

Description

With a width of only 12.5 mm, the ESX10-T electronic circuit protector provides selective protection for all DC 24 V load circuits. The ESX10-T is track-mountable and provides ease of installation for groups of devices with several circuits.

For adjustment to the load conditions the current rating is available in fixed values from 20 A to 25 A.

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



ESX10-TB-108

Features

- Track-mountable
- 20 A and 25 A rated current per channel on a width of only 12.5 mm
- Switching capacitive loads up to 30,000 µF
- Integral minus load return
- Approvals: UL

Your benefits

- Increased 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

Approvals



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

Voltage supply LINE+

Rated voltage U_N	DC 24 V
Operating voltage range U_B	DC 18 ... 26.4 V
Current rating range I_N	fixed current ratings: 20 A, 25 A
Standby current I_0 in OFF condition:	typically 12 mA
Status indication via	multi-coloured LED green: - device is ON (reset button = ON) - load circuit/power MOSFET connected red: - device switched OFF electronically (overload, short circuit) - load circuit/power MOSFET disconnected OFF: - switched off manually (reset button = OFF) - or device is dead-voltage

Load circuit LOAD

Load output	power MOSFET plus-switching (high side switch)
Voltage drop U_{ON} at rated current I_N	at $I_N = 20\text{ A}$: typically 90 mV at $I_N = 25\text{ A}$: typically 120 mV
Trip at	typically $1.3 \times I_N$ in the range of $-25\text{ °C} \dots +60\text{ °C}$: $1.1 \dots 1.5 \times I_N$
Trip times	typically 30 ms (onto overload or load increase on duty)
Max. overload	at $I_N = 20 \dots 25\text{ A}$: typically 200 A (at $L/R = 3\text{ ms}$)
Temperature disconnection	internal temperature monitoring with electronic disconnection
Free-wheeling diode for connected load	included in the device return currents $> 3\text{ A}$ longer than 1s need to be avoided
Delay time t_{ON}/t_{OFF} resistive load	typically 1.5 ms / typically 0.5 ms (EMC filtering in control input)
Short circuit or overload in the load circuit	disconnection of load • no automatic re-start • after remedy of the failure reset is required through control input IN+ (reset time $> 2\text{ s}$)

Status output

Electrical data	potential-free auxiliary change-over contact max. DC 30 V/0.5 A, min. 10 V/10 mA
Normal condition, LED green	U_B applied to reset switch = ON, no overload, no short circuit contact closed terminals 13-14
OFF condition, LED off	• reset switch is in ON position, but device is still in ON delay • reset switch OFF, »device is OFF« contact closed terminals 13-14 • No operating voltage U_B : contact open terminals 13-14
Fault condition, LED red	• electronic disconnection after overload or short circuit • single signal make contact contact open terminals 13-14
Fault condition	status output is in fault condition, if • there is no operating voltage U_B • the red LED is lighted (electronic disconnection)

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

General data

Reverse polarity protection

Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)

Terminals **LINE+ / LOAD+ / 0V**

Screw terminals	M4
Max. cable cross section rigid and flexible	0.5 – 16 mm ²
Flexible with wire end ferrule with/without plastic sleeve	0.5 – 10 mm ²
Wire stripping length	10 mm
Tightening torque (EN 60934)	1.5 – 1.8 Nm

Multi-lead connection

(2 cables with the same cross section)	
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

Terminals **auxiliary contacts**

Screw terminals	M3
Max. cable cross section	
Flexible with wire end ferrule w/wo plastic sleeve	0.25 – 2.5 mm ²
Wire stripping length	8 mm
Tightening torque (EN 60934)	0.5–0.6 Nm

Housing material	plastic material
Mounting method	symmetrical rail to EN 60715-35x7.5
Ambient temperature	-25 ... +60 °C 1... (without condensation, cf. EN 60204-1)
Storage temperature	-40 ... +70 °C

