

# SLP/SLPC and SLP/SLPCM safety light grids

Original Instructions



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With regard to the supply of products, the current issue of the following document is applicable: The General Terms of Delivery for Products and Services of the Electrical Industry, published by the Central Association of the Electrical Industry (Zentralverband Elektrotechnik und Elektroindustrie (ZVEI) e.V.) in its most recent version as well as the supplementary clause: "Expanded reservation of proprietorship"

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<b>1</b>	<b>Introduction.....</b>	<b>5</b>
<b>2</b>	<b>Declaration of conformity .....</b>	<b>6</b>
2.1	Declaration of Conformity.....	6
<b>3</b>	<b>Safety .....</b>	<b>7</b>
3.1	Symbols relevant to safety .....	7
3.2	Intended use .....	7
3.3	General Safety Information.....	7
<b>4</b>	<b>Product Description .....</b>	<b>9</b>
4.1	Use and Application .....	9
4.1.1	Layout.....	10
4.2	Indicators and Operating Controls .....	11
4.3	Interfaces and connections .....	12
4.3.1	SLPC(M) Terminal Compartment.....	12
4.3.2	SLPCM Front Connections .....	13
4.3.3	Muting light connection/light socket (only for SLPCM...-L...).....	15
4.3.4	Connections of the SLP Emitter .....	15
4.4	Scope of Delivery.....	16
<b>5</b>	<b>Installation.....</b>	<b>17</b>
5.1	Preparation.....	17
5.2	Mounting.....	19
5.3	Operating Modes .....	20
5.3.1	Startup/restart interlock (restart) .....	22
5.3.2	Relay monitor.....	22
5.3.3	Muting (SLPCM) .....	22
5.3.3.1	Evaluating the Muting Sensors through Parallel or Sequential Muting.....	22
5.3.3.2	Muting monitoring with time window limiting or protective beam limited muting .....	24
5.3.3.3	Muting sensors .....	25
5.3.3.4	Muting Lamp .....	25
5.3.3.5	Emergency muting (only with SLPCM).....	26
<b>6</b>	<b>Commissioning.....</b>	<b>27</b>
6.1	Adjusting Safety Beams.....	27
6.2	Layout with adjustable mirrors.....	27
6.3	Function Test .....	27
<b>7</b>	<b>Maintenance and Repair .....</b>	<b>29</b>

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<b>7.1</b>	<b>Maintenance .....</b>	<b>29</b>
<b>7.2</b>	<b>Repairs .....</b>	<b>29</b>
<b>8</b>	<b>Troubleshooting .....</b>	<b>30</b>
<b>9</b>	<b>Appendix.....</b>	<b>31</b>
<b>9.1</b>	<b>Technical Data .....</b>	<b>31</b>
<b>9.2</b>	<b>Dimensional drawing.....</b>	<b>34</b>
<b>9.3</b>	<b>Designation Code .....</b>	<b>35</b>
<b>9.4</b>	<b>Periodic checks.....</b>	<b>37</b>
<b>9.5</b>	<b>Accessories .....</b>	<b>38</b>
<b>9.5.1</b>	<b>SLP mounting set .....</b>	<b>38</b>
<b>9.5.2</b>	<b>Adjustable mirror .....</b>	<b>38</b>
<b>9.5.3</b>	<b>Protective glass .....</b>	<b>40</b>
<b>9.5.4</b>	<b>SLP profile alignment aid .....</b>	<b>40</b>
<b>9.5.5</b>	<b>SLP laser alignment aid.....</b>	<b>41</b>
<b>9.5.6</b>	<b>Connection Cables.....</b>	<b>41</b>
<b>9.5.7</b>	<b>Cable fastener.....</b>	<b>41</b>
<b>9.6</b>	<b>Typical circuits .....</b>	<b>42</b>
<b>9.7</b>	<b>Application Checklist .....</b>	<b>43</b>

# 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 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:

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## Symbols used

The following symbols are used in this manual:



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### Note

This symbol draws your attention to important information.

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### Handling instructions

You will find handling instructions beside this symbol

## 2 Declaration of conformity

### 2.1 Declaration of Conformity

All products were developed and manufactured under observance of the applicable European standards and guidelines.



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#### Note

A declaration of conformity can be requested from the manufacturer.

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



## 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 SLP/SLPC(M) series safety light grid consists of a receiver unit with integrated SLPC or SLPCM evaluation and a matching SLP.-T safety photoelectric transmitter. Essentially, the unit is a multibeam photoelectric protective device that forms protective beams between the transmitter and the receiver. This system may be used only in accordance with its intended purpose as noncontact safety equipment (NCSE) for preventing personnel from entering hazardous areas and dangerous locations. The available operating modes make it possible to operate the SLPCM with the muting function.

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.

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

If you open or modify the device yourself, not only are you endangering yourself and others, but you will void any warranty and the EC-type-examination certificate as well as absolving the manufacturer from any liability. If serious problems occur with the device, switch the device off. Make sure that the device cannot be switched back on accidentally. If the device needs to be repaired, it should be returned to Pepperl+Fuchs.



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**Note**

Avoid electrostatic discharge through unprotected contact with the modules.  
Components destroyed by electrostatic discharge will render the warranty null and void.

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**Note**

Observe the laws and guidelines applicable to the use or intended purpose. The device is only approved for appropriate and intended use. Ignoring these instructions will void any warranty and absolve the manufacturer from any liability.

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

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**Note****Disposal**

Electronic waste is hazardous. 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

- Self-monitoring
- Two to four safety beams
- Parallel and sequential muting (SLPCM)
- Muting restricted to time frame and safety (SLPCM)
- Emergency muting (override) for clearing material bottleneck (SLPCM)
- Selectable startup/restart interlock
- Selectable relay monitor (EDM)
- Red emitter light for easy adjustment of the light grid
- Function reserve indicator on each receiver
- Function reserve output (soiling indication)
- Diagnostic display for easy fault localization
- Easy to incorporate into the machine controller

#### Description

The SLPC(M)/SLP system is a type 4 (EN IEC 61496-1) and category 4 (EN ISO 13849-1) opto-electronic safety device.

The special features of the SLPC(M) are the adjustable start up/restart interlock (restart) and relay monitor operating modes. The SLPCM receiver unit also allows selection of a variety of muting operating modes. Muting makes it possible to purposefully bypass the protection field.

The SLPC(M) receiver generates transmitting pulses, that are conducted via a cable to the SLP light barrier emitter. The emitter generates 2, 3 or 4 light beams to suit the SLPC(M). These beams are received and evaluated by the SLPC(M). The offset of the safety beams complies with EN ISO 13855.

In the special active-passive light barrier version, SLPC(M)8-2-A, there is 1 emitter in the SLPC(M), which emits a beam that is deflected 180 ° by the SLP 8-2M mirror column into a second, returning safety beam and hits the receiver in the SLPC(M). In this case there is no SLP light beam emitter. The beam gap is 500 mm.

The light beams form a protection field. Interruptions of a light beam are detected by the receiver and the OSSDs are deactivated. The downstream equipment in the machine controller can respond by switching off the dangerous movement in the protected area. Depending on the type of light barriers, the detection range of the protective field can be 8 m, 10 m, 30 m or 65 m.



#### Note

If persons and objects (e.g., cartons, pallets, containers, etc.) use the same access to the hazardous area, the SLPCM can activate a number of muting operating modes if it is not intended to shut down the system while objects are being supplied. Muting with 2 or 4 muting sensors is possible.

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4.1.1 Layout

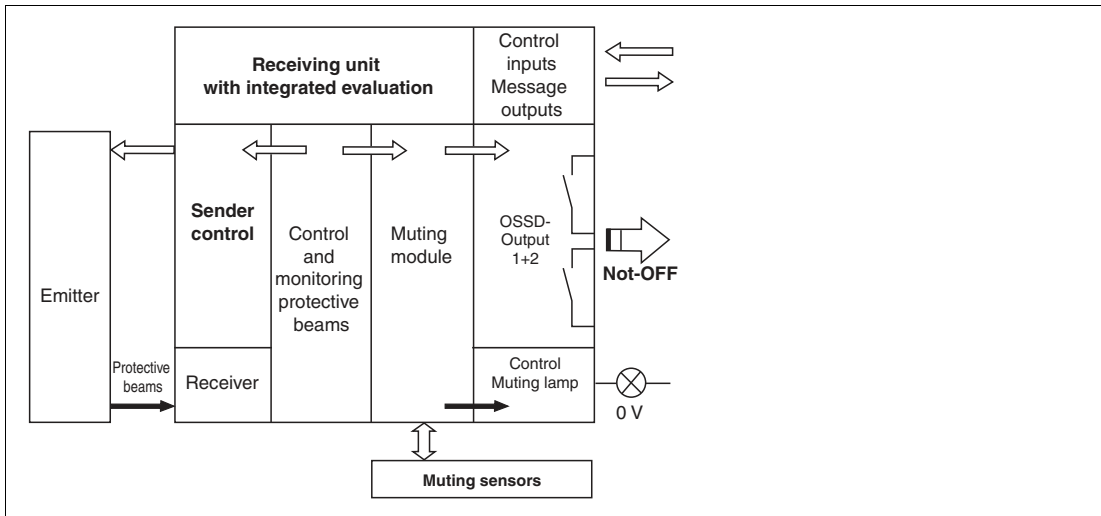


Figure 4.1 Representation of the SLP/SLPC (SLP/SLPCM) safety system

The SLP/SLPC (SLP/SLPCM) safety light grid consists of a receiver unit with integrated SLPC(M) evaluation and the SLP photoelectric sensor transmitter. The SLPC(M) receiver unit controls the SLP photoelectric sensor transmitter, receives its light, and evaluates interruptions in light beams and other safety signals. A mounting set consisting of a mounting bracket and assorted small components is available for installing the SLP photoelectric sensor transmitter and the SLPC(M) receiver unit. At least two mounting sets are required to fasten each unit in place. The units can be fastened directly into the grooves in the photoelectric sensor profile if the mounting equipment allows correct housing alignment.

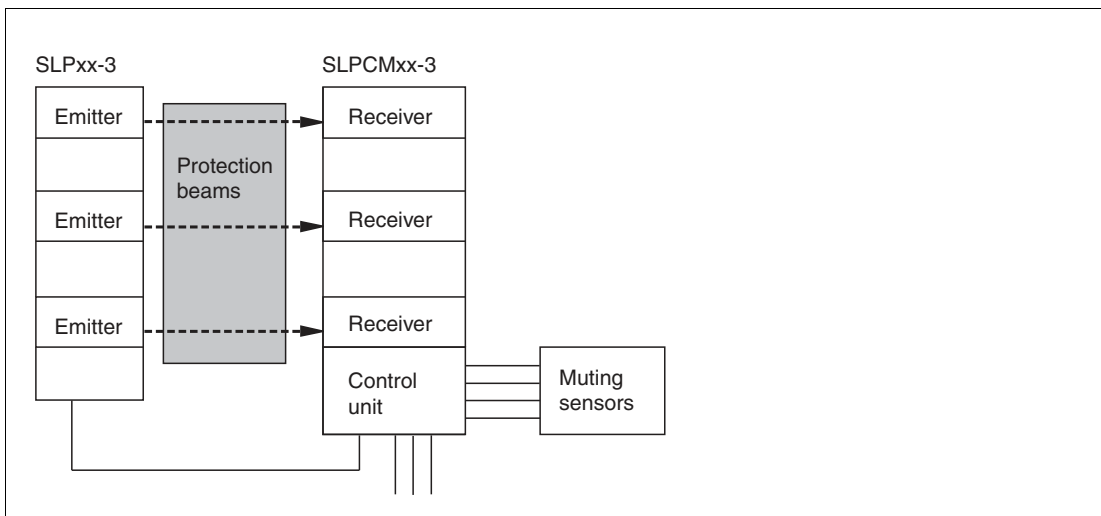


Figure 4.2 SLPCMxx-3 with SLP\*-3-T emitter

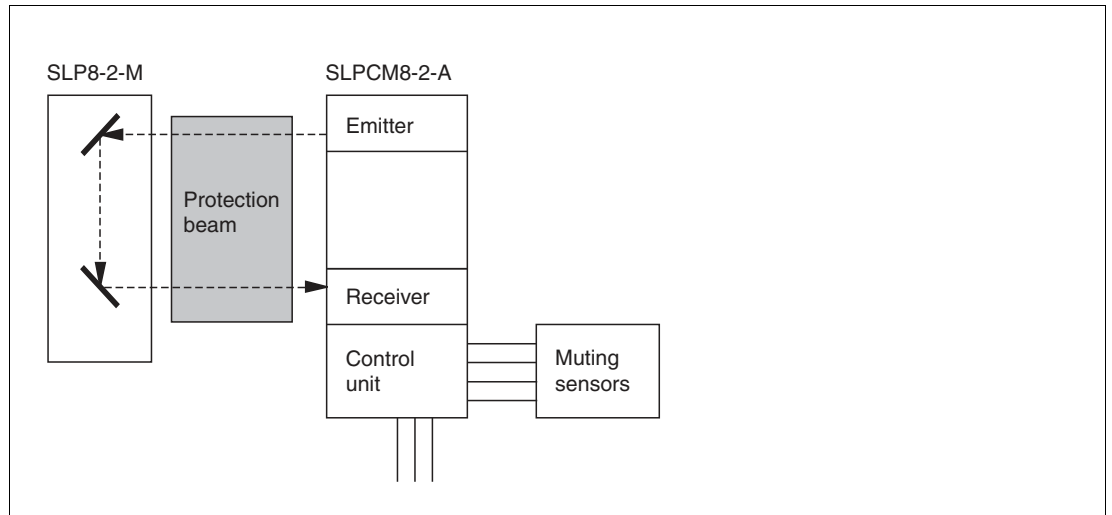


Figure 4.3 SLPCM8-2-A with adjustable mirror

## 4.2 Indicators and Operating Controls

The front panel of the SLPC(M) offers displays for the switching state of the OSSDs, the muting operating mode and status displays for indicating the operating status of the SLPC(M).

