

Description

The SPR10-T smart power relay for DC 12 V and DC 24 V applications is a controllable solid state power relay and holds three functions in a single unit:

- Solid state relay with control input
- Electronic overcurrent protection
- Status indication by means of LED and status output SF

At a width of only 12.5 mm it provides selective protection for all DC 12 V and DC 24 V load circuits. SPR10-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 of 20 A and 25 A.

The benefits of SPR10-T are obvious:

For remote switching and protection of loads, several discreet separate components had up to now been connected in the load circuit as a functional unit:

- The coil of an electro-mechanical relay is activated over a control cable. The integral contact closes the load circuit
- An additional protective element (circuit breaker or fuse) providing line or equipment protection

The SPR10-T offers both functions in a single device.

Features

- The integral power electronics offers a wear-free switching function, unsusceptible to shock, vibration and dust.
- Compared to electro-mechanical relays, it requires only a fraction of the closed current and switching current. This is paramount for battery-buffered load circuits which have to remain activated even with the generator turned off.
- The extremely low current consumption of typically 4 mA in the OFF condition is an absolute must in battery-buffered applications.
- The device offers visual status indication of the load condition (load is OFF: LED is off; load activated: green LED lighted; load disconnected due to overload or short circuit: red LED lighted).
- A status output for the group fault indication »SF« provides status information on the condition of the load circuit.
- For direct rail mounting
- Ease of wiring via entry line busbars LINE+ and 0 V, signal busbars and jumpers.

Approvals



SPR10-TB-114-DC12/24V-20/25A

Your benefits

- Increased equipment uptime through clear failure detection and stable power supply
- Space savings through a combination of solid state relay, overcurrent protection and signalling in a single device
- Reduces downtimes through quick fault resolution
- Makes planning easier through a wide input voltage range from DC 9...DC 32 V

Downloads



Data sheet / Conformity documents / Brochure / CAD data / ePlan Macros are available for you on our website.

Compliance



Technical data (T_{amb} = 25 °C, at U_N)

Voltage supply LINE+	
Rated voltage U _N	DC 12 V / 24 V
Operating voltage range U _B	DC 9...32 V
Current rating I _N	fixed current ratings: 20 A, 25 A
Closed current I ₀ in OFF condition:	typically 2 / 4 mA
Signalling of operating status via	multi-coloured LED green: load circuit/power MOSFET connected red: - device switched OFF electronically (overload, short circuit) - load circuit/power MOSFET disconnected OFF: - manually switched off (S1 = OFF) or device is dead-voltage
Load circuit LOAD	
Load output	power MOSFET plus-switching (high side switch)
Types of loads	Resistive, inductive, capacitive load; lamp loads, motors (depending on duration of inrush current)
Voltage drop U _{ON} at rated load 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 -25 °C...+60 °C: 1.1...1.5 x I _N
Trip time (standard)	typically 30 ms (when switching on onto overload or load increase on duty)
Max. overload	at I _N = 20...25 A: typically 200 A (L/R = 3 ms)
Temperature disconnection	power transistor > 150 °C
Free-wheeling diode for connected load	included in the device return currents > 3 A longer than 1 s 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 I _{N+} . (reset time > 2 s)
Control input I_{N+}	
Control voltage I _{N+}	0...5 V = OFF 8.5...32 V = ON
Control current I _E	typically 2 mA at 12 V typically 7 mA at 24 V
Reset in the event of a failure	- via external control signal (low - high) at control input I _{N+} - via reset of the supply voltage
Rise time of I _{N+}	< 5 ms

Technical data (T_{amb} = 25 °C, at U_N)

Status functions	
Electrical data	plus switching signal output, connects U _B to terminal 23 (SF) rated data: DC 24 V / max. 0.2 A (short circuit proof) The status output is connected internally with a 10 kOhm resistor against 0 V.
status OUT	+ 24 V = S1 is ON and I+ = ON (terminal 21), load output connected green LED lighted 0 V = S1 is ON and I _{N+} = ON (terminal 21), load output blocked red LED lighted
OFF condition	0 V level on status output whenever: switch S1 in OFF position and control signal I _{N+} = OFF »device is OFF« no operating voltage U _B
Visual indication	
Control current flows (I _{N+})	green LED lighted
Break operation overcurrent (SF)	red LED lighted
General data	
Reverse polarity protection	
Control circuit	yes
Load circuit	no (due to integral free-wheeling diode)
Terminals	
LINE+ / LOAD+ / 0 V	
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...10 mm ² AWG20 - AWG6 str./sol.
Wire stripping length	10 mm
Tightening torque (EN 60934)	1.5...1.8 Nm
Multi-lead connection	
(two leads of the same diameter) 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 and 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 AWG24 - AWG14 str./sol.
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

