

Operating instructions

Relay module SB300



Micro Detectors

Notes regarding safety

These operating instructions contain important information on installing the relay module.

- Read operating instructions attentively.
- Installation and electrical connection is to be performed only by expert personnel.
- Prior to initial commissioning, it must be ensured that the safety functions are correctly set.

With regards to the use, installation, starting-up and routine technical checks of the SB300 relay module, national and international regulations are valid and in particular:

- The MD Directive
- The Work Equipment Directive
- Safety and accident prevention regulations

Product description

The SB300 relay module is an interface device composed of 2 safety relays (trips) R1 and R2 with DC coil. The module has two NO contacts (one per relay) without potential. Two NC contacts are also available for the monitoring of safety contacts by safety control unit (EDM function). The module can be used as an output module for safety control unit with solid-state output, whenever outputs without potential are required, in order to create safety chains composed of contacts in series or for driving AC loads.

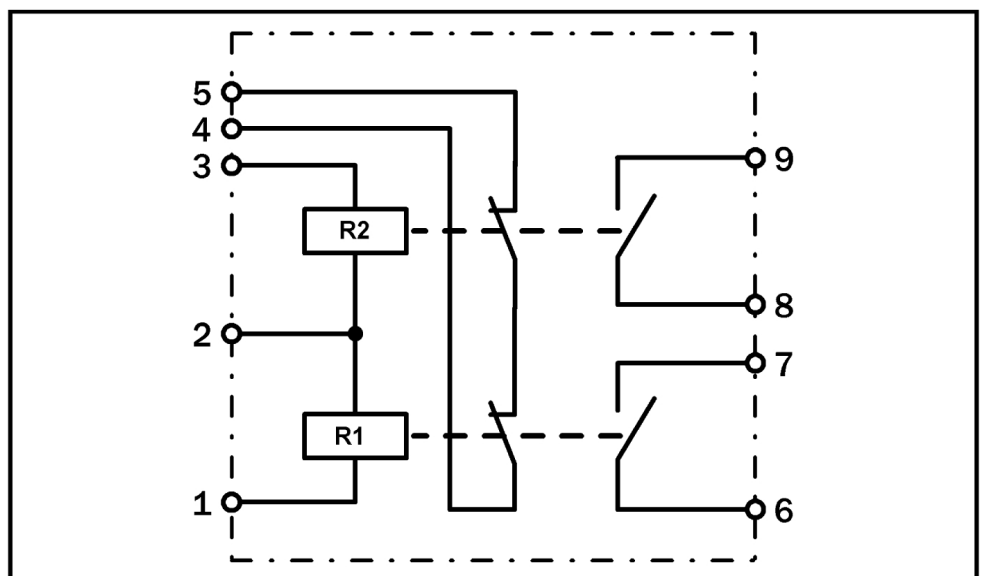


Fig. 1: Electrical diagram of SB300 relay module.

Connections

Pin N°	Meaning	Terminal description (O = Output, I = Input)
1	IN 1	I: K1 relay excitation coil. Connect to OSSD1 terminal
2	COM	K1 and K2 relay excitation coils common Connect to 0V
3	IN 2	I: K2 relay excitation coil. Connect to safety control unit OSSD2 terminal
4	Monit. A	O: checking output, A side of NC contacts series. Connect to 24V
5	Monit. B	O: checking output, B side of NC contacts series. Connect to EDM input of safety control unit
6	OSSD 1B	O: work output, B side, of K1 relay NO contact
7	OSSD 1A	O: work output, A side, of K1 relay NO contact
8	OSSD 2B	O: work output, B side, of K2 relay NO contact
9	OSSD 2A	O: work output, A side, of K2 relay NO contact

