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ORIGINAL INSTRUCTIONS

SLC Safety Light Curtain/Safety Light Grid

EN

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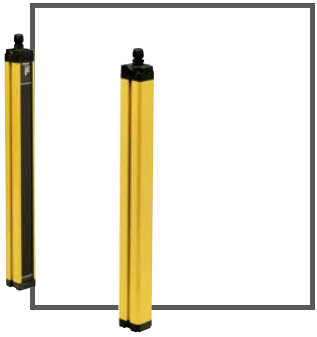

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1 Introduction

Congratulations

You have chosen a device manufactured by Pepperl+Fuchs. Pepperl+Fuchs develops, produces and distributes electronic sensors and interface modules for the market of automation technology on a worldwide scale.

Before you install this device and put it into operation, please read the operating instructions thoroughly. The instructions and notes contained in this operating manual will guide you step-by-step through the installation and commissioning procedures to ensure trouble-free use of this product. By doing so, you:

- guarantee safe operation of the device
- can utilize the entire range of device functions
- avoid faulty operation and the associated errors
- reduce costs from downtimes and incidental repairs
- increase the effectiveness and operating efficiency of your plant.

Store this operating manual somewhere safe in order to have it available for future work on the device.

Directly after opening the packaging, please ensure that the device is intact and that the package is complete.

Contact

If you have any questions about the device, its functions, or accessories, please contact us at:

Pepperl+Fuchs GmbH
Lilienthalstraße 200
68307 Mannheim, Germany
Telephone: +49 (0)621 776-1111
Fax: +49 (0)621 776-271111
Email: fa-info@de.pepperl-fuchs.com

Symbols used

The following symbols are used in this manual:

Note!

This symbol draws your attention to important information.

Handling instructions

You will find handling instructions beside this symbol

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2 Declaration of Conformity

This product was developed and manufactured under observance of the applicable European standards and guidelines.

Note!

A Declaration of Conformity can be requested from the manufacturer or downloaded from www.pepperl-fuchs.com.

The product manufacturer, Pepperl+Fuchs GmbH, 68307 Mannheim, Germany, has a certified quality assurance system that conforms to ISO 9001.

ISO**9001**

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3 Safety

3.1 Symbols relevant to safety

Danger!
This symbol indicates an imminent danger.

Non-observance will result in personal injury or death.

Warning!
This symbol indicates a possible fault or danger.

Non-observance may cause personal injury or serious property damage.

Caution!
This symbol indicates a possible fault.

Non-observance could interrupt the device and any connected systems and plants, or result in their complete failure.

3.2 Intended Use

The SLC must only be used in accordance with its intended purpose as non-contact safety equipment (NCSE) for securing hazardous areas and dangerous locations.

If used for any other purpose, the intended function of the system can no longer be guaranteed.

In addition to the notes in these instructions, the safety regulations, standards and other regulations concerning the application must be taken into consideration.

3.3 General Safety Information

Only instructed specialist staff may operate the device in accordance with the operating manual.

The following basic instructions must be observed at all times:

- The device must not be commissioned until the manual has been read and understood
- The device must not be used out of specification without suitable protective measures
- Tampering with the device is not permitted
- Do not remove the warnings or rating plates

Before selecting and using the product, an assessment must be made to determine whether it is suitable for the application in question. Pepperl+Fuchs has no influence on the selection and use of this product. Liability is therefore restricted to the consistent quality of the product.

The product must be regularly checked and maintained by specialist personnel. The outcome of inspection and maintenance work must be documented. Only original spare parts from Pepperl+Fuchs may be used for repairs.

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Use only recommended original accessories.

The operating company bears responsibility for observing locally applicable safety regulations.

User modification and or repair are dangerous and will void the warranty and exclude the manufacturer from any liability. If serious faults occur, stop using the device. Secure the device against inadvertent operation. In the event of repairs, return the device to your local Pepperl+Fuchs representative or sales office.

Store the device in the original packaging when not in use. This offers the device optimal protection against impact and moisture.

Note!

Disposal

Electronic waste is hazardous waste. When disposing of the equipment, observe the current statutory requirements in the respective country of use, as well as local regulations.

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4 Product Description

4.1 Use and Application

Features

- Type 4 opto-electronic in accordance with EN61496-1
- Self-monitoring
- Obstacle size, depending on type, 14 mm, 30 mm, 60 mm or 90 mm
- Protection field heights from 150 mm to 1800 mm (SLC 30/SLC 14)
- Protection field heights from 300 mm to 1800 mm (SLC 60)
- Protection field heights from 600 mm to 1800 mm (SLC 90)
- Cascading layout with maximum of two expansions (SLC xx-xxxx-S)
- Multi-beam protection with two to four protective beams (SLC-2, SLC-3, SLC-4)
- Selectable integrated startup/restart interlock
- Simple layout
- Robust aluminum housing
- IP67 degree of protection
- OSSDs either as semiconductor or relay contact output
- Semiconductor OSSDs with galvanic isolation

The safety light curtain/safety light grid consists essentially of an transmitter and receiver.

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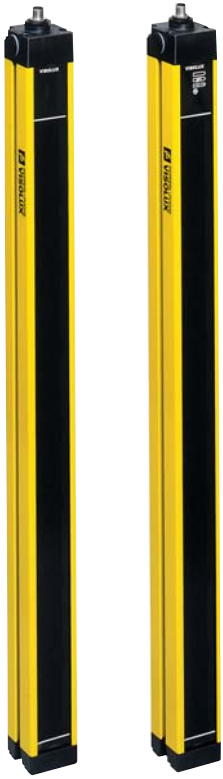

The protection field is formed by infrared light beams sent from the transmitter to the receiver. The distance between the individual light beams determines the minimum obstruction size (14 mm, 30 mm, 60 mm or 90 mm) that can be reliably detected within the entire protection field area.

The transmitter contains a certain number of transmitter diodes that emit the protective beams. The number of transmitter diodes is determined by the protection field height and the size of the obstruction. Two selectable codings, also referred to hereafter as Mode 1 or Mode 2, ensure that the hazardous interference effect of one light curtain on another in the immediate vicinity is avoided. The same applies to light grids. More information on this can be found in the subsequent sections. See chapter 6.1

The receiver detects the emitted beams, controls the OSSD safety outputs and carries out periodic tests to ensure safety.

Cascading layouts can be setup by using slaves. This allows complex protection field shapes.

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Note!

When using slaves, no more than 96 protective beams (normally using one or two slaves) are permitted. This limit may be increased to 192 protective beams if devices with reduced response times (option /130) are used.

Two types of safety outputs are available:

- PNP semiconductor outputs with galvanic isolation
- Force-directed relay contacts, NO contacts

In addition to the displays behind the front panel of the receiver, there are two PNP outputs indicating the **OSSDs switched on** and **Ready to start** states. The **Ready to start** output is also used for indicating receiver faults. If the receiver is in a fault state, the output switches on and off at a frequency of 1 Hz.

The **Test** and **Restart** inputs are used for controlling the receiver. They are triggered if a voltage of 24 VDC is applied to the input for a defined period of time. Dynamic evaluation of the signals guards against an undefined response in the event of a short circuit.

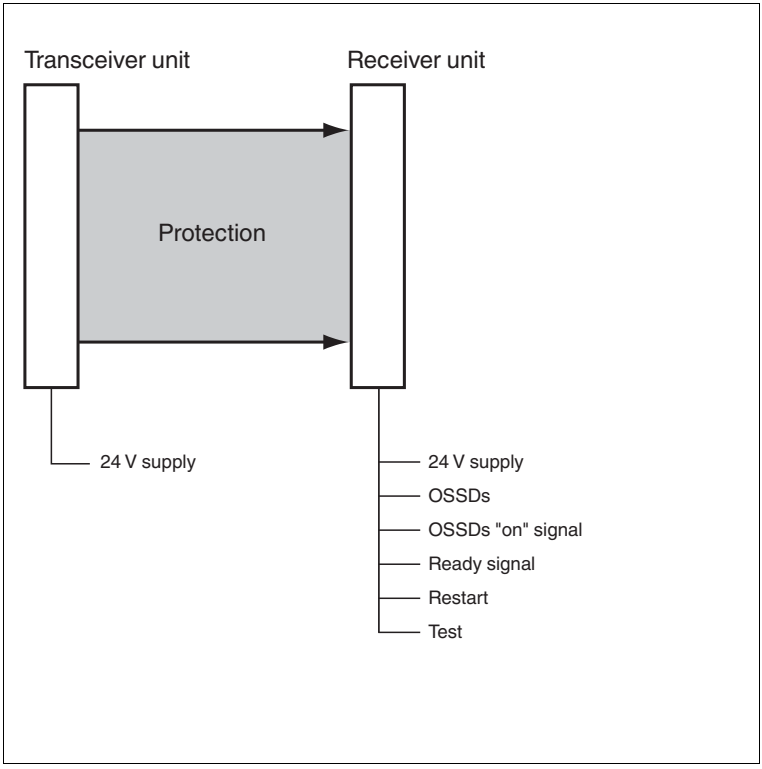

Figure 4.1 Schematic design of a protective device in the series SLC

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4.2 Displays and Controls

The displays on the transmitter and receiver units are located next to the cord grip. The illustration below shows the layout of the displays on the receiver unit.

The transmitter unit display is a seven-segment display.

Slave devices do not have displays of their own. All the necessary information about the slave is shown on the displays of the master device. A slave that is incorrectly connected is indicated by this display: E.

When a slave is connected to a receiver unit, the seven-segment display is used for signaling information on the master device and the slave. This means the user is able to determine whether the protection field has been interrupted in the slave or master (main device).

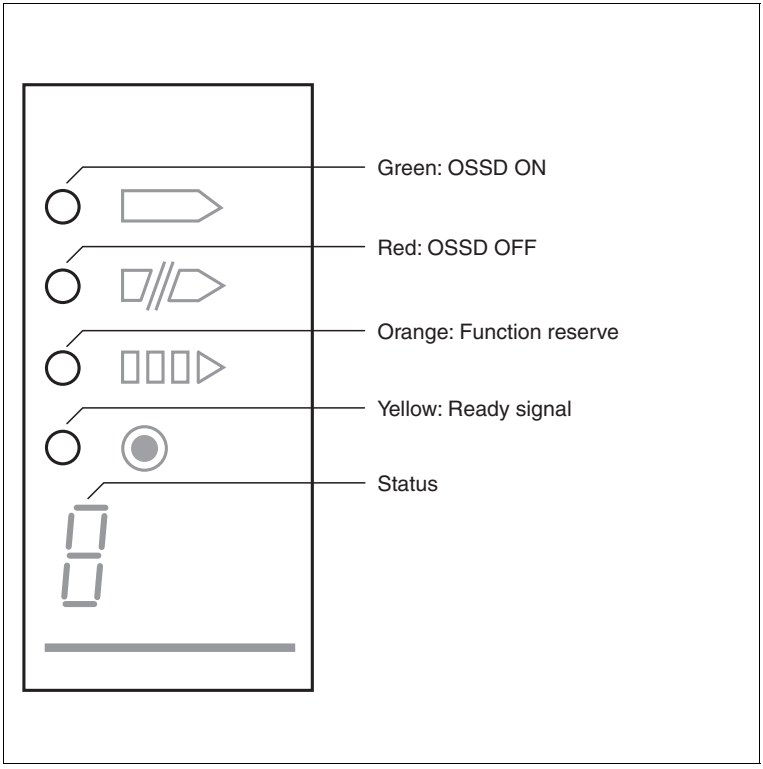

Figure 4.2 Displays on the receiver unit

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4.2.1 Transmitter Unit Display

The seven-segment display lights up when the transmitter unit is ready for operation. During startup, is displayed. During operation the set beam coding (Mode) is displayed:

 Coding 1

Coding 2

If there is a fault with the transmitter unit, is displayed.

4.2.2 Receiver Unit Display

To show its operating status, the receiver unit has four LEDs and a seven-segment display. The displays have the following meanings:

LED	Red	OSSD outputs switched off
	Green	OSSD outputs switched on
	Orange	Below function reserve level
	Yellow	Protection field free, system ready to start
Seven-segment display (no slave connected)		Protection field free, OSSD ON (continuous light)
		Protection field interrupted
		Protection field free, OSSD OFF, ready to start
		System error
		Incorrect beam coding received
		DIP switches for RI in different positions
		System startup test
Seven-segment display (slave connected)		Protection field free, OSSD ON (two scroll bars), upper scroll bar – master, lower scroll bar – slave
		Protection field interrupted Master free, slave interrupted
		Protection field interrupted Master interrupted (uppermost beam free), Slave free

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4.3 Interfaces and connections

4.3.1 Devices with Cable Gland

Connections on the transmitter and receiver unit (master)

The electrical connections are all in one terminal compartment.

