

# deTem4 Core Ex

Multiple light beam safety device



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### Described product

deTem4 Core Ex

### Manufacturer

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### Original document

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## 1 About this document

### 1.1 Function of this document

These operating instructions contain the information needed during the life cycle of the multiple light beam safety device.

Operating instructions of the multiple light beam safety device must be made available to all people who work with the device.

Please read these operating instructions carefully and make sure that you understand the content fully before working with the multiple light beam safety device.

### 1.2 Scope

These operating instructions only apply to the deTem4 Core Ex multiple light beam safety device with the following type label entry in the Operating Instructions field:

- 8022833

This document is included with the following SICK part numbers (this document in all available language versions):

- 8022833

### 1.3 Target groups and structure of these operating instructions

These operating instructions are intended for the following target groups: project developers (planners, developers, designers), installers, electricians, safety experts (such as CE authorized representatives, compliance officers, people who test and approve the application), operators, and maintenance personnel.

The structure of these operating instructions is based on the life cycle phases of the multiple light beam safety device: project planning, mounting, electrical installation, commissioning, operation, and maintenance.

In many applications, therefore, the target groups consist of the manufacturer and the operating entity of the machine in which the multiple light beam safety device is integrated:

Area of responsibility	Target group	Special chapters of these operating instructions <sup>1</sup>
Manufacturer	Project developers (planners, developers, designers)	<a href="#">Project planning, page 17</a> <a href="#">Technical data, page 60</a> <a href="#">Accessories, page 67</a>
	Installers	<a href="#">Mounting, page 29</a>
	Electricians	<a href="#">Electrical installation, page 42</a>
	Safety experts	<a href="#">Project planning, page 17</a> <a href="#">Commissioning, page 46</a> <a href="#">Technical data, page 60</a> <a href="#">Checklist for initial commissioning and commissioning, page 73</a>
Operating entity	Operators	<a href="#">Operation, page 52</a> <a href="#">Troubleshooting, page 56</a>
	Maintenance personnel	<a href="#">Maintenance, page 53</a> <a href="#">Troubleshooting, page 56</a> <a href="#">Ordering information, page 66</a>

<sup>1</sup> Chapters not listed here are intended for all target groups. All target groups must understand the safety notes in all of the operating instructions!

In other applications, the operating organization is also the manufacturer of the equipment with the corresponding allocation of the target groups.

## 1.4 Additional information

[www.sick.com](http://www.sick.com)

The following information is available on the Internet:

- This document in other languages
- Data sheets and application examples
- CAD data and dimensional drawings
- Certificates (e.g. EU declaration of conformity)
- Guide for Safe Machinery Six steps to a safe machine

## 1.5 Symbols and document conventions

The following symbols and conventions are used in this document:

### Safety notes and other notes



#### DANGER

Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.



#### WARNING

Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.



#### CAUTION

Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.



#### NOTICE

Indicates a situation presenting possible danger, which may lead to property damage if not prevented.



#### NOTE

Indicates useful tips and recommendations.

### Instructions to action

- ▶ The arrow denotes instructions to action.
  1. The sequence of instructions for action is numbered.
  2. Follow the order in which the numbered instructions are given.
- ✓ The check mark denotes the result of an instruction.



### LED symbols

These symbols indicate the status of an LED:

- The LED is off.
- ◐ The LED is flashing.
- The LED is illuminated continuously.

### Sender and receiver

These symbols indicate the sender and receiver of the device:

-  The symbol indicates the sender.
-  The symbol indicates the receiver.



## 2 Safety information

### 2.1 General safety notes

**DANGER**

Hazard due to lack of effectiveness of the protective device

In the case of non-compliance, it is possible that the dangerous state of the machine may not be stopped or not stopped in a timely manner.

- ▶ Please read this document carefully and make sure that you understand the content fully before working with the device.
- ▶ Follow all safety notes in this document.

**WARNING**

Risk of ineffectiveness of the protective device

Please observe the following information to ensure safe and correct use of the device deTem4 Core Ex.

- ▶ National and international regulations and guidelines must be observed when mounting, using, and commissioning electrical devices as well as when carrying out regular technical inspections in explosion-hazardous areas. Article 500 of the National Electrical Code and ATEX Directive 2014/34/EU shall apply in particular. Manufacturers of and entities operating machines using the device are responsible for ensuring that all applicable safety regulations and guidelines are complied with.
- ▶ These operating instructions must be made available to the operator of the machine on which the device is used. Qualified safety personnel must instruct the operator in how to use the device. The operator must also be directed to read and follow the operating instructions.

**DANGER**

Risk of ignition

Failure to observe this instruction can result in a risk of ignition from potential sparking.

- ▶ Ensure that only accessories that are approved for explosion-hazardous areas are used.

**NOTE**

SICK provides more information about the following explosion-proof connections:

- Joint between glass and cover
- Joint between cover and explosion-proof enclosure

### 2.2 Intended use

**Overview**

The deTem4 Core Ex multiple light beam safety device is an electro-sensitive protective device (ESPE) and is suitable for the following applications:

- Single-sided access protection
- Multi-sided access protection

The multiple beam light beam safety device deTem4 Core Ex is suitable for use in enclosed spaces only. It has UL/cUL certification for the following hazardous areas defined in the National Electrical Code® and Canadian Electrical Code®:

- Class I, Groups C, D
- Class II, Groups E, F, G
- Class III

The multiple light beam safety device deTem4 Core Ex also complies with these standards: EN 60079-0:2012/A11:2013/IEC 60079-0 Edition 6.0, EN 60079-1:2014/IEC 60079-1 Edition 7.0, EN 60079-31:2014/IEC 60079-31 Edition 2.0 and is certified for the following hazardous areas:

- Ⓜ II 2 G Ex db IIB T6
- Ⓜ II 2 D Ex tb IIIC T56 °C Db IP6X
- Ex db IIB T6
- Ex tb IIIC T56 °C Db IP6X

DEMKO 14 ATEX 1315X  
IECEX UL 14.0034X

The multiple light beam safety device deTem4 Core Ex does not emit any paint wetting impairment substances or volatile silicones and does not expel any fixed parts or materials into the surrounding area.

The deTem4 Core Ex multiple light beam safety device must only be used within the limits of the prescribed and specified technical data and operating conditions at all times.

Any instance of improper use, incorrect modification, or manipulation of the deTem4 Core Ex multiple light beam safety device shall void any warranty provided by SICK AG; furthermore, SICK AG shall not accept any responsibility or liability for any resulting damage and consequential damage.

### Important information

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#### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

The multiple light beam safety device works as an indirect protective measure and cannot provide protection from pieces thrown from application nor from emitted radiation. Transparent objects are not detected.

- ▶ Only use the multiple light beam safety device as an indirect protective measure.
- 



#### DANGER

Risk of ignition

Failure to observe this information could result in a risk of ignition.

- ▶ The sender, receiver, and cables delivered with the device deTem4 Core Ex are not explosion-proof. The person purchasing, assembling, and using the safety light curtain is responsible for fitting the cables in suitable explosion-proof conduits and/or cable glands to ensure the integrity of the system.
  - ▶ The type label on each individual explosion-proof enclosure contains information on the device's hazardous area class and group. Every device that penetrates the explosion-proof enclosure must be suitable for the environment in which the explosion-proof enclosure is installed with regard to its hazardous area class and group or zone.
-

**DANGER**

Risk of ignition

Failure to observe this information could result in a risk of ignition.

Only if the device is used outside North America:

- ▶ A cable gland must be mounted.
- ▶ The cable gland must be certified for d and tb environments.

**DANGER**

Risk of ignition

Failure to observe this information could result in a risk of ignition.

Only if the device is used in North America:

- ▶ Any conduit openings that are not in use must be sealed. Sealing fittings must turn at least five (5) full revolutions and be at least 3.175 mm thick (1/8 of an inch).
- ▶ Conduit sealing fittings must be applied in each installed conduit run (located a maximum of 457 mm (18 inches) away from the explosion-proof enclosure) in order to comply with the provisions of the most recent version of the National Electrical Code, Article 501.15 and/or 502.15, and all other applicable regulations.

**Reasonably foreseeable misuse**

Among others, the deTem4 Core Ex multiple light beam safety device is **not** suitable for the following applications:

- Outdoors
- Underwater
- At altitudes over 3,000 m above sea level
- In environments with increased levels of ionizing radiation

## 2.3 Requirements for the qualification of personnel

The multiple light beam safety device must be configured, installed, connected, commissioned, and serviced only by qualified safety personnel.

**Project planning**

For project planning, a person is considered competent when he/she has expertise and experience in the selection and use of protective devices on machines and is familiar with the relevant technical rules and national work safety regulations.

**Mechanical mounting**

For mechanical mounting, a person is considered competent when he/she has the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine that he/she can assess its operational safety status.

**Electrical installation**

For electrical installation, a person is considered competent when he/she has the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine that he/she can assess its operational safety status.

### **Commissioning**

For commissioning, a person is considered competent when he/she has the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine that he/she can assess its operational safety status.

### **Operation and maintenance**

For operation and maintenance, a person is considered competent when he/she has the expertise and experience in the relevant field and is sufficiently familiar with the application of the protective device on the machine and has been instructed by the machine operator in its operation.

Maintenance and thorough checks should only be conducted by qualified, trained personnel who are familiar with the regulations and instructions relating to explosion-hazardous environments, particularly:

- Ignition protection methods
- Mounting regulations
- Regulations on distances to be maintained

An operator must clean the multiple light beam safety device. Additional information for the operator of the machine: [see "Operation", page 52](#), and [see "Regular cleaning", page 53](#).

## 3 Product description

### 3.1 Setup and function

The deTem4 Core Ex multiple light beam safety device is an electro-sensitive protective device (ESPE) consisting of a sender and receiver.

Parallel infrared light beams between the sender and receiver protect the hazardous area. When one or more light beams are completely interrupted, the multiple light beam safety device reports the interruption in the light path to the secure output signal switching devices (OSSDs) by a signal change. The machine or its control must safely analyze the signals (for example using a safe control or safety relays) and stop the dangerous state.

Sender and receiver automatically synchronize themselves optically. An electrical connection between both components is not required.

