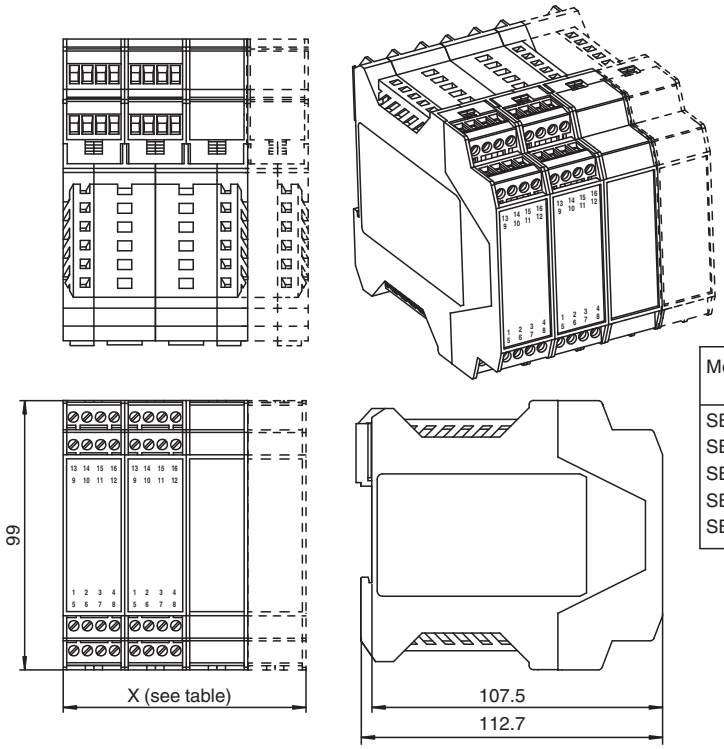
Safety control unit

SB4-OR-4XP-B-B-B-B

- 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
- Expansion slots for SB4 modules for optional enhanced functionality
- Self-monitoring (type 4 according to IEC/EN 61496-1)
- Operating mode can be selected by means of DIP switches
- 7-segment diagnostic display
- Safety outputs OSSD, external status displays OSSD

SB4 series safety control unit with optional module slots for functional enhancement

Dimensions



Model number	Number of optional slots	Housing width X [mm]
SB4-OR-4CP-B	1	67.8
SB4-OR-4CP-B-B	2	90.4
SB4-OR-4CP-B-B-B	3	113
SB4-OR-4CP-B-B-B-B	4	135.6
SB4-OR-4CP-B-B-B-B-B	5	180.8

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		see instruction manuals
B_{10d}		see instruction manuals
Type		4

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Technical Data

Indicators/operating means		
Diagnostics indicator		7-segment display
Function indicator		LED red: OSSD OFF LED green: OSSD ON Yellow LED: start readiness channel 1 - 4 LED yellow: switching state (receiver)
Stability alarm indicator		LED yellow flashing: Indicator lamp channel 1 ... 4
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
Power dissipation		If additional modules are used, max. 50 W
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		30 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 mm²
Material		
Housing		Polyamide (PA)
Mass		470 g

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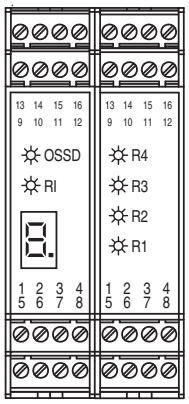
Connection



Terminal position 1

Terminal	Function
1	Reset input; NC contact
2	Restart input (RI); NC contact
3	24 V DC connection for reset, restart and RM
4	Relay monitor (RM)
5 - 6	OSSD1; floating relay contact; NO contact
7 - 8	OSSD2; floating relay contact; NO contact
9	Signal output OSSD OFF
10	Signal output OSSD ON
11	Signal output Restart
12	Reserved (n.c.)
13	+24 V DC supply voltage
14	0 V DC supply voltage
15	Functional ground
16	Reserved (n.c.)

The information applies only to the basic device.
If additional SB4 modules are used, the operating instructions that accompany the device must be observed during planning, installation and operation.

Terminal position 2

Terminal	Function	Channel Assignment	Connection Photoelectric sensor/light grid Safety device	2-channel connection P-switching	Connection Switching mat
1	Receiver 2 input	Input	Receiver output 2	OSSD output 1.2	Switching mat 1.4
2	Sensor 2 24 V DC +U	Channel 2	24 V receiver 2	24 V supply 1	
3	Sensor 2 ground GND		0 V receiver 2, transmitter 2	0 V supply 1	
4	Transmitter 2 output	Output	Transmitter input 2		Switching mat 1.3
5	Receiver 1 input	Input	Receiver output 1	OSSD output 1.1	Switching mat 1.2
6	Sensor 1 24 V DC +U	Channel 1	24 V receiver 1		
7	Sensor 1 ground GND		0 V receiver 1, transmitter 1		
8	Transmitter 1 output	Output	Transmitter input 1		Switching mat 1.1
9	Transmitter 3 output	Output	Transmitter input 3		Switching mat 2.4
10	Sensor 3 ground GND	Channel 3	0 V receiver 3, transmitter 3	0 V supply voltage 2	
11	Sensor 3 24 V DC +U		24 V receiver 3	24 V supply voltage 2	
12	Receiver 3 Input	Input	Receiver output 3	OSSD output 2.2	Switching mat 2.3
13	Transmitter 4 output	Output	Transmitter input 2		Switching mat 2.2
14	Sensor 4 ground GND	Channel 4	0 V receiver 4, transmitter 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 mat 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
	**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