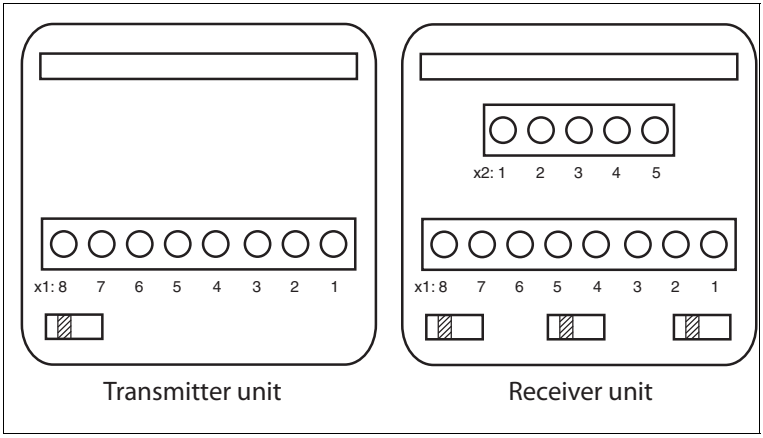

Figure 4.3 View of SLC series terminal compartment

Connections on the transmitter and receiver unit
n.c. = not connected

Terminal	Transmitter	Receiver with relay contact output	Receiver with semiconductor output
X1:1	Functional ground	Functional ground	Functional ground
X1:2	n.c.	Test (input)	Test (input)
X1:3	n.c.	OSSD 2.2 (output)	0 V OSSD
X1:4	n.c.	OSSD 1.2 (output)	24 V OSSD
X1:5	n.c.	OSSD 2.1 (output)	OSSD 2 (output)
X1:6	n.c.	OSSD 1.1 (output)	OSSD 1 (output)
X1:7	0 V AC/DC	0 V AC/DC	0 V DC
X1:8	24 V AC/DC	24 V AC/DC	24 V DC
X2:1	Not assigned	Ready to start (output)	Ready to start (output)
X2:2		OSSD status (output)	OSSD status (output)
X2:3		24 V reference for I/O	n.c.
X2:4		0 V reference for I/O	n.c.
X2:5		Startup enable (input)	Startup enable (input)

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4.3.2 Devices with M12/M20 Plug – Options /60, /92, /151

Transmitters and receivers of the SLC series with M20 plug, 7-pin (option /60)

Pin 7 of the M20 plug is the functional ground.

The relay contacts are connected inside the SLC to 24 VDV (OSSD1) and 0 VDC (OSSD2).

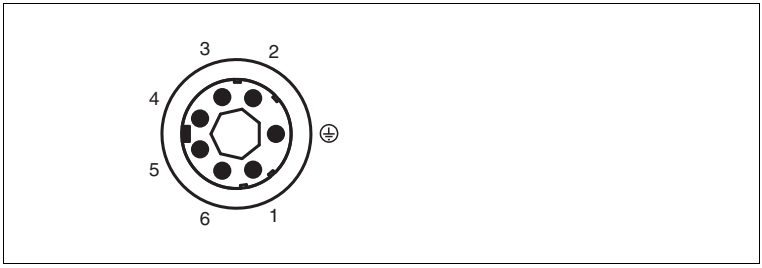

Figure 4.4 View of the M20 plug

M20 plug assignment, 7-pin (option /60)

Pin	Transmitter	Receiver with relay contact output
1	24 VDC	24 VDC
2	0 VDC	0 VDC
3	n. c.	OSSD1 (24 VDC output relay)
4	n. c.	OSSD2 (0 VDC output relay)
5	n. c.	Startup enable (input)
6	n. c.	Ready to start (output)
7	Functional ground	Functional ground

Transmitters of the SLC series with M12 plug, 4-pin (option /92)

Pin 4 of the M12 plug is the functional ground.

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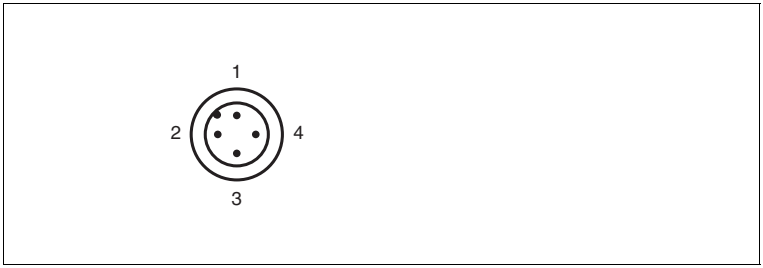

Figure 4.5 View of the M12 plug, 4-pin

M12 plug assignment, 4-pin (option /92)

Pin	Transmitter
1	24 VDC
2	n. c.
3	0 VDC
4	Functional ground

Transmitters and receivers of the SLC series with M12 plug, 8-pin (option /151)

Transmitters and receivers of the SLC series with option /151 have an M12 connecting plug with eight contacts. The relay contacts are each connected internally to 24 VDV and 0 VDC. Devices of the SLC series with option /129 have an active relay monitor instead of a test monitor.

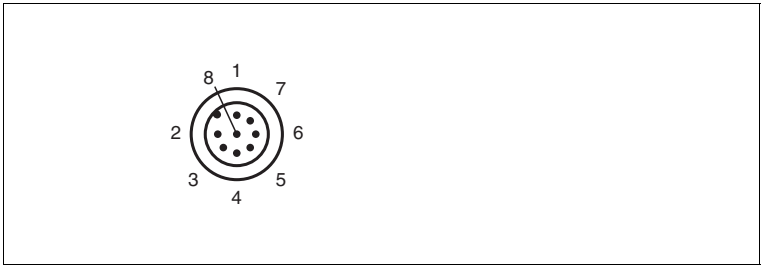

Figure 4.6 View of the M12 plug, 8-pin

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M12 plug assignment, 8-pin (option /151)

Pin	Transmitter	Receiver with relay contact output
1	n. c.	Ready to start (output)
2	24 VDC	24 VDC
3	n. c.	Startup enable (input)
4	n. c.	Test/relay monitor /129
5	n. c.	OSSD1 (24 VDC output relay)
6	n. c.	OSSD2 (0 VDC output relay)
7	0 VDC	0 VDC
8	Functional ground	Functional ground

4.3.3 Inputs

The control outputs on the receiver must be connected to NO contacts that switch at 24 VDC. The function is triggered if the contact is closed for a defined period of between 0.03 and 1 s. (see chapter 10.1).

Startup/restart interlock

The **startup/restart interlock** prevents the OSSD outputs from switching to ON after the protection field is cleared or after the power supply is turned on when the protection field is free. The safety function is only activated once the startup enable button has been pressed.

Note!

The protective function may only be enabled when there is no one inside the hazardous area.

Position the startup enable button in the hazardous area so that

- the hazardous area is clearly visible and
- activation from within the hazardous area is not possible or cannot initiate a response (protection field is interrupted when the button is pressed).

Test input

The test input is used to activate a complete test of the receiver. During this process, the OSSDs are switched off and all system components are checked. It may be necessary to carry out a test for receivers with a relay contact output if, for example, the protection field has not been interrupted for an extended period and you wish to verify that the relay outputs are functioning.

Fault messages from receivers are acknowledged by initiating a test.

Note!

A complete test is also carried out when the operating voltage is switched on. This also applies to the transmitter, which does not have a test input.

Relay monitor (option /129)

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The receiver features EDM feedback (**E**xternal **D**evice **M**onitoring, also called a relay monitor) for monitoring the OSSDs. The relay monitor is permanently activated and cannot be switched off. The relay monitor input is the test input and must always be connected, otherwise the receiver will stay locked. The test function is no longer available.

NC contacts of as many positive-action relays as required are to be used as feedback contacts. However, there must be at least two relays or contactors. The feedback contacts on all downstream external switching elements must be connected in series and must guarantee a reliable contact at a voltage of 20 V and a current of 5 mA. A surge voltage resistance of 6 kV must be guaranteed between the feedback contacts and other contacts connected to a low voltage according to the Low Voltage Directive.

The load circuit of the external switching elements must be protected by a fuse with a maximum rated value of 60 % of the load capacity of the contacts in order to prevent the contacts from welding together. The external switching elements are monitored with a delay of 180 ms after the switching operation. If the monitoring period of 180 ms has elapsed and the new switching state has not activated, the receiver unit is locked and displays the fault status on the status display.

4.4 Included in Delivery

- SLC safety light curtain/safety light grid
- Manual

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5 Installation

5.1 Preparation

Safety distance

A minimum distance must be maintained between the protection field and the hazardous area to ensure potentially dangerous movements are brought to a stop before there is contact with a person.

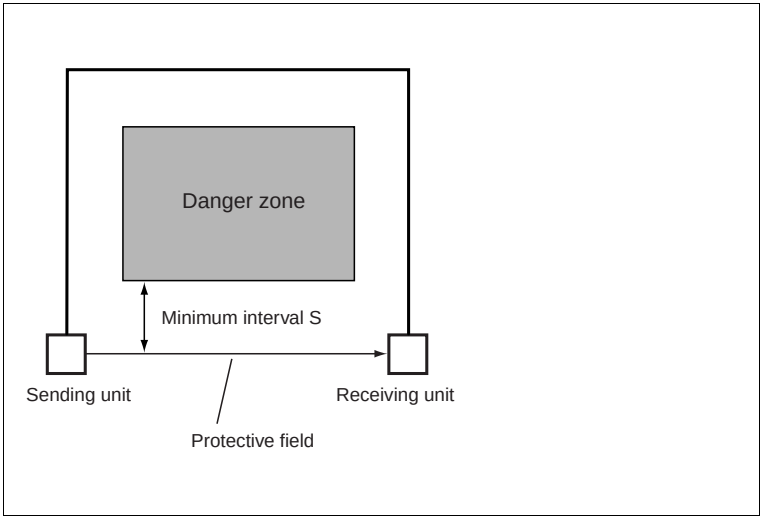

Figure 5.1 Minimum distance between protection field and hazardous area

This distance is calculated from the lag time of the machine, the response time of the safety system, and the speed of movement of the person entering the hazardous area (ISO/EN 13855).

To maintain the necessary distances when reaching over the protection field, use table 1 from ISO/EN 13855 for determining the minimum distance for a vertically arranged protection field. If you read the value 0 from the table, determine the minimum distance with the following formula:

According to ISO/EN 13855:
S = K x T + C

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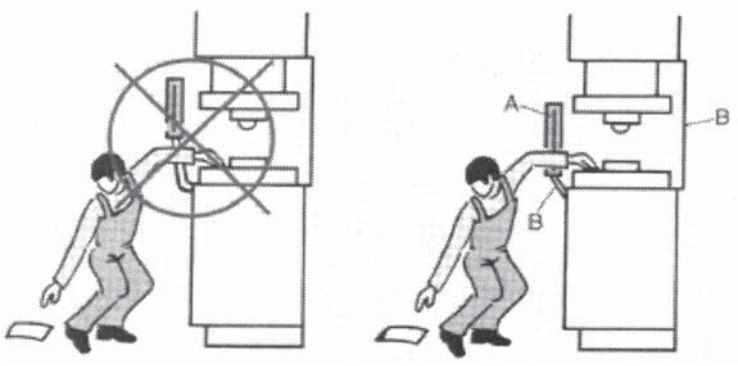
The following applies to a protection field installed **perpendicular** to the hazardous area:

S	Minimum safety distance in mm, i.e., the distance between hazardous area and protection field				
K	Constant in mm/s for the speed of approach, based on the detection capacity of the sensor				
T	Total response time of the protective device in s ($T = t_1 + t_2$)				
t_1	Response time of the protective equipment e.g., 20 ms (semiconductor OSSD) or 40 ms (relay OSSD)				
t_2	Machine lag time				
C	Additional distance in mm. See table				
	14 mm	30 mm	60 mm	90 mm	2-, 3-, or 4-beam
	0 mm	128 mm	850 mm	850 mm	850 mm
For arrangements **other** than a perpendicular arrangement of the protection field, see also ISO/EN 13855.					

Notes on setting up safety light curtains

The protective equipment must be arranged in such a manner that it is impossible to reach over, reach under, or walk behind the protection field. If the distance from the safety equipment is too great, additional safety equipment must be put in place (see illustrations below).



There must be no gaps underneath the protection field through which it is possible to reach into the hazardous area (A: protection field, B: mechanical protection).

