ESX10-TB-108-DC24V-20/25A electronic circuit protector

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 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 °C, U_B = DC 24 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 A: typically 90 mV at I_N = 25 A: typically 120 mV
Trip at	typically 1.3 x I_N in the range of -25 °C ... +60 °C: 1.1 ... 1.5 x I_N
Trip times	typically 30 ms (onto overload or load increase on duty)
Max. overload Temperature disconnection	at I_N = 20 … 25 A: typically 200 A (at L/R = 3 ms) internal temperature monitoring with electronic disconnection
Free-wheeling diode for connected load	included in the device return currents > 3 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 >2s)
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 °C, U_B = DC 24 V)

General data		
Reverse polarity protection		
Control circuit Load circuit	yes no (due to integral free-wheeling diode)	
Terminals	**LINE+ / LOAD+ / 0V**	
Screw terminals		M4
Max. cable cross section rigid and flexible		0.5 – 16 mm²
Flexible with wire end ferrule with/without plastic sleeve		0.5 – 10 mm²
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 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
Terminals	**auxiliary 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	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	
Vibration resistance	3 g, test to IEC 60068-2-6 test Fc	
Degree of protection	housing IP20,EN 60529 terminals IP20 EN 60529	
EMC requirements (EMC Directive, CE Logo)	Emitted interference: EN 61000-6-3 Noise immunity: EN 61000-6-2	
Insulation co-ordination (IEC 60934)	0.5 kV/ pollution degree 2 reinforced insulation in the operating area	
Dielectric strength	max. DC 32 V (load circuit)	
Insulation resistance (OFF condition)	n/a, only electronic disconnection	
Conformity	CE marking to 2014/30/EU	
Dimensions (h x w x d)	12.5 x 80 x 83 mm (tolerances to DIN ISO 286 part 1 IT13)	
Mass	approx. 65 g	

1) Ambient temperature range can differ depending on approvals

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

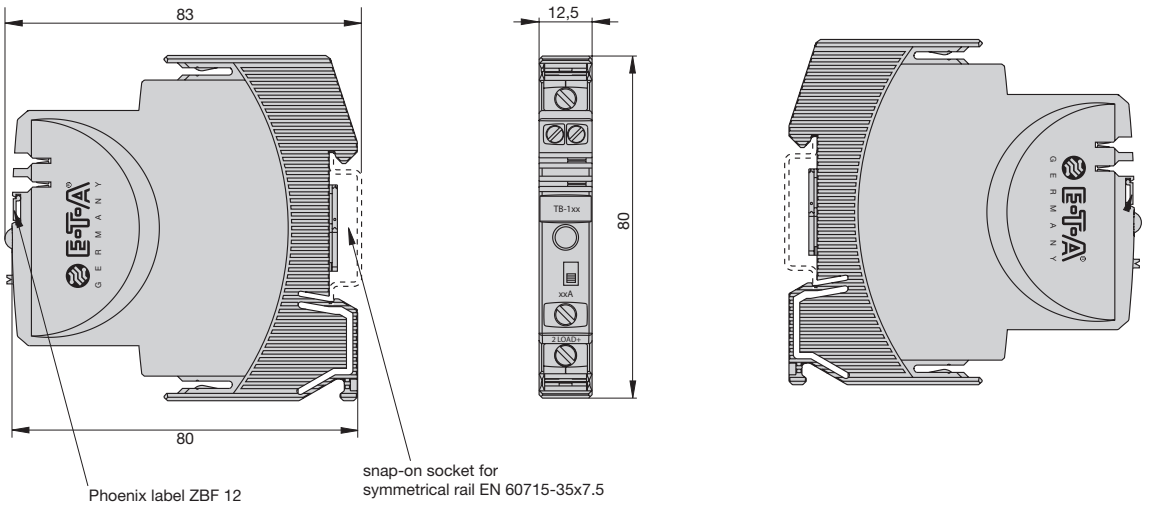
Notes

- 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.

