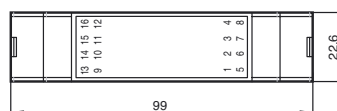
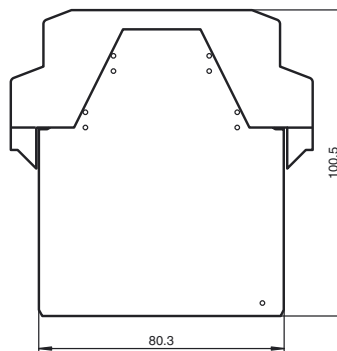


Dimensions



Model Number

SB4 Module 4XP/165

Safety control unit module

Module for Evaluation unit SafeBox - series SB4

Features

- Sensor module
- 4 sensor channels
- Micro-Controller controls
- Operating mode can be selected by means of DIP switches
- Individual module for SLA5(S), SLA20, SLA25, SLA28 and SLA40 security through-beam sensors; for SLP safety light grids, for SLC safety light curtains; for switching pads and emergency stop buttons of categories 2 or 4
- Screw terminals or spring terminals

Accessories

SB4 Cape cover sheet

SB4 Housing 2

Empty housing for Evaluation unit SB4

SB4 Housing 3

Empty housing for Evaluation unit SB4

SB4 Housing 4

Empty housing for Evaluation unit SB4

SB4 Housing 5

Empty housing for Evaluation unit SB4

SB4 Housing 6

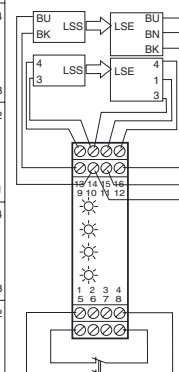
Empty housing for Evaluation unit SB4

SB4 Housing 8

Empty housing for Evaluation unit SB4

Electrical connection

| Terminal | Function            | Channel classification | Connection Beam sensor / Light grid safety feature | Connection 2-channel p ON | Connection Switching pad |
|----------|---------------------|------------------------|--|---------------------------|--------------------------|
| 1        | Receiver 2 Input    | Channel 2              | Receiver output 2                                  | OSSD Output 1.2           | Switching pad 1.4        |
| 2        | Sensor 2 24 V DC +U |                        | 24 V Receiver2                                     | 24 V Power supply 1       |                          |
| 3        | Sensor 2 Mass GND   | Channel 1              | 0 V Receiver 2, Emitter 2                          | 0 V Power supply 1        | Switching pad 1.3        |
| 4        | Emitter 2 Output    |                        | Emitter input 2                                    |                           |                          |
| 5        | Receiver 1 Input    | Channel 1              | Receiver output 1                                  | OSSD Output 1.1           | Switching pad 1.2        |
| 6        | Sensor 1 24 V DC +U |                        | 24 V Receiver 1                                    |                           |                          |
| 7        | Sensor 1 Mass GND   | Channel 3              | 0 V Receiver 1, Emitter 1                          |                           | Switching pad 1.1        |
| 8        | Emitter 1 Output    |                        | Emitter input 1                                    |                           |                          |
| 9        | Emitter 3 Output    | Channel 3              | Emitter input 3                                    |                           | Switching pad 2.4        |
| 10       | Sensor 3 Mass GND   |                        | 0 V Receiver 3, Emitter 3                          | 0 V Power supply 2        |                          |
| 11       | Sensor 3 24 V DC +U | Channel 4              | 24 V Receiver 3                                    | 24 V Power supply 2       |                          |
| 12       | Receiver 3 Input    |                        | Receiver output 3                                  | OSSD Output 2.2           | Switching pad 2.3        |
| 13       | Emitter 4 Output    | Channel 4              | Emitter input 2                                    |                           | Switching pad 2.2        |
| 14       | Sensor 4 Mass GND   |                        | 0 V Receiver 4, Emitter 4                          |                           |                          |
| 15       | Sensor 4 24 V DC +U | Channel 4              | 24 V Receiver 4                                    |                           |                          |
| 16       | Receiver 4 Input    |                        | Receiver output 4                                  | OSSD Output 2.1           | Switching pad 2.1        |