Damp heat	96 hrs / 95% RH 40°C to IEC 60068-2-78 test Cab climate class 3K3 to EN60721
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Vibration resistance	3 g, test to IEC 60068-2-6 test Fc
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Degree of protection	housing IP20,EN 60529 terminals IP20 EN 60529
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EMC requirements (EMC Directive, CE Logo)	Emitted interference: EN 61000-6-3 Noise immunity: EN 61000-6-2
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Insulation co-ordination (IEC 60934)	0.5 kV/ pollution degree 2 reinforced insulation in the operating area
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Dielectric strength	max. DC 32 V (load circuit)
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Insulation resistance (OFF condition)	n/a, only electronic disconnection
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Conformity	CE marking to 2014/30/EU
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Dimensions (h x w x d)	12.5 x 80 x 83 mm (tolerances to DIN ISO 286 part 1 IT13)
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Mass	approx. 65 g
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1) Ambient temperature range can differ depending on approvals

4

Order numbering code

Type No.	ESX10	electronic circuit protector
Mounting	TB	rail mounting, with signal contact and hole for signal busbars/jumpers
Version	1	without physical isolation
Signal input	0	without signal input
Signal output	8	auxiliary contact (make contact N/O)
Operating voltage	DC 24 V	voltage rating DC 24 V
rated current	20 A	
	25 A	

ESX10 -TB- 1 0 8-DC 24 V - 25 A ordering example

Notes

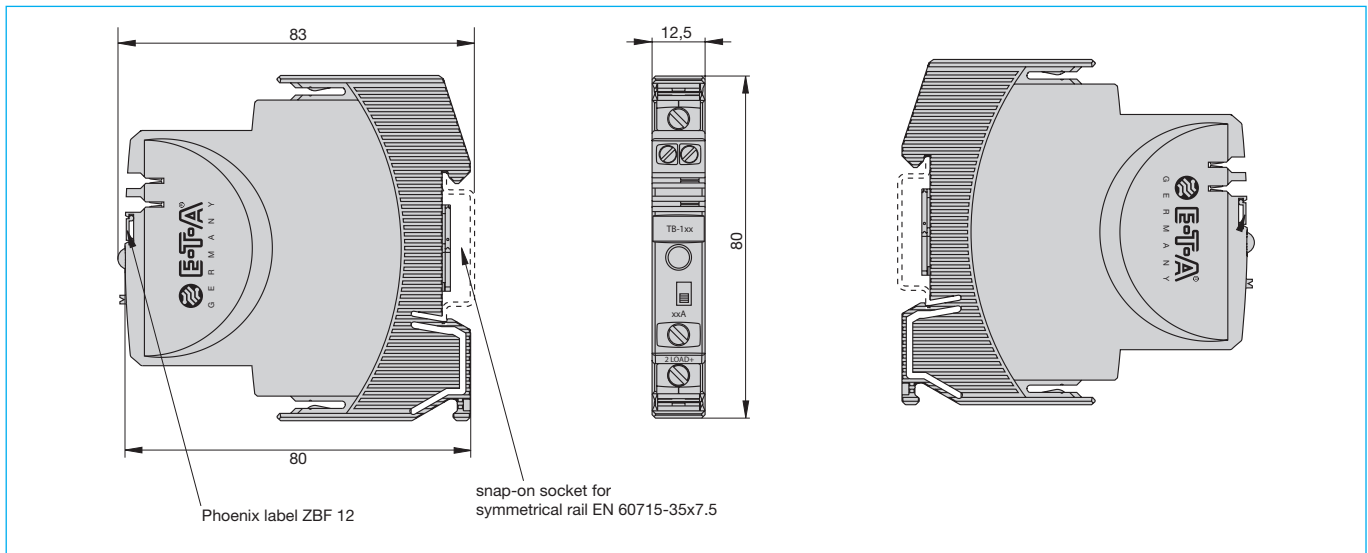
- The user has to ensure that the cable cross section of the load circuit in question complies with the current rating of the ESX10-T used.
- In addition special precautions must be taken in the system or machine (e.g. use of a safety PLC) which reliably prevent an automatic re-start of parts of the 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.

