



## Safety control unit SB4-OR-4XP-4M

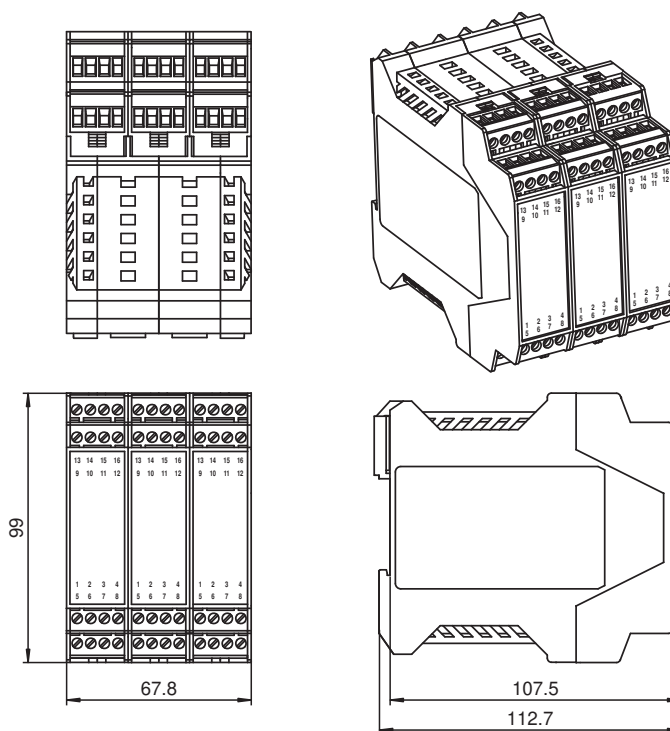


- Evaluation unit for security through-beam sensors SLA5(S) and SLA40; for safety light grids SLP, for safety light curtains SLC; for switching pads and emergency stop buttons of categories 2 and 4
- 4 sensor channels
- Self-monitoring (type 4 according to IEC/EN 61496-1)
- Operating mode can be selected by means of DIP switches
- Start/Restart disable
- Relay monitor
- Sequential and parallel muting in various operating modes
- Double muting
- Emergency muting for the correction of the material jam
- Stability alarm indication
- Clearly visible LED functional display
- 7-segment diagnostic display
- Safety outputs OSSD, external status displays OSSD

Safety control unit



### Dimensions



### Technical Data

#### General specifications

Operating mode Start/restart disable, relay monitor, muting operating modes

#### Functional safety related parameters

|                              |        |
|------------------------------|--------|
| Safety Integrity Level (SIL) | SIL 3  |
| Performance level (PL)       | PL e   |
| Category                     | Cat. 4 |

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Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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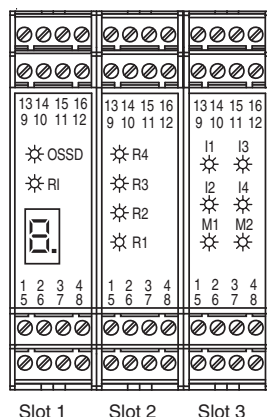
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## Technical Data