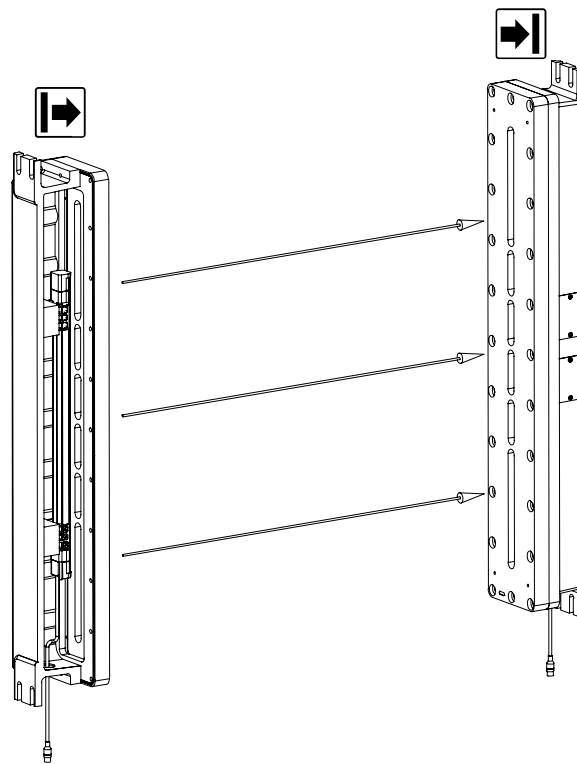


Figure 1: Sender and receiver

#### Beam separation and number of beams

The beam separation is the distance between two adjacent light beams, measured from the center of one beam to the center of the next.

The beam separation and number of beams depend on the device variant.

#### Scanning range

The scanning range is the maximum dimension of the light path between sender and receiver. It depends on the device variant.

The scanning range is reduced by using deflector mirrors.

**Further topics**

- "Data sheet", page 60
- "Deflector mirrors", page 69

**3.2 Product characteristics**

**3.2.1 Status indicators**

The sender and receiver light emitting diodes indicate the operational status.

**Sender indicators**

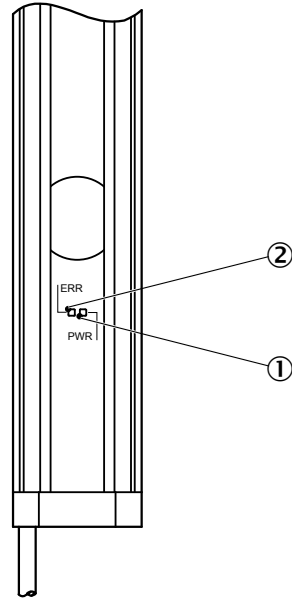


Figure 2: Sender indicators

Two light emitting diodes on the sender indicate the operational status:

Position	LED color	Display	Labeling
①	Yellow	Status indicator	PWR
②	Red	Fault indicator	ERR

Complete overview of the light emitting diode statuses and their meanings: see "Diagnostic LEDs", page 56.

Receiver indicators

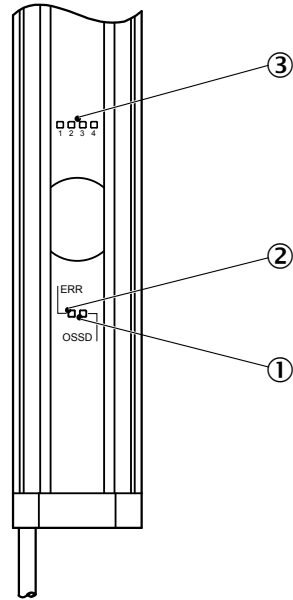


Figure 3: Receiver indicators

Six light emitting diodes on the receiver indicate the operational status:

Position	LED color	Display	Labeling
①	Red/green	OSSD status	OSSD
②	Red	Fault indicator	ERR
③	Blue	Alignment quality	1, 2, 3, 4

The blue alignment quality light emitting diodes in combination with the red flashing ERR LED also denote faults.

Complete overview of the light emitting diode statuses and their meanings: see "[Diagnostic LEDs](#)", page 56.

### 3.3 Example applications

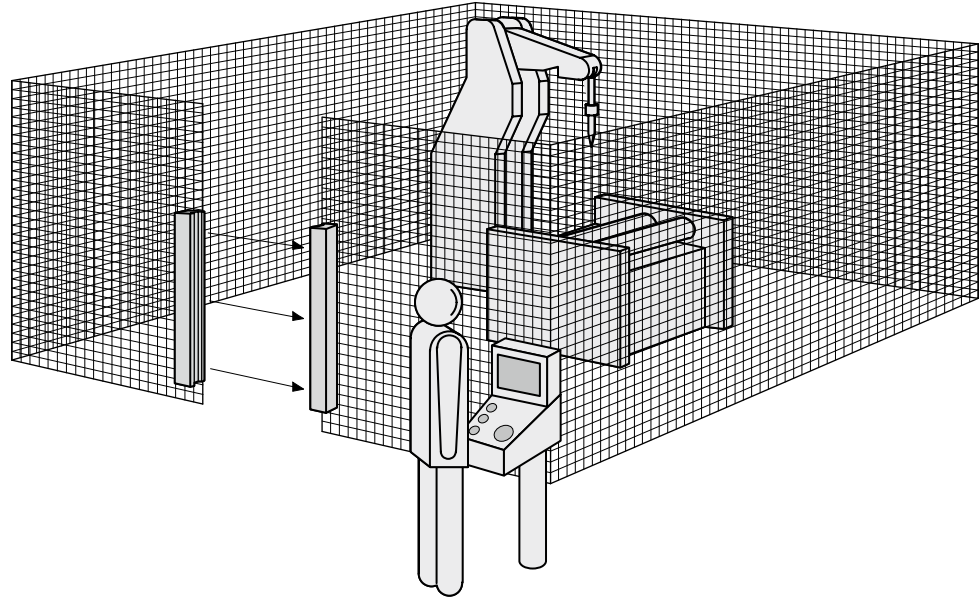


Figure 4: Single-sided access protection

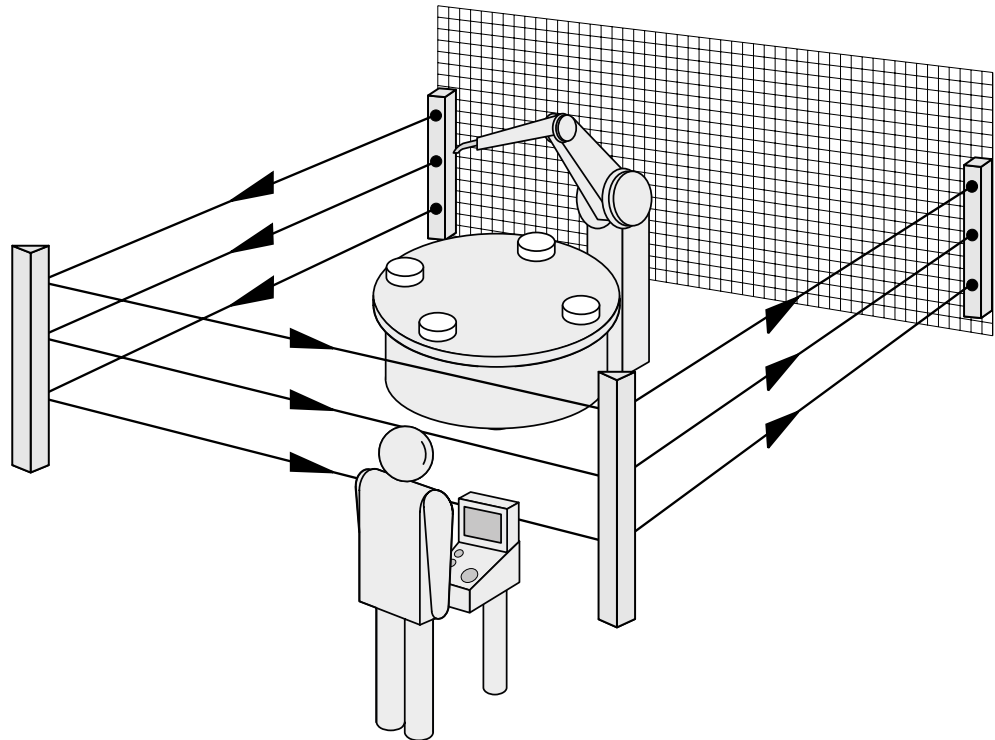


Figure 5: Multi-sided access protection



## 4 Project planning

### 4.1 Manufacturer of the machine

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**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Use of the multiple light beam safety device requires a risk assessment. Check whether additional protective measures are required.
  - ▶ Comply with the applicable national regulations derived from the application (e.g., work safety regulations, safety rules, or other relevant safety guidelines).
  - ▶ Do not combine the components of the multiple light beam safety device with components from other multiple light beam safety devices.
  - ▶ Apart from the procedures described in this document, the components of the multiple light beam safety device must not be opened.
  - ▶ The components of the multiple light beam safety device must not be tampered with or changed.
  - ▶ Improper repair of the protective device can lead to a loss of the protective function. Do not carry out any repairs on the device components.
- 

### 4.2 Operating entity of the machine

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**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Changes to the electrical integration of the multiple light beam safety device in the machine control and changes to the mechanical mounting of the multiple light beam safety device necessitate a new risk assessment. The results of this risk assessment may require the operating entity of the machine to meet a manufacturer's obligations.
  - ▶ Apart from the procedures described in this document, the components of the multiple light beam safety device must not be opened.
  - ▶ The components of the multiple light beam safety device must not be tampered with or changed.
  - ▶ Improper repair of the protective device can lead to a loss of the protective function. Do not carry out any repairs on the device components.
- 

### 4.3 Design

This chapter contains important information about the design.

Information on the individual steps for mounting the device: [see "Mounting", page 29](#).



### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Make sure that the following design requirements are met so that the multiple light beam safety device can fulfill its protective function.
    - Sender and receiver must be arranged such that persons or parts of the body are reliably detected when they enter the hazardous area.
    - Ensure that nobody can pass under the lowest light beam, pass over the highest light beam, get between two light beams, or pass by the side of the protective device.
    - If people can stay between the protective device and the hazardous point without being detected, check if additional protective measures (e.g., restart interlock) are required.
- 

### 4.3.1 Scanning range and beam separation

#### **Important information**

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### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ The multiple light beam safety device can only be mounted to machines on which the protective field width does not change when the device is switched on.
- 

#### **Beam separation and number of beams**

The beam separation is the distance between two adjacent light beams, measured from the center of one beam to the center of the next.