Technical data

Functional safety related parameters

|                                |        |
|--------------------------------|--------|
| Safety Integrity Level (SIL)   | SIL 3  |
| Performance level (PL)         | PL e   |
| Category                       | Cat. 4 |
| Mission Time (T <sub>M</sub> ) | 20 a   |
| Type                           | 4      |

Indicators/operating means

|                      |   |
|----------------------|---|
| Function display     | LED yellow (4x): indicator lamp channel 1 ... 4     |
| Pre-fault indication | LED yellow flashing: Indicator lamp channel 1 ... 4 |
| Controls             | DIP-switch  |

Electrical specifications

|                   |                |                                  |
|-------------------|----------------|----------------------------------|
| Operating voltage | U <sub>B</sub> | 24 V DC ± 20 % , via SB4 Housing |
|-------------------|----------------|----------------------------------|

Input

|                    |                     |
|--------------------|---------------------|
| Actuating voltage  | approx. 10 V        |
| Activation current | approx. 4 ... 20 mA |

Ambient conditions

|                     |                               |
|---------------------|-------------------------------|
| Ambient temperature | 0 ... 50 °C (32 ... 122 °F)   |
| Storage temperature | -20 ... 70 °C (-4 ... 158 °F) |

Mechanical specifications

|                   |   |
|-------------------|---|
| Protection degree | IP20  |
| Connection        | Cage tension spring terminals , Cable cross-section 0.2 ... 1.5 mm <sup>2</sup> |
| Material          |   |
| Housing           | Polyamide (PA)  |
| Mass              | approx. 150 g   |

Compliance with standards and directives

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|                                   |   |
|-----------------------------------|---|
| Standard conformity               | (extract)   |
| Standards                         | EN IEC 61496-1<br>EN IEC 61508<br>EN ISO 13849-1  |
| <b>Approvals and certificates</b> |   |
| SIL classification                | up to SIL3 acc. to IEC 61508<br>tested and certified by TÜV SÜD according to:<br>IEC 61508:1998 part 1, 3.4<br>IEC 61508: 2000<br>ISO 13849-1:2006<br>EN 50178:1997<br>IEC 61496-1:2004<br>IEC 61496-2:2006 |
| UL approval                       | cULus   |
| TÜV approval                      | TÜV   |

This module can only be operated within an evaluation device of the SafeBox SB4 type.

The operating instructions of the SafeBox must be observed.

## Function

The 4-channel sensor module -4X\* makes possible the connection of the so-called "3-wire" light barriers of the SLA family (for example SLA5) and light grids of type SLP. But also p-switching safety devices with dedicated cross circuit monitoring can be connected, for example safety light curtains from the SLC family. In addition switch-off mats of the 4-wire principle or integrated safety sensors in the 1 or 2 channel version can be connected.

It also contains the microcontroller control of the SafeBox. This module exists only once in a SafeBox SB4 and has to be mounted on position 2.

The module is equipped with a plug-in jumper. If the system features additional components, this plug-in jumper has to be mounted on the last mounting station.

In the assembly is also found a six-way DIP switch with which the sensors to be connected are selected. 2 switches must be activated as a pair for selection. The connection of the safety sensors is done on channels 1 and 2 or 3 and 4.

"3-wire" light barriers and light grids of the SLA and SLP families can be connected to channels 1 to 4.

The cable or the manner it is laid to the light barriers and light grids must be chosen that no short circuit between the receiver and transmitter wires is possible.

Light curtains with semiconductor switch outputs and integrated safety sensors in 2 channel design are monitored for simultaneousness. During simultaneousness monitoring the 2 channel safety devices are monitored for simultaneous opening or changing of the signals. The monitoring time is 2 s.

The connection is done on channels 3 and 4 and/or 1 and 2.

It is necessary that these sensors must have a dedicated cross circuit monitoring, since the module does not perform cross circuit monitoring with these sensors.

Integrated safety sensors, which are connected to the Safebox must work according to the normally closed principle. An open contact means "safe status".

Switch-off mats of the 4-wire principle can be connected to channels 1 and 2 and/or 3 and 4. If there is a faulty contact of the switch-off mat, the system reports Error 9 or Error 8, like the detection of an integrated safety sensor in the two-channel design.