5

Technical data (T_{amb} = 25 °C, at U_N)

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 EN60529 terminals IP20 DIN 60529
EMC requirements (EMC Directive, CE logo)	Emitted interference: EN 61000-6-3 noise immunity: EN 61000-6-2
Insulation coordination (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 trip
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.	Smart Power Relay
SPR10	
Mounting	TB rail mounting, with signal contact and hole for signal busbars
	1 without physical isolation
Signal input	1 with control input IN+ (only SPR10-T-114)
Signal output	4 status output SF (only SPR10-T-114)
Operating voltage	DC 12/24 V rated voltage DC 24 V
Current ratings	20 A 25 A
SPR10 - TB 1 1 4 - DC 12/24 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 SPR10-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 SPR10-T electronically disconnects the load circuit.

Approvals

SPR10-TB-114-DC12/24 V-20/25 A				
Approval authority	Standard	File-Certificate Nr.	Voltage ratings	Current rating range
UL	UL 2367	E306740 vol 1 sec 1	DC 12/24 V	20 A, 25 A
UL	UL 508	E322549, Vol. 1, Sec. 1	DC 12/24 V	20 A, 25 A
UL	UL 508 C22.2 No. 14	E322549, Vol. 2, Sec. 2	DC 12/24 V	20 A, 25 A

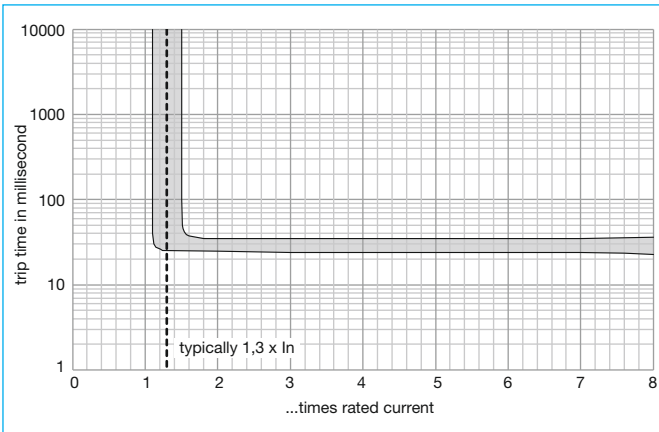
Temperature factor / cont. duty

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

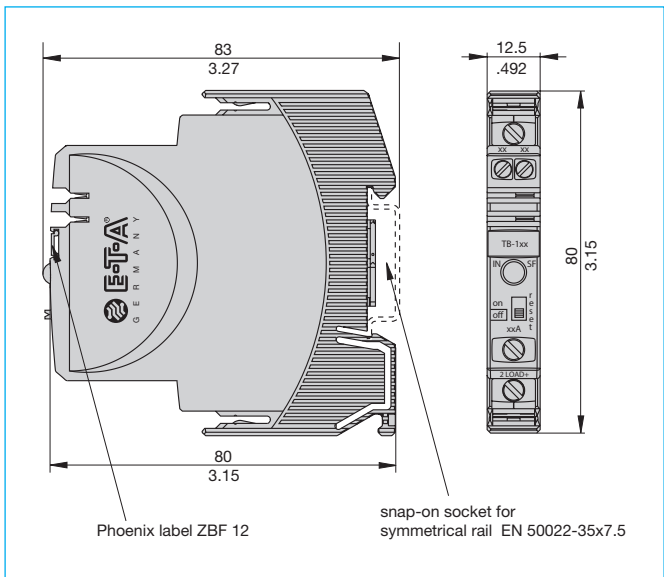
Current ratings	max. load current at 100 % ON duty			
	T _{AMB} = 23 °C	T _{AMB} = 40 °C	T _{AMB} = 50 °C	T _{AMB} = 60 °C
25 A	25 A	20 A	18 A	16 A
20 A	20 A	20 A	18 A	16 A