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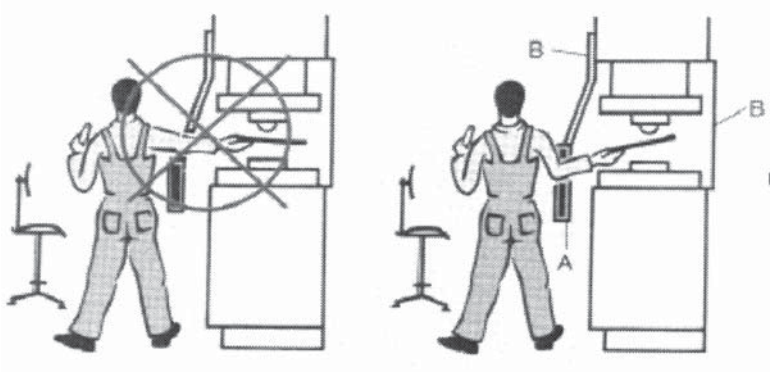
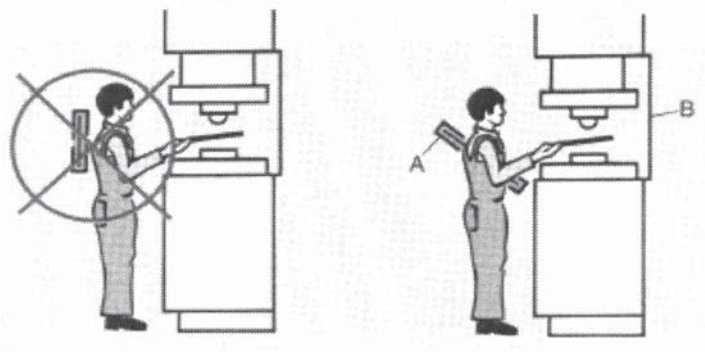


The user must not be able to reach over the protection field and into the hazardous area (A: protection field, B: mechanical protection).



The machine operator must not be able to walk between the light curtain and into the hazardous area (A: protection field, B: mechanical protection).

5.2 Mounting

In addition to protecting the hazardous area with the protection field, other measures may need to be taken to prevent the protection field from being circumvented.

The formulas and example calculation below reflect the requirements of ISO/EN 13855 in part. The requirements of these and other standards and regulations are to be applied depending on the application of the light grid/light curtain.

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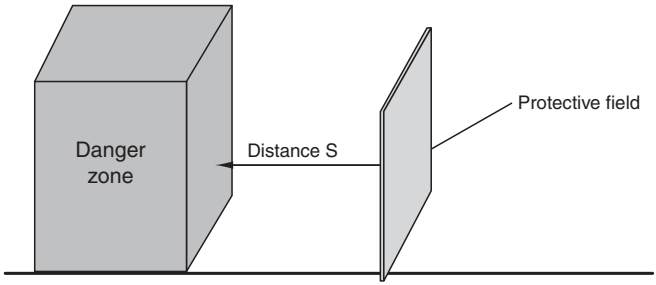
Vertical Approach



Example calculation:

Where K = 2000 mm/s and C = 0 mm for SLC14… or C = 128 mm for SLC30… the calculation formula for a distance S of 105 mm up to and including 500 mm is:

$S = 2000 \text{ mm/s} * (t_1 + t_2) + C$

If S is greater than 500 mm, then K = 1600 mm/s must be used for calculations:

$S = 1600 \text{ mm/s} * (t_1 + t_2) + C$

S must be at least 500 mm. Lower results must be corrected to a minimum distance of 500 mm.

Example: vertical arrangement

$t_1 = 50$ ms

$t_2 = 300$ ms

Hand protection C = 128 mm

$S = 2000 \text{ mm/s} * (350 * 10^{-3} \text{ s}) + 128 \text{ mm}$

S = 700 mm + 128 mm = 828 mm

As S is > 500 mm, a smaller value can also be determined:

$S = 1600 \text{ mm/s} * (350 * 10^{-3} \text{ s}) + 128 \text{ mm} = 688 \text{ mm}$

The minimum distance between the protection field and hazardous area must therefore be **688 mm**.

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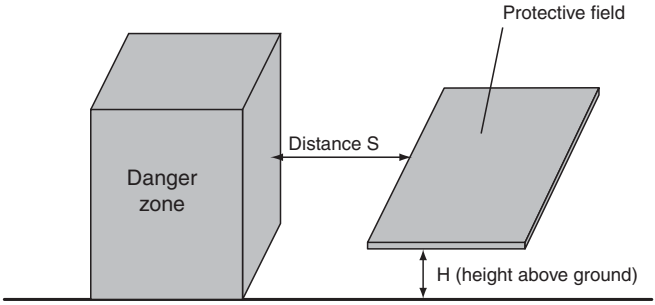
Parallel Approach



When calculating the safety distance S for the horizontal layout of the light curtain, the distance will also depend on the height of the light curtain above the floor. The maximum height H must not exceed 1000 mm. If H is greater than 300 mm, there is a risk that access will be possible under the safety light curtain. This must be considered in the risk analysis, otherwise additional protection will be required:

The safety distance is calculated as follows:

$S = 1600 \text{ mm/s} * (t_1 + t_2) + (1200 \text{ mm} - 0.4 H)$

Therefore $(1200 \text{ mm} - 0.4 H) \geq$ **850 mm** is required.

Light grid (2 to 4-beam equipment)

The general formula for calculating the required distance from the hazardous area is as follows:

$S = (1600 \text{ mm/s} * T) + 850 \text{ mm}$

The layout for individual beams parallel to the floor should be as follows:

Layout of Individual Beams

Number of beams	Height above the floor [mm]	Beam gap [mm]
2	400, 900	500
3	300, 700, 1100	400
4	300, 600, 900, 1200	300

The layout of the beams must prevent a person from being able to

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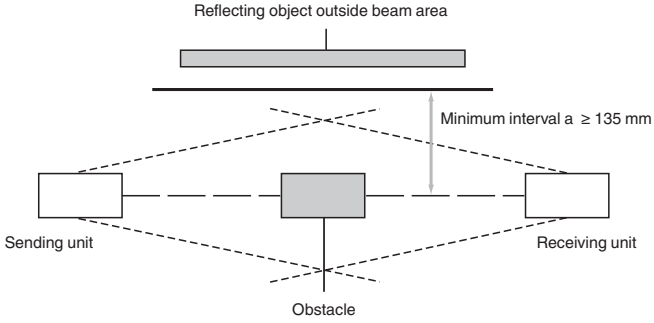
- crawl under the lowest beam,
- climb over the highest beam, or
- climb between the two beams.

Note!

If an applicable C standard recommends positioning the first beam 400 mm above the floor, follow this recommendation.

If no recommendation was given, use a risk analysis to determine whether the arrangement is permissible.

Reflection



Ensure that there are no reflective objects within the transmitter or receiver path that could deflect the beams around an obstruction (EN 61496-2).

Note!

When positioning the light grid, ensure that a minimum distance to reflecting objects or surfaces is maintained. This distance from the protection field must be maintained on all sides.

Only in this way can you ensure that an object will be reliably detected by a beam in the light grid. The minimum distances are listed in the table.

Minimum Distance Between Protection Field and Reflective Surfaces

Protection field width/range [m]	Minimum distance [mm]
0.2-3.0	135
4.0	175
5.0	220
6.0	265
8.0	350
10	450
15	660

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5.3 Multiple Layouts

Note!

If several safety light curtains/safety light grids are operating close to each other, care must be taken to prevent any mutual interference.

The illustrations below show the possible layout options.

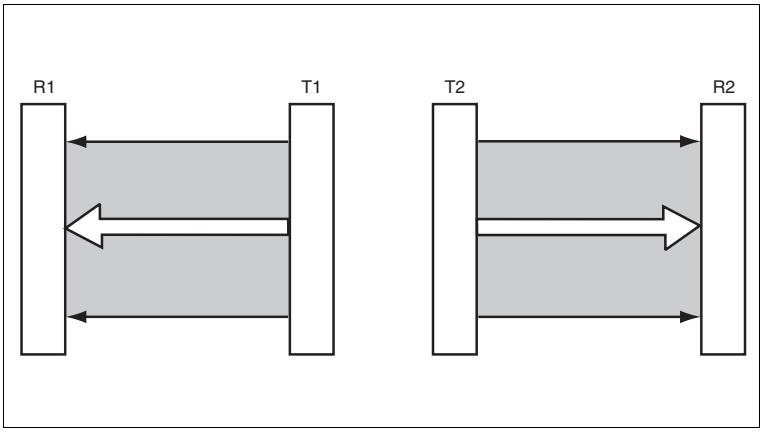

Figure 5.2 Multiple layout with the same beam coding (Mode)

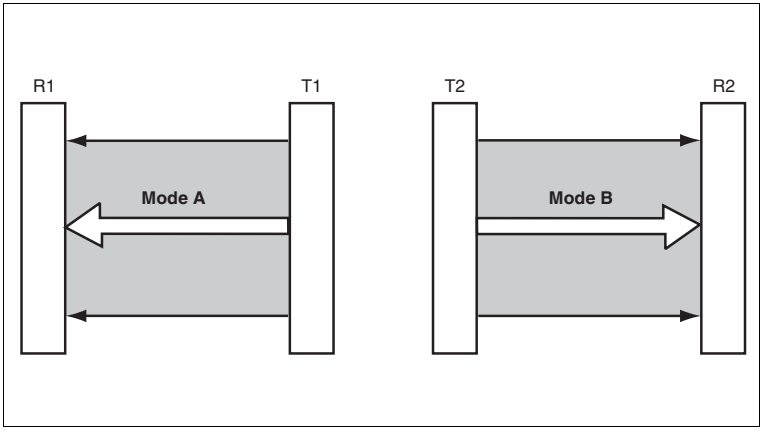

Figure 5.3 Multiple arrangements with different beam coding (Mode)

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Caution!
Layout with different beam coding

To prevent dangerous operating conditions, select a different beam coding (Mode) on both transmitter and receiver units. Operating in this layout with the same beam coding may cause undefined protection fields with the result that the safety function cannot be guaranteed. (see chapter 6.1).

5.4 Connection

Connections for transmitter and receiver basic units

An M12 plug forms the electrical connection for SLC devices with options /92, /151, whereas SLC devices with option /60 have an M20 plug connection.

Note!

Connections that are not named must not be connected. Connect the power supply only to the transmitter.

The receiver has connections for the fail-safe OSSD1 and OSSD2 outputs, signal outputs, and inputs for controlling tests and the startup enable. In devices with connecting plugs from the SLC series with option /129, only the relay monitor input is available, rather than the test input.

Note!

When using a receiver unit with relay OSSDs, ensure that fuses are present in the OSSD current circuits. This is the only way to prevent relay contacts from welding together (0.6 x $I_{Nominal}$).

The connection assignments can be found under “Interfaces and Connections”. See chapter 4.3

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Connection examples for transmitter and receiver basic units:

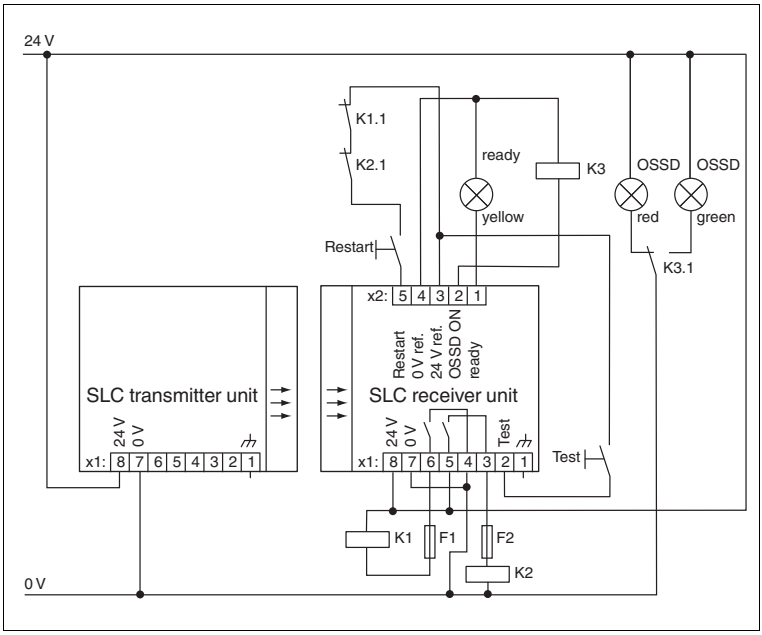

Figure 5.4 SLC connection example with relay OSSD and RI (Startup/restart interlock)