The beam separation and number of beams depend on the device variant.

#### **Scanning range**

The scanning range is the maximum dimension of the light path between sender and receiver. It depends on the device variant.

The scanning range is reduced by using deflector mirrors.

#### **Further topics**

- ["Minimum distance from reflective surfaces", page 20](#)
- ["Technical data", page 60](#)
- ["Deflector mirrors", page 69](#)

### 4.3.2 Minimum distance from the hazardous point

A minimum distance must be maintained between the multiple light beam safety device and the hazardous point. This distance is required to prevent a person or part of the body from reaching the hazardous area before the dangerous state of the machine state has completed.

#### **Calculating the minimum distance according to ISO 13855**

The calculation of the minimum distance is based on international or national standards and statutory requirements applicable at the place of installation of the machine.

If the minimum distance is calculated according to ISO 13855, then it depends on the following points:

- Machine stopping time (time interval between triggering the sensor function and the end of the machine's dangerous state)
- Response time of the protective device, see "Technical data", page 60
- Approach speed of personnel
- Type of approach: orthogonal (at right angles)
- Parameters specified based on the application

For the USA (scope of OSHA and ANSI), different regulations may apply, e.g.:

- a) Laws: Code of Federal Regulations, Title 29 (CFR29) Part 1910.217
- b) Standards: ANSI B11.19

#### Complementary information

Additional information is available in the ISO 13855 standard and in the Guidelines Safe Machinery.

SICK offers a stopping/run-down time measurement service in many countries.

#### 4.3.2.1 Calculating minimum distance from the hazardous point

##### Important information



#### DANGER

Minimum distance from the hazardous point is too small

The dangerous state of the machine may not be stopped or not be stopped in a timely manner due to a minimum distance that is too small.

- ▶ Calculate the minimum distances for the machine in which the multiple light beam safety device is integrated.
- ▶ When mounting the multiple light beam safety device, observe the minimum distance.

#### Approach

The example shows the calculation of the minimum distance for an orthogonal (at right angles) approach to the multiple light beam safety device. Depending on the application and the ambient conditions, a different calculation may be required (e.g., at a different angle to the direction of approach or an indirect approach).

1. Calculate S using the following formula:

$$S = 1,600 \text{ mm/s} \times T + C$$

where:

- S = minimum distance in millimeters (mm)
- T = machine stopping time + response time of the protective device after interruption in the light path in seconds (s)
- C = supplement in accordance with ISO 13855:
  - If it is not possible to reach over the protective device: C = 850 mm
  - If it is possible to reach over the protective device, the value  $C_{RO}$  must be used for C in accordance with ISO 13855, provided that this is greater than 850 mm:  $C \geq 850 \text{ mm}$  and  $C \geq C_{RO}$

The reach/approach speed is already included in the formula.

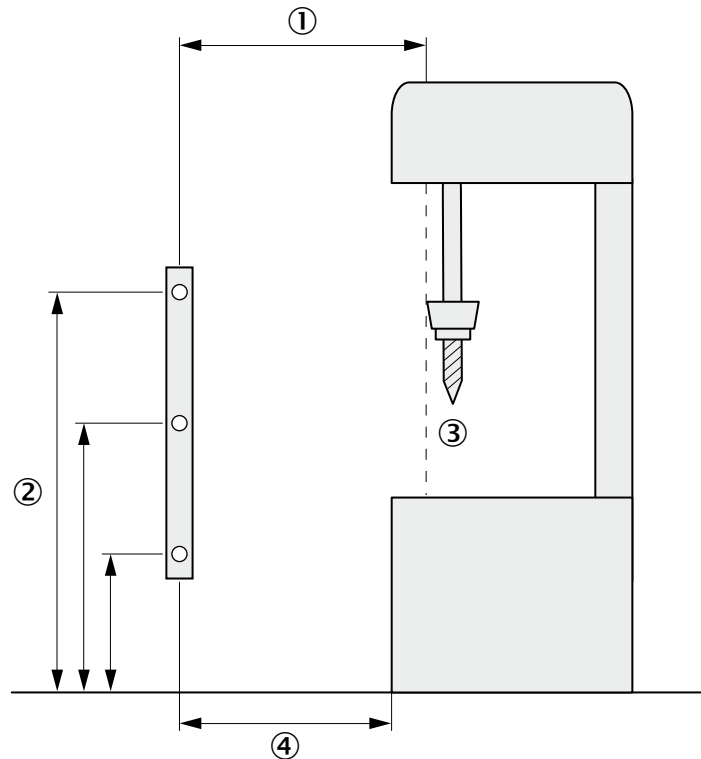


Figure 6: Minimum distance from the hazardous point

- ① Minimum distance S
- ② Height of the light beams above ground
- ③ Hazardous point
- ④ Depending on the application and distance, persons must be prevented from standing behind the protective device.

**Example calculation**

Machine stopping time = 290 ms

Response time after interruption of the light path = 20 ms

$$T = 290 \text{ ms} + 20 \text{ ms} = 310 \text{ ms} = 0.31 \text{ s}$$

$$S = 1,600 \text{ mm/s} \times 0.31 \text{ s} + 850 \text{ mm} = 1,346 \text{ mm}$$

**4.3.3 Minimum distance from reflective surfaces**

**Overview**

The light beams from the sender may be deflected by reflective surfaces and dispersive media. This can prevent an object from being detected.

Therefore, all reflective surfaces and objects (e.g., material bins, machine table, etc.) must maintain a minimum distance (a) from the light beams. This minimum distance (a) must be maintained on all sides of the light beams. This applies in horizontal, vertical, and diagonal directions as well as at the ends of the multiple light beam safety device. The same area must be free of dispersive media (e.g., dust, fog, or smoke).

The minimum distance (a) depends on the distance (D) between sender and receiver.

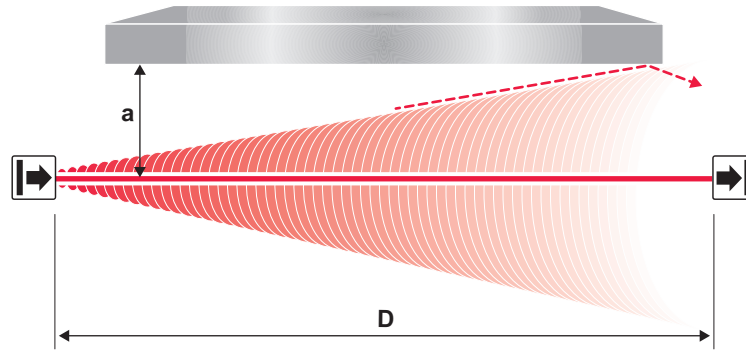


Figure 7: Minimum distance from reflective surfaces

**Important information**



**DANGER**

Hazard due to lack of effectiveness of the protective device

Reflective surfaces and dispersive media can prevent persons or parts of the body to be protected from being properly reflected and therefore, they remain undetected.

- ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the light beams.
- ▶ Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the light beams.

**Determining minimum distance to reflective surfaces**

1. Determine the distance between sender and receiver D in meters (m)
2. Read the minimum distance a in millimeters (mm) in the graph or calculate it based on the respective formula from [table 1](#):

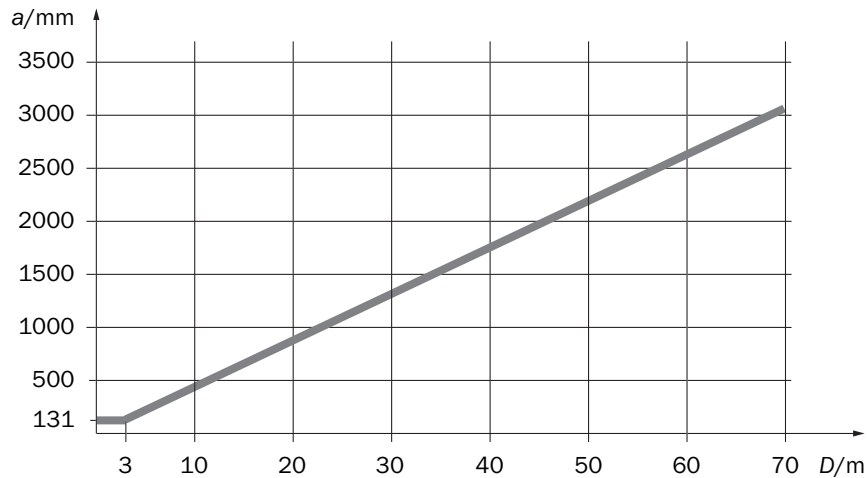


Figure 8: Graph, minimum distance from reflective surfaces

Table 1: Formula for calculating the minimum distance from reflective surfaces

Distance between sender and receiver D in m	Calculating the minimum distance from reflective surfaces a in mm
$D \leq 3$ m	$a = 131$ mm
$D > 3$ m	$a = \tan(2.5^\circ) \times 1,000 \text{ mm/m} \times D = 43.66 \times 1 \text{ mm/m} \times D$

4.3.4 Protection against interference from systems in close proximity to each other

Overview

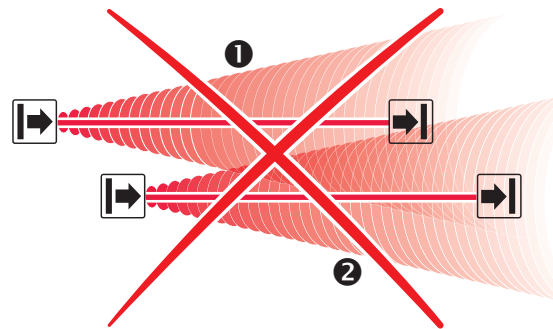


Figure 9: Preventing mutual interference from system ① and system ②

The infrared light beams of the sender of system ① can interfere with the receiver of system ②. This can disrupt the protective function of system ②. This would mean that the operator is at risk.

Avoid such installation situations or take appropriate action, e.g., install optically opaque partitions or reverse the direction of transmission of a system.

Important information



**DANGER**

Hazard due to lack of effectiveness of the protective device

Systems of multiple light beam safety devices in close proximity to each other can mutually interfere with each other.