Tab. 1: Connections for SB300 module

Technical data

Nominal coils voltage	24V DC (-10 %...+20 %)
Temperature range	-20...+60 °C
Coil resistance	720 Ω \pm 10 %
Output contacts	2 NO
Control contacts	1+1 NC serial connection
Max. switching voltage	250 V AC/DC
Contact rating	690 VA @ 230 V AC 72 W @ 24V DC
Max. inrush current	15 A for 20 ms
Switching current range	20 mA...3 A
Release time	15 ms
Operating time	10 ms
Mechanical life	5x10 ⁷
Electrical life	1x10 ⁵
Material	PA6
Mounting	DIN rail (EN 50022-35)

Tab. 2: Technical data for SB300 relay module

Dimensions

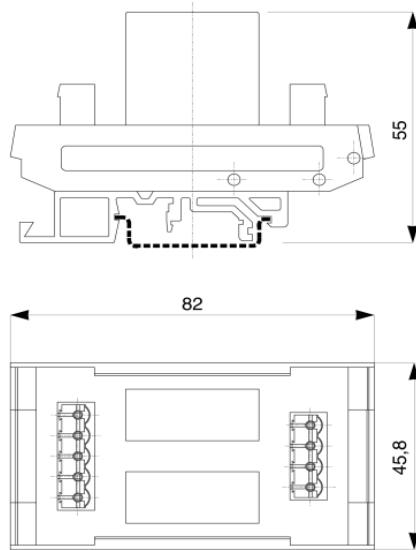


Fig. 2: Dimensions of SB300 relay module.

Installation

Warning

Install the module (rated IP 20) into a housing with a minimum protection degree of IP54 !

The module can be attached to a DIN rail EN 50022-35.

Make sure the working temperature limits are respected inside the housing.

Generally a machinery guarding requires the use of two or more control safety units, which must be able to arrest the normal machine operation if any hazardous condition is detected. In this case every relay modules (final switching devices FSD), each controlled by its own safety control unit, must be connected in series to a safety emergency stop module (machine primary control element MPCE which controls directly the hazardous motion).

In such a way, any relay module is able to interrupt the circuit to the primary control element. Figures in this section show various systems, which fulfil the requirements of Category 2:

Fig.5 Cascade of relay modules with a double controlled line that provide a further redundancy. The two channels are connected to an emergency stop module, which must carry out a parity check and monitor its own contacts. Pay attention to the fact the contacts of the emergency stop module cannot be checked from the EDM function because the state of the stop module does not match necessarily the state of any safety control unit.

Fig.:6 This figure shows a slightly more simple circuit which will satisfy the requirements of category 2 using only one-channel connection. Note that in this case EDM is compulsory because otherwise single fault might be not detected and could lead to dangerous conditions.

Fig.:7 As shown on Fig. 5 and Fig. 6 it is recommended to employ the emergency stop module which carry out a self control of its own contacts. So, it is not advisable to employ contactors unless particular shrewdness are adopted as shown in Fig. 7. In this case, any safety control unit has to be configured in Restart Interlock mode. The start/restart buttons are enabled only if the NC contacts of two contactors are correctly closed. If any single fault occurs on the contacts, at the next restart it will not be possible to remove the stop condition.

Snubber circuit

Generally a relay module is connected to inductive load which can generate detrimental and noxious overvoltage. Connecting arc-suppression devices in parallel with the load is recommended, to protect relay module against overvoltage and, therefore, to avoid damages. The following table lists recommended values for the RC circuit:

Switched voltage	Values of group R/C	
230 V AC	R = 220 Ω	C = 0.15 μ F
115 V AC	R = 220 Ω	C = 0.15 μ F
24...48 V AC	R = 100 Ω	C = 1.5 μ F
24 V DC	R = 47 Ω	C = 3.3 μ F