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

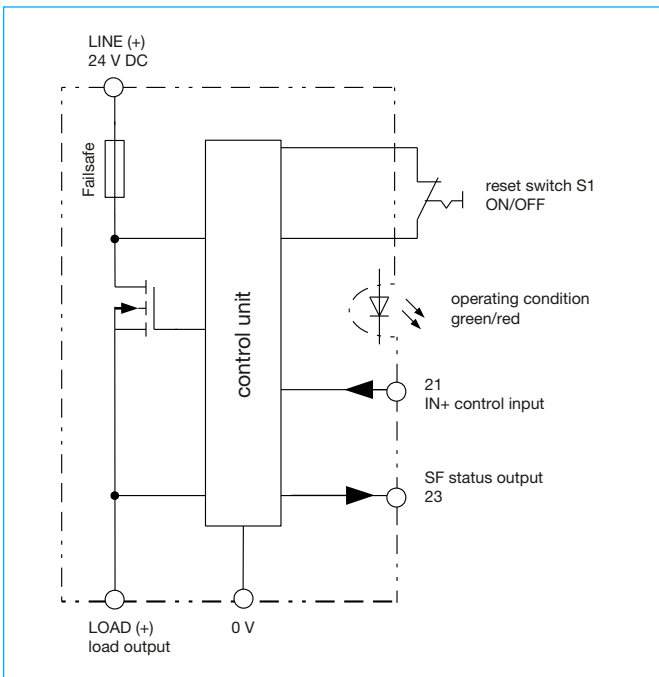
Time/current characteristic ($T_{amb} = 25\text{ °C}$)



Dimensions SPR10-TB

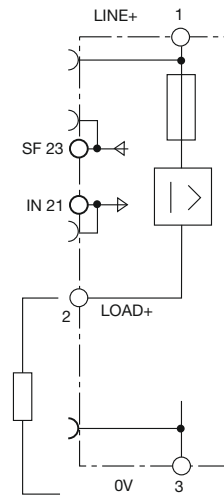


Schematic diagram SPR10-TB-114-DC12/24V-20/25A



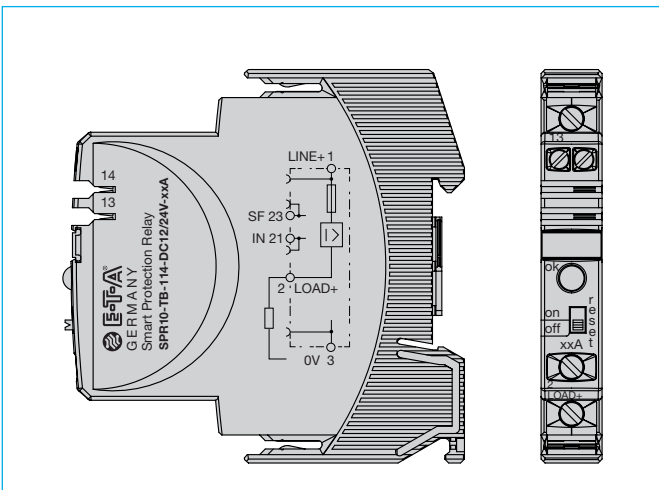
SPR10- LINE-114... signal inputs / outputs / (wiring diagrams)

SPR10-TB-114
with control input IN+
(+DC 12-24 V)
with status output SF
(+24 V = load output ON)