- ▶ Use suitable measures to prevent interference between systems in close proximity to each other.

4.3.4.1 Using reversed direction of transmission

The direction of transmission of the system ② can be changed during mounting by switching the positions of the sender and receiver. With reversed direction of mounting, the receiver ② is not affected by the infrared light from the sender ①.

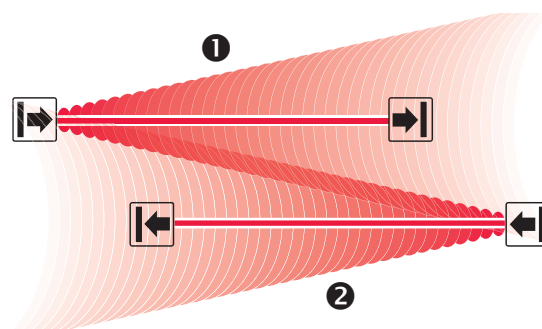


Figure 10: Trouble-free operation due to reversed direction of transmission of system ① and system ②

4.4 Integrating into the electrical control

This chapter contains important information about integration in the electrical control. Information about the individual steps for electrical installation of the device: [see "Electrical installation", page 42.](#)

### Requirements for use

The output signals of the protective device must be analyzed by downstream controllers in such a way that the dangerous state of the machine is ended safely. Depending on the safety concept, the signal is analyzed by, e.g., safety relays or a safety controller.



#### DANGER

Hazard due to lack of effectiveness of the protective device

In the case of non-compliance, it is possible that the dangerous state of the machine may not be stopped or not stopped in a timely manner.

- ▶ Make sure that the following control and electrical requirements are met so that the multiple light beam safety device can fulfill its protective function.
- 
- It must be possible to electrically influence the control of the machine.
  - The electrical control of the machine must meet the requirements of IEC 60204-1.
  - Depending on the regulations which apply at the place of installation, a restart interlock may be required. Because the multiple light beam safety device does not have this function, it must be implemented in the external control if required.
  - When using a safety controller, different signal levels of both OSSDs must be detected depending on the regulations which apply at the place of installation or the required reliability of the safety function. The maximum discrepancy time tolerated by the control must be selected according to the application.
  - The OSSD1 and OSSD2 output signals must not be connected to each other.
  - In the machine controller, the signals of both OSSDs must be processed separately.

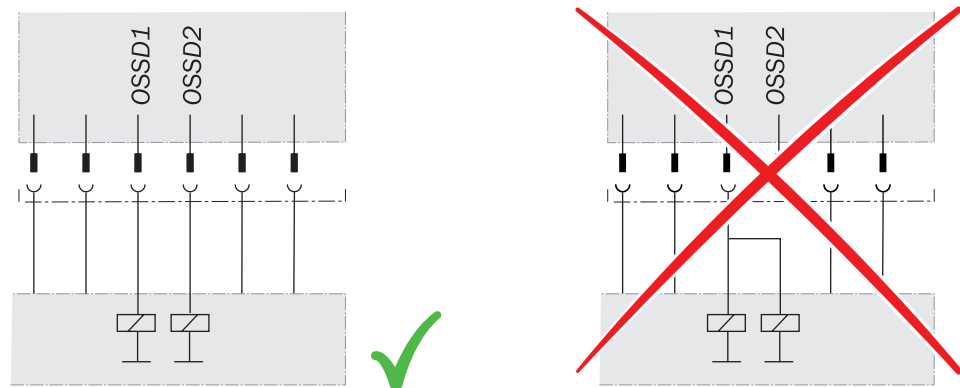


Figure 11: Dual-channel and isolated connection of OSSD1 and OSSD2

- The machine must switch to the safe state at any time if at least one of the two OSSDs switches to the OFF state.
- Prevent the formation of a potential difference between the load and the protective device. If you connect loads to the OSSDs (output signal switching devices) that then also switch if controlled with negative voltage (e.g., electro-mechanical contactor without reverse polarity protection diode), you must connect the 0 V connections of these loads and those of the corresponding protective device individually and directly to the same 0 V terminal strip. In the event of a fault, this is the only way to ensure that there can be no potential difference between the 0 V connections of the loads and those of the corresponding protective device.

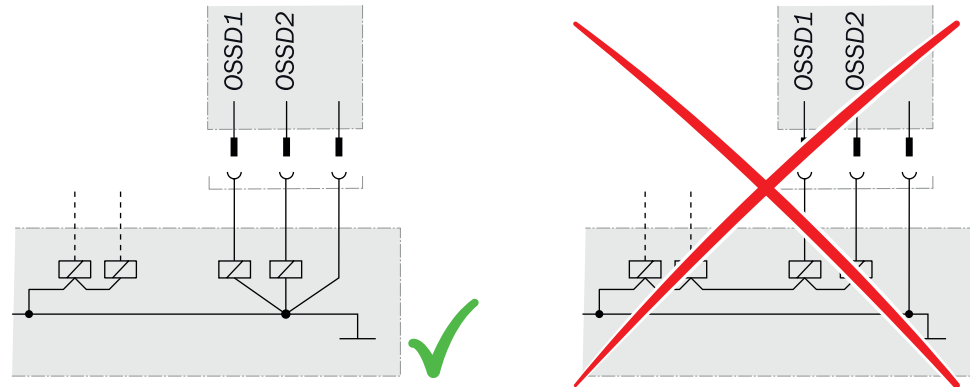


Figure 12: No potential difference between load and protective device



**DANGER**

Hazard due to lack of effectiveness of the protective device

In the case of non-compliance, it is possible that the dangerous state of the machine may not be stopped or not stopped in a timely manner.

Downstream contactors must be positively guided and monitored depending on applicable national regulations or required reliability of the safety function.

- ▶ Make sure that downstream contactors are monitored (external device monitoring, EDM).
- ▶ Because the multiple light beam safety device does not have integrated external device monitoring, this must be implemented in the external control, if required.

**Requirements for the electrical control of the machine**

Both outputs are short-circuit protected to 24 V DC and 0 V. When the light path is clear, the O SSDs are in the ON state. When a switch-off condition is present (e.g., interruption in the light path), the O SSDs are in the OFF state. In the event of a device fault, at least one O SSD is in the OFF state.

The multiple light beam safety device complies with the rules for electromagnetic compatibility (EMC) for the industrial sector (Radio Safety Class A). Radio interference cannot be ruled out when used in residential areas.



**DANGER**

Hazard due to lack of effectiveness of the protective device

In the case of non-compliance, it is possible that the dangerous state of the machine may not be stopped or not stopped in a timely manner.

- ▶ Make sure that the following control and electrical requirements are met so that the multiple light beam safety device can fulfill its protective function.
  - The external voltage supply of the multiple light beam safety device must be capable of buffering brief power failures of 20 ms as specified in IEC 60204-1.
  - The power supply unit must provide safe isolation according to IEC 61140 (SELV/PELV). Suitable power supply units are available as accessories from SICK, see "Accessories", page 67.



#### 4.4.1 Restart interlock

##### Overview

Depending on the regulations which apply at the place of installation, a restart interlock may be required.

The restart interlock prevents the machine from automatically starting up, for example after a protective device has responded while the machine is operating or after changing the machine's operating mode.



##### NOTE

Because the multiple light beam safety device does not have an integrated restart interlock, this must be implemented in the external control, if required.

##### Principle of operation

Before the machine can be restarted, the operator must reset the restart interlock.

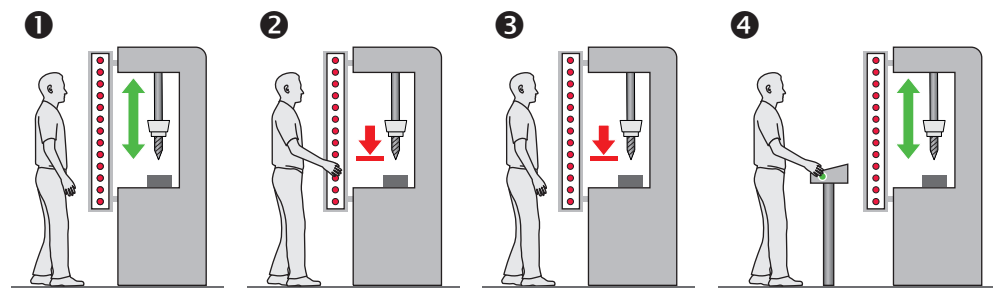


Figure 13: Schematic representation of operation with restart interlock

The dangerous state of the machine (❶) is brought to an end if the light path is interrupted (❷) and is not re-enabled (❸) until the operator presses the reset pushbutton located outside the hazardous area (❹). The machine can then be restarted.

Depending on the applicable national regulations, there must be a restart interlock if a person can stand behind the protective field. Observe IEC 60204-1.

#### 4.4.2 External device monitoring (EDM)

##### Overview

The external switching elements (external device monitoring, EDM) must be inspected in line with the regulations which apply at the place of installation or the required reliability of the safety function.

The external device monitoring (EDM) monitors the status of downstream contactors.

In order to use the external device monitoring, positively guided contactors must be used to switch off the machine. If the auxiliary contacts of the positively guided contactors are connected to the external device monitoring, the external device monitoring checks whether the contactors drop off when the OSSDs are switched off.

##### Important information



##### NOTE

Because the multiple light beam safety device does not have integrated external device monitoring, this must be implemented in the external control, if required.