Tab. 3: Recommended values for snubber group R/C

Sample circuits

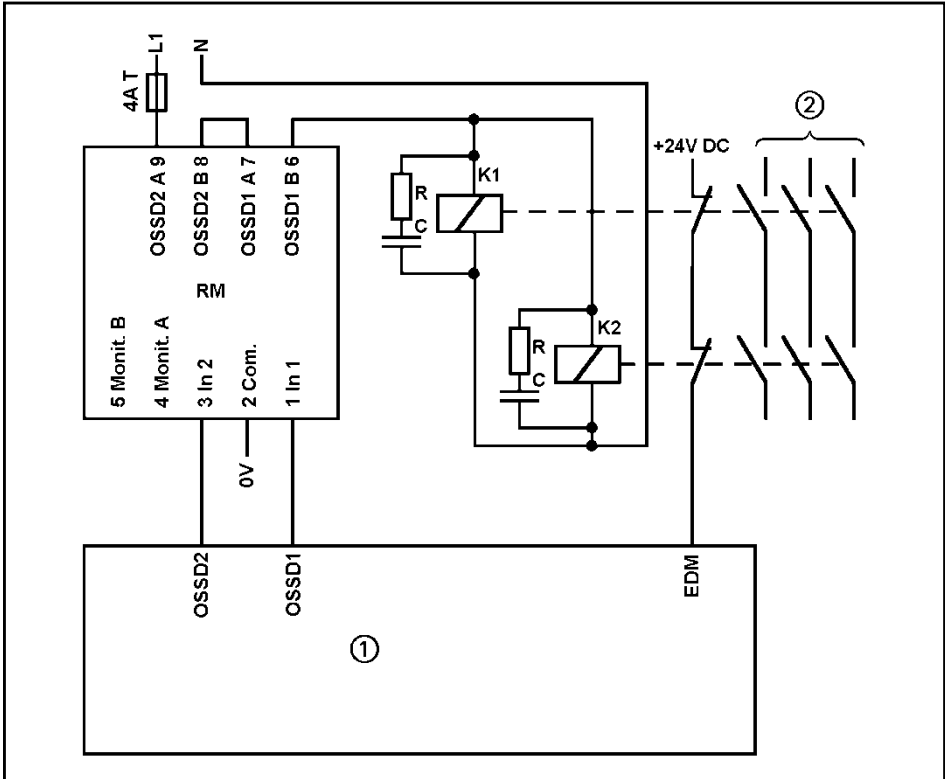


Fig. 3: SB300 relay module with single channel connection

RM = SB300 relay module

R, C = snubber circuit ¹

(1) = safety control unit or safety light curtain with EDM function

(2) = main power

¹⁾ The contacts of relay module must be protected against overvoltages by connecting arc-suppression devices in parallel with the load. Recommended value: see Tab. 3.