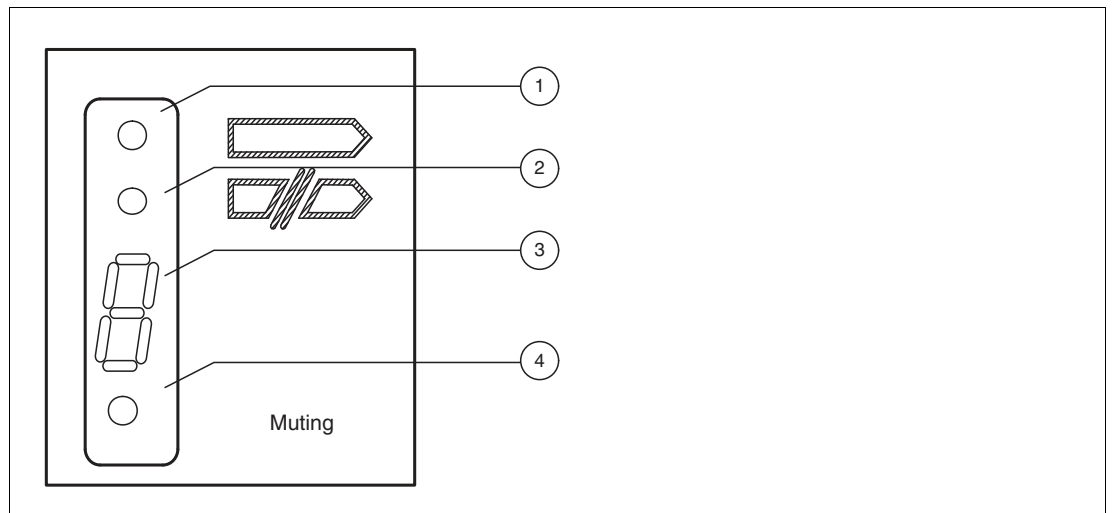


Figure 4.4 Illustration of the front panel

No.	Designation	LED Color	Description
1	LED	Green	OSSD outputs switched on
2	LED	Red	OSSD outputs switched off
3	Status		7-segment display
4	LED	Yellow	Only for SLPCM Muting operating mode selected, flashing: muting time error

Table 4.1 Displays on front panel









7-segment display	Description
	Protection field free, OSSD ON (continuous light)
	Protection field interrupted, OSSD OFF
	Protection field free, OSSD OFF, ready to start
	System error
	DIP switch setting faulty, semiconductor OSSD: supply voltage absent
	Short circuit in emitter connection
	Muting lamp faulty (only for SLPCM)
	External contactor fault (relay monitor)

Table 4.2 7-segment display

The ready to start output is activated if the receiver is awaiting a restart command. This is the case after being switched on or after an interruption of the safety beams. This output is also used for signaling a system fault. If a fault occurs, the output switches on and off (flashes) at a frequency of 1 Hz.

### 4.3 Interfaces and connections

The SLPC(M) receiver unit contains the following connection zones:

- Terminal compartment,
- Front connection (SLPCM) and
- optionally the light socket with muting light (SLPCM only).

#### 4.3.1 SLPC(M) Terminal Compartment

The connection cap with the cable duct can be removed after detaching four screws. The cap carries the connection assembly for the SLPC(M) with 16 numbered spring-type terminals.

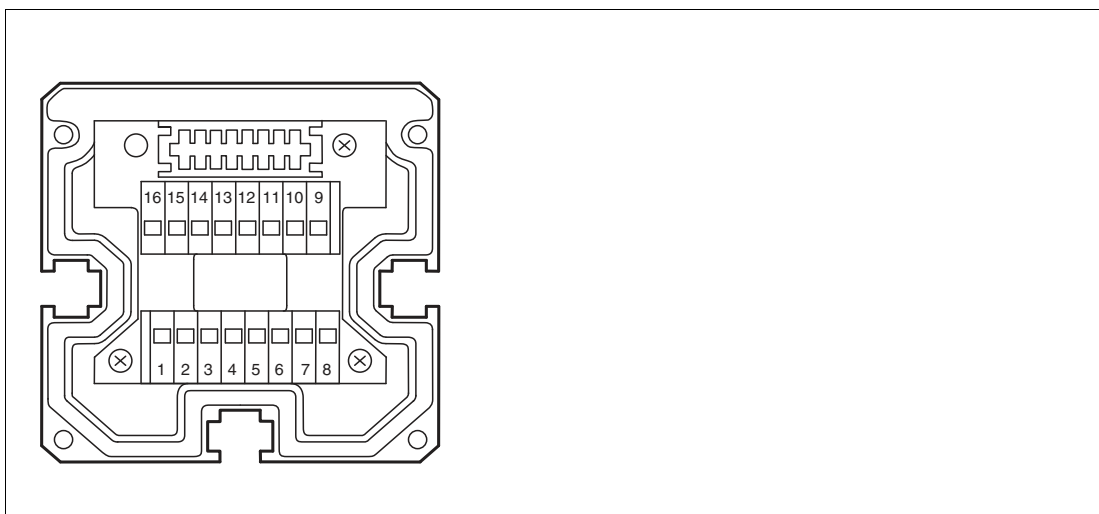


Figure 4.5 Terminal compartment for SLPC(M) receiver

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Terminal	Internal function	
1	Functional ground	
2	0 V	
3	24 V	
	Relay output	Semiconductor output
4		
5		
6		
7		
8		
	4: OSSD 1 n.o. 5: OSSD 1 common 6: OSSD 1 n.c. 7: OSSD 2 n.o. 8: OSSD 2	4: not connected 5: 0 V OSSD supply 6: 24 V OSSD supply 7: OSSD 1 8: OSSD 2
9	Relay monitor input (EDM)	
10	Startup enable input (Restart)	
11	Reset input	
12	Function reserve PNP output (soiling)	
13	Muting lamp PNP output (only for SLPCM)	
14	Ready to start PNP output	
15	OSSD OFF indication PNP output	
16	OSSD ON indication PNP output	

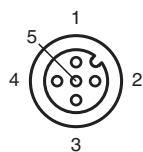
Table 4.3 SLPC(M) terminal compartment connections

The cable must be pushed from the outside through the cable gland. Press a small screwdriver (size approx. 2 mm) into the opening next to each terminal connection. Open the terminal by pressing the screwdriver away from the terminal. Press the wire in and pull out the screwdriver. The wire is now clamped. The wire is detached in the opposite manner. After clamping all wires, tighten the cable gland so that it is tight. Then position the connection cap and screw it tight.

Cable = n x 0.08 ... 1.5 mm<sup>2</sup>; diameter 5 ... 10 mm; n = number of required connections.

### 4.3.2 SLPCM Front Connections

The connections are alternatives to assignment in the terminal compartment. The front connections of the SLPCM are 4-pin or 5-pin M12 sockets. There are different numbers of connections, depending on the SLPCM version. The connections to the emitter, the muting sensors and the external muting lamp are implemented using the front connections.



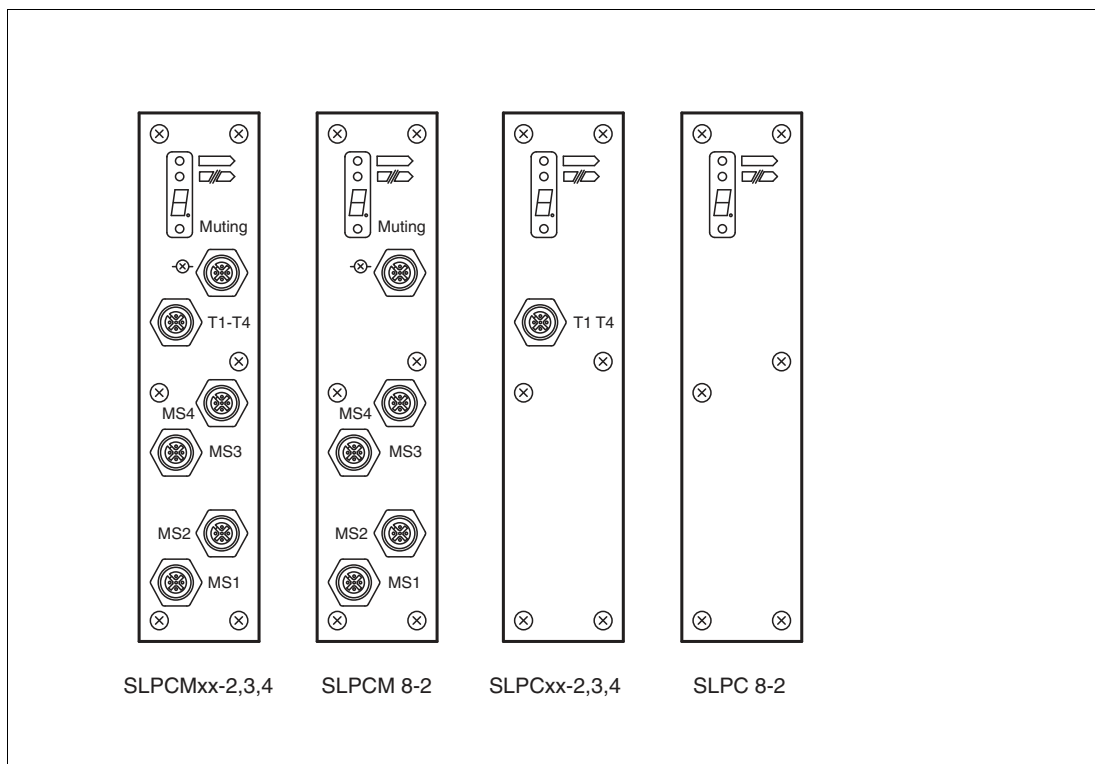


Figure 4.6 SLP/SLPCM front connections

**Controlling the Emitter**

T1-T4	
Pin	Function
1	Emitter channel 1
2	Emitter channel 2
3	0 V
4	Emitter channel 3
5	Emitter channel 4

Table 4.4 Pinning of emitter connections T1-T4

**Muting sensor inputs**

Pin	Function
1	24 V
3	0 V
4	Sensor signal

Table 4.5 Pinning for muting sensor connections MS1, MS2, MS3, and MS4

**Lamp connection**

Pin	Function
1	OSSD ON
2	OSSD OFF
3	0 V
4	'Ready to start'
5	Muting (monitored)

Table 4.6 Pinning for lamp connection

**4.3.3 Muting light connection/light socket (only for SLPCM...-L...)**

For the SLPCM version with muting light connection on the end cap (model number -L---), there is a light socket with a muting light on the end of the SLPCM opposite the cable gland.

Additional light modules can be placed on this socket as needed. The wiring of the light socket is designed for the following sequence of lights (starting from the socket):

Lamp	Color
Muting light	white
OSSD on	green
Standby	yellow
OSSD out	red

If you would like to select another series of light signals, you should change the connections of the light socket accordingly.

**4.3.4 Connections of the SLP Emitter**

The connection cap can be pulled off after four screws on the emitter are detached. A terminal card with cage terminals is located in the cap . Push the connection cable from the outside through the cable duct. Press the terminal lever next to the terminal opening downwards with a small screwdriver (size 2 ... 3.5 mm) and insert the wire. After the lever is released, the wire is clamped. The wire is detached in the opposite manner. The 0 V connection is marked with the ground symbol. The emitter connections are marked T1-T4. Connections not required are marked NC.

