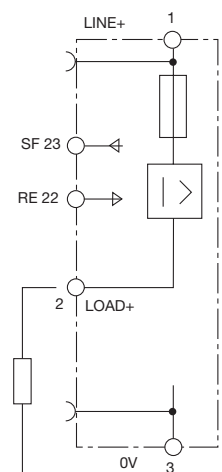
ESX10-TC-114-DC12V
with control input IN+
(+DC 12 V)
with status output SF
(+12 V = load output ON)



operating condition:
SF +12 V = OK

fault condition:
SF 0 V

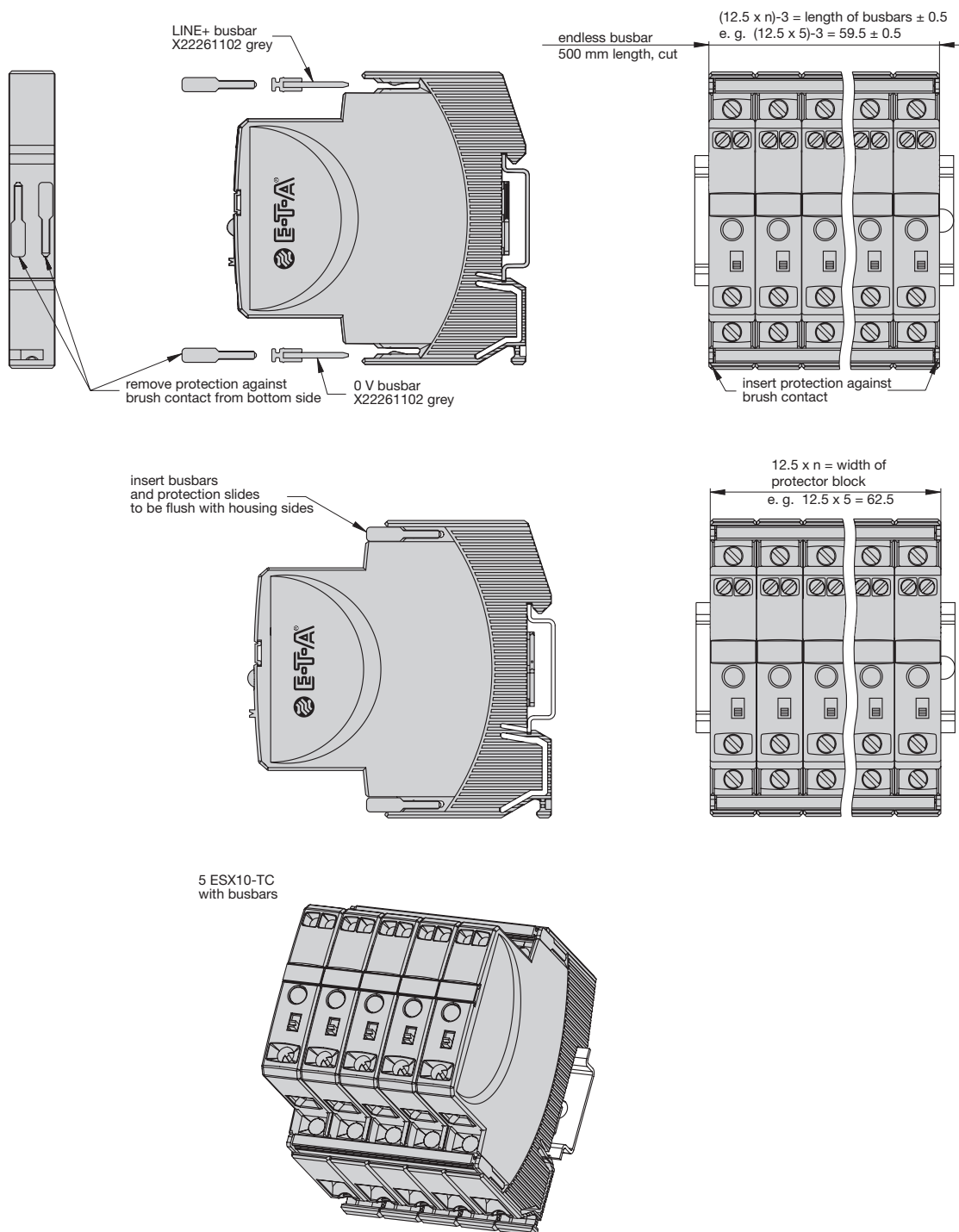
ESX10-TC-124-DC12V
with reset input RE
(+DC 12 V)
with status output SF
(+12 V = load output ON)



operating condition:
SF +12 V = OK

fault condition:
SF 0 V

Mounting examples for ESX10-T



Description of installation:

With a block of devices the busbars have to be inserted before wiring.
Max. 10 plug-in cycles for busbars allowed.