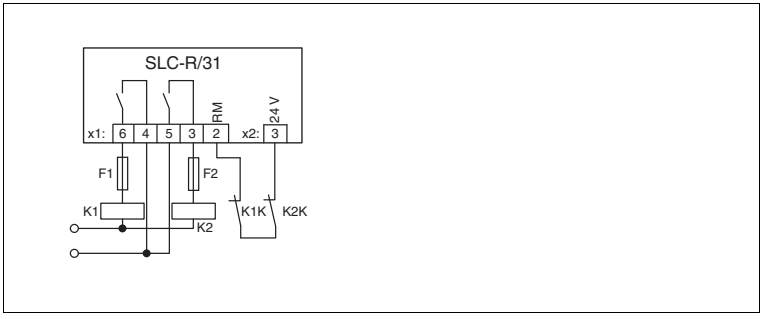

Figure 5.5 SLC connection example with relay OSSDs and relay monitor

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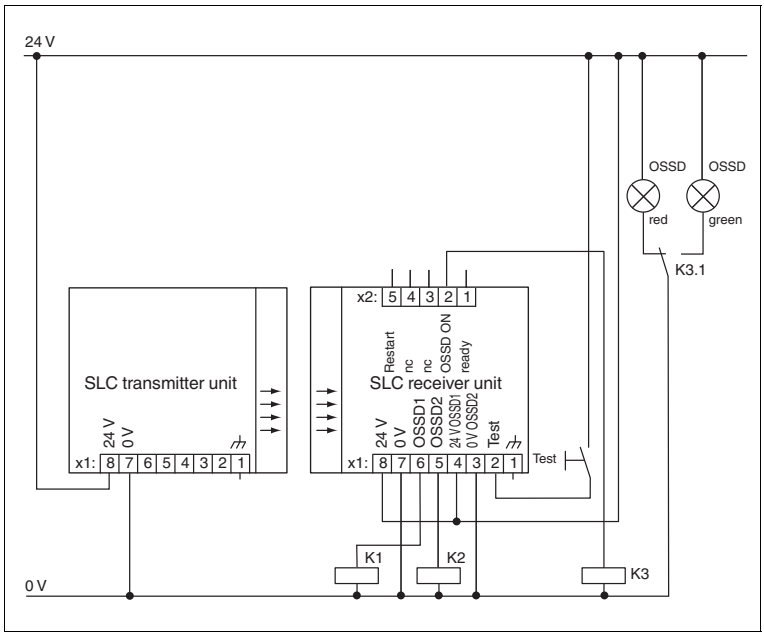

Figure 5.6 Connection example SLC with semiconductor OSSD without RI (Startup/restart interlock)

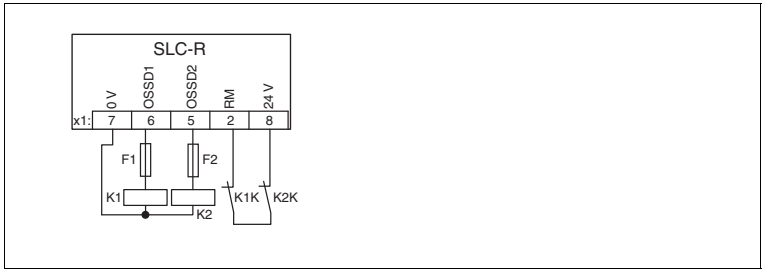

Figure 5.7 SLC connection example with semiconductor OSSDs and relay monitor

Layout and connection of cascading units

Note!

The connection examples shown are essentially sample circuits.

The connection examples do not satisfy the required safety category for a complete system installation. Additional measures may be required.

Slaves allow protection fields to be extended, or protection fields to be created that exist at more than one level.

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Note!

When deciding which slaves to connect, remember that a maximum of 96 beams must not be exceeded. Up to 192 beams are possible in conjunction with option /130.

Slaves exist for the transmitter and the receiver. They are easy to install. A maximum of two slaves can be connected to the transmitter and receiver, whereas only one slave can be connected to SLC devices with option /130. To connect a slave, remove the cap from the end of the light curtain that does not have a connection. The plug-in jumper on the connectors of the now visible PCB is removed. The slave is designed such that the cap and PCB on the connection cable plug directly onto the open end of the light curtain. Once the end cap has been screwed on, the system is complete.

A maximum of 96 protective beams is permitted when using slaves (normally one or two slaves); however this limit increases to 192 protective beams (one slave) for devices with option /130. Devices with option /130 also boast shorter response times with the same number of channels.

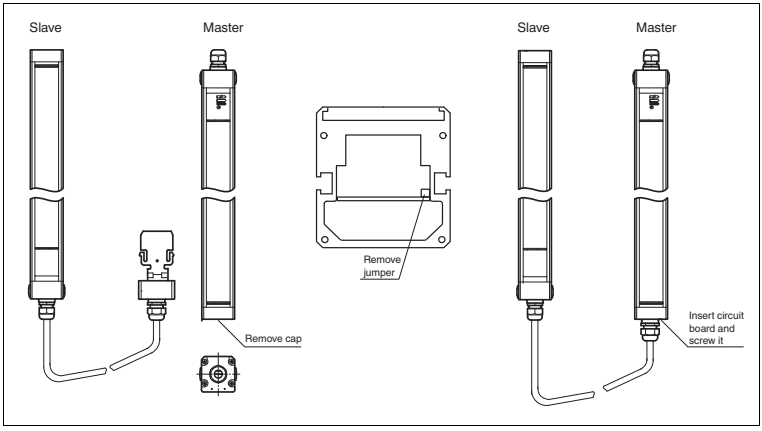

Figure 5.8 Master / slave connection version

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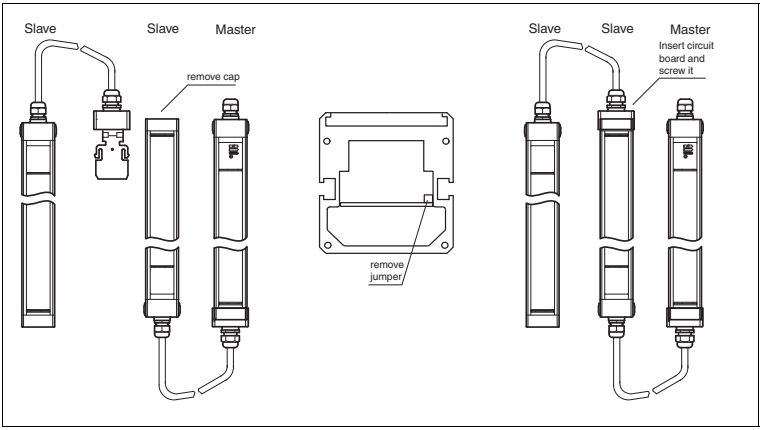

Figure 5.9 Master / slave / slave connection version

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6 Commissioning

6.1 Operating Mode Settings for Startup/Restart Interlock and Beam Coding

Note!

The startup/restart interlock (RI) is activated and deactivated on the receiver unit.

Note!

The interlock is activated when the unit is delivered.

The startup/restart interlock (RI) ensures that after the power supply has been turned on, or after an interruption in the protection field, the **'Ready to start'** status is signaled when the protection field is free and the startup enable has to be activated in order for the device to switch on the OSSDs.

To prevent two devices in extremely close proximity to each other from causing mutual hazardous interference, the transmitter and receiver units can be operated using two different beam codings (Mode see chapter 5.3). The coding must be set on both the transmitter and receiver unit.

Note!

Ensure that the same coding is set on both the transmitter and receiver unit.

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6.1.1 Transmitter Unit

The beam coding (Mode) must be set on the transmitter unit. The beam coding selected is shown on the seven-segment display behind the front panel when the transmitter unit is in use.

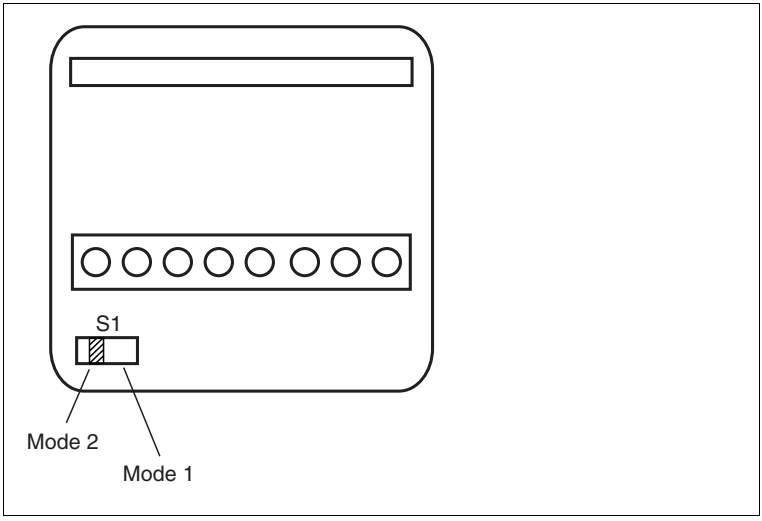

Figure 6.1 Beam coding (Mode) setting on the transmitter unit

6.1.2 Receiver Unit

Note!

Use S3 to set the beam coding (Mode) to the same as the transmitter.

The startup/restart interlock is activated using switches S1 and S2. Both switches must be in the same position. If DIP switches S1 and S2 are in different positions, then the receiver unit is blocked and the status indicator reports a fault.

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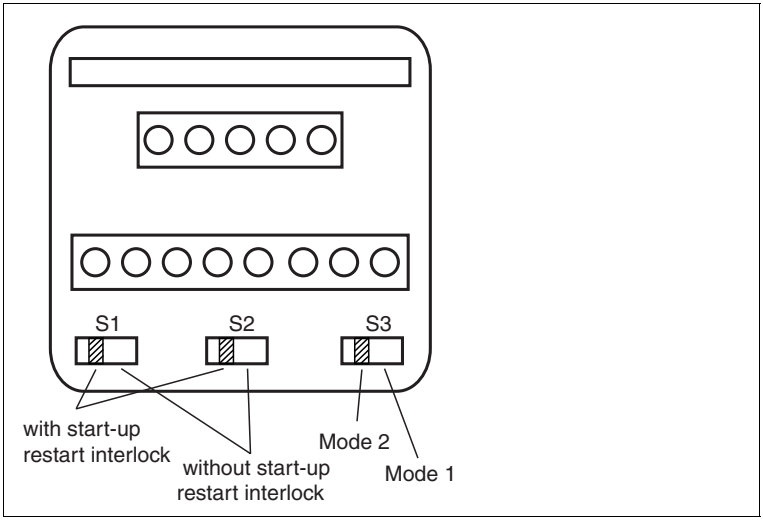

Figure 6.2 Setting the beam coding (mode) and the start / restart at the receiver unit

6.1.3 Transmitter and Receiver Unit

The transmitter and receiver units must be aligned so that they are parallel to each other and are at the same height. Mounting brackets, available as accessories, or M8 hexagonal screws can be used to securely mount the units.

The device is switched on when the field of vision is free. The transmitter and receiver units must be adjusted to allow the reception signal level to exceed the signal strength. The orange LED on the receiver unit goes out when the reception signal is greater than the signal strength.

Note!

A check must be carried out to see whether the OSSD outputs all switch on correctly, and whether the status indicators (ready to start and OSSD status) light up according to the operating status.

Note!

The test rod supplied is used to check the detection capability of the device.

When using a light curtain, the area in front of the transmitter element and receiver element, as well as along the protection field limits, must be fully covered with the test rod in order to find any detection gaps caused by reflective surfaces. When using a light grid (2, 3, or 4-beam), the detection capability of the individual beams in the entire detection area must be checked.

When in startup/restart interlock (RI) operating mode, the operation of the lock should be tested when the power is turned on and after the protection field is interrupted.

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If a test input is connected, its function must be checked when the protection field is free. After the test button has been pressed, the OSSD outputs must turn off and the system test must be carried out. The **system test** mode is signaled by status display .

The effectiveness of the switch-off function of the device and the response time of the safety function when a beam is interrupted must be checked.

Cascading Layouts with Slave

The main device must be set up first. The main device is properly set up when a scroll bar runs through the upper four segments of the seven-segment display.

After that, the slave must be set up. If the adjustment is successful, then the display on the seven-segment display goes out and a scroll bar runs through the lower elements ( ). This makes it very easy to correct any misalignments.

Layout with Deviation Mirrors

Deviation mirrors deflect the path of protection fields and grids to offer protection on more than one side using just a single transmitter/receiver pair. Each mirror reduces the sensing range by no more than 15%.

The mirrors are arranged so that light beams from the transmitter can be deflected to the receiver. To deflect the protection field through 90°, the mirror is positioned at an angle of 45°.

When aligning the layout, ensure that all components are arranged vertically and at the same height. To roughly align the mirror, turn it so that you can see the receiver reflected in the mirror when looking at it with the transmitter behind you. see chapter 10.6.5

Aligning the mirrors is made easier by using the BA12 beam alignment aid. see chapter 10.6.6

Note!