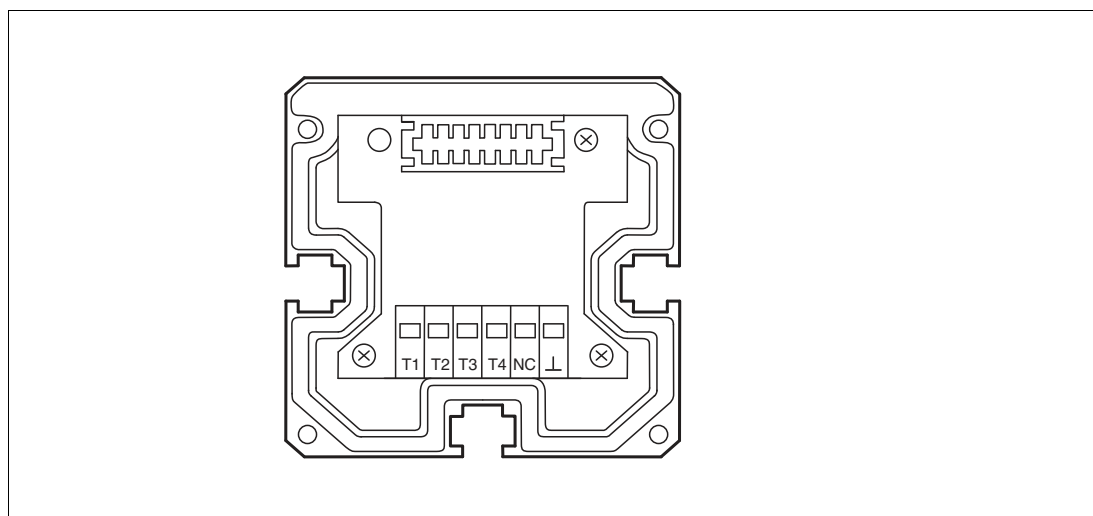


Figure 4.7 Terminal compartment for SLP emitter, 1-4 channels

### 4.4 Scope of Delivery

The scope of delivery includes:

- Packaging unit 1: Transmitter
- Packaging unit 2: Receiver
  
- Instruction manual
- Test rod

Bracket and cable are not included in the delivery package. Visit [www.pepperl-fuchs.com](http://www.pepperl-fuchs.com) for a selection of compatible mounting brackets and recommended cables.



## 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.

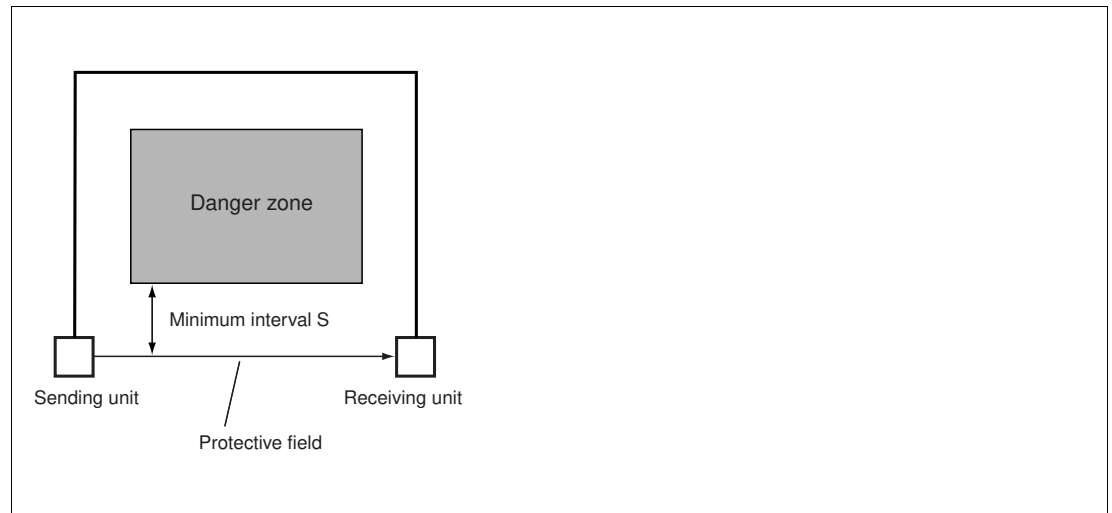


Figure 5.1 Minimum distance between protection field and hazardous area

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 (EN ISO 13855).

To comply with the necessary distances in the event that the protective field spreads, please refer to Table 1 of EN ISO 13855 to check the minimum distance for a vertically located protection field. If the table gives you a reading of 0, find the minimum distance with the following formula:

According to EN ISO 13855:

$$S = K \times T + C$$

Accordingly:

S	Minimum safety distance in mm, i.e., the distance between hazardous area and protection field
K	Constant in mm/s, based on the speed at which body parts approach the machine
C	Additional distance in mm This distance depends on how far a person can enter into the danger area before the protective device is triggered. At least 850 mm; for additional requirements see EN 13855
T	Total response time of the protective device in s,
$t_1$	Response time of the protective equipment. 20 ms (semiconductor OSSD) or 40 ms (relay OSSD)
$t_2$	Response time of the protective device of the machine until standstill

**Light grid (2 to 4-beam equipment)**

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

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

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

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

**Note**



If an applicable C standard recommends that the first beam be positioned at a height of 400 mm from the floor, you should follow this recommendation.

If no recommendation has been made, use a risk analysis to determine whether the position is OK.

**Note**



Ensure that there are no reflective objects within the transmitting or receiving lobe that could deflect the beams around an obstruction.

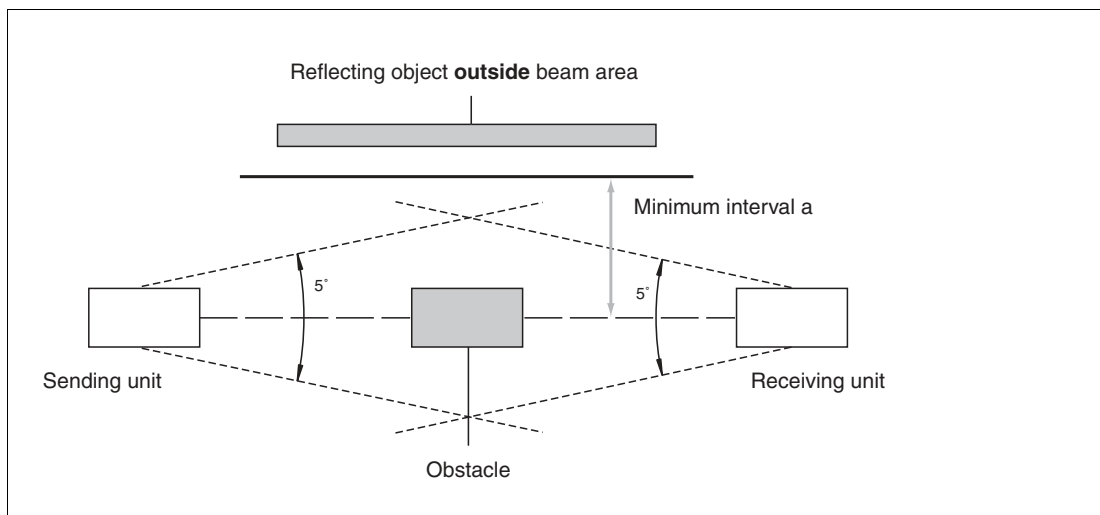


Figure 5.2 Remirroring

**Note**



When positioning the safety light grid, make sure that a minimum distance from reflective objects or surfaces is maintained.

This distance must be maintained from the protection level on all sides. This is the only way of ensuring that an object in the beam path of the safety light grid is reliably detected.

**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

**5.2 Mounting**

Various brackets are available for securing the safety light grid.

**Mounting**

1. Align the emitter and receiver so that they are parallel with one another and at the same height.
2. Align the emitters and receivers parallel with one another.
3. The function reserve indicator helps with correct alignment.

**Note**

Safety light grids should be positioned so that the SLP emitters that are coupled to the various SLPCM receiving units cannot illuminate the receivers of a different receiving unit.

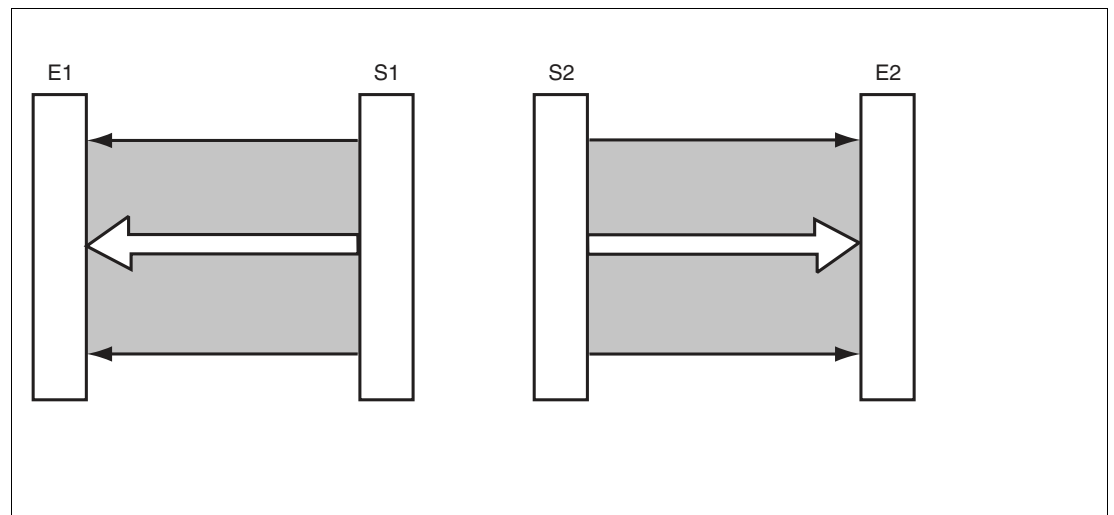


Figure 5.3 Multiple assignment

**Note**

When incorporating the SLPC(M) into the safety control system of the machine, the instructions in EN IEC 61496-1, among other things, must be taken into account (coupling of control elements downstream of the opto-electronic safety device).

**Caution!****Circumventing the safety beams**

The safety light grids must be installed so that it is not possible to reach the hazardous area by circumventing the safety beams. It must not be possible:

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

The minimum distance of the photoelectric sensors from the hazardous area must be obtained from the applicable regulations and standards.

In the standard version, the SLPC(M) is delivered with pnp OSSDs. The OSSDs have a separate power supply to enable galvanic isolation from the SLPC(M). If this galvanic isolation is not necessary, the identically named power supply connections for the internal circuitry and the OSSDs can be connected. Both the pnp and the relay version are only approved for galvanic isolation between low voltage networks. The relay outputs must be externally protected with fuses. All pnp outputs are internally protected against short circuits and do not require any external fuses. If the relay output contacts are subject to inductive loads, they must be protected against the increased loads by RC combinations or free-wheeling diodes. The circuitry must be directly adjacent to the consumer. When using free-wheeling diodes, ensure that the fall time of the connected relays or contactors is extended.

**Note**

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.

**The following points should be observed during installation:**

- Have the applicable standards and regulations been observed?
- Does the technical data of the safety light grid meet the requirements of the application?
- Have the necessary distances been observed?
- Are all inputs and outputs wired correctly?
- Is it impossible to circumvent the protective device?
- Are the restart button and the override button (SLPCM only) located so that the entire hazardous area can be viewed?
- Is it impossible to press the buttons from inside the hazardous area?

## 5.3 Operating Modes

A number of operating modes can be set on the SLPC(M) receiver. The 10 DIP switches in the profile are accessible after removing the connection cap. There are 2 switches (e.g., 1 and 6) for each operating mode that must be switched to the same position.

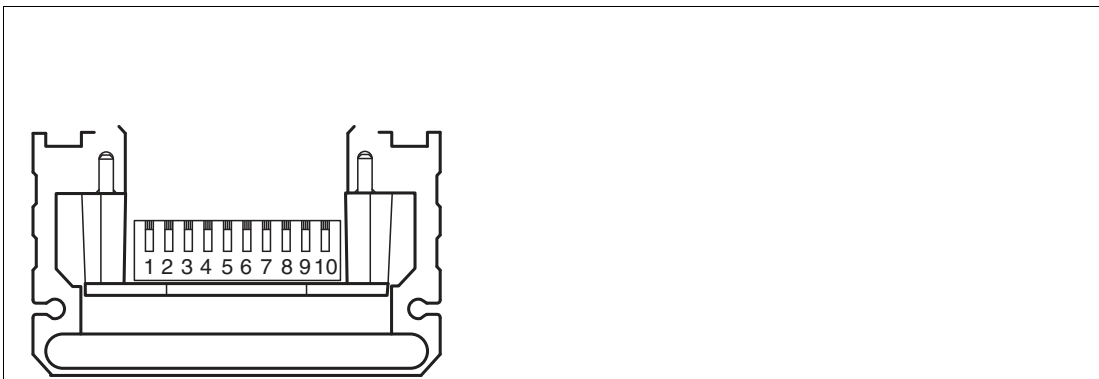


Figure 5.4 DIP switches

The adjustment should follow the order 1 to 5 (6 to 10). Please note that switches 4 and 5 (9 and 10) are only enabled if switch 3 (8) is switched to the ON position (muting on).