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Matching System Components

	**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
	**SLCS30/35**	Safety light curtain
	**SLCS30-*-3702**	Safety light curtain
	**SLCS30-*-3702**	Safety light curtain
	SLCS60	Safety light curtain
	**SLCS60/35**	Safety light curtain

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Matching System Components

	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 operating instructions that accompany the unit must be observed during planning, installation and operation.

The SB4 evaluation system is a type 4 (EN 61496-1 or IEC 61496-1) and category 4 (EN 954-1) AOPD. This system has also been designed and tested in accordance with IEC 61508. The system meets the requirements of SIL3.

At most 4 safety thru-beam sensors can be connected to the control interface in the default setting.

The SB4 module at position 2 enables SLA-series "3-wire" thru-beam sensors (such as SLA5) and SLP light grids to be connected. P-switching safety devices with integrated cross-circuit monitoring can also be connected, such as SLC series safety light curtains. Switching mats designed according to the 4-wire principle and single or dual-channel contact-equipped safety sensors can also be connected.

The cables must be selected for and routed to the photoelectric sensors and light grids in such a way as to ensure short circuits cannot occur between the receiver and the emitter wire.

Light curtains with semiconductor switching outputs and dual-channel contact-equipped safety sensors are monitored for simultaneity The monitoring time is 2 seconds.

The devices are connected at channels 3 and 4 and/or 1 and 2. Please note that these sensors must feature integrated cross-circuit monitoring, as the module in these

sensors is not designed to include this feature. Contact-equipped safety sensors that are connected to the SafeBox must operate normally closed outputs.

An open contact signifies that the status is "safe". Switching mats designed in accordance with the 4-wire principle can be connected to channels 1 and 2 and/or 3 and 4.

The control interface has empty slots. They are used for individual function extensions with SB4 modules.

The following SB4 modules can be used:

- SB4 modules 4C:SB4 modules 4C in various versions.
  SB4 module for connecting four 2-wire sensors
- SB4 modules 4X:SB4 modules 4X in various versions.
  SB4 module for connecting 3-wire sensors and safety devices with semiconductor switching outputs
- SB4 modules 6C:SB4 modules 6C in various versions.
  SB4 module for connecting six 2-wire sensors
- SB4 modules 2E:SB4 modules 2E in various versions.
  Additional 2 OSSDs, relay monitoring, restart connection and 2 connections for contact-equipped safety signals(e.g. emergency off switch), timer functions
- SB4 modules 4M:SB4 modules 4M in various versions.
  Muting module for connecting up to 4 muting sensors

Operating modes

The startup/restart interlock is activated by default.

All groups feature DIP switches to select the functions. Two switches must always be actuated in order to select a function.

Switches on the first group:

Switch	Position	Operating mode
1 and 3	OFF	without startup/restart interlock (restart, RI)
	ON	with startup/restart interlock (restart, RI)
2 and 4	OFF	without relay monitor (RM)
	ON	with relay monitor (RM)

Switches on the second group:

Six DIP switches for selecting the sensor type and position are available on the module. There are six ways in which to combine the sensors. The required combination must be set in binary form. Two switches must always be actuated in order to select a function, e.g. DIP switches 1–3 have the same switch position as DIP switches 4–6.

DIP switches			Operating mode
3 and 6	2 and 5	1 and 4	
0	0	0	SLA/SLP/bridge on 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 on channel 1 + 2 and pressure-sensitive mat channel 3 + 4
1	0	0	Pressure-sensitive mat channel 1 + 2 and channel 3 + 4
1	0	1	SLC channel 1 + 2 and channel 3 + 4

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Indicators

The OSSD-R/supply module in position 1 features a red/green LED to signal the OSSD off/on statuses, a yellow LED to indicate the "Ready for startup" status and a 7-segment display for system diagnostics.

The 7-segment display signals the system status and error codes.

Display	7-segment display
1	DIP switch setting not identical
2	Incorrect configuration
3	Time-out of one or more muting sensors
4	Transmitter fault
6	Muting lamp fault
7	Simultaneity monitoring fault
8	Receiver fault
9	Sensor channel fault
C	Sensor channel fault
E	System fault
F	Relay monitor fault
H	Selection chain fault
L	Configuration fault
U	Under/overvoltage detected

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