operating condition: SF +24 V = OK
fault condition: SF 0 V

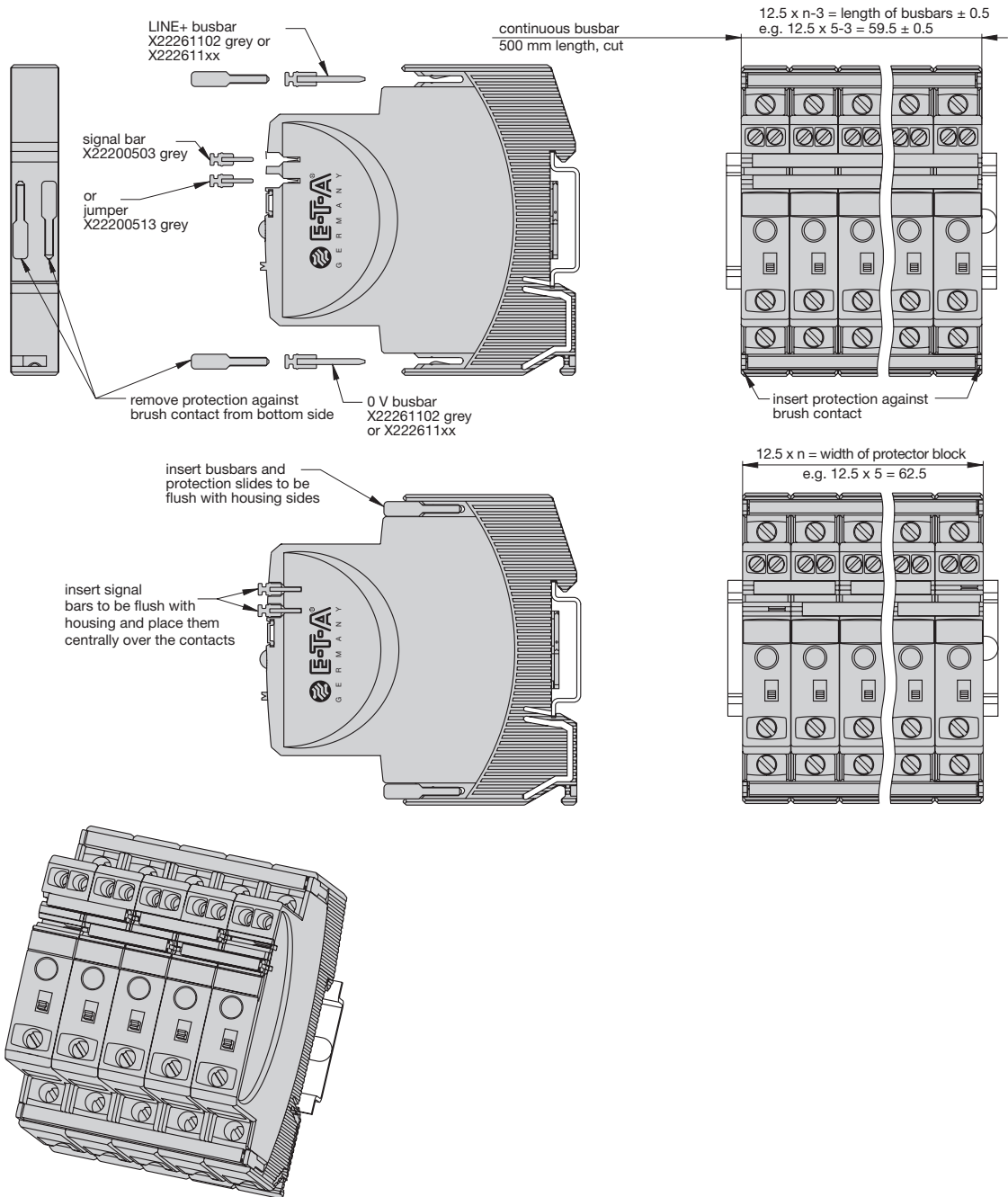
Connection diagram SPR10-TB-114-... (example)



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Mounting examples SPR10-TB-114-DC12/24V-20/25A

