

Description

The type ESX50D-Sxx is an electronic circuit protector capable of communication, which forms the intelligent power distribution system **ControlPlex®** type SVS201-CP together with the bus terminal controller CPC10 and the power distribution board SVS201-PWR

By means of its communication interface, the measuring values recorded by the ESX50D-Sxx will be forwarded to the CPC10 via the proprietary device bus ELBus® and then to a superordinate programmable control unit. This allows flexible adjustment of the current rating and its parameters to the requirements of the system and its direct controllability. So the user can import the relevant information regarding his DC 24 V voltage supply and process it accordingly.

The ESX50D-S is available in two different versions. The first version has a rotary switch to allow current rating adjustment directly on the circuit protector in a range from 1 A to 10 A. The second version offers this adjustment feature via a field bus system or a USB service interface.

At a width of only 12.5 mm the ESX50D-S provides selective protection for all DC 24 V load circuits. This is achieved by a combination of active electronic current limitation in the event of a short circuit and by a parameterisable overload disconnection.

A typical application is the protection of DC 24 V switched mode power supplies which are widely used in in factory automation today. In the event of an overload, however, they turn down the output voltage which is intended to power all connected loads. So if there is a failure in a single load of the system, the supply voltage will break down also in all other load circuits. Not only does this frequently cause undefined fault conditions, but it can even lead to machine stoppages or system downtimes. This is exactly where the ESX50D-S comes in by responding to the overload conditions faster than the switched mode power supply. The max. possible overcurrent is limited to typically 1.4 times of the selected current rating (see table 1). This allows switching on capacitive loads up to min. 20,000 µF, disconnection is effected in the event of overload or short circuit or at undervoltage and overheating.

Visual status and failure indication is by a multi-coloured LED on the protector and is transmitted to the superordinate control unit via the communication interfaces. The manual ON/OFF switch on the device as well as the control units which are programmable from memory and which are connected to the communication interfaces allow the start-up of selected load circuits.

As soon as the ESX50D-S detects an overload or short circuit in its load circuit, it blocks the load output transistor after a parameterisable period of time and disconnects the current flow in the faulty circuit. After remedy of the failure, the load output of the ESX50D-S is re-activated by an electronic reset signal or manually by actuating the ON/OFF switch on the device.



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

Operating data

Operating voltage U _B	DC 24 V (18...32 V)
Current ratings I _N	adjustable ratings: 1 A through 10 A in 1 A steps
Standby current I ₀	in ON condition: typically 20 mA with the versions -S100/ -S110
Visual status indication	multicoloured LED: green - load circuit connected flashing (green/yellow): - load current warning limit reached yellow: - overload or short circuit until disconnection red: - after disconnection due to overload, short circuit or temperature - after undervoltage disconnection in ON condition of operating voltage with automatic reset flashing (red/OFF): - upon changed rating adjustment (only ESX50D-S110) OFF: - devices switched off via ON/OFF switch - device switched off via the communication interface - no operating voltage with ON/OFF switch in ON condition

Load circuit

Load output	power MOSFET switching output (plus switching)
Load current warning limit hysteresis	0.8 x I _N * (adjustable from 0.5 to 1.0 x I _N) 5 % (adjustable from 5 % to 20 %)
Overload disconnection (I _{OL})	1.2 x I _N * (adjustable from 105 % to 135 % I _N) see time/current characteristic
Short circuit current (I _{KS})	active current limitation with I _{KS} = typically 2.5 x I _N , 1 A typically 1.4 x I _N , 2 A-10 A (see time/current characteristic)
Trip times	overload disconnection (I _{ÜL}) = 3000ms* (adjustable from 50ms ... 10,000ms) short circuit disconnection (I _{KS}) = 100ms* (adjustable from 50ms ... 1,000ms) (see time/current characteristic)

* factory settings

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

Temperature monitoring	internal temperature monitoring with electronic disconnection
disconnection hysteresis	typically +100 °C typically 10 °C
Operating voltage monitoring with regard to low voltage	OFF at typically U _B < 16.0 V ON at typically U _B > 17.5 V with automatic ON and OFF switching
ON delay t _{Start}	100ms* (adjustable from 100ms to 2,500ms)
Disconnection of load circuit	- manually on the device with the ON/OFF switch (OFF) - by a superordinate control unit via communication interface - after disconnection due to overload or short circuit - temporarily at undervoltage - at excess temperature of the device (only ESX50D-S110) - upon changed rating adjustment - during switch-on delay - at no operating voltage
Leakage current in load circuit in the OFF condition	typically < 1 mA
Capacitive loads	min. 20,000 µF
Free-wheeling diode	external free-wheeling diode recommended for inductive load
Parallel connection of several load outputs	not allowed

* factory settings

Order numbering code

Type No.	ESX50D-S Electronic Circuit Breaker, with current limitation
Mounting	S plug-in, with rotary switch for current rating adjustment from 1 A to 10 A
Version	1 without physical isolation
Current rating adjustment	00 current rating adjustable via communication interface 10 current rating adjustable via rotary switch
Operating voltage	DC 24 V voltage rating DC 24 V
Current rating	1 A - 10 A adjustable
ESX50D-S 1 00 - DC 24 V - 1 A-10 A	ordering example

Notes for installation

- The user has to ensure that the cable cross section of the load circuit in question complies with the current rating of the ESX50D-S 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 ESX50D-S.