Ensure that the mirror surfaces are kept clean. Use an alcohol or mineral spirits with a lint-free cloth to clean the mirrors. Other cleaning agents are not permitted as they may damage the mirror surfaces. (see chapter 8.1).

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7 Receiver Signal Outputs

One method of signaling the operating state of the system is to attach indicator lights directly. The outputs are short-circuit-proof PNP outputs that supply a maximum current of 100 mA.

OSSD status

The **OSSD** output is active when the protection field is free and the OSSD outputs are activated. An external green/red indicator can be derived from this signal.

"Ready to start"

The **Ready to start** signal output indicates that the protection field is free and startup enable may be confirmed to switch on the OSSD outputs.

If the receiver unit is locked in a fault state, the output switches on and off at a frequency of approx. 1 Hz.

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8 Maintenance and Repair

8.1 Cleaning and Maintenance

The SLC is maintenance-free.

The prescribed periodic checks must be carried out and documented. The checks must include whether the components are fitted securely and whether the optical surfaces are clean.

Note!

Use a damp, soft, lint-free cloth to clean the surfaces, especially the optic covers. Alcohol or mineral spirits may be used as cleaning fluids. Other cleaning agents are not permitted as they may damage the mirror surfaces.

8.2 Repair

The device must not be repaired, changed, or manipulated. In case of failure, always replace the device with an original device.

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9 Troubleshooting

Note!

Always carry out a function check on the device after correcting a fault.

High-Frequency Electromagnetic Fields

High-frequency electromagnetic fields with a field intensity of 10 V/m or greater can cause a receiver with a semiconductor output to switch to the safe state.

If this fault occurs, press the test contact (Reset). The receiver clears the fault state by performing a system reset.

If this process does not correct the fault, attempt to return to normal mode by switching off the power supply for at least 1 second, then switching it back on again.

Fault Messages and Corrective Measures

Fault	Cause	Action
Transmitter status display	Internal fault	Briefly interrupt power supply. If the fault recurs, return the device to Pepperl+Fuchs. If a slave has been connected: check maximum number of beams and position of the plug-in jumper
Receiver status display	Internal fault	Briefly interrupt power supply or press test contact. In devices with OSSD semiconductor: Check the power connection of the OSSD. If the fault recurs, return the device to Pepperl+Fuchs. If a slave has been connected: check maximum number of beams and position of the plug-in jumper
Receiver status display	The coding set on the receiver unit does not correspond with the coding of the signal received.	Change the coding.
Receiver status display	Switch positions for AWS not identical.	Move DIP switches for startup/restart interlock (AWS) to same position.
Receiver status display	Beam interrupted or adjustment error	Remove object from protection field or adjust receiver and transmitter.
Receiver status display cannot be acknowledged	Faulty restart contact connection	Check restart connection

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Fault	Cause	Action
Receiver status display cannot be acknowledged	Relay monitor time monitoring has been triggered (only for option /129)	Check relay monitor connection
Function reserve LED (orange) is on	Insufficient function reserve	Clean the front panels and adjust the transmitters and receivers.

Note!

If the safety device requires repair, please send the transmitter **and** receiver together to Pepperl+Fuchs.

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10 Appendix

10.1 Technical Data

Functional Safety Data

PFH_d	SLC14-300: 8.75E-9 SLC14-600: 1.19E-8 SLC14-900: 1.49E-8 SLC14-1800: 2.42E-8 SLC30-900: 1.03E-8 SLC30-1800: 1.50E-9 SLC60-xxx: 1.04E-8 SLC90-xxx: 8.08 E-9 xxx = each protection field length; for unspecified protection field length, use the next higher protection field length with the same resolution. SLC-n, n=2,3,4: 7.27E-9 The PFHd values specified apply up to the maximum ambient temperature
Performance Level	PL e (in accordance with ISO 13849-1)
Category	4 (in accordance with EN ISO 13849-1)
Type	4 (in accordance with EN 61496-1)
Life time	20 a
B10D value (Relay OSSD version) DC -13, 24 V I = 2 A I ≤ 1 A	: 200,000 switching cycles : 2,000,000 switching cycles For additional values see OSSD outputs

Conformity

Functional safety	ISO 13849-1
Product standard	EN 61496-1 ; IEC 61496-2

Approvals and Certificates

CE conformity	CE
UL approval	cULus Listed
CCC approval	CCC approval / marking not required for products rated ≤36 V
TÜV approval	TÜV

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Protection Field

Model	Obstacle size / resolution [mm]	Protection field height / selection range [mm]	Grid [mm]	Protection field width [m]
SLC14	14	150 ... 1800	150	0.2 ... 5
SLC30	30	150 ... 1800	150	0.2 ... 15
SLC60	60	300 ... 1800	300	0.2 ... 15
SLC90	90	600 ... 1800	300	0.2 ... 15
	Number of beams			
SLC2	2			0.2 ... 20
SLC3	3			0.2 ... 20
SLC4	4			0.2 ... 20

Inputs on the Receiver

Reset		
NO contact	Actuation current	10 mA
	Switching voltage	24 VDC
	Actuation time	0.03 s ... 1 s
Startup enable		
	Actuation current	10 mA
	Switching voltage	24 VDC
	Actuation time	0.03 s ... 1 s

Outputs on the Receiver

OSSD		
PNP semiconductor	Electrically isolated, monitored for short and crossed circuits, p-switching (24 V)	
	U_{OSSD}, potential-free	24 VDC
	Switching voltage	ON: U_{OSSD} - 2 V OFF: U_{OSSD} < 1 V
	Switching current	ON: max. 0.5 A OFF: < 5 µA
	Load inductance (max.)	1.0 H
	Load capacitance (max.)	220 nF

Note!

The outputs are permanently monitored by short (80 µs) sampling pulses. You must ensure that this has no effect on the following circuit.

The upstream power supply for an SLC with semiconductor outputs must be capable of withstanding power failures of up to 20 ms.

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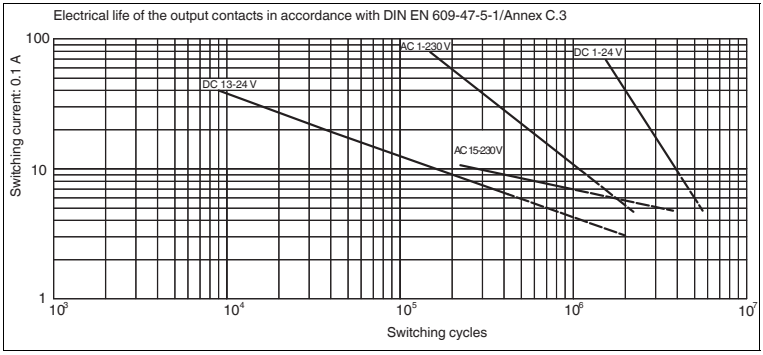
Outputs on the Receiver

OSSD		
Relay	Potential-free NO contact	
	Max. switching voltage	50 V
	Max. switching current	2 A
	Max. switching frequency	1 Hz

Switching Capacity



The power supply connection must guarantee secure isolation (SELV/PELV).

Outputs on the Receiver

Signaling outputs		
PNP semiconductor	Short-circuit protected	
	Max. switching current	0.1 A
	OSSDs status (active = OSSDs ON) Ready to start (in event of a fault, switches on and off at a frequency of 1 Hz)	

Supply Voltage

Transmitter	24 VDC -30 %/+25 %; 24 VAC -20 %/+15 %
Receiver	
PNP semiconductor	24 VDC -30 %/+25 %
Relay	24 VDC -15 %/+25 %; 24 VAC -20 %/+15 %

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Warning!
Current circuits

Current circuits that are influenced by the OSSD contacts must be protected by a max. 2 A slow-blow fuse in order to prevent the relay contacts from welding together in the event of a short circuit or high switching currents.

For inductive loads, the output contacts must be protected against the resulting increased load by RC combinations or free-wheeling diodes. The circuitry must be provided by the consumer.

When using free-wheeling diodes, ensure that the fall times of the connected relays or contactors are extended.

Current Consumption at 24 VDC

Transmitter	≤ 100 mA
Receiver	≤ 150 mA (without load)

Power consumption

Transmitter	3 W
Receiver	4.5 W

Light type

Transmitter	Infrared (880 nm)
LED risk group designation	Free group in accordance with DIN EN 62471

Immunity to Extraneous Light

Receiver	In accordance with IEC 61496-2

Ambient conditions

Operating temperature	0 °C ... +55 °C
Storage temperature	-25 °C ... +70 °C
Relative humidity	Max. 95 %, not condensing
Degree of protection	IP67

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Connection Type

Terminal Screw terminals	Max. cable cross-section		1 mm^2 with wire-end ferrule 1.5 mm^2 without wire-end ferrule	
	Alternative transmitter		Alternative receiver	
	Option	Type	Option	Type
	/60	M20, 7-pin	/60	M20, 7-pin
	/92	M12, 4-pin	/151	M12, 8-pin
Length of connection cable	Max. 50 m			
Length of slave connection cable	0.5 m			
Protection class	III, low protective voltage			

Housing

Transmitter and receiver	Aluminum profile, coated in yellow, RAL1021 Plastic cover Optional protective glass pane in front of plastic disc to protect against welding sparks

Dimensions of the SLC safety light curtains and safety light grids:

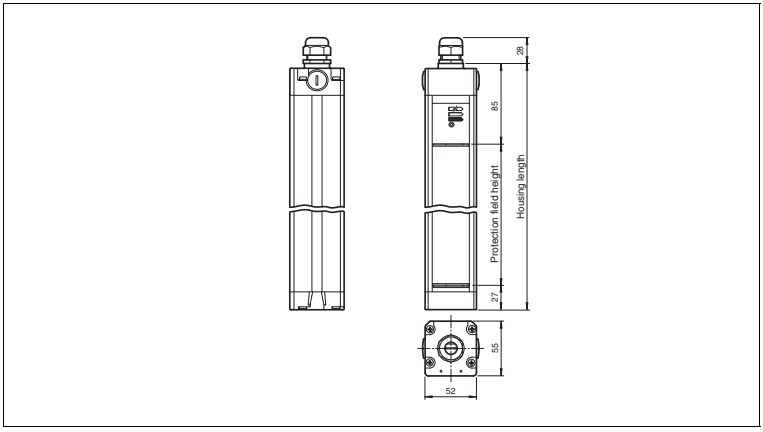

Figure 10.1 Dimensions of SLC safety light curtain (master)

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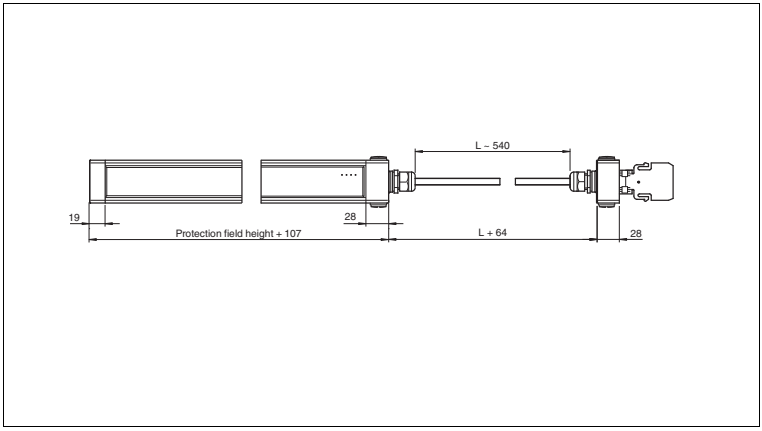

Figure 10.2 Dimensions of SLC safety light curtain (slave)

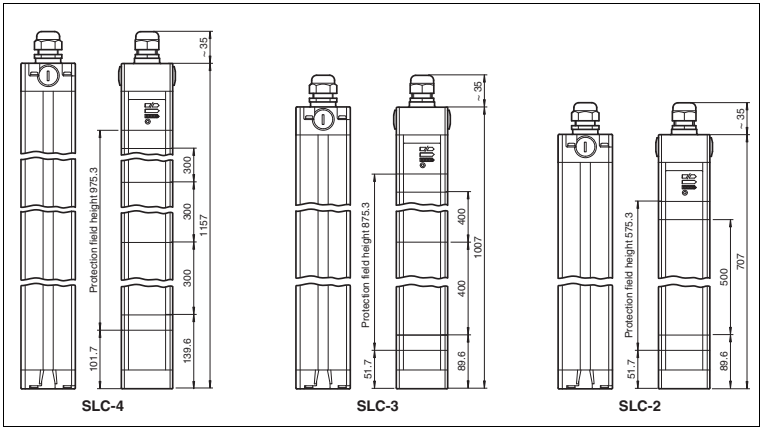

Figure 10.3 Dimensions of SLC safety light grid

- The housing cross-section is the same as an SLC safety light curtain → see Figure 10.1 on page 42.