|                                   |       |                                                                                                                                |
|-----------------------------------|-------|--------------------------------------------------------------------------------------------------------------------------------|
| Mission Time ( $T_M$ )            |       | 20 a                                                                                                                           |
| PFH <sub>d</sub>                  |       | 3.5 E-9                                                                                                                        |
| B <sub>10d</sub>                  |       | see instruction manuals                                                                                                        |
| Type                              |       | 4                                                                                                                              |
| <b>Indicators/operating means</b> |       |                                                                                                                                |
| Diagnostics indicator             |       | 7-segment display                                                                                                              |
| Function indicator                |       | LED red: OSSD OFF<br>LED green: OSSD ON<br>Yellow LED: start readiness channel 1 - 4<br>LED yellow: switching state (receiver) |
| Stability alarm indicator         |       | LED yellow flashing: Indicator lamp channel 1 ... 4                                                                            |
| <b>Electrical specifications</b>  |       |                                                                                                                                |
| Operating voltage                 | $U_B$ | 24 V DC, $\pm 20\%$                                                                                                            |
| No-load supply current            | $I_0$ | 500 mA                                                                                                                         |
| Protection class                  |       | no identification ; see instruction manuals                                                                                    |
| <b>Input</b>                      |       |                                                                                                                                |
| Activation current                |       | approx. 7 mA                                                                                                                   |
| Activation time                   |       | 0.4 ... 1.2 s                                                                                                                  |
| Test input                        |       | Reset-input for system test                                                                                                    |
| <b>Output</b>                     |       |                                                                                                                                |
| Safety output                     |       | 2 relay outputs, force-guided NO-contact                                                                                       |
| Signal output                     |       | 1 PNP each, max. 300 mA for start readiness, OSSD on, OSSD off, muting lamp                                                    |
| Switching voltage                 |       | 10 V ... 250 V AC/DC                                                                                                           |
| Switching current                 |       | min. 10 mA , max. 6 A AC/DC                                                                                                    |
| Switching power                   |       | DC: max. 24 VA<br>AC: max. 230 VA                                                                                              |
| Response time                     |       | 38 ms                                                                                                                          |
| <b>Conformity</b>                 |       |                                                                                                                                |
| Functional safety                 |       | ISO 13849-1 ; EN 61508 part1-4                                                                                                 |
| Product standard                  |       | EN 61496-1                                                                                                                     |
| <b>Approvals and certificates</b> |       |                                                                                                                                |
| CE conformity                     |       | CE                                                                                                                             |
| UKCA conformity                   |       | UKCA                                                                                                                           |
| UL approval                       |       | cULus                                                                                                                          |
| TÜV approval                      |       | TÜV                                                                                                                            |
| <b>Ambient conditions</b>         |       |                                                                                                                                |
| Ambient temperature               |       | 0 ... 50 °C (32 ... 122 °F)                                                                                                    |
| Storage temperature               |       | -20 ... 70 °C (-4 ... 158 °F)                                                                                                  |
| Relative humidity                 |       | max. 95 %, not condensing                                                                                                      |
| Shock resistance                  |       | see instruction manuals                                                                                                        |
| Vibration resistance              |       | see instruction manuals                                                                                                        |
| <b>Mechanical specifications</b>  |       |                                                                                                                                |
| Degree of protection              |       | IP20                                                                                                                           |
| Connection                        |       | screw terminals , lead cross section 0.2 ... 2 mm <sup>2</sup>                                                                 |
| Material                          |       |                                                                                                                                |
| Housing                           |       | Polyamide (PA)                                                                                                                 |
| Mass                              |       | 430 g                                                                                                                          |

## Connection



Terminal Slot 1

| Terminal | Function                                                   |
|----------|------------------------------------------------------------|
| 1        | Reset input; normally closed contact                       |
| 2        | Restart input (RI); normally closed contact                |
| 3        | 24 V DC connection for reset, restart and RM               |
| 4        | Relay monitor (RM)                                         |
| 5 - 6    | OSSD1; potential free relay contact; normally open contact |
| 7 - 8    | OSSD2; potential free relay contact; normally open contact |
| 9        | Signal output OSSD OFF                                     |
| 10       | Signal output OSSD ON                                      |
| 11       | Signal output restart                                      |
| 12       | Leave free (n.c.)                                          |
| 13       | +24 V DC supply voltage                                    |
| 14       | 0 V DC supply voltage                                      |
| 15       | Earth                                                      |
| 16       | Leave free (n.c.)                                          |

Terminal Slot 3

| Terminal | Function                                 |
|----------|------------------------------------------|
| 1        | 24 V sensor supply                       |
| 2        | Sensor 2 IN                              |
| 3        | Sensor 4 IN                              |
| 4        | 0 V sensor supply                        |
| 5        | 24 V sensor supply                       |
| 6        | Sensor 1 IN                              |
| 7        | Sensor 3 IN                              |
| 8        | 0 V sensor supply                        |
| 9        | Input override 1                         |
| 10       | 24 V override 1                          |
| 11       | 24 V override 2                          |
| 12       | Input override 2                         |
| 13       | +24 V DC supply voltage for muting lamps |
| 14       | 0 V DC supply voltage for muting lamps   |
| 15       | Output muting lamp 1                     |
| 16       | Output muting lamp 2                     |