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

General data

Fail-safe-element	integral fail-safe-element 15A Max. rupture capacity of the element is 300 A at 24 V DC
Terminals	LINE+ / LOAD+ / GND / Ad / COM
Blade terminals	6.3 mm to EN60934-6.3-0.8
Housing material	moulded
Mounting of enclosure	plug-in type, suitable for SVS201-PWR-xx
Ambient temperature	0...+50 °C (without condensation, cf. EN 60204-1)
Storage temperature	-40...+70 °C
Humidity	96 hrs / 95% RH 40°C to IEC 60068-2-78-Cab climate class 3K3 to EN 60721
Vibration	3 g, test to IEC 60068-2-6 test Fc
Degree of protection	IEC 60529, DIN VDE 0470) operating area IP30 terminal area IP00
EMC requirements (EMC directive, CE logo)	emission: EN 61000-6-3 susceptibility: EN 61000-6-2
Insulation co-ordination (IEC 60934)	0.5 kV / pollution degree 2 reinforced insulation in operating area
Dielectric strength	max. DC 30 V (load circuit)
Insulation resistance (OFF condition)	n/a, only electronic disconnection
Approvals	CE logo
Dimensions (w x h x d)	12.5 x 70 x 60 mm (tolerances to DIN ISO 286 part 1 IT13)
Mass	approx. 40 g

Features and Benefits

- Communication capability with superordinate control units which are programmable from memory
- Import and adjust parameters of the device
- Remote control of load outputs and selective load protection, electronic trip curve
- All types of loads can be connected (DC 24 V motors upon request)
- Active current limitation when switching on capacitive loads up to min. 20,000 µF and in case of overload/short circuit
- Whole-number adjustable current ratings from 1A to 10 A by means of rotary switch and superordinate control unit
- Reliable parameterisable overload disconnection (factory setting: 1.2 x IN) even with long load lines or small cable cross sections
- Manual ON/OFF switch (S1)
- Clear status indication through LED and signalling to the superordinate control system
- Integral fail-safe-element
- Width per channel only 12.5 mm
- Plug-in type mounting on power distribution system SVS201-PWR-xx



Communication interface

Overview of commands:

- Writing/reading of configuration (parameters)

- Current rating (1A - 10A, in whole numbers) (writable only for ESX50D-S100)
- Switch-on behaviour (latest state, OFF, ON)
- Overload disconnection (105 % ... 135 % I_N)
- Trip time at overload (50 ms ... 10,000 ms)
- Trip time at short circuit (50 ms ... 1,000 ms)
- ON delay (50 ms ... 2,500 ms)
- Current limit value (50 % ... 100 %)
- Hysteresis limit value (5 % ... 20 %)

- Reading of static product information

- Product type
- Serial number
- Hardware version
- Software version

- Reading of dynamic product information / measuring values

- Error memory
- Trip counter
- Reason of last trip
- Status / event of device
- Load voltage
- Load current
- Operating voltage
- Temperature

- Switch on/off or reset load output

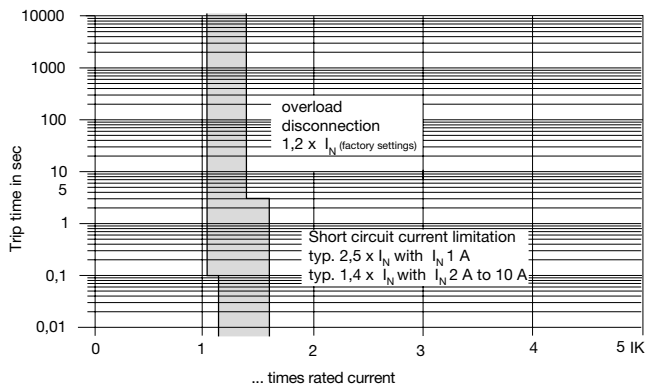
- Reset error memory
- Reset trip counter
- Read / delete histogramm memory
- Set parameters to factory setting