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Overall length and weight

Protection field height [mm]	Overall length of the transmitter / receiver unit [mm]	Weight of transmitter / receiver unit [g]
SLC Safety Light Curtain		
150	260	750
300	410	1200
450	560	1650
600	710	2100
750	860	2550
900	1010	3000
1050	1160	3450
1200	1310	3900
1350	1460	4350
1500	1610	4800
1650	1760	5250
1800	1910	5700
SLC Safety Light Grid		
SLC-2	710	2100
SLC-3	1010	3000
SLC-4	1160	3450

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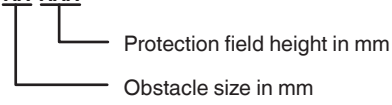
10.2 Ordering Information

SLC series safety light curtains

Designation Code

SLC-xx-xxx



Standard devices are equipped with a cable gland

The following devices deviate from this specification:
Option /31, relay OSSD (only specify for the receiver or the complete unit)
Option /60, M20 connection, 6-pin + PE
Option /92, M12 plug, 4-pin, metal, for transmitter only
Option /129, relay monitor instead of test
Option /130, reduced response time (max. 192 channels)
Option /151, M12 plug, 8-pin, metal

Example: SLC14-450-R/31
Receiver with relay OSSDs, obstacle size: 14 mm protection field height: 450 mm

Other marks:
-S Slave
-T Transmitter
-R Receiver

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All type codes for SLC safety light curtains with semiconductor outputs and cable gland

		Semiconductor output			Relay output (option /31)		
Obstacle size [mm]	Protection field height [mm]	Set	Transmitter (-T)	Receiver unit (-R)	Receiver unit (-R)	Transmitter (-T)	Receiver unit (-R)
14	150	SLC14-150	SLC14-150-T	SLC14-150-R	SLC14-150/31	Code same as transmitter for semiconductor output	SLC14-150-R/31
	300	SLC14-300	SLC14-300-T	SLC14-300-R	SLC14-300/31		SLC14-300-R/31
	450	SLC14-450	SLC14-450-T	SLC14-450-R	SLC14-450/31		SLC14-450-R/31
	600	SLC14-600	SLC14-600-T	SLC14-600-R	SLC14-600/31		SLC14-600-R/31
	750	SLC14-750	SLC14-750-T	SLC14-750-R	SLC14-750/31		SLC14-750-R/31
	900	SLC14-900	SLC14-900-T	SLC14-900-R	SLC14-900/31		SLC14-900-R/31
	1050	SLC14-1050/130	SLC14-1050-E/130	SLC14-1050-R/130	SLC14-1050/31/130		SLC14-1050-R/31/130
	1200	SLC14-1200/130	SLC14-1200-T/130	SLC14-1200-R/130	SLC14-1200/31/130		SLC14-1200-R/31/130
	1350	SLC14-1350/130	SLC14-1350-T/130	SLC14-1350-R/130	SLC14-1350/31/130		SLC14-1350-R/31/130
	1500	SLC14-1500/130	SLC14-1500-T/130	SLC14-1500-R/130	SLC14-1500/31/130		SLC14-1500-R/31/130
	1650	SLC14-1650/130	SLC14-1650-T/130	SLC14-1650-R/130	SLC14-1650/31/130		SLC14-1650-R/31/130
	1800	SLC14-1800/130	SLC14-1800-T/130	SLC14-1800-R/130	SLC14-1800/31/130		SLC14-1800-R/31/130

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		Semiconductor output			Relay output (option /31)		
Obstacle size [mm]	Protection field height [mm]	Set	Transmitter (-T)	Receiver unit (-R)	Receiver unit (-R)	Transmitter (-T)	Receiver unit (-R)
30	150	SLC30-150	SLC30-150-T	SLC30-150-R	SLC30-150/31	Code same as transmitter for semiconductor output	SLC30-150-R/31
	300	SLC30-300	SLC30-300-E	SLC30-300-R	SLC30-300/31		SLC30-300-R/31
	450	SLC30-450	SLC30-450-T	SLC30-450-R	SLC30-450/31		SLC30-450-R/31
	600	SLC30-600	SLC30-600-T	SLC30-600-R	SLC30-600/31		SLC30-600-R/31
	750	SLC30-750	SLC30-750-T	SLC30-750-R	SLC30-750/31		SLC30-750-R/31
	900	SLC30-900	SLC30-900-E	SLC30-900-R	SLC30-900/31		SLC30-900-R/31
	1050	SLC30-1050	SLC30-1050-E	SLC30-1050-R	SLC30-1050/31		SLC30-1050-R/31
	1200	SLC30-1200	SLC30-1200-T	SLC30-1200-R	SLC30-1200/31		SLC30-1200-R/31
	1350	SLC30-1350	SLC30-1350-T	SLC30-1350-R	SLC30-1350/31		SLC30-1350-R/31
	1500	SLC30-1500	SLC30-1500-T	SLC30-1500-R	SLC30-1500/31		SLC30-1500-R/31
	1650	SLC30-1650	SLC30-1650-T	SLC30-1650-R	SLC30-1650/31		SLC30-1800-R/31
	1800	SLC30-1800	SLC30-1800-T	SLC30-1800-R	SLC30-1800/31		SLC30-150-R/31
60	300	SLC60-300	SLC60-300-T	SLC60-300-R	SLC60-300/31	Code same as transmitter for semiconductor output	SLC60-300-R/31
	600	SLC60-600	SLC60-600-T	SLC60-600-R	SLC60-600/31		SLC60-600-R/31
	900	SLC60-900	SLC60-900-T	SLC60-900-R	SLC60-900/31		SLC60-900-R/31
	1200	SLC60-1200	SLC60-1200-T	SLC60-1200-R	SLC60-1200/31		SLC60-1200-R/31
	1500	SLC60-1500	SLC60-1500-E	SLC60-1500-R	SLC60-1500/31		SLC60-1500-R/31
	1800	SLC60-1800	SLC60-1800-T	SLC60-1800-R	SLC60-1800/31		SLC60-1800-R/31

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		Semiconductor output			Relay output (option /31)		
Obstacle size [mm]	Protection field height [mm]	Set	Transmitter (-T)	Receiver unit (-R)	Receiver unit (-R)	Transmitter (-T)	Receiver unit (-R)
90	600	SLC90-600	SLC90-600-T	SLC90-600-R	SLC90-600/31	Code same as transmitter for semiconductor output	SLC90-600-R/31
	900	SLC90-900	SLC90-900-T	SLC90-900-R	SLC90-900/31		SLC90-900-R/31
	1200	SLC90-1200	SLC90-1200-T	SLC90-1200-R	SLC90-1200/31		SLC90-1200-R/31
	1500	SLC90-1500	SLC90-1500-T	SLC90-1500-R	SLC90-1500/31		SLC90-1500-R/31
	1800	SLC90-1800	SLC90-1800-T	SLC90-1800-R	SLC90-1800/31		SLC90-1800-R/31

All type codes for SLC safety light curtains - slaves

Obstacle size [mm]	Protection field height [mm]	Set	Transmitter unit (-T)	Receiver unit (-R)
14	150	SLC14-150-S	SLC14-150-T-S	SLC14-150-R-S
	300	SLC14-300-S	SLC14-300-T-S	SLC14-300-R-S
	450	SLC14-450-S	SLC14-450-T-S	SLC14-450-R-S
	600	SLC14-600-S	SLC14-600-T-S	SLC14-600-R-S
	750	SLC14-750-S	SLC14-750-T-S	SLC14-750-R-S
30	150	SLC30-150-S	SLC30-150-T-S	SLC30-150-R-S
	300	SLC30-300-S	SLC30-300-T-S	SLC30-300-R-S
	450	SLC30-450-S	SLC30-450-T-S	SLC30-450-R-S
	600	SLC30-600-S	SLC30-600-T-S	SLC30-600-R-S
	750	SLC30-750-S	SLC30-750-T-S	SLC30-750-R-S
	900	SLC30-900-S	SLC30-900-T-S	SLC30-900-R-S
	1050	SLC30-1050-S	SLC30-1050-T-S	SLC30-1050-R-S
	1200	SLC30-1200-S	SLC30-1200-T-S	SLC30-1200-R-S
	1350	SLC30-1350-S	SLC30-1350-T-S	SLC30-1350-R-S
	1500	SLC30-1500-S	SLC30-1500-T-S	SLC30-1500-R-S
	1650	SLC30-1650-S	SLC30-1650-T-S	SLC30-1650-R-S
60	300	SLC60-300-S	SLC60-300-T-S	SLC60-300-R-S
	600	SLC60-600-S	SLC60-600-T-S	SLC60-600-R-S
	900	SLC60-900-S	SLC60-900-T-S	SLC60-900-R-S
	1200	SLC60-1200-S	SLC60-1200-T-S	SLC60-1200-R-S
	1500	SLC60-1500-S	SLC60-1500-T-S	SLC60-1500-R-S
	1800	SLC60-1900-S	SLC60-1800-T-S	SLC60-1800-R-S

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Obstacle size [mm]	Protection field height [mm]	Set	Transmitter unit (-T)	Receiver unit (-R)
90	600	SLC90-600-S	SLC90-600-T-S	SLC90-600-R-S
	900	SLC90-900-S	SLC90-900-T-S	SLC90-900-R-S
	1200	SLC90-1200-S	SLC90-1200-T-S	SLC90-1200-R-S
	1500	SLC90-1500-S	SLC90-1500-T-S	SLC90-1500-R-S
	1800	SLC90-1800-S	SLC90-1800-T-S	SLC90-1800-R-S

Note!

A test rod matching the resolution is supplied with each complete SLC14, SLC30, and SLC60 light curtain.

SLC series safety light grid

Designation Code

SLC-x

Number of beams 2, 3, 4

When ordering individual components add the following ending:
Receiver unit -R
Transmitter unit -T
/31 Option relay-OSSD (state only by the receiving unit or complete unit)

Example: SLC-3/31
Light grid complete, number of beams 3, relay output (Option /31)

All type codes for SLC safety light grids with cable gland

Number of beams	Beam gap [mm]	Semiconductor output			Relay output (option /31)		
		Complete	Transmitter (-T)	Receiver unit (-R)	Complete	Transmitter (-T)	Receiver unit (-R)
2	500	SLC-2	SLC-2-T	SLC-2-R	SLC-2/31	SLC-2-T	SLC-2-R/31
3	400	SLC-3	SLC-3-T	SLC-3-R	SLC-3/31	SLC-3-T	SLC-3-R/31
4	300	SLC-4	SLC-4-T	SLC-4-R	SLC-4/31	SLC-4-T	SLC-4-R/31

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10.3 Response Times

The device response time is shown on the rating plate. The values for devices with a semiconductor output are listed in the table below by way of a guideline for determining the proper safety equipment. Add 20 ms for devices with a relay output (option /31).

Number of beams and response times of SLC series safety light curtains classified according to obstacle size
*** only with option /130**

Protection field height [mm]	SLC14-...		SLC30-...		SLC60-...		SLC90-...	
	Number of beams	Response time [ms]	Number of beams	Response time [ms]	Number of beams	Response time [ms]	Number of beams	Response time [ms]
150	16	10	8	10				
300	32	14	16	10	8	10		
450	48	18	24	12				
600	64	22	32	14	16	10	8	10
750	80	26	40	16				
900	96	30	48	18	24	12	12	10
1050	112	22*	56	20				
1200	128	25*	64	22	32	14	16	10
1350	144	28*	72	24				
1500	160	31*	80	26	40	16	20	11
1650	176	34*	88	28				
1800	192	36*	96	30	48	18	24	12

Response Times of Cascading Units

If cascading units are used, the response time of the entire safety equipment system, i.e., master and slave, must be determined. The overall number of beams for master and slave can be determined from the table. Depending on the type of output, the table lists the corresponding response time. The type label must show the same response time as determined in this manner.

Response times of cascading safety light curtains depending on the number of beams and classified according to type of output

Number of beams	Response time [ms]		
	Semiconductor output	Relay output	
8	10	30	
16	10	30	

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Number of beams	Response time [ms]		
24	12	32	
32	14	34	
40	16	36	
48	18	38	
56	20	40	
64	22	42	
72	24	44	
80	26	46	
88	28	48	
96	30	50	

Example calculation:

Master	SLC14-300/31	32 beams
Slave	SLC60-900-S	24 beams

32 + 24 beams = **56 beams**

56 beams coupled with a relay OSSD have a response time of **40 ms**.