Terminal Slot 2

| 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<br>24 V Power supply 1<br>0 V Power supply 1 | Switching pad 1.4        |
| 2        | Sensor 2 24 V DC +U |                        | 24 V Receiver2                                     |                                                              |                          |
| 3        | Sensor 2 Mass GND   |                        | 0 V Receiver 2, Emitter 2                          |                                                              |                          |
| 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   |                        | 0 V Receiver 1, Emitter 1                          |                                                              |                          |
| 8        | Emitter 1 Output    |                        | Emitter input 1                                    |                                                              |                          |
| 9        | Emitter 3 Output    | Channel 3              | Emitter input 3                                    | 0 V Power supply 2<br>24 V Power supply 2<br>OSSD Output 2.2 | Switching pad 2.4        |
| 10       | Sensor 3 Mass GND   |                        | 0 V Receiver 3, Emitter 3                          |                                                              |                          |
| 11       | Sensor 3 24 V DC +U |                        | 24 V Receiver 3                                    |                                                              |                          |
| 12       | Receiver 3 Input    |                        | Receiver output 3                                  |                                                              |                          |
| 13       | Emitter 4 Output    | Channel 4              | Emitter input 2                                    | OSSD Output 2.1                                              | Switching pad 2.2        |
| 14       | Sensor 4 Mass GND   |                        | 0 V Receiver 4, Emitter 4                          |                                                              |                          |
| 15       | Sensor 4 24 V DC +U |                        | 24 V Receiver 4                                    |                                                              |                          |
| 16       | Receiver 4 Input    |                        | Receiver output 4                                  |                                                              |                          |

## Matching System Components

|  |            |                                  |
|--|------------|----------------------------------|
|  | SLP8-2     | Safety light grid                |
|  | SLP8-2-A-L | Safety light grid, active column |
|  | SLP8-2-L   | Safety light grid                |
|  | SLP8-2-M   | Deviation mirror                 |
|  | SLP10-2    | Safety light grid                |
|  | SLP10-2-L  | Safety light grid                |
|  | SLP10-3    | Safety light grid                |
|  | SLP10-3-L  | Safety light grid                |

## Matching System Components

|                                                                                     |                      |                      |
|-------------------------------------------------------------------------------------|----------------------|----------------------|
|    | <b>SLP10-4</b>       | Safety light grid    |
|    | <b>SLP10-4-L</b>     | Safety light grid    |
|    | <b>SLCT14</b>        | Safety light curtain |
|    | <b>SLCT14-*-3702</b> | Safety light curtain |
|    | <b>SLCT30</b>        | Safety light curtain |
|    | <b>SLCT30-/35</b>    | Safety light curtain |
|    | <b>SLCT30-*-3702</b> | Safety light curtain |
|    | <b>SLCT60</b>        | Safety light curtain |
|    | <b>SLCT60-/35</b>    | Safety light curtain |
|  | <b>SLCT90</b>        | Safety light curtain |
|  | <b>SLCT90-/35</b>    | Safety light curtain |
|  | <b>SLCS14</b>        | Safety light curtain |
|  | <b>SLCS14-*-3702</b> | Safety light curtain |
|  | <b>SLCS14-*-3702</b> | Safety light curtain |
|  | <b>SLCS30</b>        | Safety light curtain |
|  | <b>SLCS30-/35</b>    | Safety light curtain |
|  | <b>SLCS30-*-3702</b> | Safety light curtain |
|  | <b>SLCS30-*-3702</b> | Safety light curtain |
|  | <b>SLCS60</b>        | Safety light curtain |
|  | <b>SLCS60-/35</b>    | Safety light curtain |