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

Current rating I _N	Typical voltage drop U _{ON} at I _N	Active current limitation I _{Limit} typically	Max. load current at 100 % ON duty	
			T _{AMB} = 40 °C	T _{AMB} = 50 °C
1 A	15 mV	2,5 x I _N	1 A	1 A
2 A	30 mV	1,4 x I _N	2 A	2 A
3 A	45 mV	1,4 x I _N	3 A	3 A
4 A	60 mV	1,4 x I _N	4 A	4 A
5 A	75 mV	1,4 x I _N	5 A	5 A
6 A	90 mV	1,4 x I _N	6 A	5 A
7 A	105 mV	1,4 x I _N	7 A	6 A
8 A	120 mV	1,4 x I _N	8 A	7 A
9 A	135 mV	1,4 x I _N	9 A	8 A
10 A	150 mV	1,4 x I _N	10 A	9 A

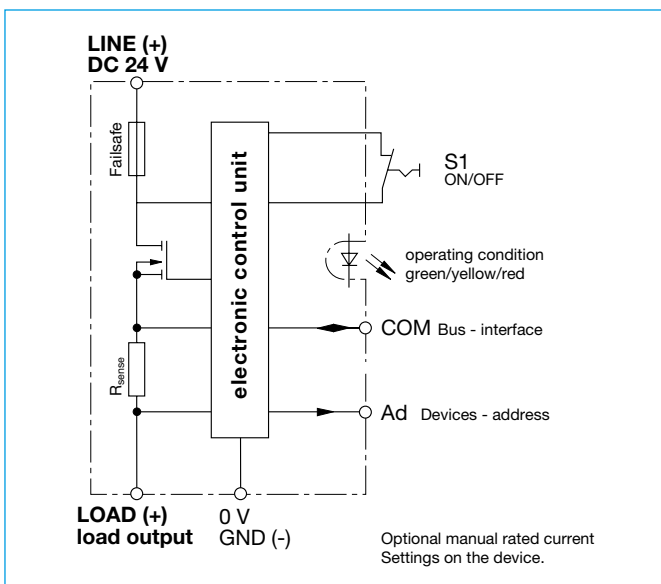
Note: When mounted side-by-side without convection, the devices should carry max. 80% of their rated load continuously (100 % ON duty).

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



- Without the current limitation there would be a much higher overcurrent in the event of an overload or short circuit.

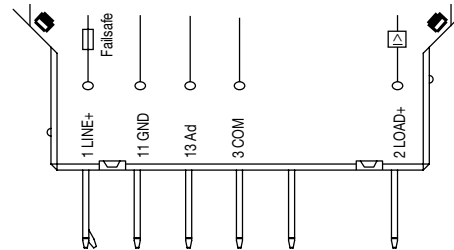
Schematic diagram ESX50D-S100 (example)



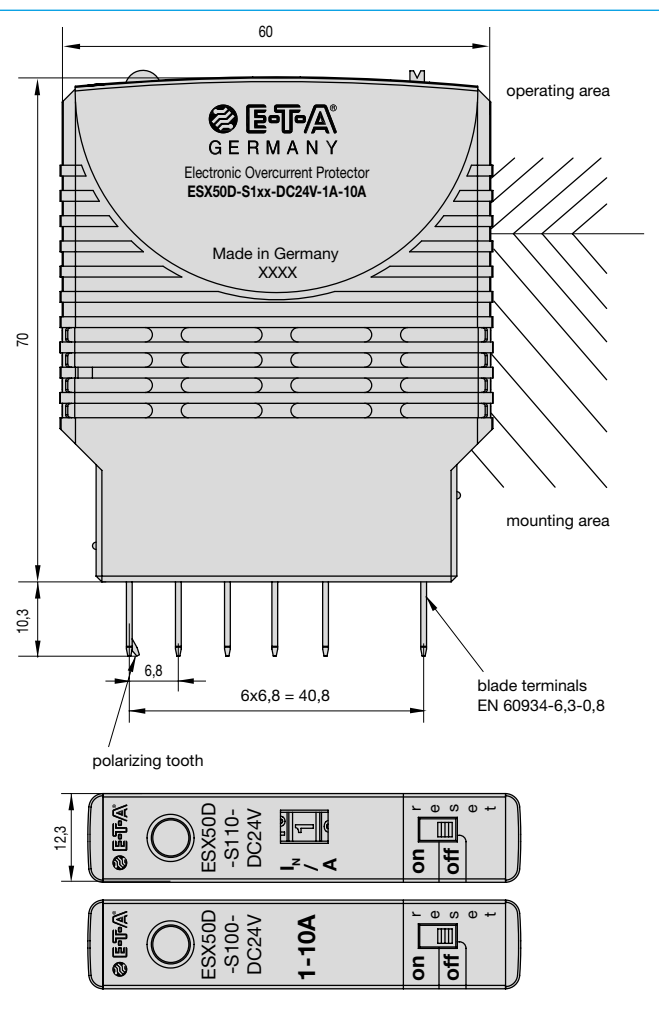
Wiring diagrams

ESX50D-S100 / -S110

with communication and address contact



Dimensions ESX50D-S...



7

All dimensions without tolerances are for reference only. E-T-A reserves the right change specifications at any time 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.