Switch	Position	Operating mode
1 + 6	OFF	Without startup/restart interlock
	ON	With startup/restart interlock
2 + 7	OFF	Without relay monitor (EDM)
	ON	With relay monitor (EDM)
Activate the following switches only for SLPCM		
3 + 8	OFF	Muting off
	ON	Muting on
4 + 9	OFF	Sequential muting
	ON	Parallel muting
5 + 10	OFF	Muting restricted to a specific time frame
	ON	Muting restricted to a specific safety beam

Table 5.1 DIP switches for selecting the operating mode

**Example for adjusting the operating mode for SLPCM**

	With startup/restart interlock	No relay monitor	Muting ON	Sequential muting	Muting restricted to a specific safety beam
Switch	1	2	3	4	5
	6	7	8	9	10
Position	ON	OFF	ON	OFF	ON

Table 5.2 Example for adjusting the operating mode for SLPCM

The preset operating mode must be noted on the supplied sticker using an indelible marker, and this sticker must be placed in a visible position on the device.

Startup/restart lock	<input type="checkbox"/>	<input type="checkbox"/>
Relay monitor	<input type="checkbox"/>	<input type="checkbox"/>
Muting	<input type="checkbox"/>	<input type="checkbox"/>
Parallel	<input type="checkbox"/>	<input type="checkbox"/>
Sequential	<input type="checkbox"/>	<input type="checkbox"/>
Limited by time window	<input type="checkbox"/>	<input type="checkbox"/>
Limited by protective beam	<input type="checkbox"/>	<input type="checkbox"/>

### 5.3.1 Startup/restart interlock (restart)

In startup / restart lock mode, the OSSDs will not turn on if the protective beams are free. The "Standby" output is activated and an  $\square$  appears on the 7-segment display. After the restart button has been pressed, the OSSDs turn on, the "Standby" output is turned off and the 7-segment display shows a continuous light.

### 5.3.2 Relay monitor

The SLPC(M) can monitor external switching elements correlated in time with the OSSD switch outputs for safety-relevant features with the aid of feedback contacts. Normally closed contacts of force-directed relays should be used as feedback contacts. The feedback contacts of all external switching elements downstream in the circuit must be switched in series. One end of this series connection must be connected to the positive power supply and the other end to connection 9 of the end cap. The monitoring contacts on the external switching elements must guarantee a reliable contact at a voltage of 20 V and a current of 5 mA. A surge voltage strength of 6 kV must be guaranteed between the monitoring contacts and other contacts connected to a low voltage according to the Low Voltage Directive.

#### Note

The working area of the external switching elements must be protected with a fuse that has a rated value of 60 % of the load capacity of the contacts to prevent the contacts from welding together. The external switching elements are monitored at a delay of 180 ms following the switching process. If the new switching state has not been reached after the monitoring time (180 ms) has elapsed, the SLPC(M) switches to a locking state and shows error  $\square$  on the diagnostic display. After the cause is rectified, the error can be acknowledged by resetting the SLPC(M).

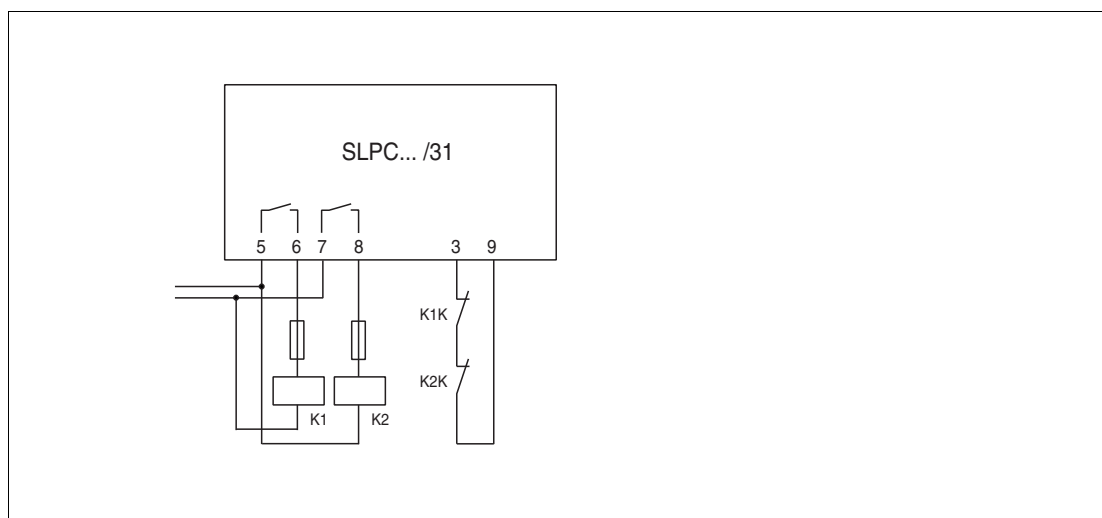


Figure 5.5 Sample connection of relay monitor

### 5.3.3 Muting (SLPCM)

In muting mode, the protective function of the SLPCM is bypassed correctly. For bypassing to take place, there must be **at least 2 activated muting sensors** and one muting light. Various muting modes can be set on the SLPCM. These modes make it possible for you to adapt to different applications.

#### 5.3.3.1 Evaluating the Muting Sensors through Parallel or Sequential Muting

Muting sensors are activated within a short span of time or in succession, depending on their arrangement. The activation sequence can be monitored by choosing between parallel and sequential muting.

**Parallel muting**

In the parallel muting operating mode, the muting sensors, arranged in pairs (MS1 and MS2; MS3 and MS4), must be activated within 2 s. If only one of the muting sensors is activated in this time, it is locked. The lock prevents activation of the muting; the safety beams remain active. This lock will only be removed once the sensor is no longer active.

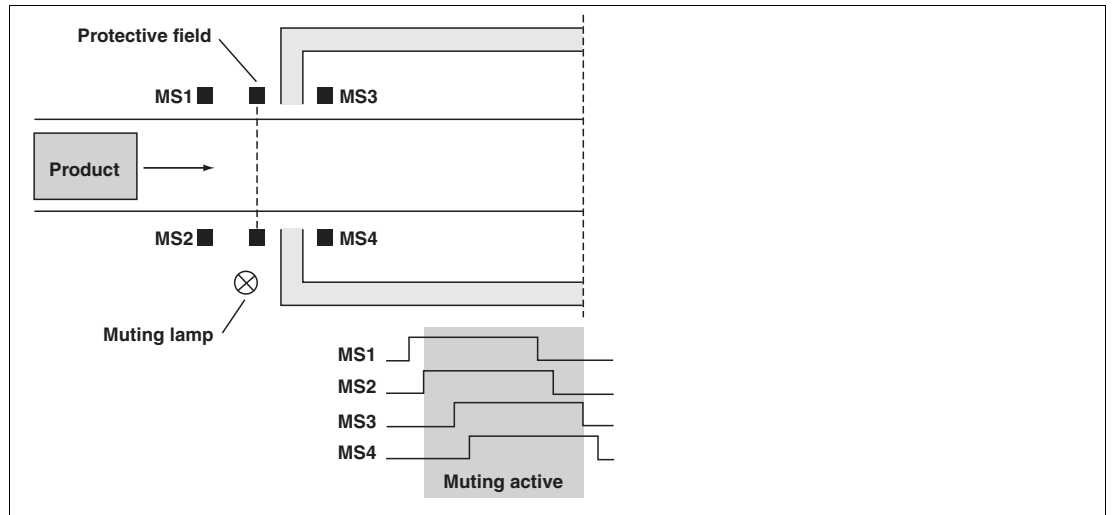


Figure 5.6 Parallel Muting

**Sequential muting**

In contrast to parallel muting where the activated sensors MS1 and MS2 or MS3 and MS4 fulfill the muting condition, sequential muting also allows sensors MS2 and MS3 to keep the muting condition. The muting sensors are activated successively. The arrangement of the sensors is to be selected in such a way that a person cannot unintentionally activate 2 sensors.

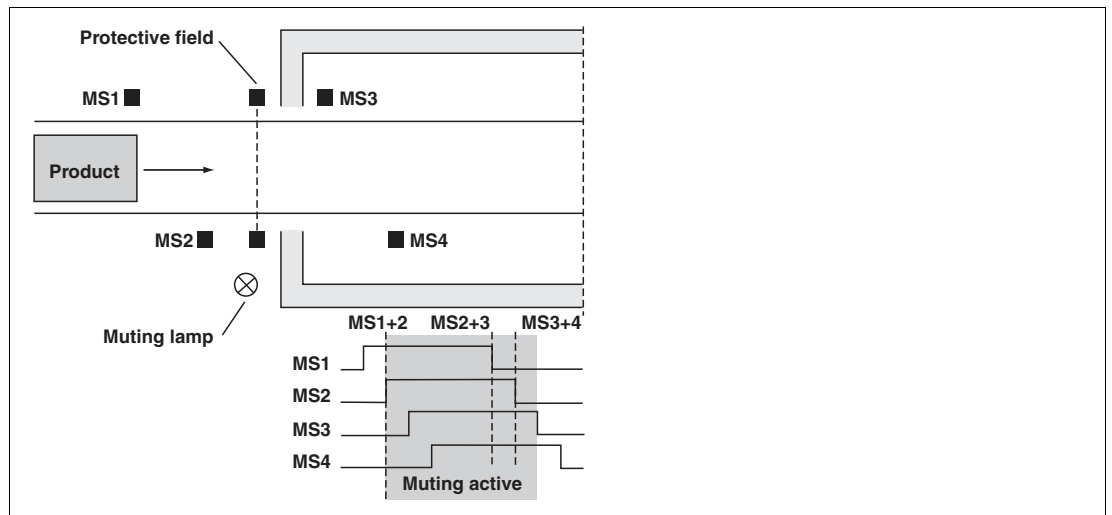


Figure 5.7 Sequential muting

### 5.3.3.2 Muting monitoring with time window limiting or protective beam limited muting



#### Note

##### Continuous muting

To prevent dangerous continuous muting from occurring in the event of a failure of the muting sensors, muting is operated with time window or protective beam limiting. Muting limited by a time window should be used if the objects the protective beams are supposed to pass by unimpeded will normally have crossed over within about 240 s. If this time is too short, muting limited by protective beams can be used. It should be noted that muting ends about 115 ms after all protective beams have become free.

##### Time window limiting

If muting limited by time window is set, each muting sensor is monitored by time. Each sensor may be activated for a maximum of 240 s, which means that the muting object must have passed the sensor within this time. If the time is exceeded, the control unit disables the sensor. When the sensor is disabled, muting can no longer be activated. The sensor must be deactivated before it can be enabled.

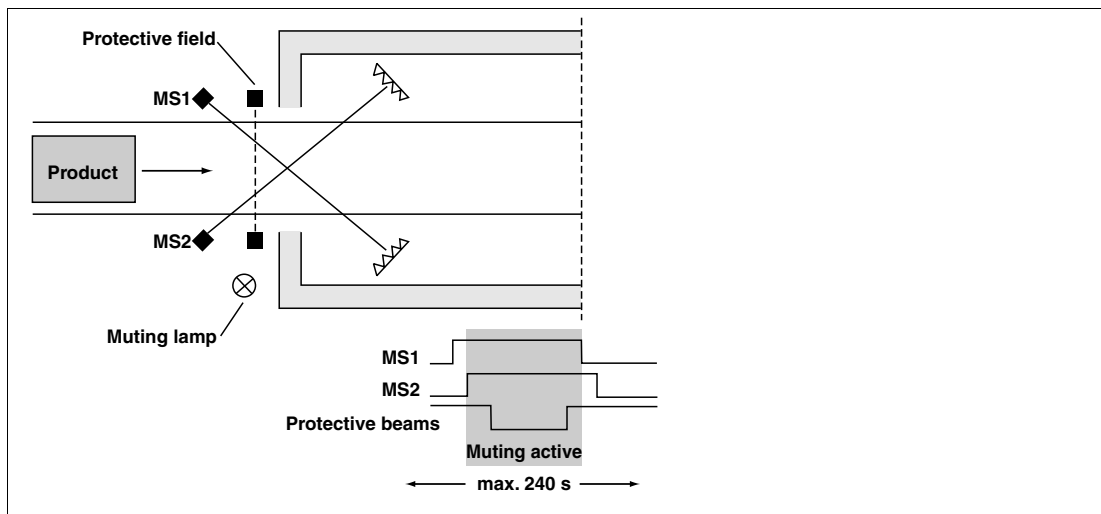


Figure 5.8 Time window limiting



### Protective beam limiting

In the case of muting limited by protective beams, the muting sensors are evaluated chronologically after they are activated. Two activated muting sensors initiate the muting process. No later than 240 seconds after the activation (applies for each muting sensor separately) at least one protective beam must be interrupted. In contrast to muting limited by a time window, this stops time measurement to allow muting unlimited by time. About 115 ms after the protective field is exited (all protective beams are free) and the way through becomes free again, all activated muting sensors are disabled so that muting is no longer possible.