## Operating modes

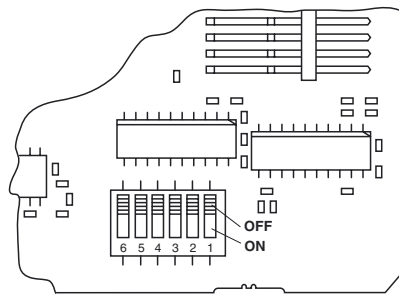
The assembly contains 6 DIP switches for selecting the sensor types and the position. Six possibilities are offered for combining sensors. The desired combination is to be set binary. For function selection, always 2 switches must be actuated, that means DIP switches 1 - 3 have the same switch position as DIP switches 4 - 6.

| DIP switch |         |         | Operating mode  |
|------------|---------|---------|---|
| 3 and 6    | 2 and 5 | 1 and 4 |   |
| 0          | 0       | 0       | SLA /SLP/ bridge channel 1 + 2 and channel 3 + 4              |
| 0          | 0       | 1       | SLA / SLP / jumper to channel 1 + 2 and SLC channel 3 + 4     |
| 0          | 1       | 0       | SLC channel 1 + 2 and channel 3 + 4                           |
| 0          | 1       | 1       | SLA / SLP / jumper channel 1 + 2 and safety mat channel 3 + 4 |

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|   |   |   |  |
|---|---|---|--|
| 1 | 0 | 0 | Safety mat channel 1 + 2 and channel 3 + 4     |
| 1 | 0 | 1 | SLC channel 1 + 2 and safety mat channel 3 + 4 |

**Position of the DIP switches**



**Displays**

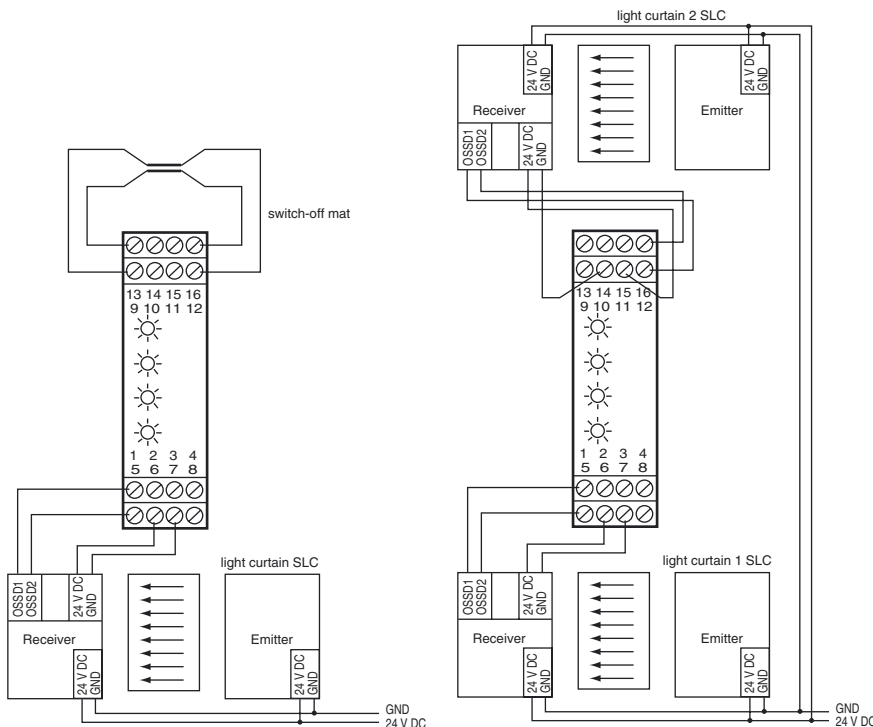
There is a yellow LED for each channel on the front plate of the module which displays the status of the input channel.

| Display              | LED    | Meaning  |
|----------------------|--------|--|
| R1 - R4<br>(R1 - R6) | yellow | Status sensor input 1 - 4<br>OFF: interrupted<br>ON: released<br>Flashing: light beam released, function reserve fallen short of<br>(frequency approx. 2.5 Hz)<br>Flashing rapidly: error (frequency approx. 5 Hz) |

**Connections**

Connections are designed as removable screw terminals. The terminal assignment can be found in the adjoining table.

Up to 4 light barriers or 2 two-channel p-switching safety devices or 2 switch-off mats can be connected to the 4-channel sensor module. Unused channels must be deactivated by means of a bridge between transmitter output and receiver input.



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