Approvals

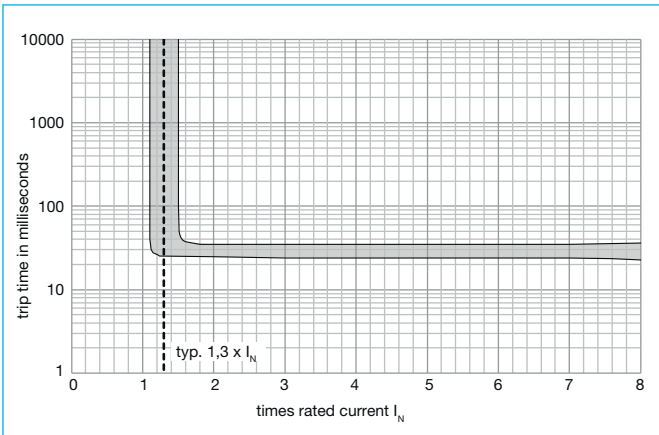
ESX10-TB-...-20 A/25 A

Approval authority	Standard	File certificate no.	Voltage ratings	Current rating range
UL	UL 2367	E306740	DC 24 V	20 A, 25 A
UL	UL 508 C22.2 No. 14	E322549	DC 24 V	20 A, 25 A

Dimensions ESX10-TB-... preferred mounting position horizontal



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



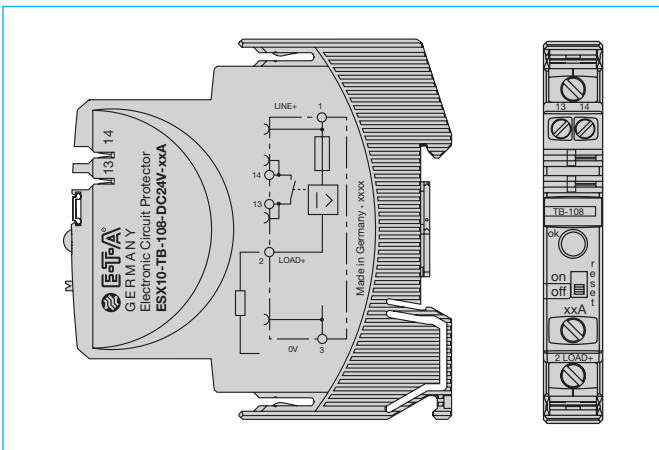
Temperature factor / cont. duty

The max. load current depends on the ambient temperature and whether the devices are mounted side-by-side.

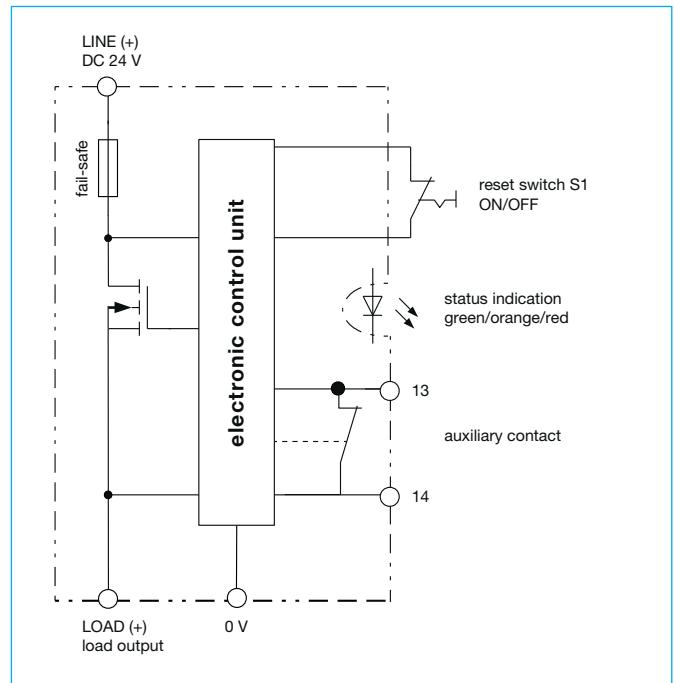
rated current	max. load current at 100 % ON duty			
	$T_{AMB} = 23\text{ }^{\circ}\text{C}$	$T_{AMB} = 40\text{ }^{\circ}\text{C}$	$T_{AMB} = 50\text{ }^{\circ}\text{C}$	$T_{AMB} = 60\text{ }^{\circ}\text{C}$
In				
25A	25A	20A	18A	16A
20A	20A	20A	18A	16A

