Electronic Circuit Protector ESX10-TC DC 12 V

Description

Electronic circuit protector type ESX10-TC is designed to ensure **selective** disconnection of DC 12 V load systems.

DC 12 V power supplies, which are widely used in industry today, will shut down the output in the event of an overload with the result that one faulty load in the system can lead to complete disconnection of all loads. As well as an unidentified failure this also means stoppage of the whole system.

Through **selective** disconnection the ESX10-TC 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 75,000 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.

The ESX10-TC, with a width of only 12.5 mm, can be snapped onto symmetrical rails ensuring ease of installation and saving space in control cabinets.
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.

US patent number: US 6,490,141 B2
US patent number: US 8,237,311 B2

Features

- Selective load protection, electronic trip characteristics.
- Active current limitation for safe connection of capacitive loads up to 75,000 µF and on overload/short circuit.
- Current ratings 1 A...10 A at DC 12 V.
- Reliable overload disconnection with 1.1 x I_N plus, even with long load lines or small cable cross sections.
- Manual ON/OFF button (S1).
- Control input IN+ for remote ON/OFF signal (option).
- Electronic reset input RE (option).
- Clear status and failure indication through LED, status output SF.
- Integral fail-safe element adjusted to current rating.
- Width per unit only 12.5 mm.
- Rail mounting
- Ease of wiring through busbar LINE+ and 0 V.
- Additional versions with ATEX approval available.
  Marking: ⟨Ex⟩ II 3G Ex nA IIB T4 Gc X
  ESX10-TC...-**E**
  Please observe separate operating instructions:

ESX10-TC

Technical data ($T_{ambient}$ = 25 °C, operating voltage U_S = DC 12 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_0	ON condition: typically 15...20 mA
Status indication by means of	• 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_K	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_B < 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	

4

Technical data ($T_{ambient}$ = 25 °C, operating voltage U_S = DC 12 V)

Status output SF	**ESX10-TC-114/-124**
Electrical data	plus-switching signal output, connects U_S to terminal 12 of module 17plus 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
OFF condition	0 V level at status output when: ● 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-TC-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-TC-114**
Electrical data	see reset input RE
Control signal IN+	+ 12 V level (HIGH): device will be switched (terminal 21) 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 not required 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/wo plastic sleeve	0.5 – 10 mm²
multi-lead connection (2 identical cables)	
rigid/flexible	0.5 – 4 mm²
flexible with wire end ferrule without plastic sleeve	0.5 – 2,5 mm²
flexible with TWIN wire end ferrule with plastic sleeve	0.5 – 6 mm²
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/wo plastic sleeve	0.25 – 2.5 mm²
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	-25...+60 °C [1] (without condensation, see EN 60204-1) with condensation upon request [1] Ambient temperature range can differ depending on approvals

Technical data ($T_{ambient}$ = 25 °C, operating voltage U_S = DC 12 V

Storage temperature	-40...+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
Approvals	CE-logo UL 2367, File # E306740, Solid State Overcurrent Protectors UL 508, File # E322549
Dimensions (W x H x D)	12.5 x 80 x 83 mm
Mass	approx. 65 g

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

current rating I_N	typically voltage drop U_{ON} at I_N	active current limitation I_{Limit} (typically)	max. load current at 100% ON duty	
			T_a = 40 ° C	T_a = 60 ° C
1 A	80 mV	1.8 x I_N	1 A	1 A
2 A	130 mV	1.8 x I_N	2 A	2 A
3 A	80 mV	1.8 x I_N	3 A	3 A
4 A	100 mV	1.8 x I_N	4 A	4 A
6 A	130 mV	1.8 x I_N	6 A	6 A
10 A	150 mV	1.5 x I_N	10 A	9 A

Attention: when mounted side-by-side without convection the ESX10-T should not carry more than 80 % of its rated load with 100 % ON duty due to thermal effects.

Attention

Please note:

- 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.
- Automatic start-up of machinery after shut down must be prevented (Machinery Directive 98/37/EG and EN 60204-1). In the event of a short circuit or overload the load circuit will be disconnected electronically by the ESX10-T.