4.4.3 Connection diagrams

Connection diagram for UE48-20S with restart interlock and external device monitoring

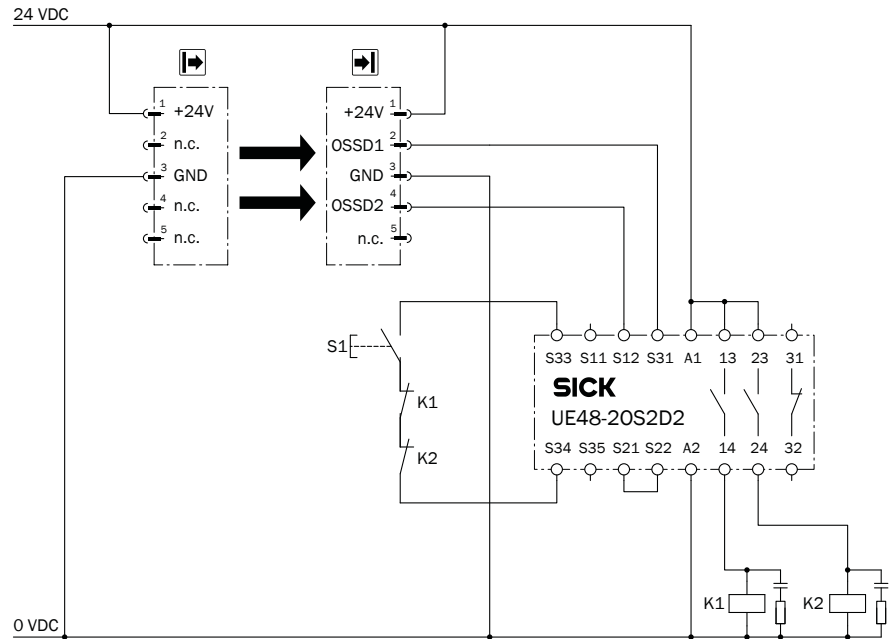


Figure 14: Connection diagram for UE48-20S with restart interlock and external device monitoring

The multiple light beam safety device can be connected to the UE48-20S switching amplifiers. It is operated with restart interlock and external device monitoring.

**Operating principle**

When the protective field is clear, the OSSID1 and OSSID2 outputs carry voltage. The system can be switched on when K1 and K2 are in the de-energized position. Pressing the S1 button switches on the UE48 switching amplifier. Contacts 13-14 and 23-24 of the UE48 activate the K1 and K2 contactors.

When the protective field is interrupted, the OSSID1 and OSSID2 outputs carry no voltage. The UE48 switches off and K1, K2 are deactivated.

**Fault analysis**

Failure of K1 and K2 does not cause the loss of the shut-down function. Cross-circuits and short-circuits of the OSSID1 and OSSID2 outputs are recognized and lead to the locking state. It is recognized if the K1 or K2 contactors do not de-energize.

4.5 Testing plan

The manufacturer of the machine and the operating entity must define all required checks. The definition must be based on the application conditions and the risk assessment and must be documented in a traceable manner.

- ▶ When defining the check, please note the following:
  - Define the type and execution of the check.
  - Define the frequency of the check.
  - Notify the machine operators of the check and instruct them accordingly.

The following checks are often defined in connection with a protective device:

- Check during commissioning and modifications
- Regular check

#### Check during commissioning and modifications

The check must detect if it is possible to enter the hazardous area without being detected.

The following points are often helpful for the definition of the check:

- Does the check have to be completed by quality safety personnel?
  - Can the check be completed by personnel specially qualified and authorized personnel?
  - Does the check have to be documented in a traceable manner?
  - Can the check be carried out according to a check list (see ["Checklist for initial commissioning and commissioning", page 73](#))?
  - Do the machine operators know the function of the protective device?
  - Have the machine operators been trained to work on the machine?
  - Have the machine operators been notified about modifications on the machine?
  - Does the hazardous area to be secured have to be checked with a test rod, see ["Test rod check", page 27](#)?
- Define all guidelines for the check.

#### Regular check

The check must detect if it is possible to enter the hazardous area without being detected. Such possibilities may exist due to modifications, manipulations or external influences.

The following points are often helpful for the definition of the check:

- Which check must be carried out and how is it carried out?
    - [Test rod check, page 27](#)
    - [Visual check of the machine and the protective device, page 28](#)
  - How often does the check have to be carried out?
  - Do the machine operators have to be notified of the check and do they need to be instructed accordingly?
- Define all guidelines for the check.

### 4.5.1 Test rod check

#### Overview

The light beam is covered with an opaque test rod (minimum diameter of 30 mm). When the light beam is covered, the OSSD LED on the receiver must light up red. The check is carried out for each light beam and at multiple positions between the sender and the receiver.

#### Important information



#### DANGER

Hazard due to unexpected starting of the machine

- Make sure that the dangerous state of the machine is and remains switched off during the check.
- Make sure that the outputs of the multiple light beam safety device do not affect the machine during the check.



### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

Do not operate the machine if the OSSD LED lights up green during the test!

- ▶ If the OSSD LED lights up green during the test, even if only briefly, work must stop at the machine.
- ▶ In this case, the mounting and electrical installation of the multiple light beam safety device must be checked by appropriately qualified safety personnel.

---

### **Prerequisites**

- The OSSD LED lights up green.

### **Approach**

1. Cover a light beam completely.  
✓ The OSSD LED on the receiver lights up red.
2. Enable the light beam.  
✓ The OSSD LED on the receiver lights up green.
3. Carry out the check for each light beam.
4. Carry out the check at the following positions:
  - Immediately in front of the sender
  - In the middle, between the sender and the receiver (or between the deflector mirrors)
  - Immediately in front of the receiver
  - Directly before and after each deflector mirror (if installed)

#### **4.5.2 Visual check of the machine and the protective device**

The following points are often helpful for the definition of the check:

- Has the machine been retrofitted?
- Have machine parts been removed?
- Have modifications been made to the surroundings of the machine?
- Have the protective device or its parts been dismantled?
- Is it possible to enter the hazardous area without being detected?
- Is the protective device damaged?
- Is the protective device severely contaminated?
- Is the front screen contaminated, scratched or destroyed?
- Are there any damaged cables or open cable ends?

If one of the points applies, the machine should be shut down immediately. In this case, the machine and the protective device must be checked by appropriately qualified safety personnel.

## 5 Mounting

### 5.1 Safety

#### Important information

---

**DANGER**

Risk of ignition or explosion

- ▶ Disconnect the voltage supply before starting to mount the explosion-proof enclosure to avoid igniting hazardous atmospheres.
  - ▶ Only reconnect the voltage supply once you have completed the mounting process.
- 

**DANGER**

Risk of ignition or explosion

- ▶ If you have to remove the cover when working on the multiple light beam safety device, make sure that the joints and o-ring are clean and undamaged before refitting the cover.
- 

**DANGER**

Risk of ignition or explosion

- ▶ The multiple light beam safety device must be mounted so that there is a gap of more than 30 mm between all other objects and the flange joints between the housing and the cover.
- 

**DANGER**

Dangerous state of the machine

- ▶ Make sure that the dangerous state of the machine is (and remains) switched off during mounting, electrical installation, and commissioning.
  - ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during mounting, electrical installation, and commissioning.
- 

**DANGER**

Hazard due to lack of effectiveness of the protective device

If unsuitable brackets are used or if subjected to excessive vibrations, the device may become detached or damaged.

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Only use SICK-approved brackets for mounting.
  - ▶ Take appropriate measures for vibration damping if vibration and shock specifications exceed the values and test conditions specified in the data sheet.
-



### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Do not do repair work on device components.
  - ▶ Do not make changes to or manipulate device components.
  - ▶ Apart from the procedures described in this document, the device components must not be opened.
- 



### CAUTION

Risk of injury due to heavy weight

Lifting and moving heavy loads may cause injury.

Unsecured heavy loads may, for example, fall over and cause bruising.

- ▶ Only lift the device using equipment or two persons.
  - ▶ Wear suitable protective clothing and safety shoes.
- 



### NOTE

Mount the device in the following order.

---

#### Prerequisites

- The multiple light beam safety device has been designed correctly.

#### Further topics

- ["Design", page 17](#)
- 

## 5.2 Unpacking

### Approach

1. Check the components for completeness and the integrity of all parts.
2. Please contact your respective SICK subsidiary should you have any complaints.

### Further topics

- ["Scope of delivery", page 66](#)
- 

## 5.3 Mounting

### Important information

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### NOTE

- ▶ Read this section in full before mounting the brackets.
  - ▶ Read the information on aligning the sender and receiver, [see "Sender and receiver alignment", page 47](#)
- 



### DANGER

Risk of ignition or explosion

- ▶ Disconnect the voltage supply before starting to mount the explosion-proof enclosure to avoid igniting hazardous atmospheres.
  - ▶ Only reconnect the voltage supply once you have completed the mounting process.
-

**DANGER**

Risk of ignition or explosion

- ▶ If you have to remove the cover when working on the multiple light beam safety device, make sure that the joints and o-ring are clean and undamaged before refitting the cover.

**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons or parts of the body to be protected may not be recognized or not recognized in time in case of non-observance.

- ▶ Take account of the minimum distances calculated for the machine: see "[Minimum distance from the hazardous point](#)", page 18, see "[Minimum distance from reflective surfaces](#)", page 20.
- ▶ Mount multiple light beam safety devices such that nobody can pass under the lowest light beam, pass over the highest light beam, get between two light beams, or pass by the side of the protective device.

**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ The end with the cable connection must point in the same direction for the sender and receiver.

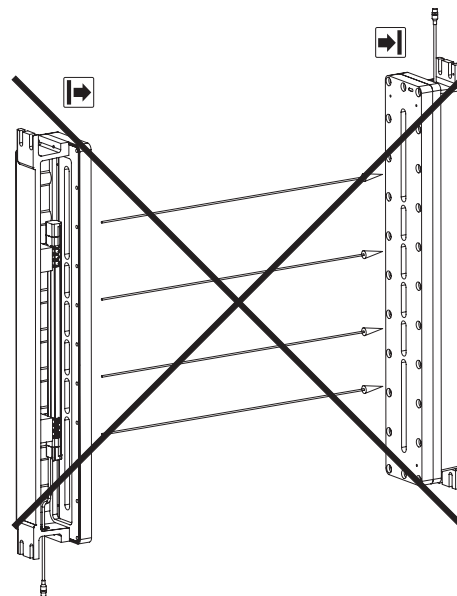
**Mounting instructions**

Figure 15: Sender and receiver must not be installed at 180° rotated relative to each other

**Approach**

1. If the multiple light beam safety device in pre-mounted condition has been purchased, please skip this step.  
First mount the multiple light beam safety device in the explosion-proof enclosure using the two supplied FlexFix brackets and risers. The FlexFix bracket makes it possible to rotate the sender and receiver around the axis of the device and to

align them accurately. In addition to the FlexFix brackets, the risers must also be used to mount the multiple light beam safety device as close to the window on the cover as possible.