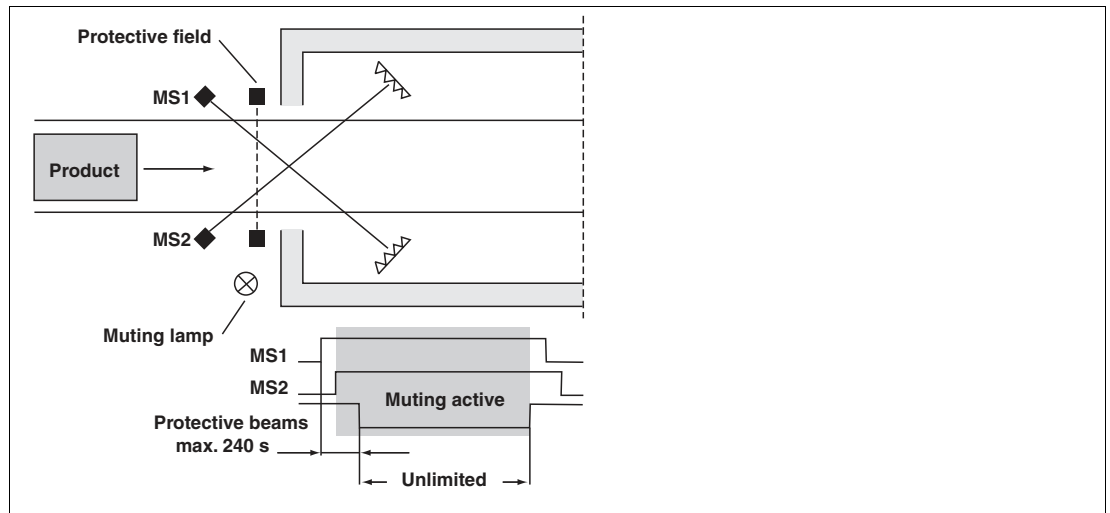


Figure 5.9 Protective beam limiting

#### 5.3.3.3 Muting sensors

The purpose of muting sensors is to detect muting objects. If an object is detected, the output of the muting sensor switches its power supply through. Sensors with relay or pnp output are suitable for this purpose. When no power is flowing, the output of the muting sensor must not be active. The sensor output should be capable of switching an operating current of 8 mA reliably at 20 V. The following sensors can be used as muting sensors:

- Retroreflective sensors (light on) with reflector on the object
- Diffuse mode sensors
- Inductive switches
- Mechanical switches.

#### 5.3.3.4 Muting Lamp

When using muting, an indicator lamp must be used for signaling the muting status. In accordance with IEC 61496-1, the SLPCM monitors the muting indicator lamp current for a minimum value of 10 mA. This monitoring ensures that the muting indicator lamp fulfills its warning function correctly. If the muting indicator lamp is defective, the SLPCM assumes the interlock mode and indicates error 6 (muting lamp defective) on its display. The muting lamp is checked when it is switched on, when the reset command is executed, and during the time in which muting is active. To increase the availability of the system, two muting lamps can be connected in parallel. The prerequisite for this is that both indicator lamps are simultaneously visible close together when the access is approached. If no muting is used, no muting indicator lamps are necessary.

### 5.3.3.5 Emergency muting (only with SLPCM)

The emergency muting function is available for cases where the system must be approached again to remove the obstructing object from the area around the protective field and the muting sensors. During emergency muting, the disabled muting sensors are evaluated again for a period of 3-4 seconds. As a result, the OSSDs are turned on again for 3-4 seconds. Emergency muting can be triggered with the override button. Triggering can be subsequently repeated, i.e., by activating the button within 3 seconds, the duration of the On state of the OSSDs can be further extended until the object has left the area around the muting sensors.

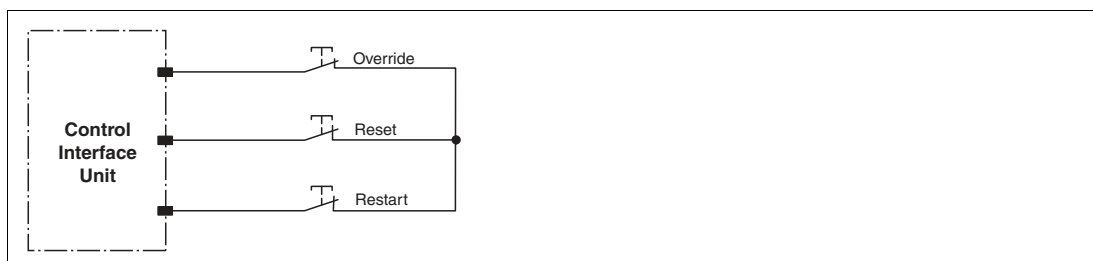


Figure 5.10 Connection for Override, Restart and Reset buttons

## 6 Commissioning

### 6.1 Adjusting Safety Beams

The emitter and receiver must be aligned so that they are opposite one another and are at the same height. The lowest beam must be the correct height above the floor. It is recommended that the SLP/SLC profile alignment aid be used to align the profiles vertically and horizontally.

The SLP emitter can be aligned by using a reflector. Mount the reflector in front of the lens of the receiver (SLPC(M)) for the upper light beam. With the system switched on, look in the direction of the reflector from the SLP. The emitter must be adjusted in such a way that the red emitter light can be seen in the reflector. The upper mount for the emitter must be secured.

Then place the reflector in front of the lens of the lower light beam and align as above by swiveling the emitter sideways. Then swivel the SLPC(M) receiver so that the function display of all receiving lenses indicates with a continuous light that the light beams are optimally aligned.

If the red emitter light is difficult to observe (for example with long detection ranges), an SLP laser alignment aid should be used.

### 6.2 Layout with adjustable mirrors

Adjustable 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 below 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.

Aligning the mirrors is made easier by using the SLP laser alignment aid.

Make sure that the surfaces of the mirror are clean. The mirror must be cleaned using a non-scratch detergent and lint-free cloth.

### 6.3 Function Test



#### Testing the Detection Capacity of the Installed Opto-electronic Safety Device

The following tasks must be carried out to check the detection capacity:

1. Remove all objects from the beam pathways
2. Interrupt all light beams one after another; the OSSD outputs must switch to the off state (red display lights up).




#### Checking the Muting Function (SLPCM only)

1. Check the arrangement of the muting sensors (it must not be possible for one person to activate 2 muting sensors simultaneously).
2. Check the function of the set muting operating mode.
3. Check the arrangement of the muting lamp.
4. Check the function with muting objects (is the muting function reliably performed?)
5. Check the locking functions of the SLPCM (time monitoring) and emergency muting.



## Checking the Startup/Restart Interlock and Startup Enable

1. Interrupt a beam and simultaneously free all beams.
2. Output relays must remain blocked if a startup lock exists, and the startup enable indicator lamp must light up or the status display must indicate a .
3. Press startup enable contact for 0.05 ... 1 s (RESTART).  
↳ OSSD outputs must activate and the indicator lamp for startup enable must go off.



## Checking the Fault Reset Connection (RESET)

1. Remove all objects from the beam path.
2. If a startup lock exists, press the startup enable contact (RESTART).
3. The OSSD outputs must be activated.
4. Press the fault reset contact (RESET) for 0.05 ... 1 s.  
↳ The OSSD outputs must deactivate.



## Checking the Relay Monitor

1. Interrupt the connection cable between the external contact and the SLPC(M) receiver.
2. Switch on the SLPC(M) receiver.
3. Read the status display for the SLPC(M).
4. If F is displayed, contact monitoring is active.  
↳ Reconnect the interrupted cable.

### Functioning of the OSSDs

- The two OSSDs are activated under the following conditions:
  - With an active startup lock: the safety beams are free and startup is enabled.
  - Without startup lock: the safety beams are free.
- The OSSDs remain activated under the following conditions:
  - No safety beam is interrupted.
  - Muting is active while safety beams are interrupted (SLPCM only).
- The OSSDs are deactivated under the following conditions:
  - The safety beams are interrupted.
  - With the muting function activated (SLPCM only), the safety beams are interrupted while time monitoring has blocked the muting sensors (flashing muting LED on the front panel).
  - A fault status is detected.
  - The contact for the fault reset (RESET) is pressed.

## 7 Maintenance and Repair

### 7.1 Maintenance

The safety light curtain is maintenance free.

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



#### Note

Use a soft, lint-free cloth to clean the surfaces and to cover the lenses. Only use alcohol or mineral spirits as cleaning fluids. Avoid the use of any other cleaning agents, as they may damage or impair the lens surfaces.

---

### 7.2 Repairs

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



#### Danger!

Danger to life from using damaged or repaired devices.

Using a defective or repaired device can compromise its function and its electrical safety.

- Do not use a damaged or polluted device.
  - The device must not be repaired, changed or manipulated.
  - If there is a defect, always replace the device with an original device from Pepperl+Fuchs.
-

## 8 Troubleshooting



### Note

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

Faults in the system always cause the system to transition to the safe locked state. The OSSDs are then deactivated. A considerable number of the faults put the system into a state that generates a fault indication on the status indicator for the receiver unit.

The output for the ready to start signal can be used to signal a fault externally. If a fault occurs, the output switches on and off at a frequency of 1 Hz.

To acknowledge a fault, the operator presses the reset button for 0.03...1s. The SLPC(M) transitions to the start status after a successful system test or stops in the fault status with the corresponding fault indication.

### Possible Actions for Troubleshooting

Display	Possible troubleshooting action
Displays on all components of the system are not lit up	Check power supply
External protection field display (OSSD red and green) is not lit up	Check installation
"Ready to start" status is not indicated despite the protection field being free	Check the receiving status of the SLPC(M) receiver channels; check switch 1 and switch 6 for operating mode
Contamination output not working	Check installation and external power supply
Some reception displays are not lit	Readjust emitter and receiver. Check wiring for emitter (swapped strands)
Yellow LED for muting operating mode flashing (only SLPCM)	Check muting sensors
display cannot be acknowledged	Check startup enable key and its installation
display	Safety beams are not free. Clear the safety beams. Check status of the displays on the receivers. Check whether all emitters are lit up. Remove dirt. Readjust emitter and receiver if necessary
Fault indication	Check DIP switch setting; semiconductor OSSD: check supply voltage to the OSSD
Fault indication	Check cable between SLPC(M) and emitter
Fault indication  (SLPCM only)	Check muting lamp, check installation of muting lamp. If the system is intended to operate without muting, deactivate switch 3 and switch 8
Fault indication	Press Reset or switch power supply off and on again. If a fault occurs continuously, there is an internal fault and the SLPC(M) receiver unit must be sent for repair
Fault indication	Check installation of the relay monitor (are the feedback contacts NC contacts?). If the system is intended to operate without a relay monitor, deactivate switch 2 and switch 7

Table 8.1 Possible actions for troubleshooting

## 9 Appendix

### 9.1 Technical Data

#### Functional safety related parameters

PFH <sub>d</sub>	3.54 E-9
Performance level (PL)	PL e (nach ISO 13849-1)
Category	Kat. 4 (nach ISO 13849-1)
Mission Time (T <sub>M</sub> )	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 with Standards and Directives

Directive conformity see chapter 2.1	
Conformity	
Functional safety	ISO 13849-1
Product standard	EN 61496-1 ; IEC 61496-2

#### Approvals and certificates

CE conformity	CE
Approvals	TÜV Süd

#### General specifications

Designation (receiver)	SLPC8-2-A SLPCM8-2-A	SLPC10-... SLPCM10-...	SLPC30-... SLPCM30-...	SLPC65-... SLPCM65-...
Effective detection range	0.2 ... 8 m	0.2 ... 10 m	6 ... 30 m	12 ... 65 m
Light source	LED			
Light type	modulated visible red light			
LED risk group designation	Free group in accordance with DIN EN 62471			
Target size	static: 32 mm dynamic: 50 mm (at v = 1.6 m/s of the obstacle)			
Beam spacing	2 beams: 500 mm 3 beams: 400 mm 4 beams: 300 mm			
Number of beams	2-, 3-, and 4-beam			
Operating mode	Start/restart disable, relay monitor,			
Angle of divergence	< 5 °			

#### Indicators/operating means

Diagnostics indicator	7-segment display
Function indicator	LED red: per receiver channel off: interruption flashes: receiver continuously on: reception with sufficient stability control on the front plate: LED red: OSSD off LED green: OSSD on; SLPCM LED gelb: Muting ein

Pre-fault indicator	LED red next to receiver flashes
Control elements	10 DIP switch in receiver terminal compartment

### Electrical specifications

Operating voltage	24 V DC -15% / +25% , galvanically isolated
No-load supply current	max. 250 mA
Protection class	III , IEC 61140

### Inputs

Activation current	approx. 10 mA
Activation time	0.03 ... 1 s
Test input	Reset-input for system test
Function input	Relay monitor, start release

## Outputs

### OSSD

PNP semiconductor	Electrically isolated, monitored for short and crossed circuits, p-switching (24 V)	
	$U_{OSSD}$ , potential-free	24 VDC
	Switching voltage	ON: $U_{OSSD} - 2\text{ V}$ OFF: $U_{OSSD} < 1\text{ V}$
	Switching current	ON: max. 0.5 A OFF: $< 5\text{ mA}$
	Load inductance (max.)	1.0 H
	Load capacitance (max.)	220 nF
	Response time	20 ms

### Note

The outputs are permanently monitored by short (80  $\mu\text{s}$ ) sampling pulses. You must ensure that this has no effect on the downstream circuit.