When mounted side-by-side and without air convection, the rated current can only be carried up to **max. 80%**.

Connection diagram ESX10-TB-108-DC24V-20/25A



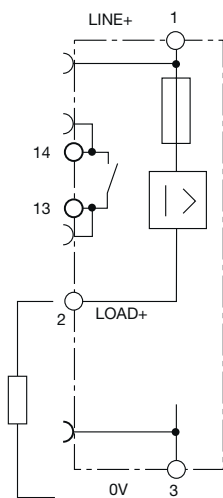
Schematic diagram ESX10-TB-108-DC24V-20/25A



ESX10- LINE-108-... Signal inputs / outputs / (wiring diagrams)

The auxiliary contacts are shown in the OFF or fault condition

ESX10-TB-108
without signal input
with auxiliary contact
(single signal, make contact)



operating condition: 13-14 closed
fault condition: 13-14 open

Wiring diagrams, application examples ESX10-TB-108-DC24V-20/25A

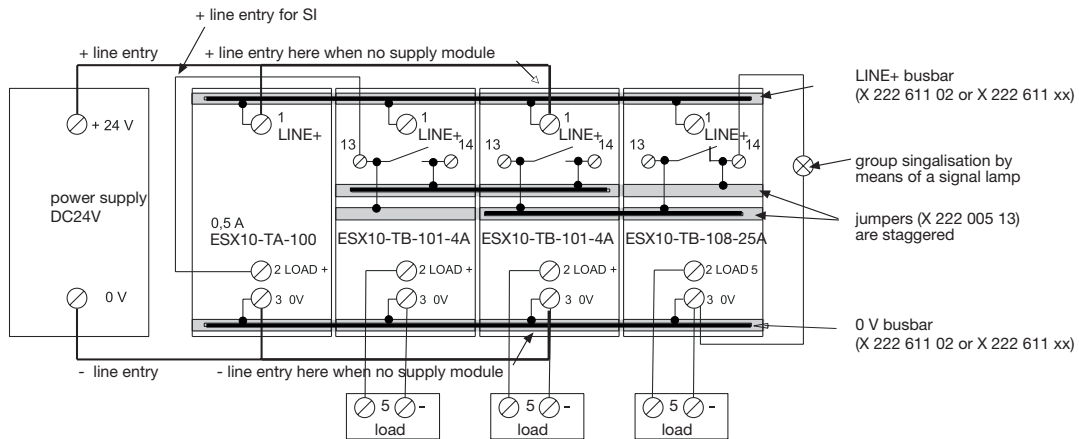
Applications examples: line entry DC 24 V with protection of signal circuit and direct connection of loads

Auxiliary contacts are shown on the OFF of fault condition
 ESX10-TB-108-25A with 2x ESX10-TB-101-4A