The SPR10-T has an integral power distribution system



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

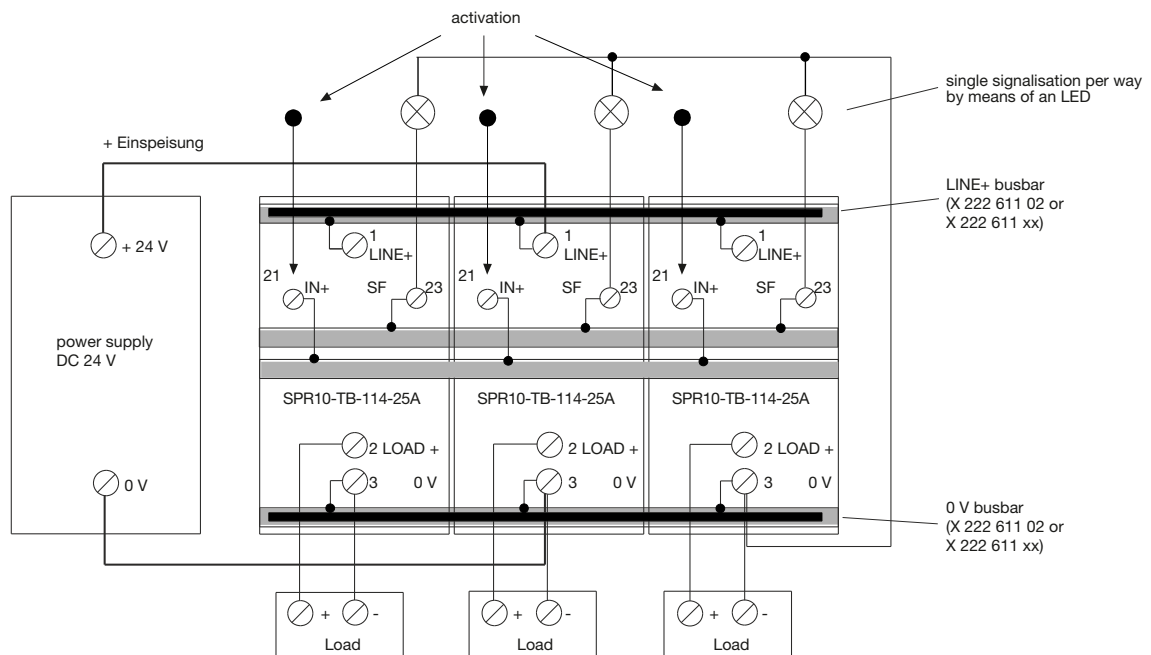
Wiring diagrams, application examples SPR10-TB-114-DC12/24V-20/25A

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

SPR10-TB-114

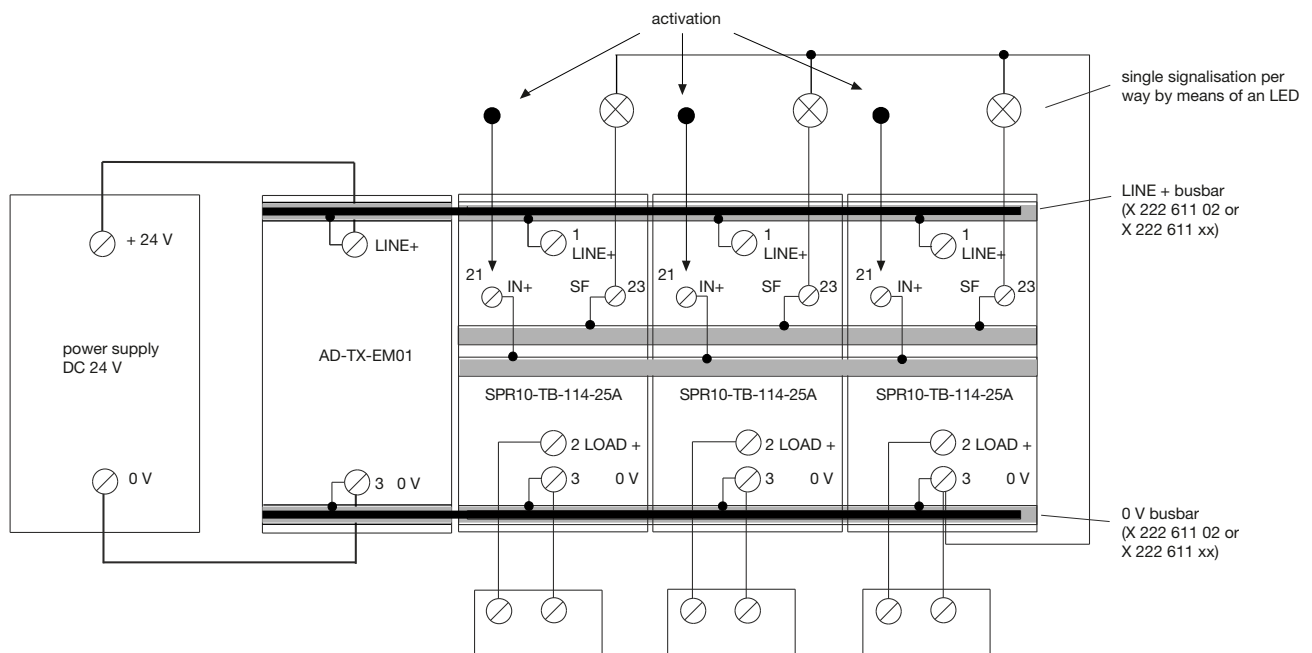
Single signalisation with common line entry