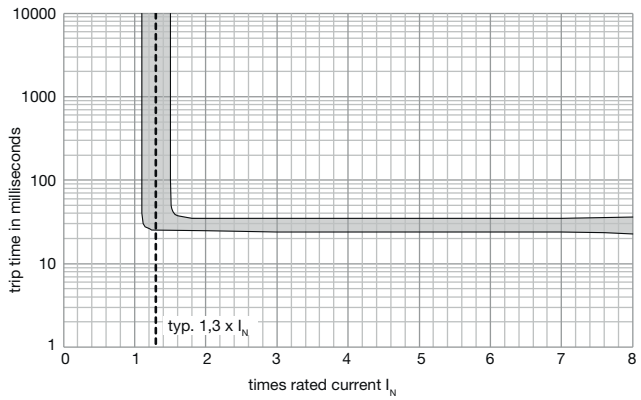
Approvals

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 °C)

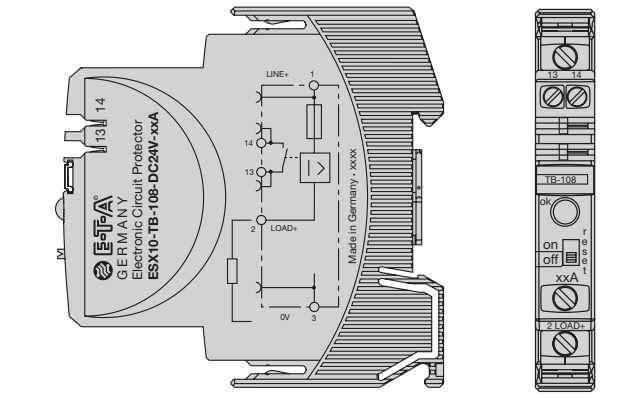


Temperature factor / cont. duty

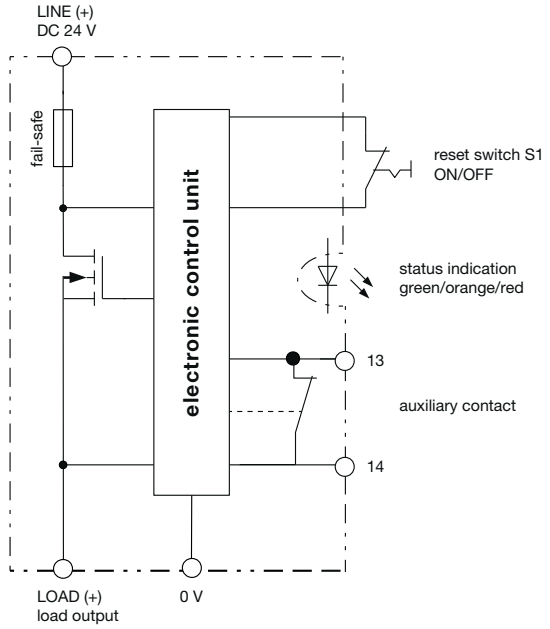
The max. load current depends on the ambient temperature and whether the devices are mounted side-by-side.

rated current	max. load current at 100 % ON duty			
In	**T_{AMB} = 23 °C**	**T_{AMB} = 40 °C**	**T_{AMB} = 50 °C**	**T_{AMB} = 60 °C**
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



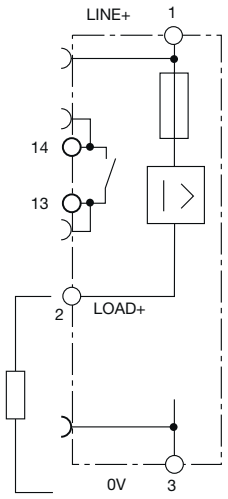
Schematic diagram ESX10-TB-108-DC24V-20/25A