2. Install the cable glands if necessary.
3. Secure the handles supplied onto the enclosure cover.
4. Mount the multiple light beam safety device in the explosion-proof enclosure on the machine. The explosion-proof enclosure can either be attached directly or using the alignment bracket (available as an accessory).

### 5.3.1 Mount the multiple light beam safety device in the explosion-proof enclosure (only if being used in North America)

#### Important information

---



#### NOTE

If the device in pre-mounted condition has been purchased, please skip this section.

---



#### DANGER

Risk of ignition or explosion

- ▶ Use fixing screws with a yield point of at least 640 MPa to attach the cover to the explosion-proof enclosure.
- 

#### Approach

1. Unscrew the fixing screws on the cover and remove the cover from the explosion-proof enclosure.
2. Secure the risers and the FlexFix brackets in the explosion-proof enclosure using the supplied M5 screws.
3. Tighten the fixing screws on the FlexFix mount brackets with a torque of 5 to 6 Nm. Too high a torque could damage the brackets while too low a torque does not provide sufficient protection against vibration.
4. Mount the multiple light beam safety device on the FlexFix brackets so that the connecting cable is at the same end of the explosion-proof enclosure as the 3/4" NPT opening. Do not tighten the fixing screws at this point.



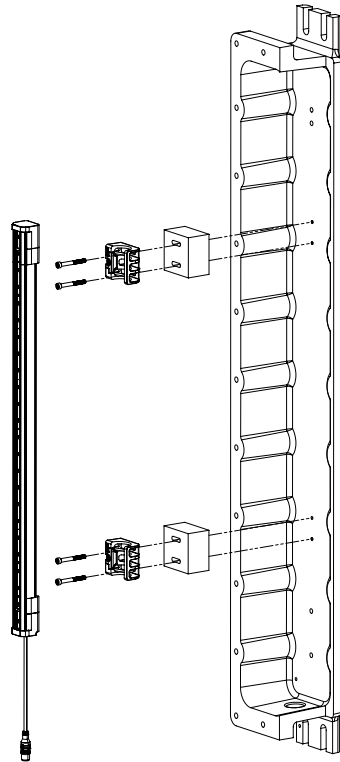


Figure 16: Mount the multiple light beam safety device in the explosion-proof enclosure.

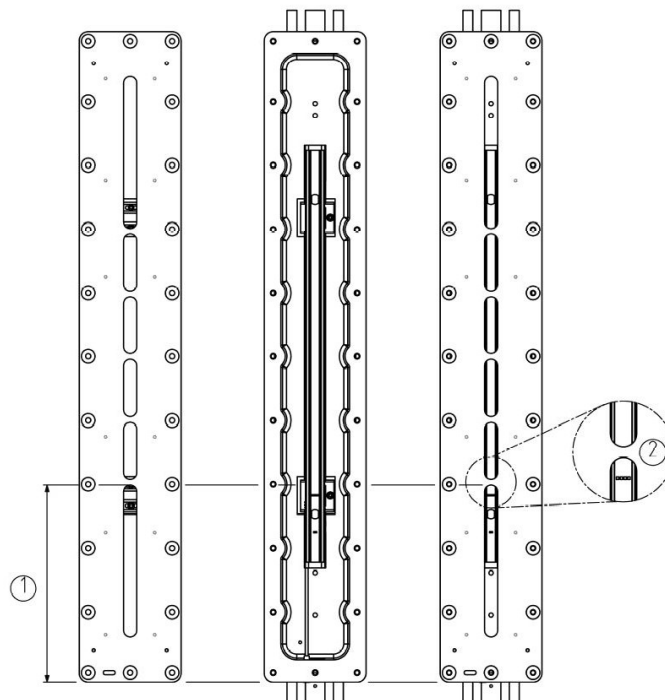


Figure 17: Align the multiple light beam safety device in the explosion-proof enclosure.

- ① Measure the distance from the end of the cover to the first rib. Position the multiple light beam safety device so that the rib is between two optical lenses.
- ② Detailed view

### Approach

5. Rotate the multiple light beam safety device in the FlexFix brackets so that the front screen of the device faces the opening in the explosion-proof enclosure. The infra-red rays must be able to pass through the window in the cover without obstruction.
6. Tighten the screws used to secure the multiple light beam safety device in the FlexFix brackets with a torque of 2.5 to 3 Nm.
7. Guide the connecting cable through the 3/4" NPT opening.
8. If a cable gland is required, follow the instructions to mount the gland, [see "Mount the optional cable gland", page 34](#).
9. Fit the cover to the explosion-proof enclosure using the supplied fixing screws and washers. Tighten the fixing screws with a torque of 11.5 to 14.5 Nm.



### NOTE

The washers must be used to obtain enclosure rating IP 66.

---

### 5.3.2 Mount the optional cable gland

#### Overview

Depending on national regulations and requirements, a cable gland may have to be installed. The cable gland is available as an accessory.

#### Important information

---



### DANGER

Risk of ignition or explosion

- ▶ Check the 3/4" NPT opening on the thread for damage.
  - ▶ Do not use the device if the thread for the 3/4" NPT opening is damaged.
- 

### Approach

1. Guide the cable through the cable gland.
2. Screw the cable gland into the 3/4" NPT opening on the explosion-proof enclosure.
3. Pull the collar on the cable gland so that the cable is securely attached.

### 5.3.3 Mount the handles to the cover of the explosion-proof enclosure

#### Approach

1. Use the supplied M6 screws to secure the two handles onto the cover of the explosion-proof enclosure.
2. Tighten the screws with a torque of 4.5 to 5 Nm.

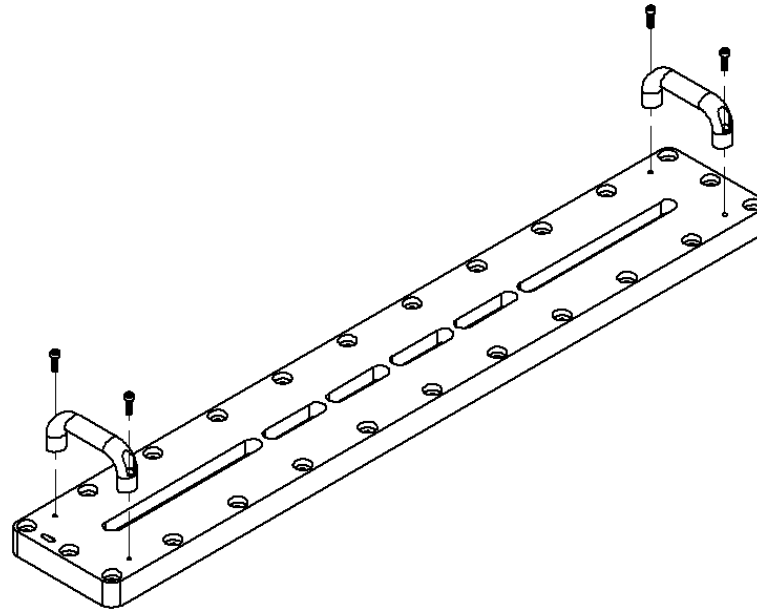


Figure 18: Mounting of the handles

### 5.3.4 Mount the multiple light beam safety device

#### General notes

- ▶ Find a place to mount the multiple light beam safety device that is stable enough to hold its weight.
- ▶ Mount the sender and receiver on a level surface.
- ▶ Mount the sender and receiver at the same height.
- ▶ The end with the connecting cable must point in the same direction for both devices.

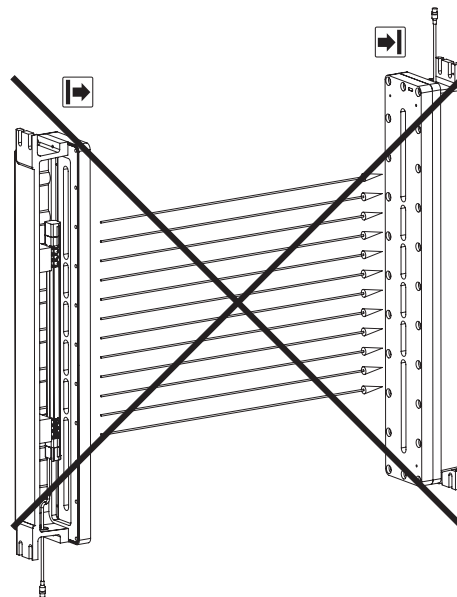


Figure 19: The sender and receiver are mounted incorrectly

- ▶ Sender and receiver must not be installed at 180° rotated relative to each other.
- ▶ Make sure that the sender and receiver are aligned correctly. The optical lens systems of the sender and the receiver must be located opposite one another.

- ▶ If necessary, use a water level to check that the components are parallel.
- ▶ The alignment bracket makes it possible to rotate the sender and receiver around the axis of the device and to align them accurately; see "Sender and receiver alignment", page 47.

5.3.4.1 Mounting the multiple light beam safety device without the alignment bracket

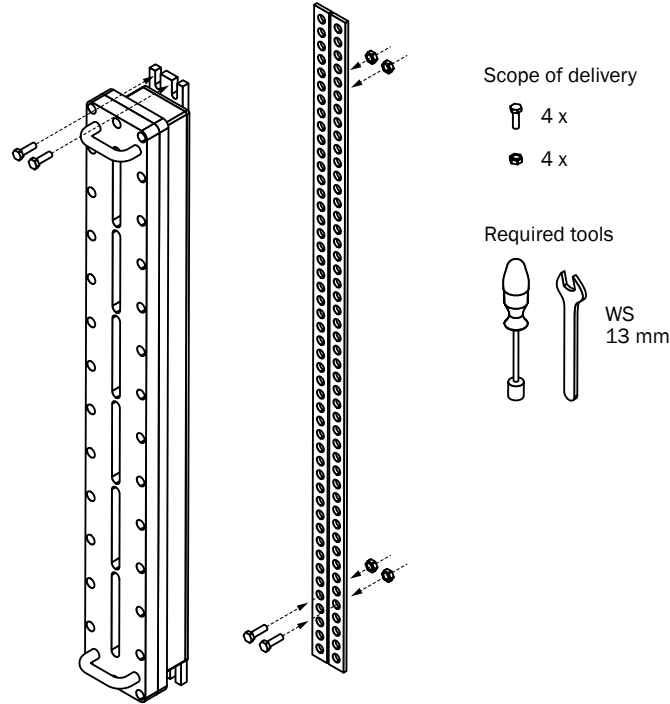


Figure 20: Mounting the multiple light beam safety device without the alignment bracket

Approach

- ▶ Use wrench size 13 mm.