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

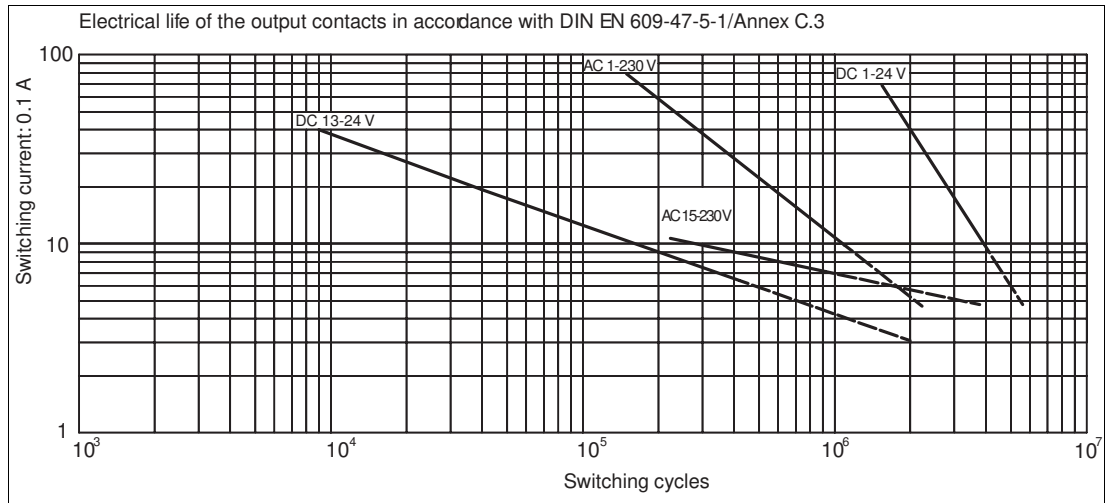
### Outputs on the Receiver

<b>OSSD</b>		
Relay	Potential-free NO contact	
	Max. switching voltage	50 V
	Max. switching current	2 A
	Max. switching frequency	1 Hz
	Response time	40 ms





**Switching Capacity**



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



**Caution!**

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.

**Ambient conditions**

Ambient temperature	0 ... 50 °C (32 ... 122 °F)
Storage temperature	-20 ... 70 °C (-4 ... 158 °F)
Relative humidity	max. 95 %, not condensing

**Mechanical specifications**

Degree of protection	IP65
Connection	M16 cable gland , terminal compartment with cage-terminals
Connection options	Further electrical connection options on request: Connector DIN 43 651 Hirschmann, emitter: 6-pin+PE, receiver: 11-pin+PE
Material	
Housing	extruded aluminum profile, RAL 1021 (yellow) coated
Optical face	Plastic pane
Mass	2.3 kg ... 3.7 kg Depending on number of beams in the light grid

**Ambient conditions**

Number of beams	Beam gap A/mm	Housing length L/mm (not including cable gland)
2	500	636
3	400	936
4	300	1036

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## 9.2 Dimensional drawing

### SLPC(M)/SLP safety light grid

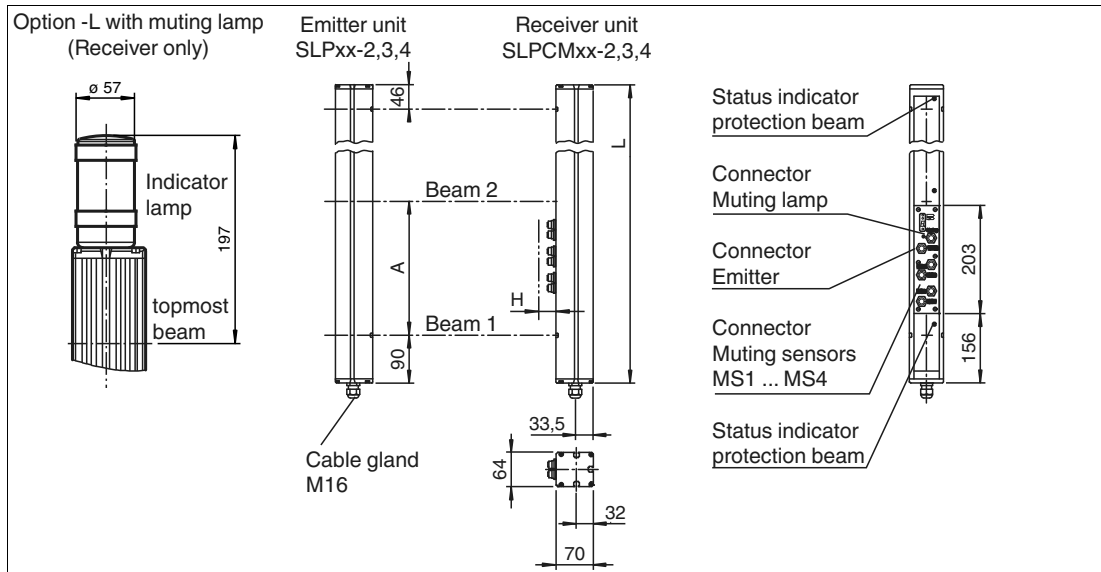


Figure 9.1 Dimensions of SLP/SLPC(M)xx-2,3,4

### SLPC(M)8-2-A and SLP8-2-M safety light grids

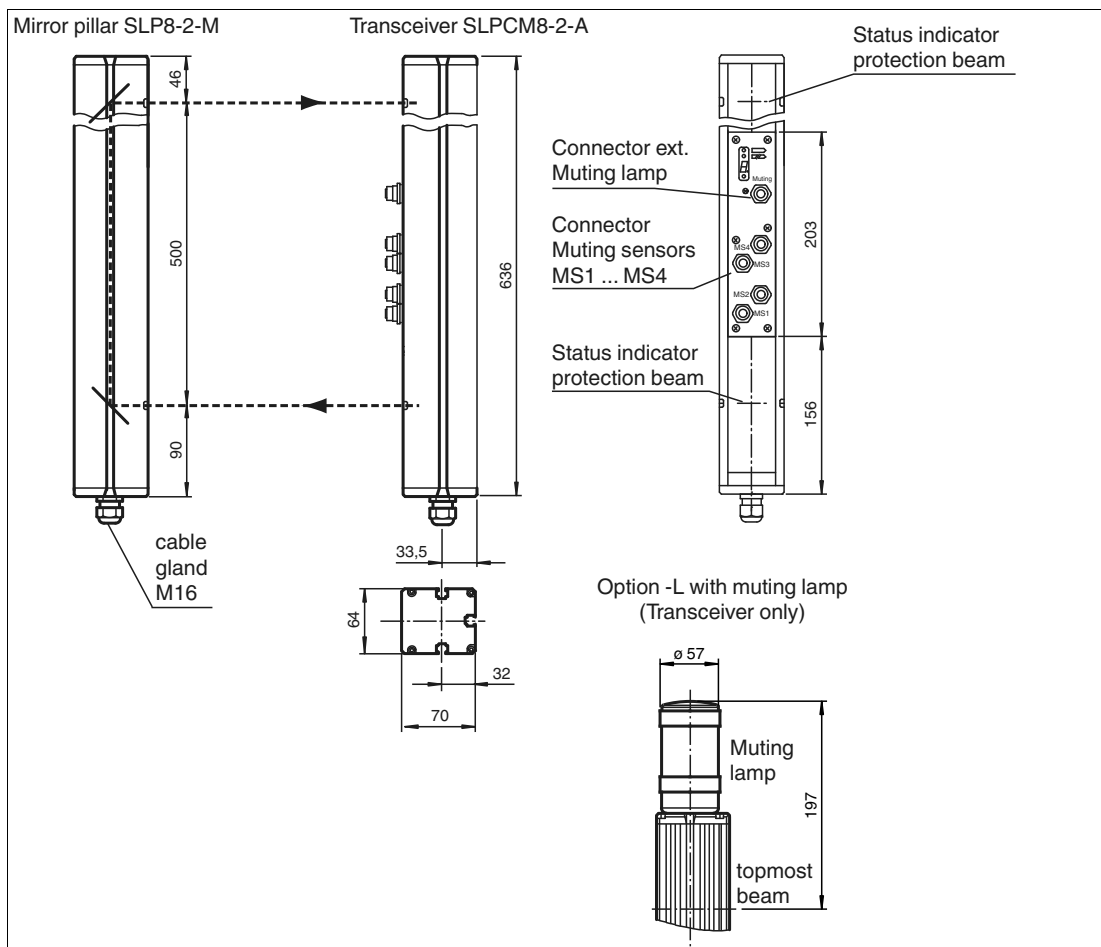
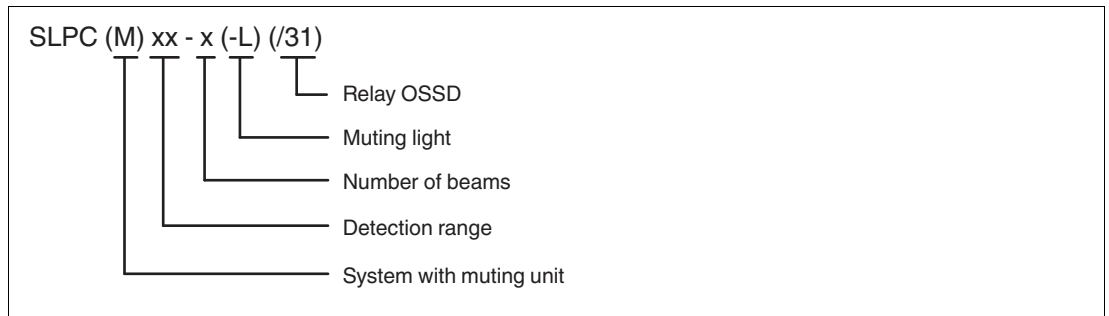


Figure 9.2 Dimensions of SLPC(M)8-2-A and SLP8-2-M

### 9.3 Designation Code

#### Ordering code



**Example:** SLPC30-3/31: SLPC receiver unit, sensing range 30 m, 3 safety beams, relay OSSDs

#### Model numbers for SLPC (SLPCxx-x)

Sensing range	Type	2 safety beams		3 safety beams		4 safety beams	
		Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD
10 m	Complete set	SLPC10-2	SLPC10-2/31	SLPC10-3	SLPC10-3/31	SLPC10-4	SLPC10-4/31
	Receiver	SLPC10-2-R	SLPC10-2-R/31	SLPC10-3-R	SLPC10-3-R/31	SLPC10-4-R	SLPC10-4-R/31
	Emitter	SLP10-2-E		SLP10-3-E		SLP10-4-E	
30 m	Complete set	SLPC30-2	SLPC30-2/31	SLPC30-3	SLPC30-3/31	SLPC30-4	SLPC30-4/31
	Receiver	SLPC30-2-R	SLPC30-2-R/31	SLPC30-3-R	SLPC30-3-R/31	SLPC30-4-R	SLPC30-4-R/31
	Emitter	SLP30-2-E		SLP30-3-E		SLP30-4-E	
65 m	Complete set	SLPC65-2	SLPC65-2/31	SLPC65-3	SLPC65-3/31	SLPC65-4	SLPC65-4/31
	Receiver	SLPC65-2-R	SLPC65-2-R/31	SLPC65-3-R	SLPC65-3-R/31	SLPC65-4-R	SLPC65-4-R/31
	Emitter	SLP65-2-E		SLP65-3-E		SLP65-4-E	

Table 9.1 Model numbers for SLPC

#### Model numbers for SLPCM (SLPCMxx-x) with integrated muting

Sensing range	Type	2 safety beams		3 safety beams		4 safety beams	
		Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD
10 m	Complete set	SLP-CM10-2	SLP-CM10-2/31	SLP-CM10-3	SLP-CM10-3/31	SLP-CM10-4	SLP-CM10-4/31
	Receiver	SLP-CM10-2-R	SLP-CM10-2-R/31	SLP-CM10-3-R	SLP-CM10-3-R/31	SLP-CM10-4-R	SLP-CM10-4-R/31
	Emitter	SLP10-2-E		SLP10-3-E		SLP10-4-E	

Sensing range	Type	2 safety beams		3 safety beams		4 safety beams	
		Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD
30 m	Complete set	SLP-CM30-2	SLP-CM30-2/31	SLP-CM30-3	SLP-CM30-3/31	SLP-CM30-4	SLP-CM30-4/31
	Receiver	SLP-CM30-2-R	SLP-CM30-2-R/31	SLP-CM30-3-R	SLP-CM30-3-R/31	SLP-CM30-4-R	SLP-CM30-4-R/31
	Emitter	SLP30-2-E		SLP30-3-E		SLP30-4-E	
65 m	Complete set	SLP-CM65-2	SLP-CM65-2/31	SLP-CM65-3	SLP-CM65-3/31	SLP-CM65-4	SLP-CM65-4/31
	Receiver	SLP-CM65-2-R	SLP-CM65-2-R/31	SLP-CM65-3-R	SLP-CM65-3-R/31	SLP-CM65-4-R	SLP-CM65-4-R/31
	Emitter	SLP65-2-E		SLP65-3-E		SLP65-4-E	