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

The auxiliary contacts are shown in the OFF or fault condition

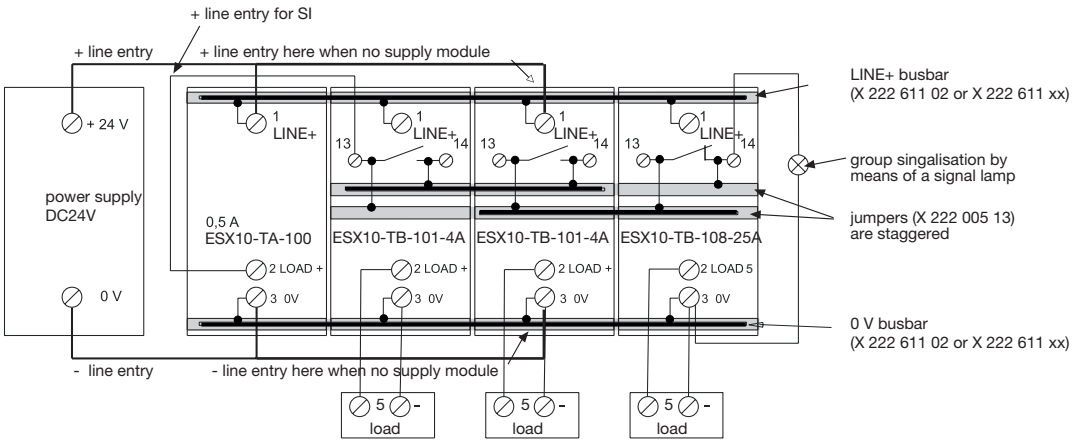
ESX10-TB-108
without signal input
with auxiliary contact
(single signal, make contact)



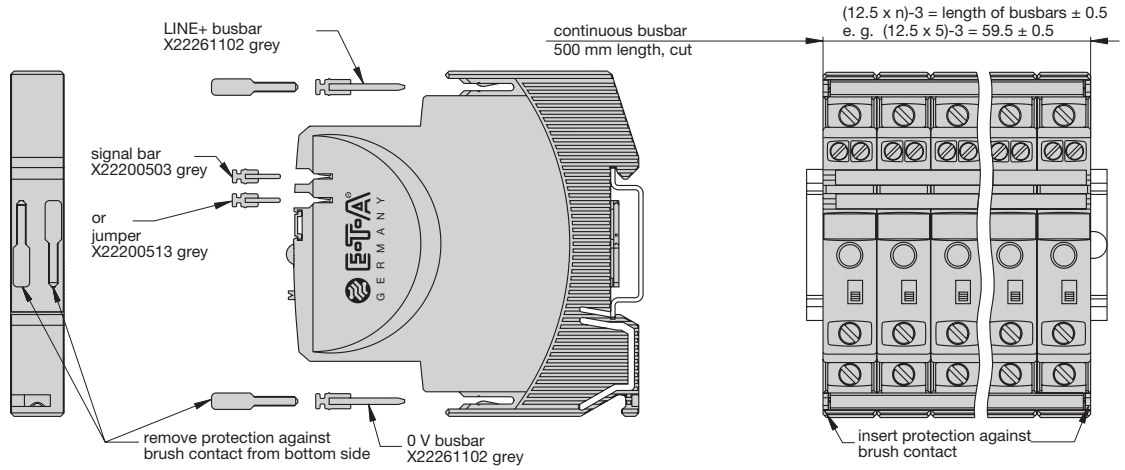
operating condition: 13-14 closed
fault condition: 13-14 open

