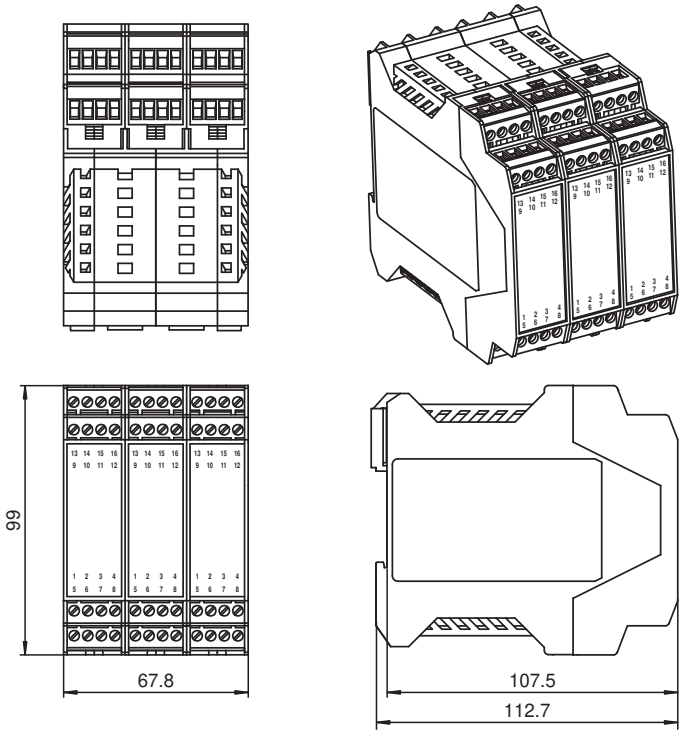
Safety control unit

SB4-OR-4XP-4X

- 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
- 8 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
- 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,
Functional safety related parameters	
Safety Integrity Level (SIL)	SIL 3
Performance level (PL)	PL e
Category	Cat. 4
Mission Time (T_M)	20 a
PFH_d	3.5 E-9

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Technical Data

B_{10d}		see instruction manuals
Type		4
Indicators/operating means		
Diagnostics indicator		7-segment display
Function indicator		LED red: OSSD OFF LED green: OSSD ON Yellow LED: start readiness channel 1 - 8 LED yellow: switching state (receiver)
Stability alarm indicator		LED yellow flashing: Indicator lamp channel 1 ... 8
Electrical specifications		
Operating voltage	U_B	24 V DC, ± 20 %
No-load supply current	I_0	max. 500 mA
Protection class		no identification ; see instruction manuals
Input		
Activation current		approx. 7 mA
Activation time		0.4 ... 1.2 s
Test input		Reset-input for system test
Output		
Safety output		2 relay outputs, force-guided NO-contact
Signal output		Output for displaying the switching state of the OSSDs
Switching voltage		10 V ... 250 V AC/DC
Switching current		min. 10 mA , max. 6 A AC/DC
Switching power		DC: max. 24 VA AC: max. 230 VA
Response time		38 ms
Conformity		
Functional safety		ISO 13849-1 ; EN 61508 part1-4
Product standard		EN 61496-1
Approvals and certificates		
CE conformity		CE
UKCA conformity		UKCA
UL approval		cULus
TÜV approval		TÜV
Ambient conditions		
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
Mechanical specifications		
Degree of protection		IP20
Connection		screw terminals , lead cross section 0.2 ... 2 mm^2
Material		
Housing		Polyamide (PA)
Mass		430 g

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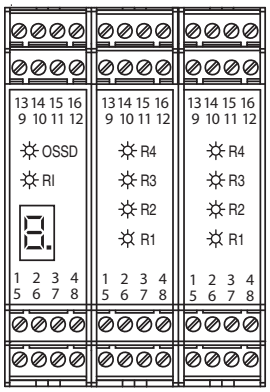
Connection



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 2

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

Terminal Slot 3

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

Matching System Components

	**SLP8-2**	Safety light grid
	**SLP8-2-A-L**	Safety light grid, active column
	**SLP8-2-L**	Safety light grid

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Matching System Components

	**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
	**SLP10-4**	Safety light grid
	**SLP10-4-L**	Safety light grid
	**SLCT14**	Safety light curtain
	**SLCT14-*-3702**	Safety light curtain
	**SLCT30**	Safety light curtain
	**SLCT30-/35**	Safety light curtain
	**SLCT30-*-3702**	Safety light curtain
	**SLCT60**	Safety light curtain
	**SLCT60-/35**	Safety light curtain
	**SLCT90**	Safety light curtain
	**SLCT90-/35**	Safety light curtain
	**SLCS14**	Safety light curtain
	**SLCS14-*-3702**	Safety light curtain
	**SLCS14-*-3702**	Safety light curtain
	**SLCS30**	Safety light curtain

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Matching System Components

	**SLCS30/35**	Safety light curtain
	**SLCS30-*-3702**	Safety light curtain
	**SLCS30-*-3702**	Safety light curtain
	**SLCS60**	Safety light curtain
	**SLCS60/35**	Safety light curtain
	**SLCS90**	Safety light curtain
	**SLCS90/35**	Safety light curtain
	**SLCT-M-01**	Inclined mirror for stable 90° deflection with cover plate
	**SLCT-M-01-1200**	Inclined mirror for stable 90° deflection with cover plate
	**SLCT-M-01-1500**	Inclined mirror for stable 90° deflection with cover plate
	**SLCT-M-01-2100**	Inclined mirror for stable 90° deflection with cover plate
	**SLC-XXX-M**	Safety light grid mirror

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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 8 safety light barriers can be connected to the evaluation device.

With the sensor cards on positions 2 and 3, 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.

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

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

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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

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