Response times of safety light grids (2 to 4-beam protective equipment)

The response times are:

for equipment with a semiconductor output:	10 ms
for equipment with a relay output /31:	30 ms

Response times of safety light curtains with reduced response times (option /130) classified according to number of beams and type of output

Number of beams	Response time [ms]		
	Semiconductor output	Relay output	
8	6	26	
16	6	26	
24	8	28	
32	9	29	
40	10	30	
48	12	32	
56	13	33	
64	14	34	
72	15	35	
80	17	37	

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Number of beams	Response time [ms]		
88	18	38	
96	19	39	
104	21	41	
112	22	42	
120	24	44	
128	25	45	
136	26	46	
144	28	48	
152	30	50	
160	31	51	
168	33	53	
176	34	54	
184	35	55	
192	36	56	

Example calculation:

Master	SLC14-300/31/130	32 beams
Slave	SLC60-900-S	24 beams

32 + 24 beams = **56 beams**

56 beams coupled with a relay OSSD option /130 have a response time of **33 ms**.

10.4 Periodic Checks

The test intervals and test scope of the periodic checks are determined according to the particular application of the safety equipment.

Warning!
Devices with a relay OSSD must be periodically checked to see whether the output relays switch off.

Ensure that the transmitter/receiver is switched on at least once per day.

Ensure that the protection is interrupted at least once every day.

If this is not guaranteed, perform the following test every day.

Daily Check

1. Make sure the protection field is clear.
2. Confirm the startup enable.
3. Interrupt the protection field inside the protection field area using the test rod (corresponding to size of obstacle for SLC14, 30, 60).

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4. Check the entire protection field height in several places, especially in front of the transmitter and receiver.

   ↳ The OSSD outputs switch off.

5. Slowly move the test rod through the protection field and watch the displays on the receiver while doing so.

   ↳ If the start/restart interlock is activated, the yellow ready to start indicator must **not** come on. If the start/restart interlock is deactivated, the green status indicator of the OSSD display must **not** come on.

Note!

After the protection field area has been cleared, the outputs must switch back to the ON state if the start/restart interlock is **deactivated**.

Note!

Once the protection field area has been cleared, the OSSD outputs must switch back to the ON state if the start/restart interlock is **activated**.

Note!

The device must be included in any general checks on machine safety functions. This includes checking for proper alignment and installation. In addition, adherence to the required response times must be tested.

10.5 Application Checklist

A list of important points should help you avoid errors when planning, setting up, and using the protective equipment. This application checklist is not complete and must be modified to suit each specific application.

Note!

Observing Applicable Standards and Laws

The relevant laws and standards that apply to the use of opto-electronic safety devices must be followed. There are differences depending on the area of use.

Before installation

- Have all the applicable standards and regulations been observed?
- Does the technical data of the SLC meet the requirements of the application? (E.g., resolution, protection field height, operating voltage)
- Is the overvoltage category required by EN 50178 met in the receiver unit connections?
- Is there enough space for fitting and dismounting components?
- Are the distances between the protection field and the hazardous area as well as the reflective surfaces maintained as required?

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After installation

- Is the startup enable input connected when the startup/restart interlock is activated?
- Is the ready to start signal lamp connected?
- Is the test input connected?
- Is the red/green indicator for signaling the status of the OSSD outputs in a visible location?
- Are all components correctly connected?
- Has the SLC been positioned so that the protection field cannot be bypassed and people cannot enter the hazardous area undetected?
- Has the SLC been configured?
- Have the necessary safety distances been maintained?
- Are there fuses in the OSSD current circuits that prevent the contacts from welding together when using an SLC with a relay contact output?

Commissioning

- Has the detection capability of the SLC been tested over the entire protection field height using the test rod? This test should take place at multiple locations and at least once in front of the transmitter and receiver as well as in the middle of the protection field.
- Do the OSSD switch outputs trigger the requisite stop?
- Has the response time been checked?

Periodic check

- Have the requisite test steps and test intervals been determined?
- Is the protection field interrupted at least four times each working day, the system switched on and the test button pressed in order to test the switch off function of the safety system?
- Is the detection capability of the SLC tested regularly over the entire protection field height using the test rod?
- Are the response times checked at regular intervals?
- Is all machine safety equipment inspected at the required intervals?
- Are all inspections documented?

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10.6 Accessories

10.6.1 Mounting Bracket

Order code: MS SLC

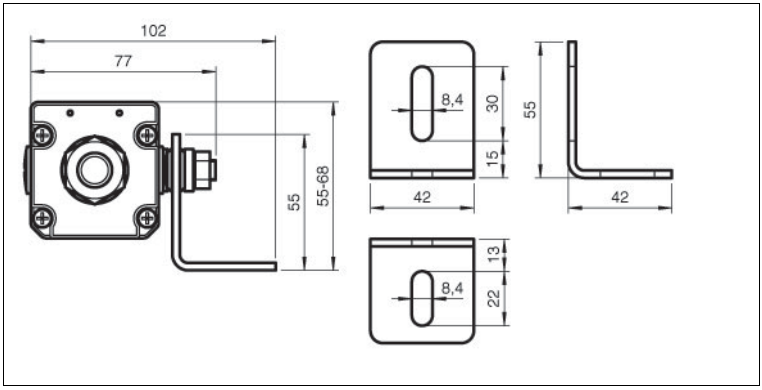

Figure 10.4 MS SLC mounting bracket

The transmitter/sender unit and slaves can also be secured using mounting brackets. The mounting bracket shown allows the unit to be rotated about the longitudinal axis by at least ± 5°. When attaching and aligning the unit, avoid subjecting the profile to mechanical tension.

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10.6.2 Test Rod for SLC14, 30, 60

Test rods are used to check the detection capability of safety light curtains. They must be kept next to the safety light curtain. At prescribed regular intervals, the protection field must be tested over its entire height and the results must be logged.

Order code: TR 14/30/50/60

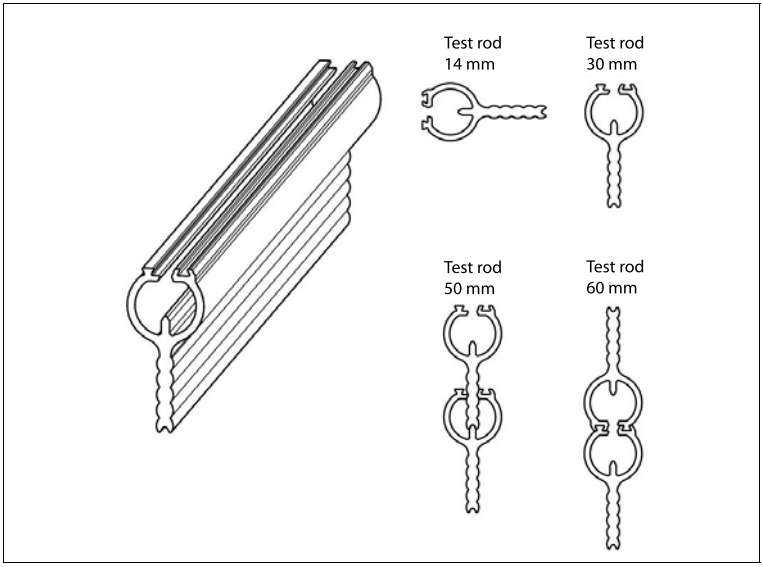

Figure 10.5 TR 14/30/50/60 test rod

10.6.3 Protective Glass

It may be necessary to use protective glass to protect the working optical surfaces of the safety light curtain (for use with welding robots to guard against sparks). SLC protective glass holders are required to fit the protective glass. An SLC protective glass holder comprises two brackets including screws and nuts. An SLC protective glass consists of two glass panels (one each for the transmitter and receiver). The protective glasses are segmented for protection field heights of 1050 mm or greater.

We recommend that the brackets are attached at the ends of the profile where possible.

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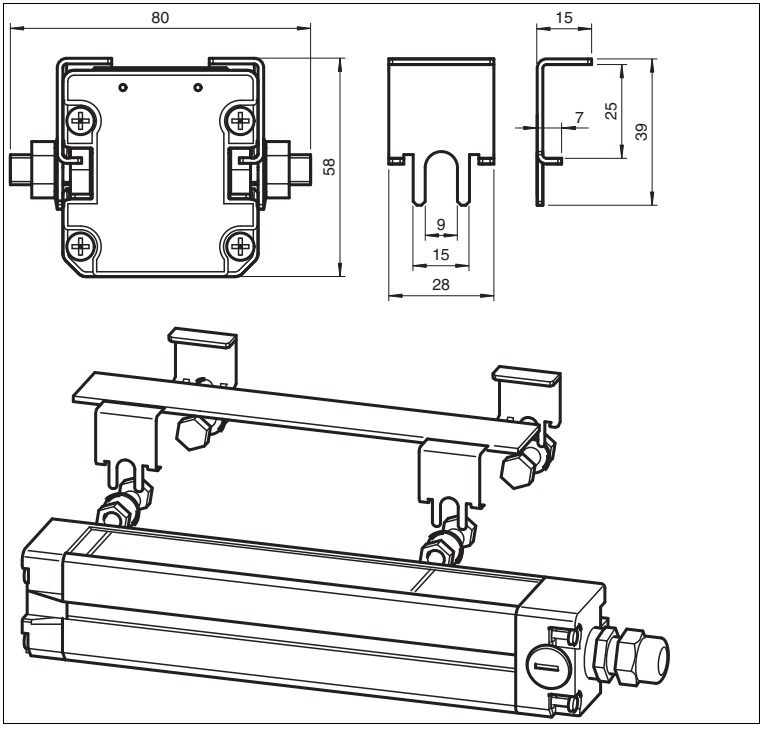

Figure 10.6 Fitting the protective glass

Protective Glass for SLC Safety Light Curtains and Safety Light Grids

Protection field height/mm	Protective glass order code	Number of SLC protective glass holder PG brackets
150	PG SLC-150	4
300	PG SLC-300	4
450	PG SLC-450	4
600	PG SLC-600	4
750	PG SLC-750	4
900	PG SLC-900	4
1050	PG SLC-1050	8
1200	PG SLC-1200	8
1350	PG SLC-1350	8
1500	PG SLC-1500	8
1650	PG SLC-1650	8
1800	PG SLC-1800	8

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10.6.4 Lateral Cable Gland

The TC SLC lateral cable gland comprises:

- Two M16 cable glands
- Dummy plugs for M20 cable glands

Model number: TC SLC

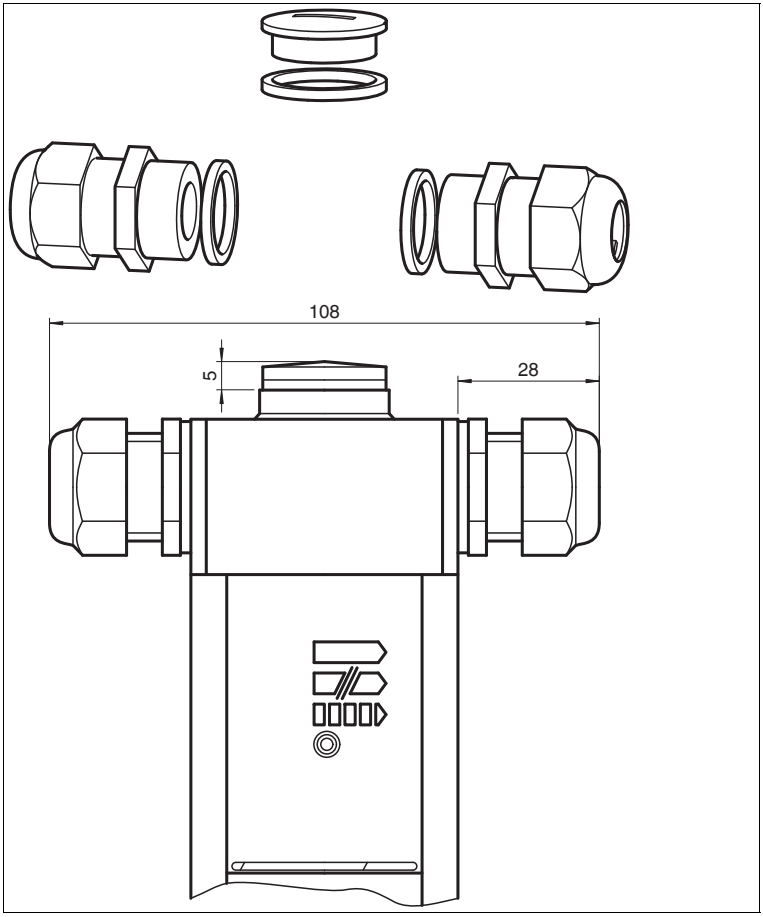

Figure 10.7 Mounting an additional lateral cable gland

10.6.5 Deviation Mirror

Deviation mirrors are used for protecting hazardous areas on more than one side when using Pepperl+Fuchs safety light curtains or grids. The type of mirror to be used depends on the protection field height or the number of beams and the detection range.