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## Matching System Components

|                                                                                   |                       |                                                            |
|-----------------------------------------------------------------------------------|-----------------------|------------------------------------------------------------|
|  | <b>SLCS90</b>         | Safety light curtain                                       |
|  | <b>SLCS90/35</b>      | Safety light curtain                                       |
|  | <b>SLCT-M-01</b>      | Inclined mirror for stable 90° deflection with cover plate |
|  | <b>SLCT-M-01-1200</b> | Inclined mirror for stable 90° deflection with cover plate |
|  | <b>SLCT-M-01-1500</b> | Inclined mirror for stable 90° deflection with cover plate |
|  | <b>SLCT-M-01-2100</b> | Inclined mirror for stable 90° deflection with cover plate |
|  | <b>SLC-XXX-M</b>      | Safety light grid mirror                                   |

## Function

The evaluation system SB4 is an ESPE of type 4 (EN 61496-1 or IEC 61496-1) or category 4 (EN 954-1). This system is also designed and tested according to IEC 61508. It meets the requirements for the SIL3.

The operating instructions supplied with the device must be observed for planning, installation and operation.

A maximum of 4 safety light barriers can be connected to the evaluation device.

With the sensor card on position 2, it is possible to connect "3-wire" light barriers of the SLA family (for example SLA5) and light grids of the SLP type. 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.

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. The monitoring time is 2 s.

The connection is done on channels 3 and 4 and/or 1 and 2. Note that these sensors must feature a dedicated cross circuit monitoring, because the module does not

carry out the cross circuit monitoring for 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.

The module on position 3 implements the muting function. Refer to the operating instructions for detailed notes on the functions.

The user must make sure to only connect sensors that can be muted to the sensor card that is assigned to the muting module.

These are, for example, light barriers or light grids.

## Operating modes

By default, the restart interlock is activated.

Each assembly contains DIP switches for selecting the functions. For selecting functions, 2 selector switches must always be actuated.

Switches on the first assembly:

| Switch  | Position | Operating mode                          |
|---------|----------|-----------------------------------------|
| 1 and 3 | OFF      | Without restart interlock (restart, RI) |
|         | ON       | With restart interlock (restart, RI)    |
| 2 and 4 | OFF      | Without relay monitor (RM)              |
|         | ON       | With relay monitor (RM)                 |

Switches on the second assembly:

The assembly contains 6 DIP switches for selecting the sensor type 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/bridge on channel 1 + 2 and SLC channel 3 + 4     |
| 0          | 1       | 0       | SLC channel 1 + 2 and channel 3 + 4                        |
| 0          | 1       | 1       | SLA /SLP/bridge channel 1 + 2 and safety mat channel 3 + 4 |
| 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             |

Switches on the third assembly:

| Switch             | Position | Operating mode                  |
|--------------------|----------|---------------------------------|
| 1<br>Group 1 and 2 | OFF      | Muting lamp monitoring inactive |
|                    | ON       | Muting lamp monitoring active   |
| 2<br>Group 1 and 2 | OFF      | Single muting                   |
|                    | ON       | Double muting                   |
| 3<br>Group 1 and 2 | OFF      | Time window-limited muting      |
|                    | ON       | Protection beam-limited muting  |
| 4<br>Group 1 and 2 | OFF      | Sequential muting               |
|                    | ON       | Parallel muting                 |

## Displays

The OSSD-R/supply module on position 1 has a red/green LED for indicating the OSSD on/off statuses, a yellow LED for the start-ready status and a 7 segment display for system diagnosis.

The 7 segment display indicates the status and the error codes of the system.

| Display | 7 segment display                      |
|---------|----------------------------------------|
| 1       | DIP switch positions differ            |
| 2       | Incorrect configuration                |
| 3       | Time-out at one or more muting sensors |
| 4       | Transmitter error                      |
| 6       | Muting lamp error                      |
| 7       | Simultaneousness monitoring error      |
| 8       | Receiver error                         |
| 9       | Error at sensor channel                |
| C       | Error at sensor channel                |
| E       | System error                           |
| F       | Relay monitor error                    |
| H       | Selection chain error                  |
| L       | Configuration error                    |
| U       | Low voltage or voltage surge detected  |