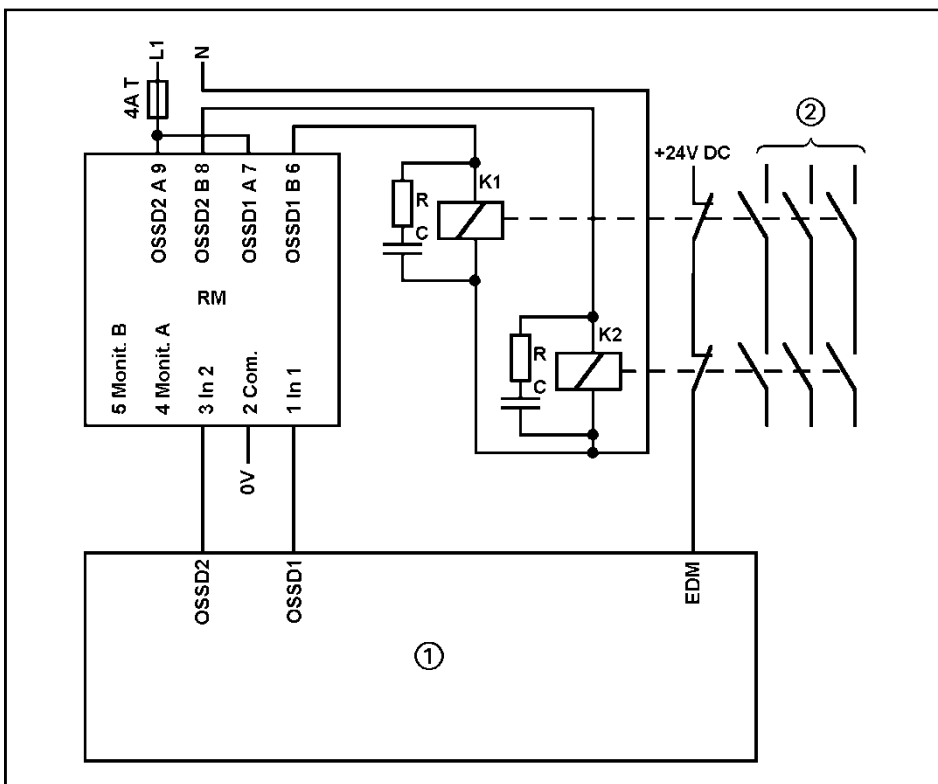


Fig. 4: Relay module with double channel connection

RM = SB300 relay module R, C = snubber circuit ¹⁾

(1) = safety control unit or safety light curtain with EDM function

(2) = main power

¹⁾ The contacts of relay module must be protected against overvoltages by connecting arc-suppression devices in parallel with the load. Recommended value: see Tab. 3.