SPR10-TB-114

Single signalisation with common line entry

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



Description

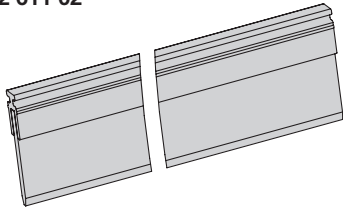
The SPR10-T has an integral power distribution system. The following wirings can be carried out with different plug-in type busbars:

- LINE +(DC 24 V)
- 0 V
- **Important:** The SPR10-T electronic devices 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
 max. 10 plug-in cycles allowed
part no. X 222 611 02

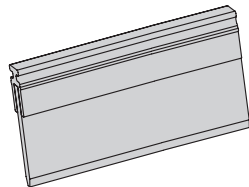


Busbars for LINE+ and 0 V

grey insulated
 max. 10 plug-in cycles allowed

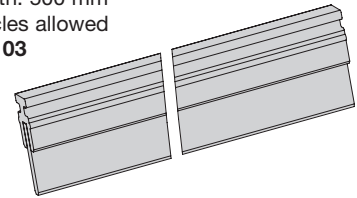
X 222 611 22 (block of 2 SPR10-T), length: 22 mm
X 222 611 34 (block of 3 SPR10-T), length: 34.5 mm
X 222 611 47 (block of 4 SPR10-T), length: 47 mm
X 222 611 59 (block of 5 SPR10-T), length: 59.5 mm
 Packaging unit: 10 pcs

X 222 611 72 (block of 6 SPR10-T), length: 72 mm
X 222 611 97 (block of 8 SPR10-T), length: 97 mm
X 222 611 12 (block of 10 SPR10-T), length: 122 mm
 Packaging unit: 4 pcs



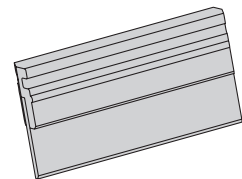
Signal busbars for aux. contacts and reset inputs

suitable for signal busbar SPR10-T
 ampacity with one input I_{max} 1 A
 with aux. contacts connected in series I_{max} 0.5 A
 grey insulated, length: 500 mm
 max. 10 plug-in cycles allowed
part no. X 222 005 03



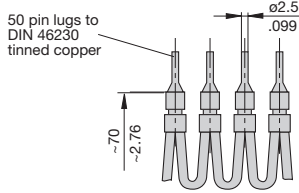
Busbars for auxiliary contacts

suitable for jumper SPR10-T
 grey insulated, length: 21 mm
 max. 10 plug-in cycles allowed
part no. X 222 005 13
 Packaging unit: 10 pcs



Accessories

Connector bus link -K10
 suitable for auxiliary contacts (series connection)
X 210 589 02 (1.5 mm², brown),

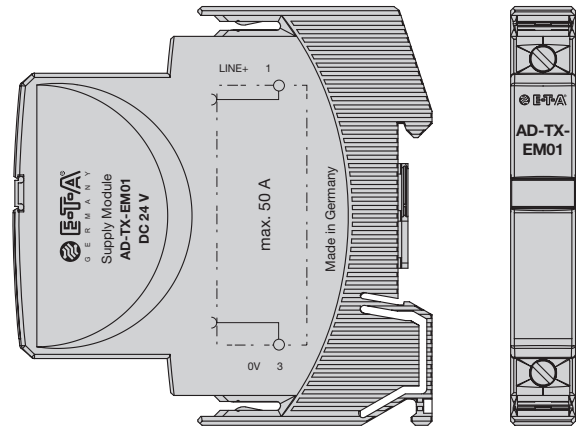


**Passive supply module for LINE+ and 0 V
 (without protection)**

Ampacity
 Max. cable cross section see ESX10-T

I_{max} 50 A

part no. **AD-TX-EM01**



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