Table 9.2 Model numbers for SLPCM

**Model numbers for SLPCM with muting lamp (SLPCMxx-x-L)**

Sensing range	Type	2 safety beams		3 safety beams		4 safety beams	
		Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD
10 m	Complete set	SLP-CM10-2-L	SLP-CM10-2-L/31	SLP-CM10-3-L	SLP-CM10-3-L/31	SLP-CM10-4-L	SLP-CM10-4-L/31
	Receiver	SLP-CM10-2-R-L	SLP-CM10-2-R-L/31	SLP-CM10-3-R-L	SLP-CM10-3-R-L/31	SLP-CM10-4-R-L	SLP-CM10-4-R-L/31
	Emitter	SLP10-2-E		SLP10-3-E		SLP10-4-E	
30 m	Complete set	SLP-CM30-2-L	SLP-CM30-2-L/31	SLP-CM30-3-L	SLP-CM30-3-L/31	SLP-CM30-4-L	SLP-CM30-4-L/31
	Receiver	SLP-CM30-2-R-L	SLP-CM30-2-R-L/31	SLP-CM30-3-R-L	SLP-CM30-3-R-L/31	SLP-CM30-4-R-L	SLP-CM30-4-R-L/31
	Emitter	SLP30-2-E		SLP30-3-E		SLP30-4-E	
65 m	Complete set	SLP-CM65-2-L	SLP-CM65-2-L/31	SLP-CM65-3-L	SLP-CM65-3-L/31	SLP-CM65-4-L	SLP-CM65-4-L/31
	Receiver	SLP-CM65-2-R-L	SLP-CM65-2-R-L/31	SLP-CM65-3-R-L	SLP-CM65-3-R-L/31	SLP-CM65-4-R-L	SLP-CM65-4-R-L/31
	Emitter	SLP65-2-E		SLP65-3-E		SLP65-4-E	

Table 9.3 Model numbers for SLPCM with built-in muting lamp

Model numbers for transceiver SLPC8-2 A/mirror SLP8-2-M

Sensing range	Type	2 safety beams		With built-in muting lamp	
		Semiconductor OSSD	Relay OSSD	Semiconductor OSSD	Relay OSSD
10 m	Complete set	SLPCM8-2	SLPCM8-2/31	SLPCM8-2-L	SLPCM8-2-L/31
	Transceiver	SLPCM8-2-A	SLPCM8-2-A/31	SLPCM8-2-A-L	SLPCM8-2-A-L/31
	Mirror	SLP8-2-M			

Table 9.4 Model numbers for SLPC8-2

## 9.4 Periodic checks

The test intervals and scope of the periodic checks are determined according to requirements.

**A daily test is required if the OSSD outputs on the SLPC(M) receiver unit are relays and the following is not guaranteed:**

- A protective field interruption occurs at least once per day
- or the device is not turned on once each operating day



### Testing

The test is performed as follows:

1. Make sure the protection field is free.
2. Activate the startup enable.
3. Interrupt the protection field inside the protection field range using the test rod. A test rod of large enough size must be used.
4. Check the entire protection field at several points parallel to the transmitter or receiver units, in particular in front of the transmitter and receiver and in the center between the transmitter and receiver.
  - ↳ The OSSD outputs switch off. The indicator for the OSSD display must change from green to red.
5. If the receiver unit does not have a fault status, the test is complete.



### Note

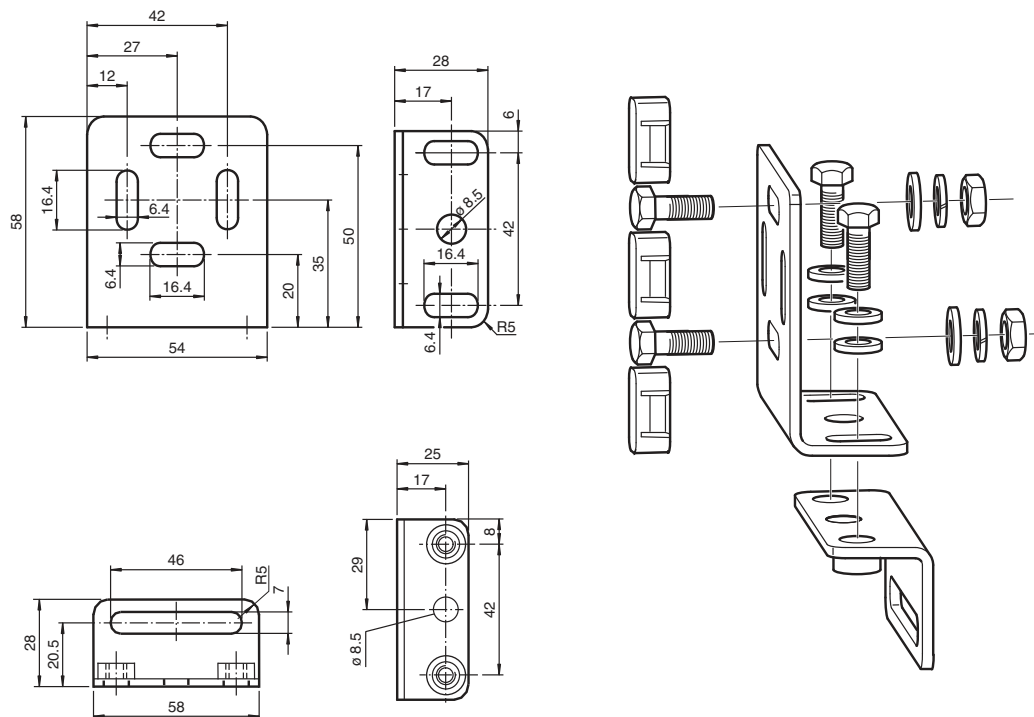
The periodic check of the safety functions from the plant where the SLPC(M)/SLP system is installed must also include the functions of the NCSE. The proper layout, installation, and required response time must be checked. Test records of tests that have been performed must be kept and archived.

## 9.5 Accessories

### 9.5.1 SLP mounting set

A mounting set can be used to secure and align the device. A minimum of 2 mounting sets are required for each profile.

Model number: MS SLP



### 9.5.2 Adjustable mirror

#### Mirror for SLP safety light grid (2, 3, 4 beam)

Adjustable mirrors are used to protect hazardous areas on more than one side. The type of mirror required depends on the sensing range.

#### 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**

SLP-2 with one adjustable 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 / 85% = 14 m \* 1.18 = **16.47 m**

A **SLC-800-M** adjustable mirror is required.

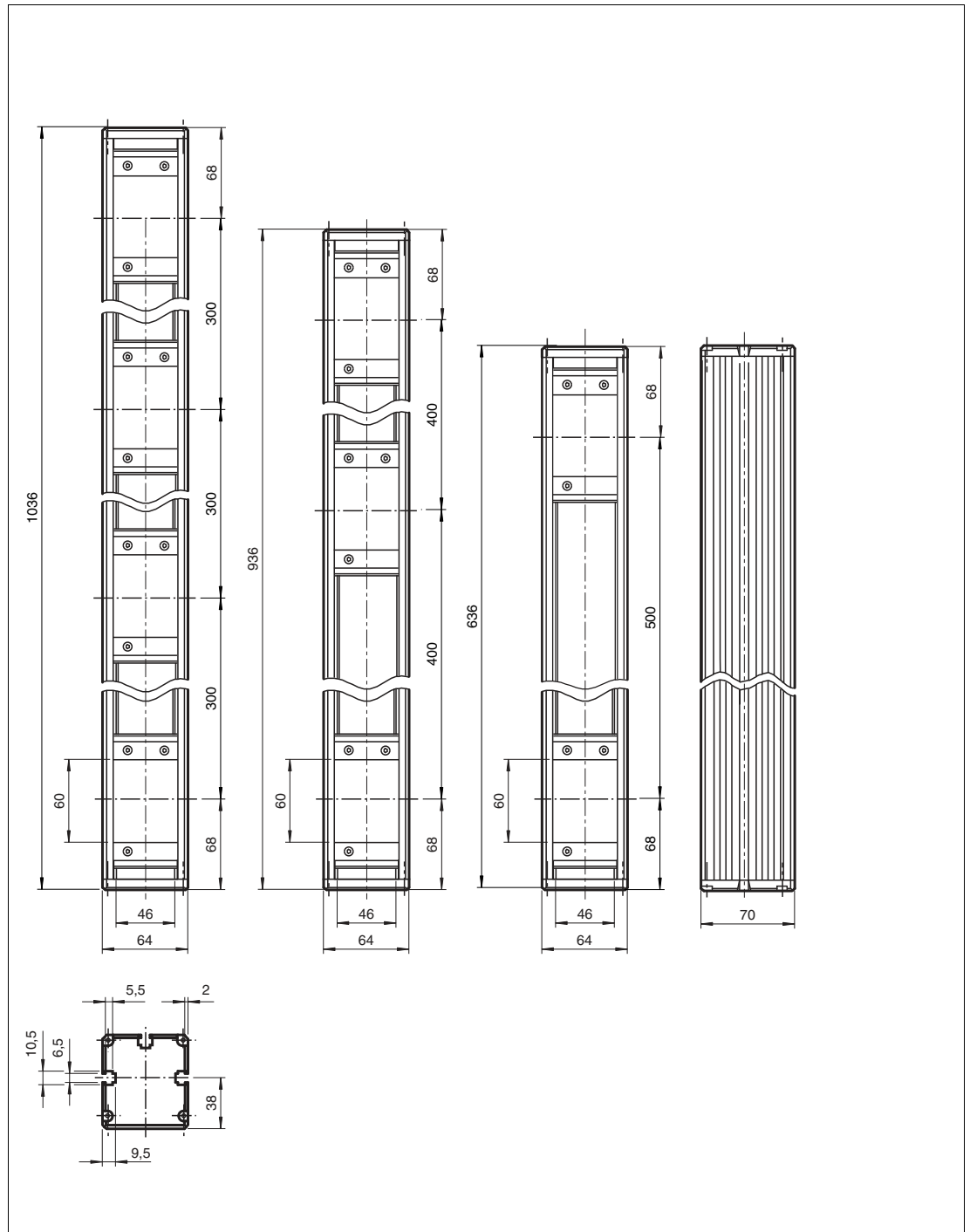


Figure 9.3 SLP and SLC mirrors (2-, 3- and 4-beam)

118587 2020-01

### 9.5.3 Protective glass

Mineral glass window to protect the light output surface from SLP, SLPC, and SLPCM safety light grids (Example: for use in welding robots for protection against sparks). A packaging unit contains two glass panels (one each for the transmitter and receiver). SLP protective glass holders are required to secure the protective glass.

Safety light grid	Model number for the correct protective glass
SLPxx-2... SLPCxx-2... SLPCMxx-2...	PG SLP-2
SLPxx-3... SLPCxx-3... SLPCMxx-3...	PG SLP-3
SLPxx-4... SLPCxx-4... SLPCMxx-4...	PG SLP-4

Table 9.5 Selecting the correct protective glass for the safety light grid

### 9.5.4 SLP profile alignment aid

The PA SLP/SLC profile alignment aid is ideal for aligning the profiles of SLP safety grids both vertically and horizontally.

Model number: PA SLP/SLC

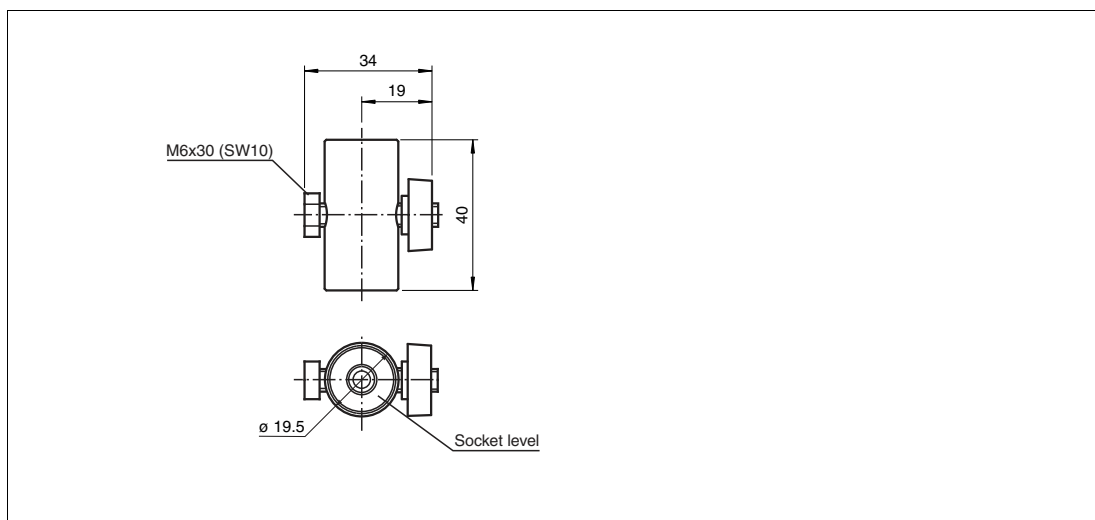


Figure 9.4 PA SLP/SLC profile alignment aid



### 9.5.5 SLP laser alignment aid

BA SLP laser alignment aid for SLP safety light grids.