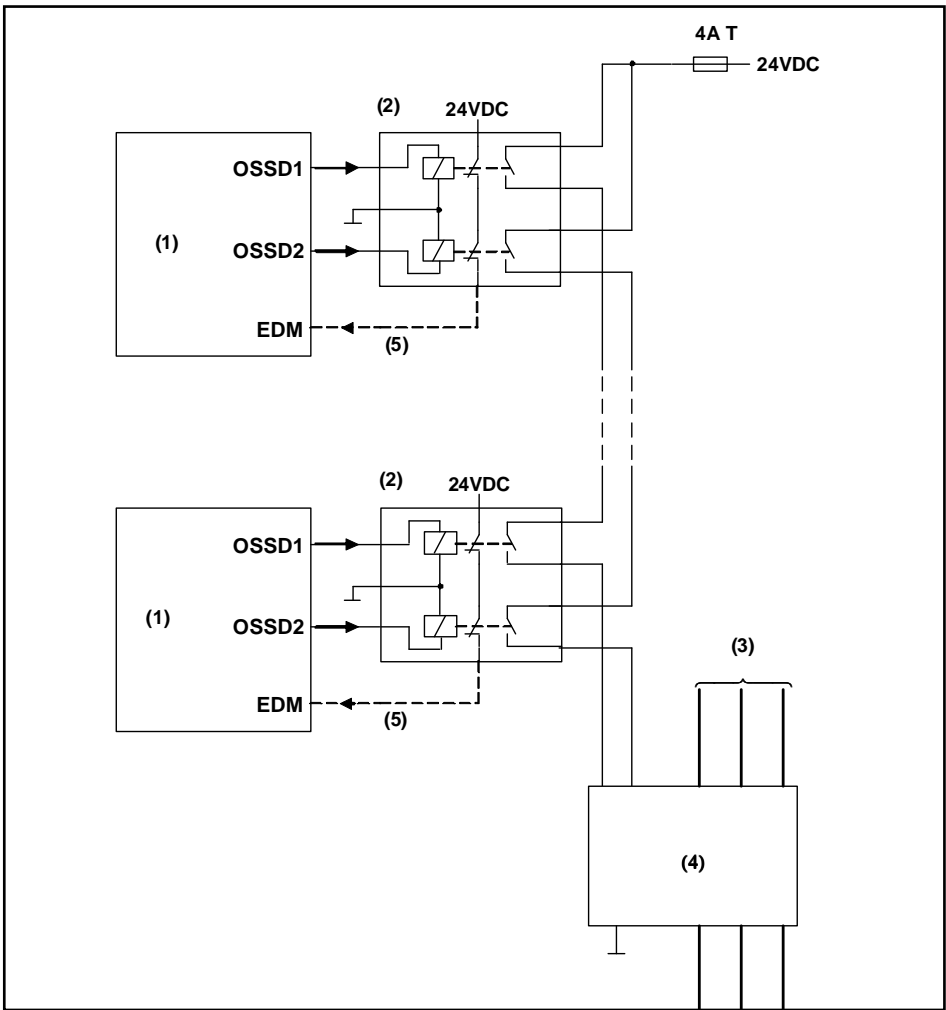


Fig. 5: Cascade of relay modules with double controlled line and connection of the EDM terminal

1 = safety control unit
2 = SB300 relay module

3 = main power
4 = emergency stop module

5 = EDM return signal ¹⁾

¹⁾ EDM function provides a further monitoring of the system in order to monitor the relay contacts and discover where the failure is located. In this scheme, on the other hand, EDM function is not indispensable for the safety conditions, because the emergency stop module carry out parity check of the two channels, and will detect every single fault on the wiring and contactors.

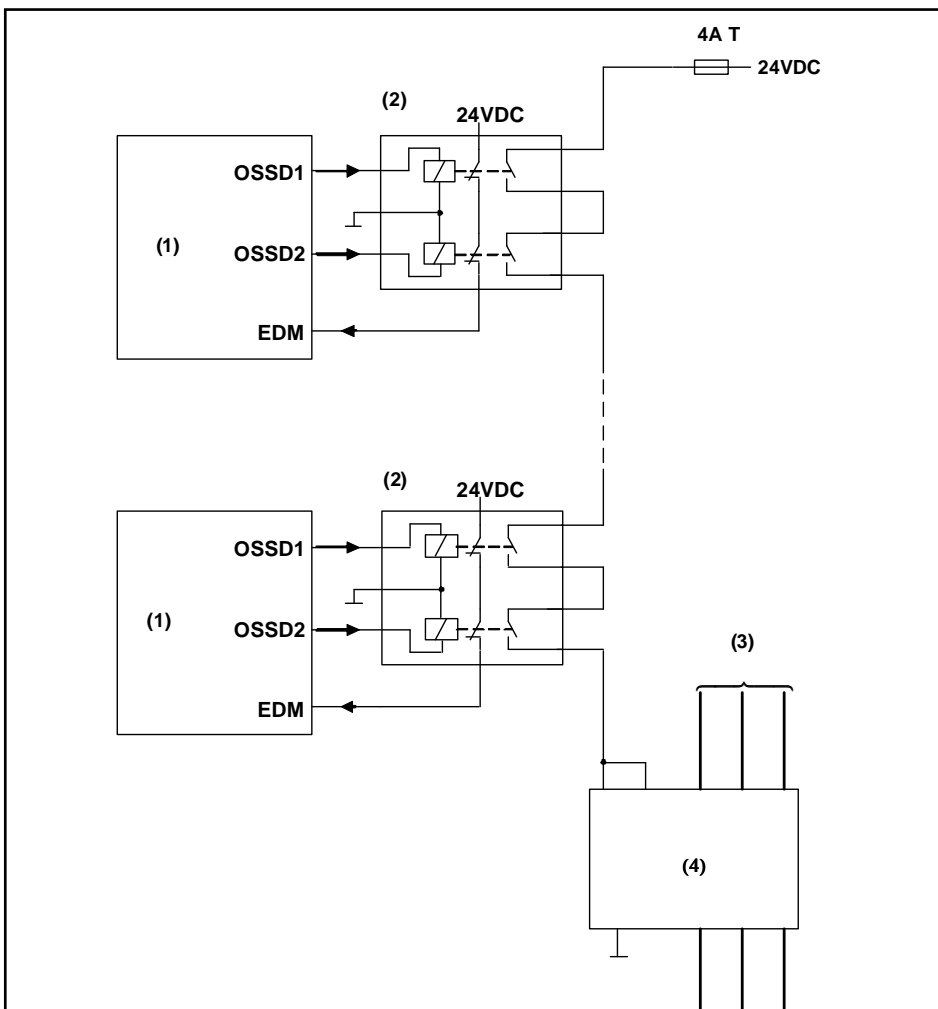


Fig. 6: Cascade of relay modules with single controlled line and connection of the EDM terminal.