Ordering configuration for ATEX versions: ...-E

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
Approvals
E ATEX

ESX10 -TC 1 2 4 -DC 12 V-10 A-E ordering example

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 in the event of a failure
Signal input
1 with control input IN+, only ESX10-T-114
2 with reset input RE, only ESX10-T-124
Signal output
4 status output SF (only ESX10-T-114, ESX10-T-124)
Operating voltage
DC 12 V rated voltage DC 12 V
Current rating
1 A
2 A
3 A
4 A
6 A
10 A

ESX10 - TC 1 2 4 - DC 12 V - 10 A ordering example

Description of ESX10-T signal inputs and outputs (wiring diagrams) see next page.

Approvals

ESX10-TC			
Authority	**Standard**	**Voltage ratings**	**Current ratings**
UL	UL 2367	DC 12 V	1 A...12 A
UL	UL 1604	DC 12 V	1 A...10 A
UL	UL 508 C22.2 No 14	DC 12 V	1 A...10 A
TÜV	ATEX 94/9/EC Annex VIII EN 60079-0 EN 60079-11 EN 60079-15	DC 12 V	
GL	Rules VI, part 7, GL 2012, category C, EMC1	DC 12 V	1 A...10 A

Information 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)

Instruction leaflet

E-T-A ENGINEERING TECHNOLOGY
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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4

EG-declaration of Conformity for ATEX-version ESX10-TC-...-E

E-T-A Elektrotechnische Apparate GmbH

EU-Konformitätserklärung Nr. 100.218.1018-03
Declaration of Conformity

Wir / We: **E-T-A Elektrotechnische Apparate GmbH**
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

Elektronischer Sicherungsautomat
Solid state overcurrent protector

ESX10-TA (Hutschienenmontage 24Vdc / rail mounting 24Vdc)
ESX10-TB (Hutschienenmontage 24Vdc / rail mounting 24Vdc)
ESX10-... (Steckmontage, mit Modul 17PLUS, 24Vdc / plug-in mounting with module 17PLUS, 24Vdc)
ESX10-TC (Hutschienenmontage 12Vdc / rail mounting 12Vdc)

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

Diese Konformitätserklärung folgt den grundlegenden Anforderungen der Norm EN ISO/IEC 17050-1:2010 Konformitätsbewertung - Konformitätserklärung von Anbietern – Teil 1: Allgemeine Anforderungen.

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.

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)

2014/34/EU ATEX-Richtlinie / ATEX Directive

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:

DIN EN 60079-0:2014-06
Explosionsgefährdete Bereiche - Teil 0: Betriebsmittel - Allgemeine Anforderungen
Explosive atmospheres - Part 0: Equipment - General requirements

EN 60079-15: 2010 - Explosive Atmosphäre – Geräteschutz durch Zündschutzart „n"
Explosive atmospheres – Equipment protection by type of protection "n"

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

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1/2

E-T-A Elektrotechnische Apparate GmbH

EU-Konformitätserklärung Nr. 100.218.1018-03
Declaration of Conformity

Zusätzliche Angaben: Additional information:

II 3G Ex nA IIB T4 Gc X
-20°C≤Ta≤+60°C (für / for ESX10-TC)
0°C≤Ta≤+50°C (für / for ESX10, ESX10-TA, ESX10-TB)

Besondere Bedingungen: Special conditions:

Die zugehörige Betriebsanleitung enthält wichtige sicherheitstechnische Hinweise und Vorschriften für die Inbetriebnahme der genannten Geräte gemäß der Richtlinie 2014/34/EU (ATEX)
The pertinent user manual is including important safety-related information and regulations for placing into operation of the described devices in accordance with Directive 2014/34/EU (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.
In case the products will be fitted into a higher-level machine or system, the manufacturer of the new machine or system needs to assess possible new risks resulting from this action.