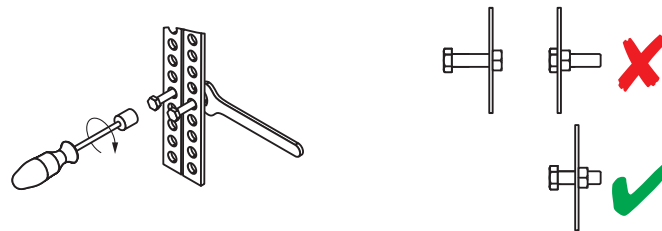


Figure 21: Mounting the multiple light beam safety device without the alignment bracket: Step 1

1. Using 6 to 8 revolutions, screw in the two M8 screws for mounting the lower end of the explosion-proof enclosure. Make sure you leave enough space between the screws and the mounting surface for the lower end of the explosion-proof enclosure.

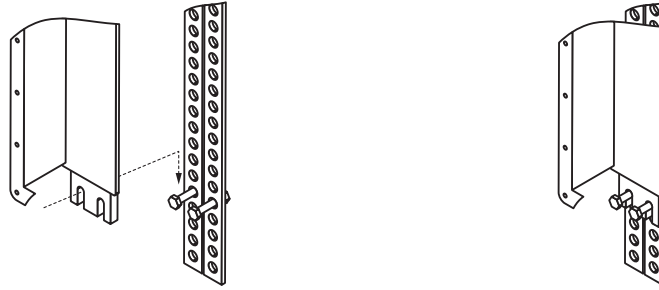


Figure 22: Mounting the multiple light beam safety device without the alignment bracket:  
Step 2

2. Position the explosion-proof enclosure on the two screws so that the mounting holes are directly over the partly-tightened screws.

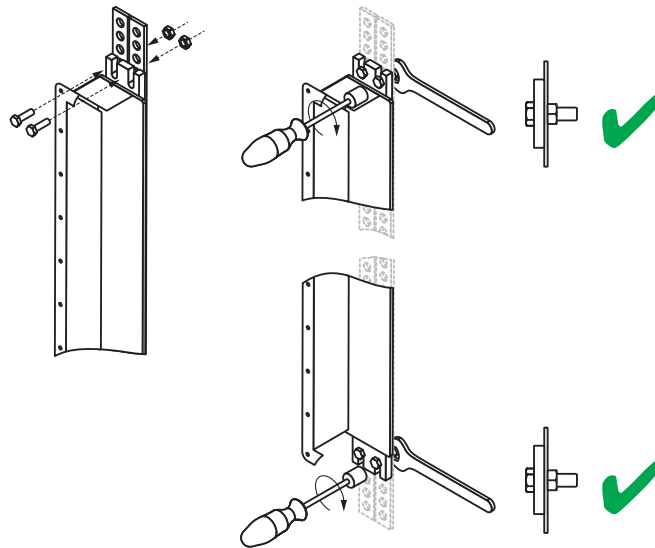


Figure 23: Mounting the multiple light beam safety device without the alignment bracket:  
Steps 3 and 4

3. Fix the upper end of the explosion-proof enclosure to the mounting surface using two M8 screws.
4. Tighten the two lower M8 screws.

5.3.4.2 Mounting the multiple light beam safety device with the alignment bracket

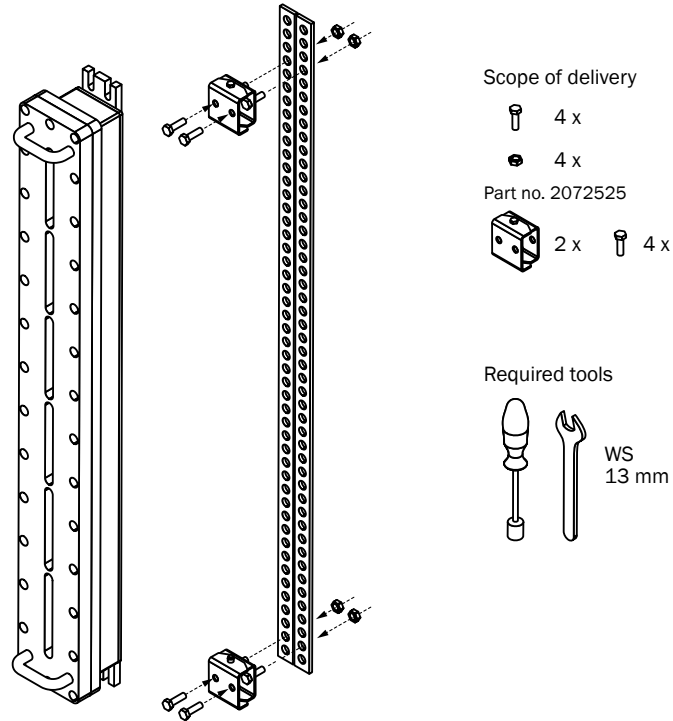


Figure 24: Mounting the multiple light beam safety device using the alignment brackets

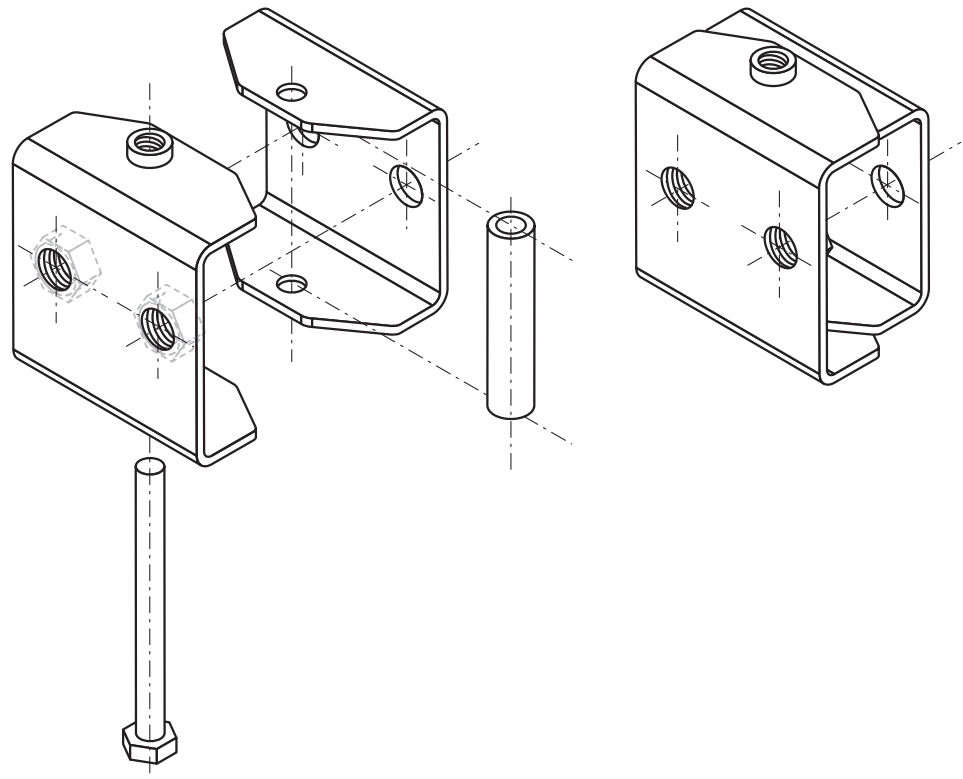


Figure 25: Assembling the alignment brackets

### Approach

1. Mount the lower alignment bracket so that the threaded hole faces up and the head of the lock screw faces down.
2. Rotate the alignment bracket as far to one side as possible. Secure the alignment bracket on the open side by screwing the first M8 screw into the through hole.
3. Rotate the lower alignment bracket to the other side. Secure the alignment bracket using the second M8 screw.
4. Mount the upper alignment bracket so that the threaded hole faces down and the head of the lock screw faces up.
5. Rotate the upper alignment bracket as far to one side as possible. Secure the alignment bracket on the open side by screwing the first M8 screw into the through hole.
6. Rotate the upper alignment bracket to the other side. Secure the alignment bracket using the second M8 screw.

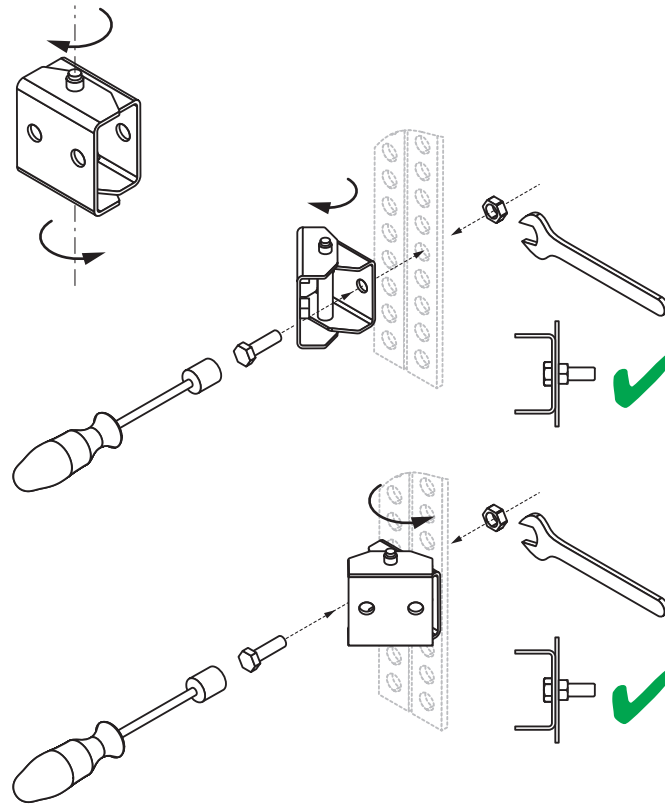


Figure 26: Mounting the multiple light beam safety device using the alignment brackets: Steps 1 to 6

7. Using 6 to 8 revolutions, screw the two M8 screws for mounting the lower end of the explosion-proof enclosure into the lower alignment bracket. Make sure you leave enough space between the screws and the alignment bracket for the lower end of the explosion-proof enclosure.