1 = safety control unit

3 = main power

2 = SB300 relay module

4 = safety emergency stop module

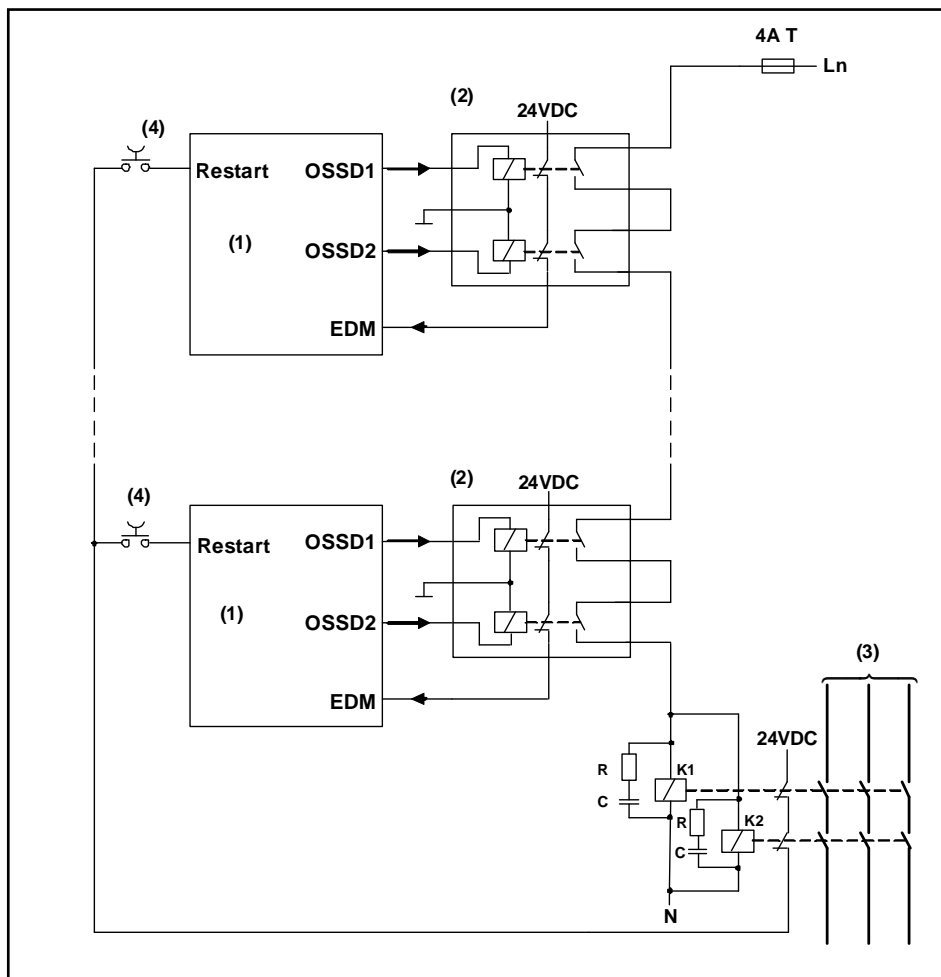


Fig. 7: Cascade of relay modules with single controlled line and connected to power contactors

R, C = snubber circuit ¹⁾

1= safety control unit

2 = SB300 relay module

4 = start/restart button

3= main power

K1,K2 = power contactors

1) The contacts of relay module must be protected against overvoltages by connecting arc-suppression devices in parallel with the load. Recommended value: see *Tab. 3*.



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