Altdorf, 28. Jun 2016

Dr. Clifford Sell
Geschäftsführer

ppa. Ralf Dietrich
Ltg. Produkt-, Marktentwicklung

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

(Name, Funktion, Unterschrift des/der Befugten / name, function, signature of authorized person(s))

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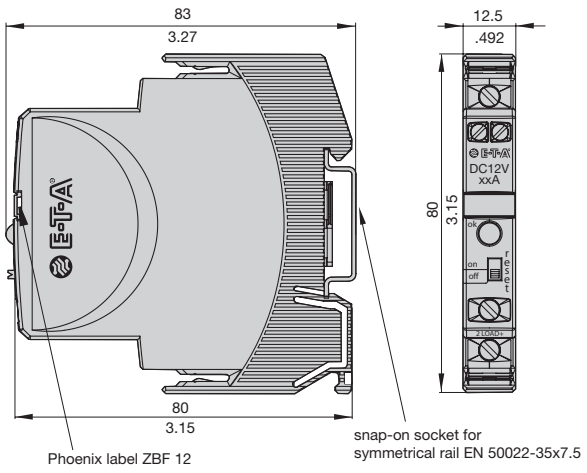
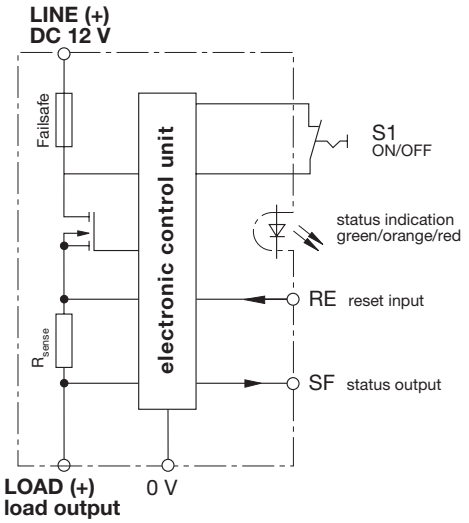
Dimensions



Schematic diagram ESX10-TC-124-DC 12 V (Example)

ESX10-TC-124-...



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

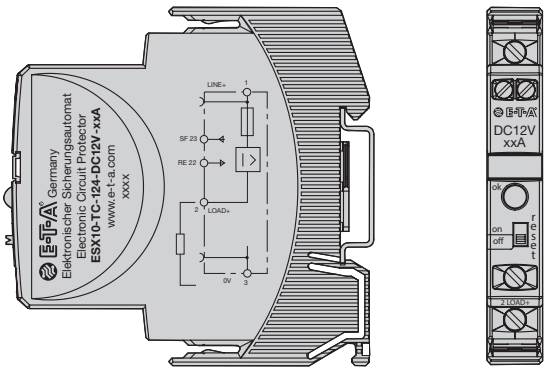
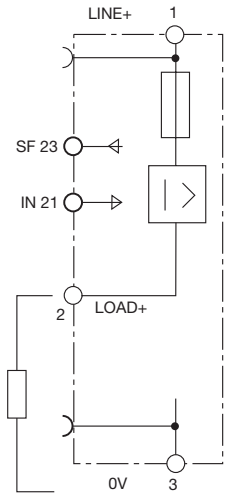


Table 2 : ESX10-T - product version

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

ESX10-T Signal inputs / outputs (wiring diagram)

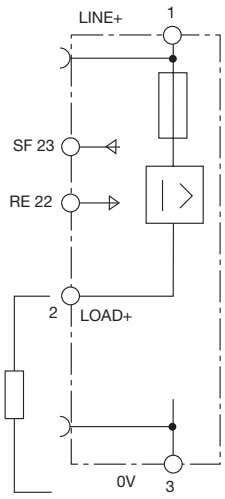
ESX10-TC-114-DC12V
with control input IN+
(+DC 12 V)
with status output SF
(+12 V = load output ON)



operating condition:
SF +12 V = OK

fault condition:
SF 0 V

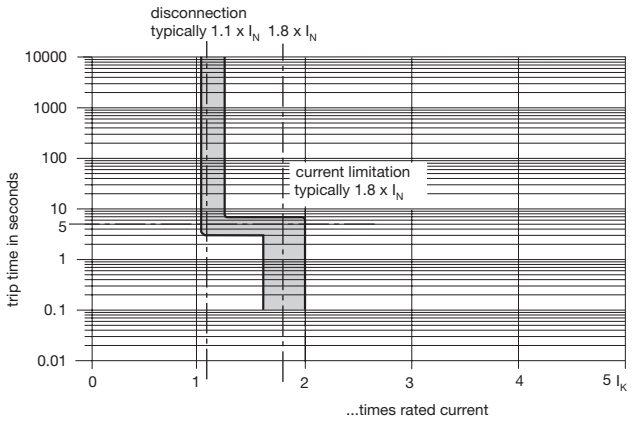
ESX10-TC-124-DC12V
with reset input RE
(+DC 12 V ↓)
with status output SF
(+12 V = load output ON)



operating condition:
SF +12 V = OK

fault condition:
SF 0 V

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



*1) 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

- The trip time is typically 3 s in the range between 1.1 and 1.8 x I_N*1).
- Electronic current limitation occurs at typically 1.8 x I_N*1) 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_N*1) 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.