Recommendation:

The line entry busbars and signal busbars should be interrupted after 10 devices and line entry should start a new.

Table of possible busbar lengths

(part no. X 222 611 02 possibly cut to length, see accessories).

Number of devices	2	3	4	5	6	7	8	9	10
Length of rail [mm] $\pm 0,5$ mm	22	34.5	47	59.5	72	84.5	97	109.5	122

Description

The ESX10-T has an integral power distribution system. The following wirings can be carried out with different plug-in type busbars:

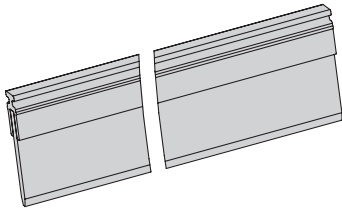
- LINE
- 0 V

Important: The electronic devices ESX10-T require
A 0V connection

Accessories

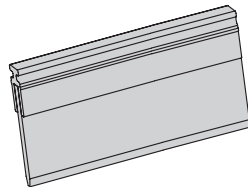
Busbars for LINE+ and 0 V

ampacity with one input I_{\max} 50 A
(recommendation: central supply)
ampacity with two inputs I_{\max} 63 A
grey insulated, length: 500 mm
part no. X 222 611 02



Busbars for LINE+ and 0 V

grey insulated
max. 10 plug-in cycles allowed



part no. X 222 611 22 (block of 2 ESX10-Ts),
length: 22 mm
packaging unit: 10 pcs

part no. X 222 611 34 (block of 3 ESX10-Ts),
length: 34.5 mm
packaging unit: 10 pcs

part no. X 222 611 47 (block of 4 ESX10-Ts),
length: 47 mm
packaging unit: 10 pcs

part no. X 222 611 59 (block of 5 ESX10-Ts),
length: 59.5 mm
packaging unit: 10 pcs

part no. X 222 611 72 (block of 6 ESX10-Ts),
length: 72 mm
packaging unit: 4 pcs

part no. X 222 611 97 (block of 8 ESX10-Ts),
length: 97 mm
packaging unit: 4 pcs

part no. X 222 611 12 (block of 10 ESX10-Ts),
length: 122 mm
packaging unit: 4 pcs

Insulated wire bridge

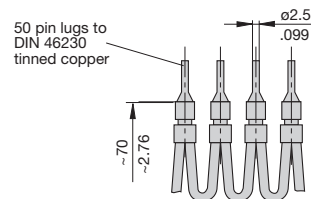
optional as jumper for ESX10-TC-114.../ESX10-TC-124...
for group signalling

X 223 108 01

Packaging unit: 10 pcs

Connector bus link –K10

suitable for auxiliary contacts (series connection)
X 210 589 02 (1.5 mm², brown),

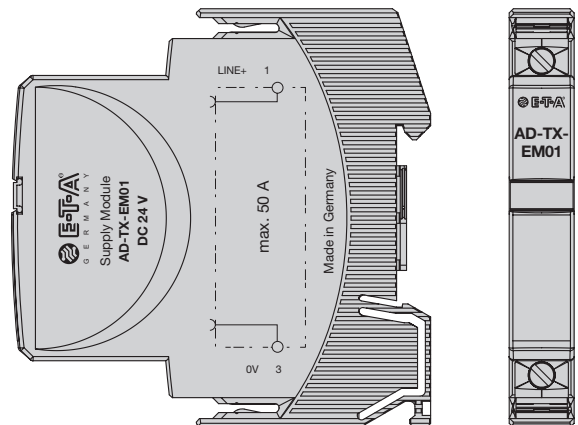


Supply module for LINE+ and 0 V

suitable for ESX10-T... product versions
ampacity

I_{\max} 50 A

part no. AD-TX-EM01



All information and data given on our products are accurate and reliable to the best of our knowledge, but E-T-A does not accept any responsibility for the use in applications which are not in accordance with the present specification. E-T-A reserves the right to change specifications at any time in the interest of improved design, performance and cost effectiveness. Dimensions are subject to change without notice. Please enquire for the latest dimensional drawing with tolerances if required. All dimensions, data, pictures and descriptions are for information only and are not binding. Amendments, errors and omissions excepted. Ordering codes of the products may differ from their marking.

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