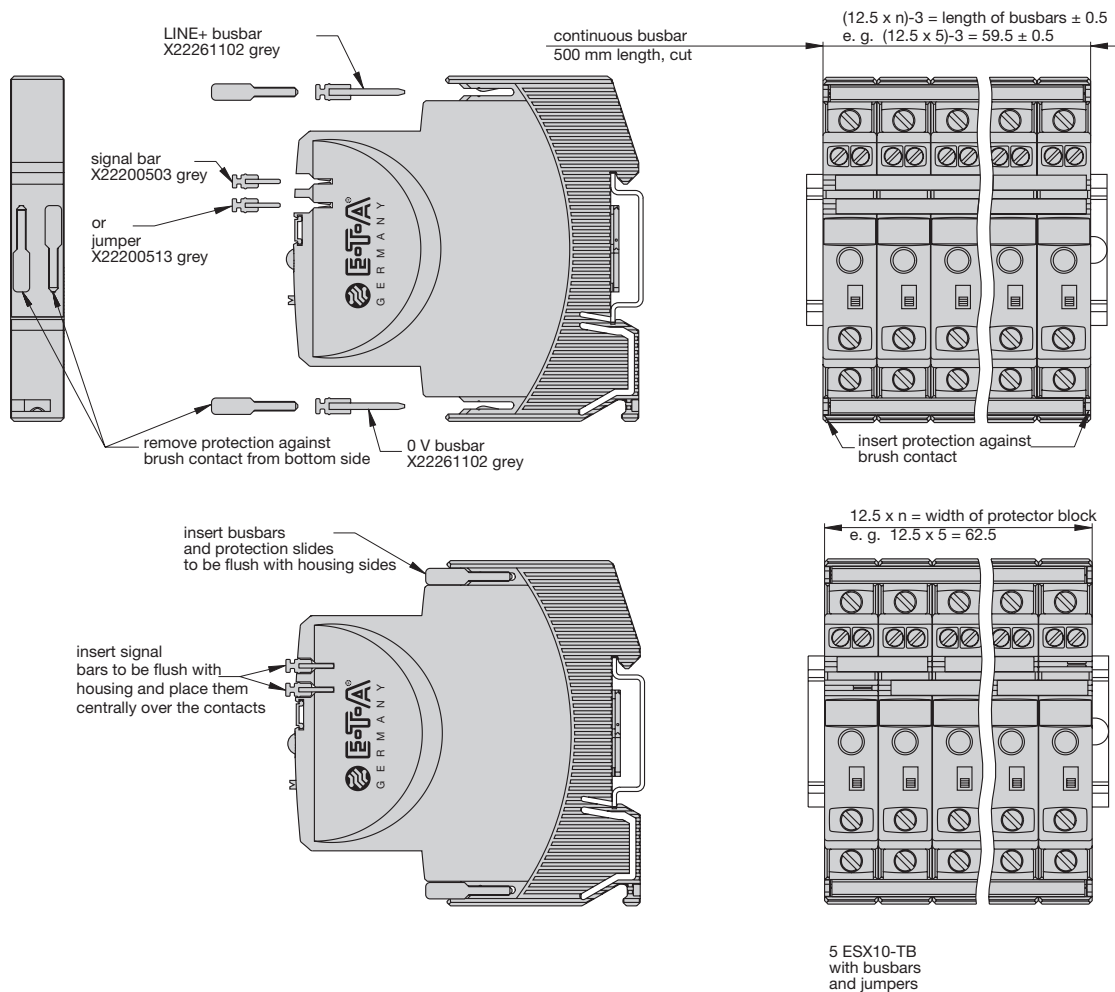
Group signalisation (series connection)

Type ESX10-TA-100-DC24V-0.5A can be used as a supply module including protection of auxiliary circuit

Optional: passive supply module AD-TX-EM01 (without protection)



Mounting examples for ESX10-T



Description of installation:

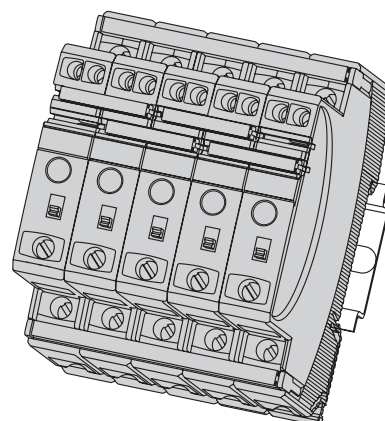
With a block of devices the busbars have to be inserted before wiring.
Max. 10 plug-in cycles for busbars allowed.