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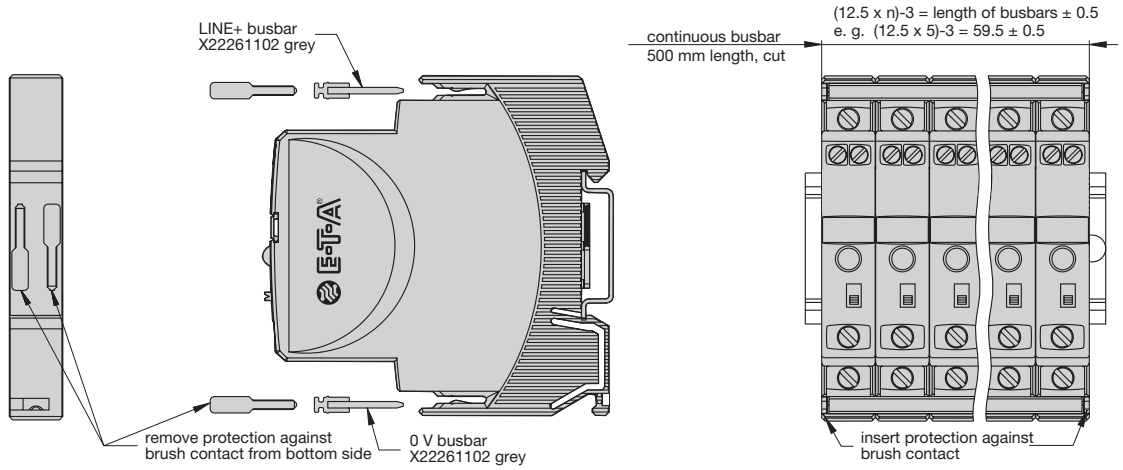
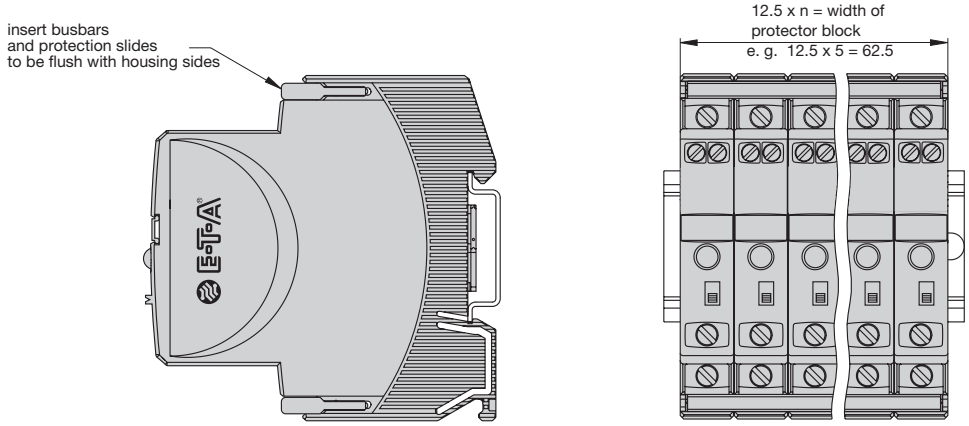
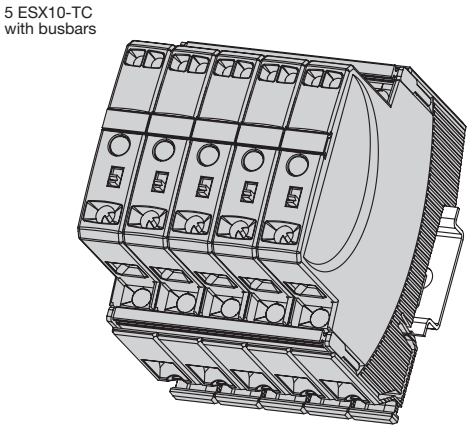
Mounting examples for ESX10-TC

The ESX10-TC-DC 12 V features an integral power distribution system.