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

Dimensions: L = 131 mm

Model number: BA SLP

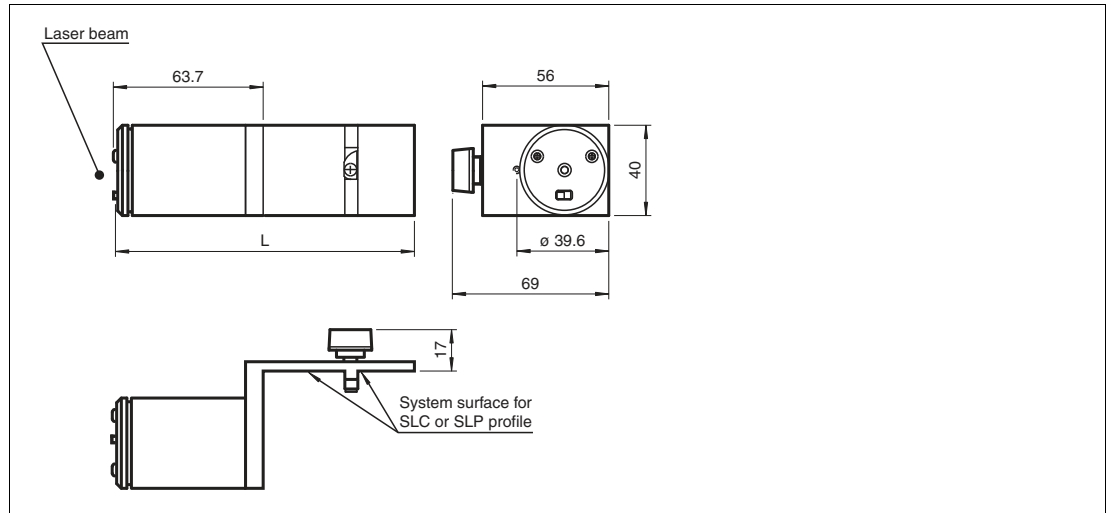


Figure 9.5 BA SLP beam alignment aid

### 9.5.6 Connection Cables

Angled connectors or cables with a molded-on angled connector are recommended for connecting the cables to the M12 sockets on the front of the SLPC(M). A 5-pin connector must be implemented in order to connect an SLP emitter with 4 beams. The M12 indicator light connection likewise requires a 5-pin connector. All other connectors are 4-pin.

Connection cables are not included in the scope of delivery of a safety light grid.

#### Connection cables for safety light grid

Type	Model number		
	Length 2 m	Length 5 m	Length 10 m
4-pin cable	V1-W-2M-PUR	V1-W-5M-PUR	V1-W-10M-PUR
5-pin cable	V15S-W-2M-PUR	V15S-W-5M-PUR	V15S-W-10M-PUR

Table 9.6 Safety light grid connection cable

### 9.5.7 Cable fastener

Appropriate cable fasteners are available to fasten the cables that are connected to the front plate and that can be fastened on the side in the profiled slot.

Model number: Fastener SLPC/M

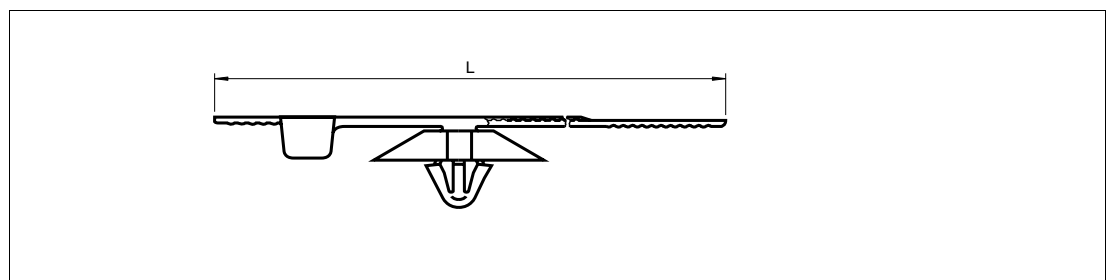


Figure 9.6 Dimensional drawing of cable fastener

9.6 Typical circuits

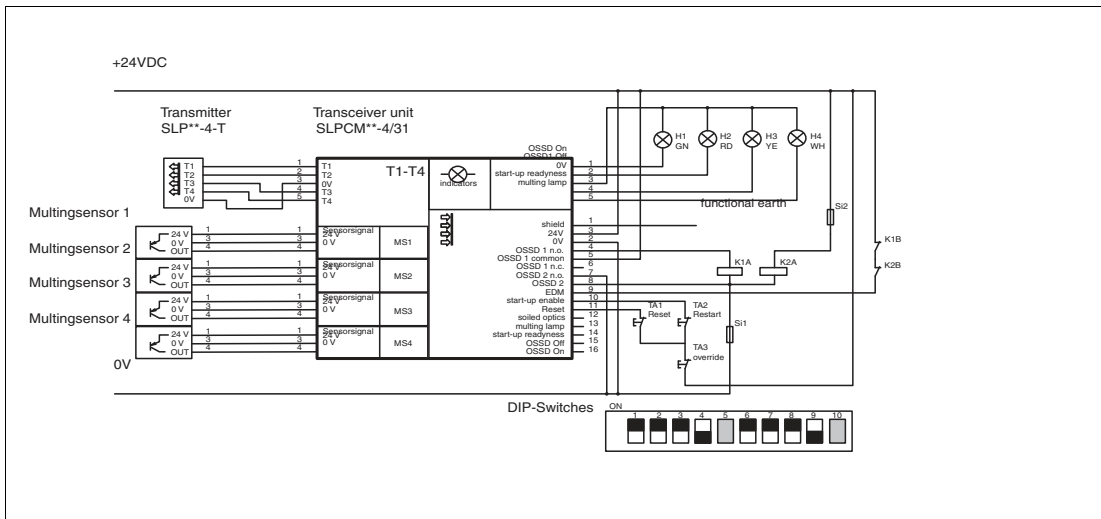


Figure 9.7 SLPCM receiver unit with transmitter SLP

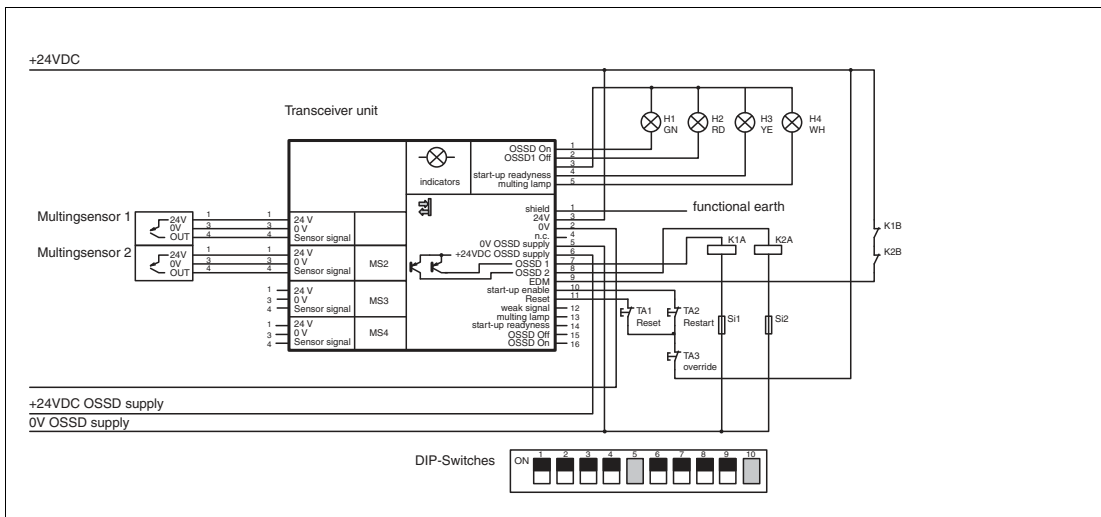


Figure 9.8 SLPCM 8-2-A receiver unit and 2 muting sensors

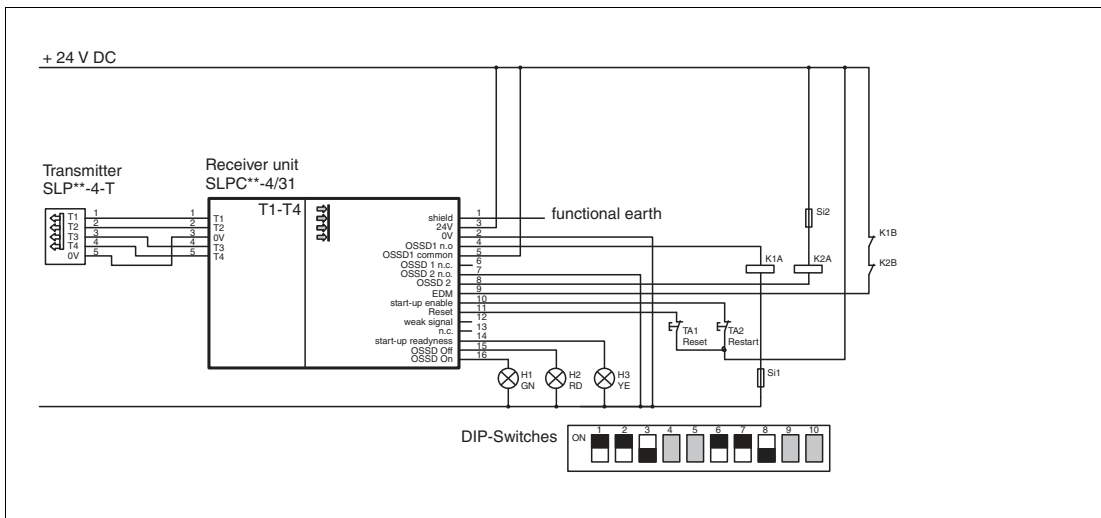


Figure 9.9 SLPC receiver unit with SLP transmitter

118587 2020-01

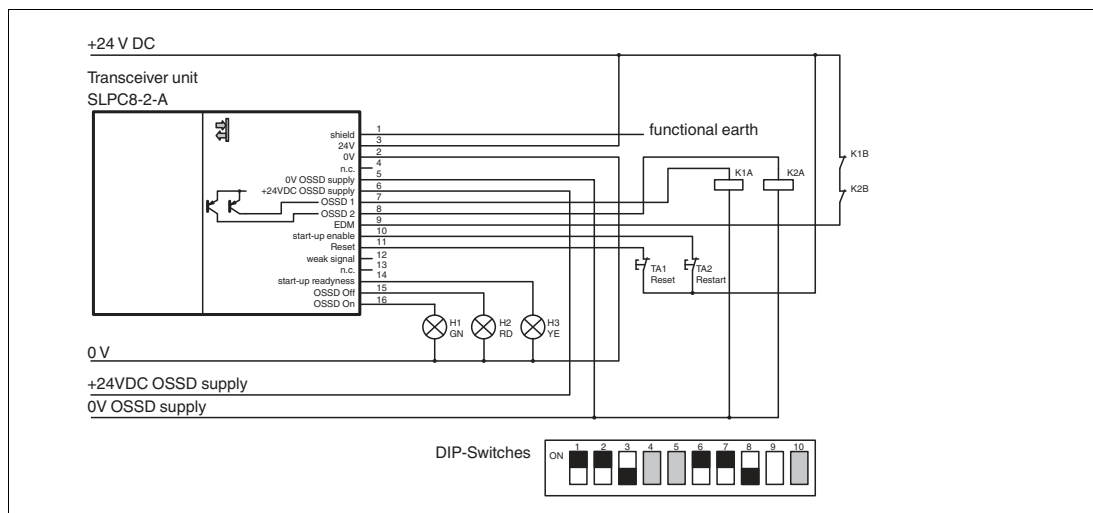


Figure 9.10 Transceiver SLPC8-2-A with adjustable mirror

## 9.7 Application Checklist

A list of important points should help you avoid errors when planning, setting up, and using the protective device. 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 SLCP(M) meet the requirements of the application? (E.g., resolution, protection field height, operating voltage)
- Is the overvoltage category required by EN 50178 met at the receiver connections?
- Is there enough space for fitting and dismantling components?
- Are the distances between the protection field and the hazardous area as well as the reflective surfaces maintained as required?

#### 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 SLCP(M) been positioned so that the protection field cannot be bypassed and people cannot enter the hazardous area undetected?
- Has the SLCP(M) been adjusted?
- 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 SLCP(M) with a relay contact output?

### **Commissioning**

- Has the detection capability of the SLCP(M) 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 emitter 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 inspection**

- 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 SLCP(M) 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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