Recommendation:

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

Table of busbar lengths

(X 222 611 02 and X 222 005 03 or their cut lengths - see accessories)



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

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Description

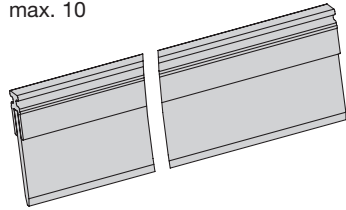
The ESX10-T has an integral power distribution system. The following wirings can be carried out with different plug-in type busbars:

- LINE +(DC 24 V)
- 0 V
- **Important:** The electronic devices ESX10-T require a 0 V connection.
- Auxiliary contacts
- Reset inputs

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
 plug-in cycles allowed max. 10
X 222 611 02

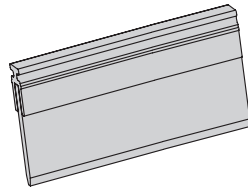


Busbars for LINE+ and 0 V

grey insulated
 max. 10 plug-in cycles allowed

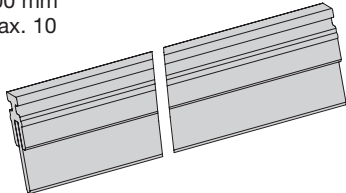
X 222 611 22 (block of 2 ESX10-Ts), length: 22 mm
X 222 611 34 (block of 3 ESX10-Ts), length: 34.5 mm
X 222 611 47 (block of 4 ESX10-Ts), length: 47 mm
X 222 611 59 (block of 5 ESX10-Ts), length: 59.5 mm
 Packaging unit: 10 pcs

X 222 611 72 (block of 6 ESX10-Ts), length: 72 mm
X 222 611 97 (block of 8 ESX10-Ts), length: 97 mm
X 222 611 12 (block of 10 ESX10-Ts), length: 122 mm
 Packaging unit: 4 pcs



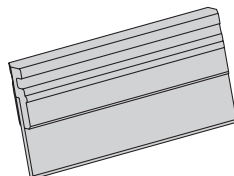
Signal busbars for aux. contacts and reset inputs

suitable for signal busbars ESX10-TB-...
 ampacity with one input I_{max} 1 A
 with aux. contacts connected in series I_{max} 0.5 A
 grey insulated, length: 500 mm
 plug-in cycles allowed max. 10
X 222 005 03



Busbars for auxiliary contacts

grey insulated, length: 21 mm
 plug-in cycles allowed max. 10
X 222 005 13
 Packaging unit: 10 pcs

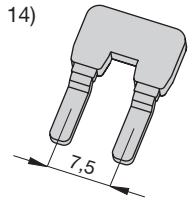


Insulated wire bridge

for group signalling
 (series connection of make contacts 13 - 14)

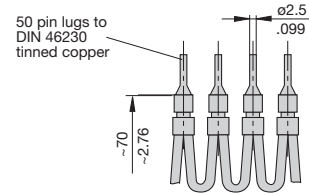
X 223 108 01

Packaging unit: 10 pcs



Connector bus link -K10

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

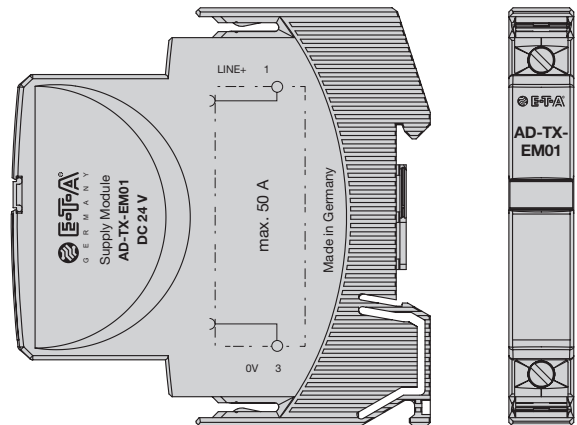


Supply module for LINE+ and 0 V (without protection)

Ampacity I_{max} 50 A
 Max. cable cross section see ESX10-T

Technical data
 see terminals of ESX10-T

AD-TX-EM01



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