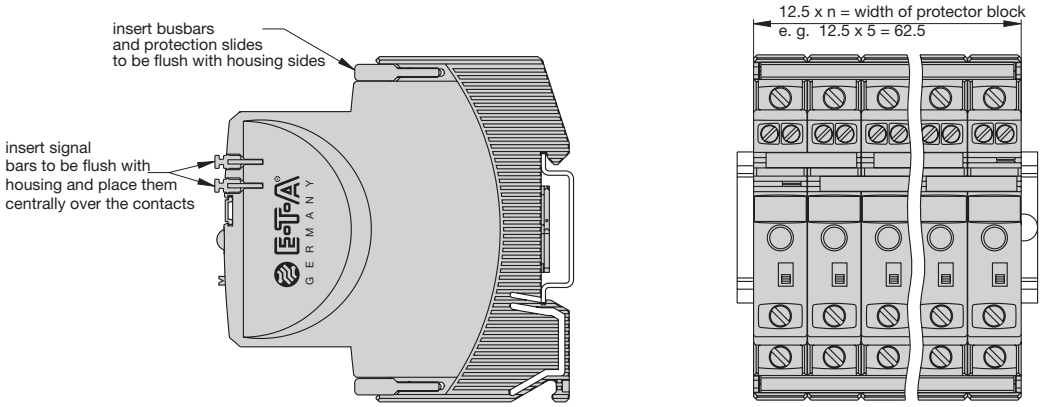
Wiring diagrams, application examples ESX10-TB-108-DC24V-20/25A

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-108-25Awith 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)

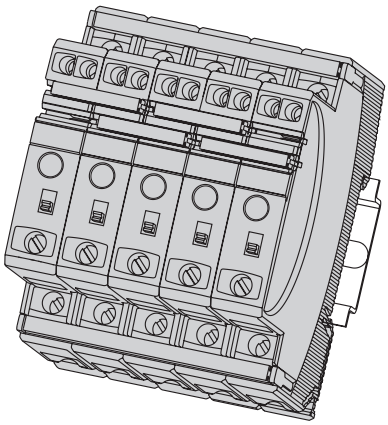


Mounting examples for ESX10-T





5 ESX10-TB
with busbars
and jumpers



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

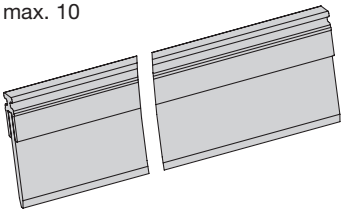
Description

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

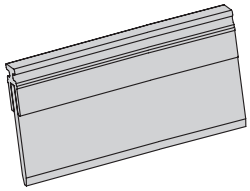
Busbars for LINE+ and 0 V
ampacity with one input I_{max} 50 A
(recommendation: central supply)
ampacity with two inputs I_{max} 63 A
grey insulated, length: 500 mm
plug-in cycles allowed max. 10
X 222 611 02



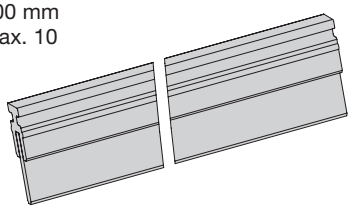
Busbars for LINE+ and 0 V
grey insulated
max. 10 plug-in cycles allowed

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

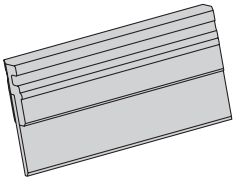
X 222 611 72 (block of 6 ESX10-Ts), length: 72 mm
X 222 611 97 (block of 8 ESX10-Ts), length: 97 mm
X 222 611 12 (block of 10 ESX10-Ts), length: 122 mm
Packaging unit: 4 pcs



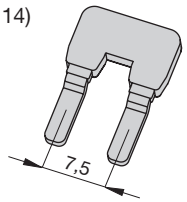
Signal busbars for aux. contacts and reset inputs
suitable for signal busbars ESX10-TB-...
ampacity with one input I_{max} 1 A
with aux. contacts connected in series I_{max} 0.5 A
grey insulated, length: 500 mm
plug-in cycles allowed max. 10
X 222 005 03



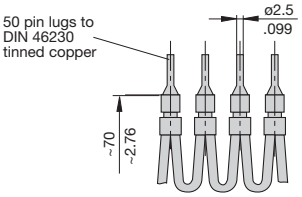
Busbars for auxiliary contacts
grey insulated, length: 21 mm
plug-in cycles allowed max. 10
X 222 005 13
Packaging unit: 10 pcs



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