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	10.95	122

Description

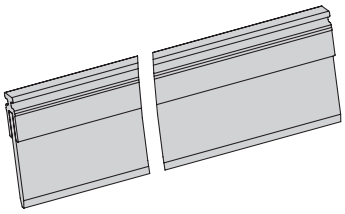
The ESX10-T features an integral power distribution system. The following wiring modes are possible with various pluggable current busbars:

- LINE +DC 12 V
- 0 V

  Caution: The electronic devices ESX10-T require a 0 V connection

Accessories

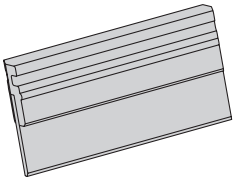
Busbars for LINE+ and 0 V
max. load with one line entry I_{max} 50 A
(recommended: centre line entry)
max. load with two line entries I_{max} 63 A
grey insulation, length: 500 mm
X 222 611 02



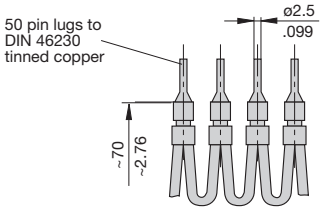
Busbars for LINE+ and 0 V
grey insulation
max. number of plug-on operations 10:

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
packing unit: 10 pcs

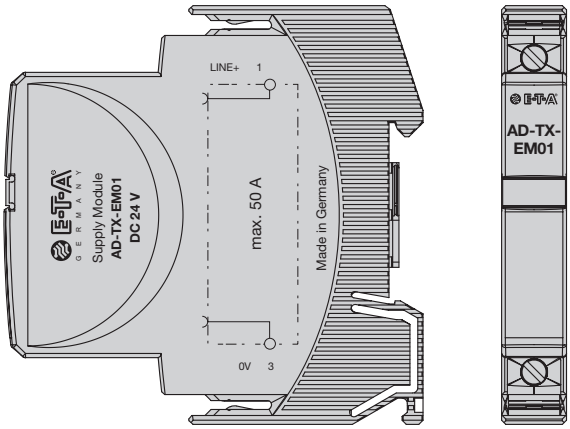
X 222 611 97, (8-unit-block ESX10-T), length: 97 mm
X 222 611 12, (10-unit-block ESX10-T), length: 122 mm
packing unit: 4 pcs



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... versions
ampacity I_{max} 50 A
AD-TX-EM01



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All dimensions without tolerances are for reference only. In the interest of improved design, performance and cost effectiveness the right to make changes in these specifications without notice is reserved. Product markings may not be exactly as the ordering codes. Errors and omissions excepted.

LifeElectronics
Живое партнерство

ООО «ЛайфЭлектроникс» **“LifeElectronics” LLC**

ИНН 7805602321 КПП 780501001 Р/С 40702810122510004610 ФАКБ "АБСОЛЮТ БАНК" (ЗАО) в г.Санкт-Петербурге К/С 30101810900000000703 БИК 044030703

Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- *Конкурентоспособные цены и скидки постоянным клиентам.*
- *Специальные условия для постоянных клиентов.*
- *Подбор аналогов.*
- *Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.*

- *Приемлемые сроки поставки, возможна ускоренная поставка.*
- *Доставку товара в любую точку России и стран СНГ.*
- *Комплексную поставку.*
- *Работу по проектам и поставку образцов.*
- *Формирование склада под заказчика.*

- *Сертификаты соответствия на поставляемую продукцию (по желанию клиента).*
- *Тестирование поставляемой продукции.*
- *Поставку компонентов, требующих военную и космическую приемку.*
- *Входной контроль качества.*
- *Наличие сертификата ISO.*

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- *Регистрацию проекта у производителя компонентов.*
- *Техническую поддержку проекта.*
- *Защиту от снятия компонента с производства.*
- *Оценку стоимости проекта по компонентам.*
- *Изготовление тестовой платы монтаж и пусконаладочные работы.*

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