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Mirror for SLC safety light curtain

Deviation Mirror Order Codes

Order code	Mirror height H	Housing length L
SLC-350-M	350 mm	406 mm
SLC-500-M	500 mm	556 mm
SLC-800-M	800 mm	856 mm
SLC-1000-M	1000 mm	1056 mm
SLC-1300-M	1300 mm	1356 mm
SLC-1600-M	1600 mm	1656 mm

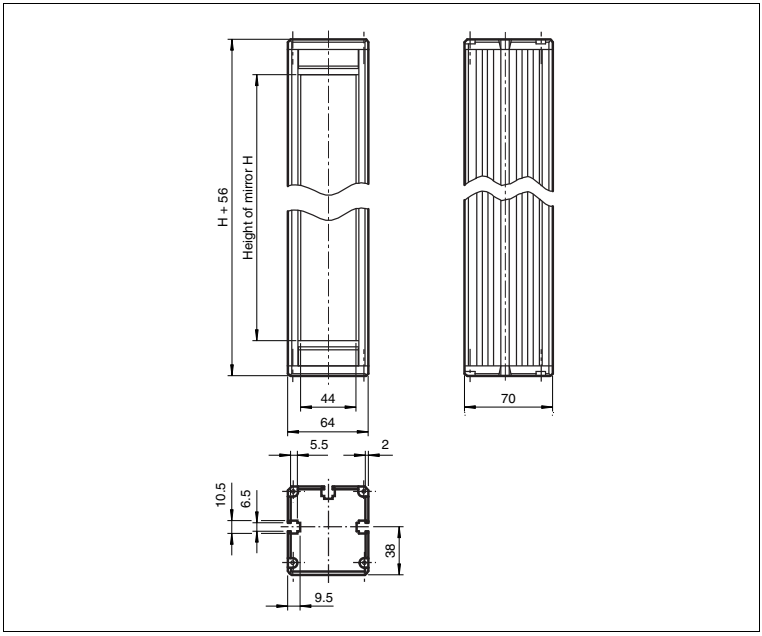

Figure 10.8 SLC deviation mirror

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Mirror for SLC safety light grid (2-, 3-, 4-beam)

Order codes for mirrors for SLP and SLC (2, 3 and 4-beam)

Number of beams	Deviation mirror order codes	
	Sensing range < 15 m	Sensing range > 15 m
2	SLP-2-M	SLC-800-M
3	SLP-3-M	SLC-1000-M
4	SLP-4-M	SLC-1000-M

Note!

When determining the sensing range, remember to take into account that the light path length increases by 15 % for each mirror used.

Example

SLC-2 with one deviation mirror

Distance between transmitter and mirror = 6 m

Distance between receiver and mirror = 8 m

Real length = 6 m + 8 m = 14 m

Range = real length + 15 % = 14 m * 1.15 = **16.10 m**

An **SLC-800-M** must be used as the deviation mirror.

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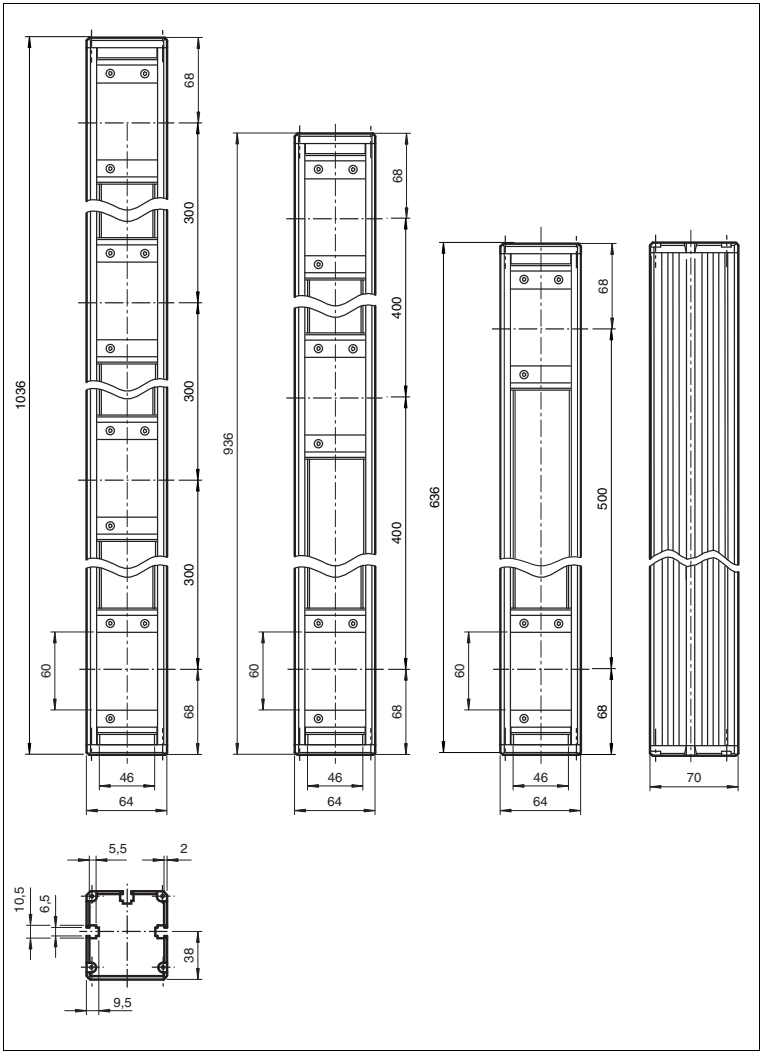

Figure 10.9 SLP and SLC mirrors (2-, 3- and 4-beam)

10.6.6 Alignment Aids

PA SLP/SLC Profile Alignment Aid

The PA SLP/SLC profile alignment aid is exceptionally well suited to aligning SLC safety light curtains or SLC safety light grids both vertically and horizontally.

Order code: PA SLP/SLC

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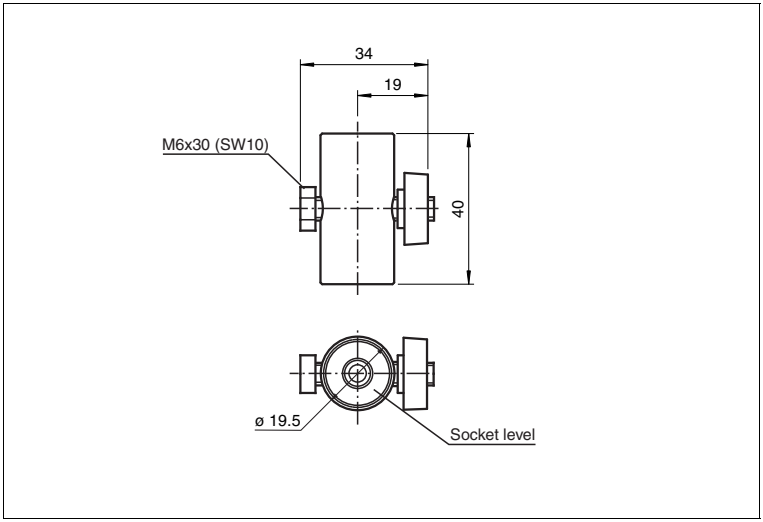

Figure 10.10 PA SLP/SLC profile alignment aid

BA SLC Beam Alignment Aid

BA SLC beam alignment aid for SLC safety light grids and SLC safety light curtains.

The basic device and profile adapter are included with the delivery.

Dimensions: L = 131 mm

Order code: BA SLC

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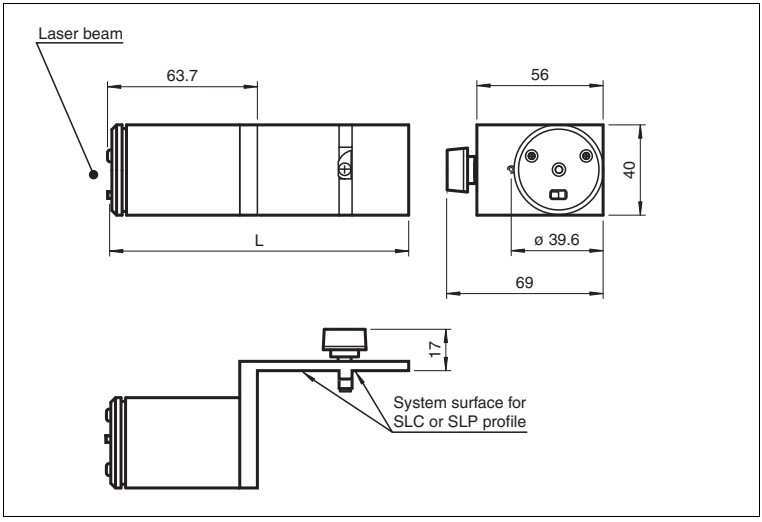

Figure 10.11 BA SLC beam alignment aid

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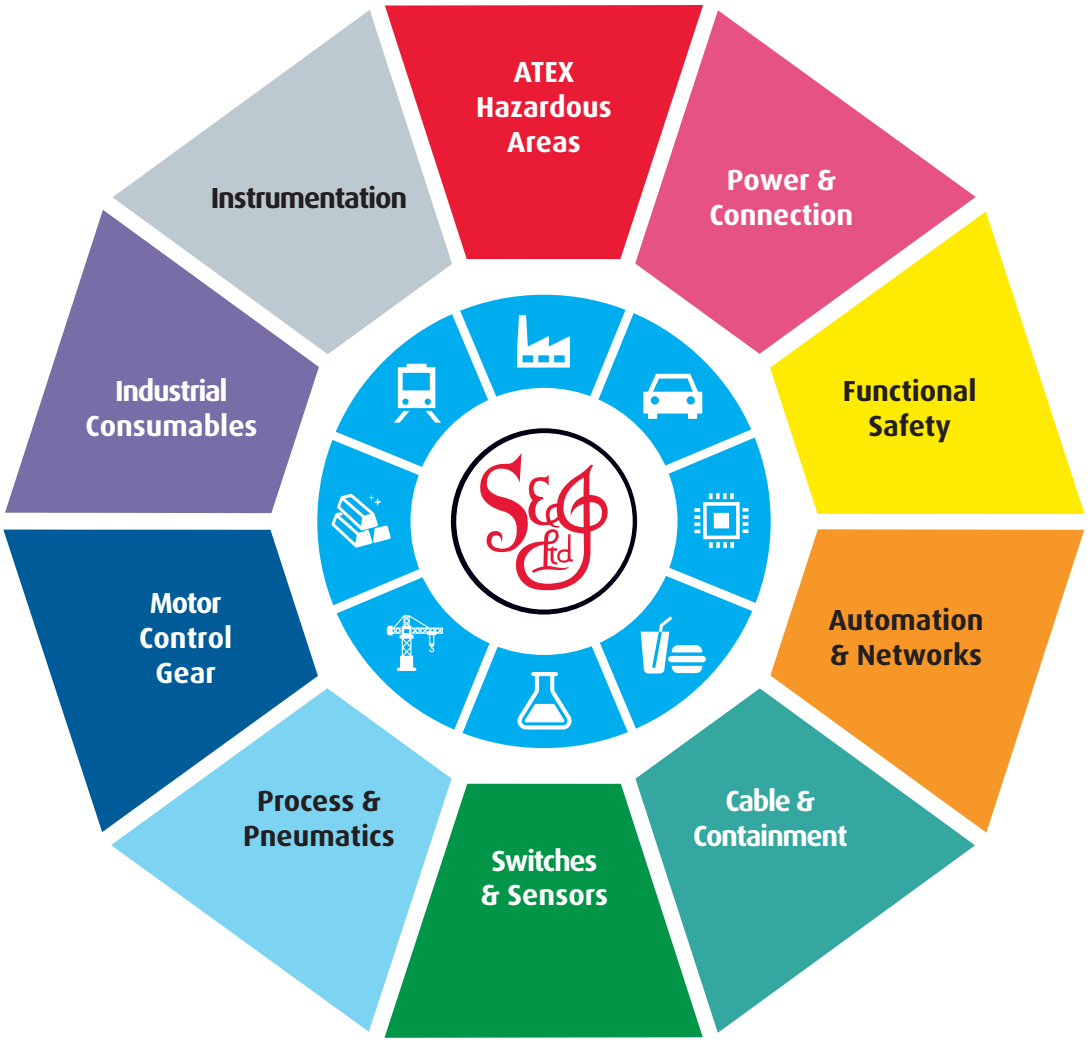

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