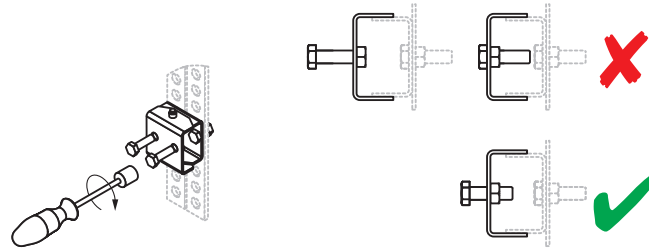


Figure 27: Mounting the multiple light beam safety device using the alignment brackets: Step 7

8. Position the explosion-proof enclosure on the two screws so that the mounting holes are directly over the partly-tightened screws.

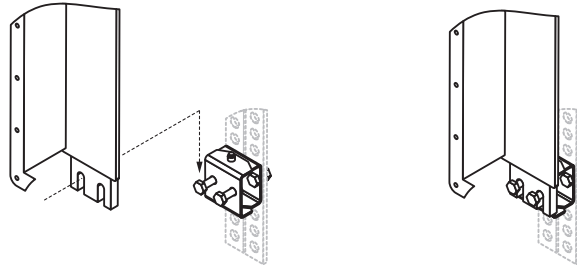


Figure 28: Mounting the multiple light beam safety device using the alignment brackets: Step 8

9. Fix the upper end of the explosion-proof enclosure to the upper alignment bracket using two M8 screws.
10. Tighten the two lower screws.

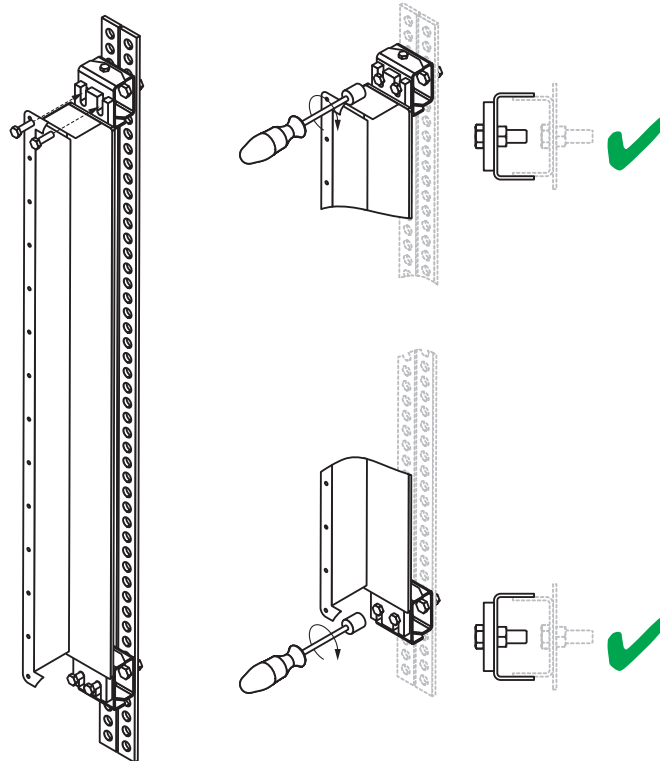


Figure 29: Mounting the multiple light beam safety device using the alignment brackets: Steps 9 and 10

11. Turn the multiple light beam safety device so that they face one another and so that the receiver receives the strongest signal possible.



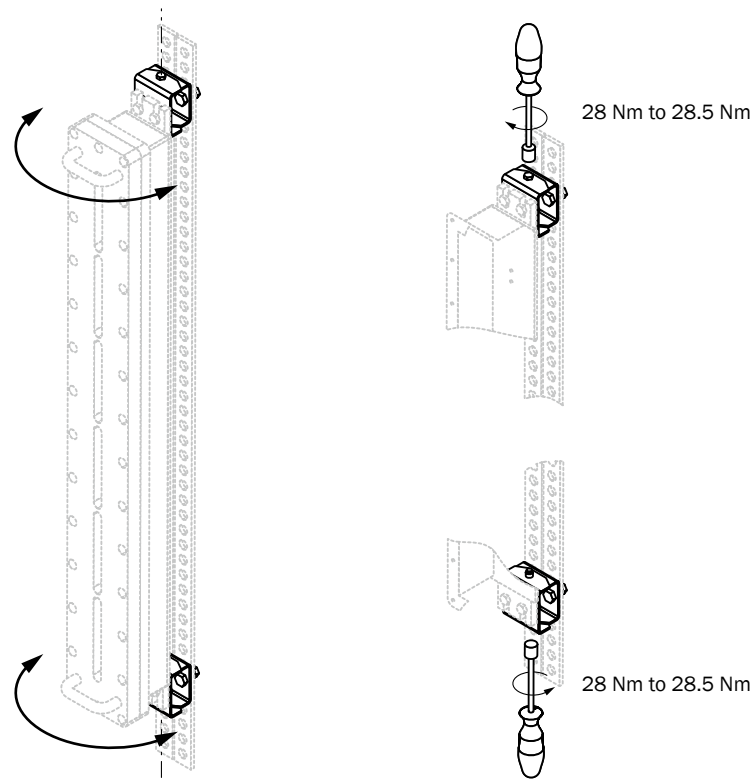


Figure 30: Mounting the multiple light beam safety device using the alignment brackets: Steps 11 and 12

12. Tighten the locking screws on all alignment brackets with a torque of 28 to 28.5 Nm in order to secure the multiple light beam safety device in this position.

## 6 Electrical installation

### 6.1 Safety

#### Important information

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#### DANGER

Hazard due to electrical voltage  
Hazard due to unexpected starting of the machine

- ▶ Make sure that the machine is (and remains) disconnected from the power supply during the electrical installation.
  - ▶ Make sure that the dangerous state of the machine is (and remains) switched off during electrical installation.
  - ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during electrical installation.
  - ▶ Only use an appropriate voltage supply, see "Technical data", page 60.
- 



#### DANGER

Ignition Hazard

Failure to observe this information could result in a risk of ignition

- ▶ Always switch the voltage supply off before disconnecting a connecting cable from the device.
  - ▶ Ensure that all electrical connections to the device or to the connections are protected.
  - ▶ The IP enclosure rating for the connections and therefore for the device is only guaranteed if the connections are protected. Otherwise foreign objects can get into the terminal compartment. This can cause an explosion the next time the device is switched on.
  - ▶ Put in place measures for ensuring supply reliability and delivery dependability.
- 



#### DANGER

Risk of ignition or explosion

- ▶ If you have to remove the cover when working on the multiple light beam safety device, make sure that the joints and o-ring are clean and undamaged before refitting the cover.
- 



#### DANGER

Risk of ignition or explosion

- ▶ Disconnect the power supply before opening the explosion-proof enclosure to avoid igniting hazardous atmospheres.
  - ▶ Do not reconnect the power supply until you have completed the electrical installation.
-

**DANGER**

Risk of ignition or explosion

- ▶ Each connection to the protection earth (PE) on the explosion-proof enclosure must use at least one wire with a cross-section meeting the requirements of the table below.

Table 2: Minimum wire cross-section for protection earth (PE)

Wire cross-section of outer cable S	Minimum wire cross-section of the corresponding protection earth wire S <sub>p</sub>
$S \leq 16 \text{ mm}^2$	S
$16 \text{ mm}^2 < S \leq 35 \text{ mm}^2$	16 mm <sup>2</sup>
$S > 35 \text{ mm}^2$	0.5 S

**DANGER**

Hazard due to electrical voltage

Hazard due to unexpected starting of the machine

- ▶ Make sure that the machine is (and remains) disconnected from the power supply during the electrical installation.
- ▶ Make sure that the dangerous state of the machine is (and remains) switched off during electrical installation.
- ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during electrical installation.
- ▶ Only use an appropriate voltage supply, see "Technical data", page 60.

**DANGER**

Hazard due to lack of effectiveness of the protective device

The dangerous state may not be stopped in the event of non-compliance.

- ▶ Always connect the two OSSDs separately. The two OSSDs must not be connected to each other.
- ▶ Connect the OSSDs such that the machine controller processes both signals separately.

**DANGER**

Hazard due to lack of effectiveness of the protective device

The dangerous state may not be stopped in the event of non-compliance.

- ▶ Prevent the formation of a potential difference between the load and the protective device.

**Prerequisites**

- The multiple light beam safety device has been safely integrated into the control system and the electrical system of the machine.
- Mounting has been completed correctly.

**Example: Isolated connection of OSSD1 and OSSD2**

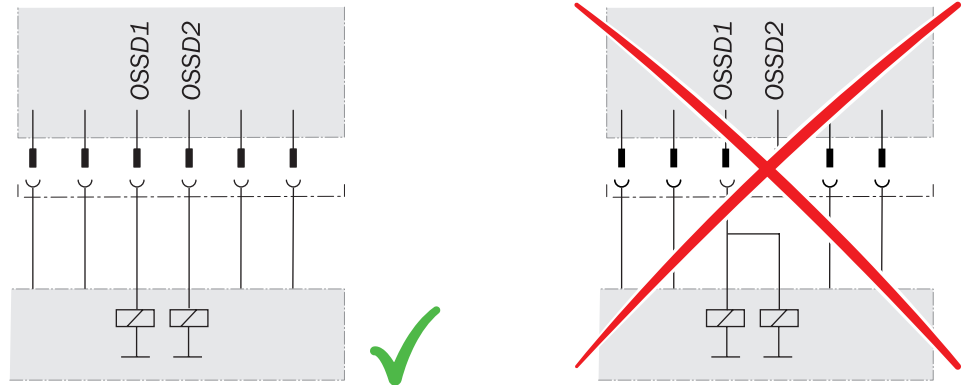


Figure 31: Dual-channel and isolated connection of OSSD1 and OSSD2

**Avoiding any potential difference between load and protective device**

- Prevent the formation of a potential difference between the load and the protective device. If you connect loads to the OSSDs (output signal switching devices) that then also switch if controlled with negative voltage (e.g., electro-mechanical contactor without reverse polarity protection diode), you must connect the 0 V connections of these loads and those of the corresponding protective device individually and directly to the same 0 V terminal strip. In the event of a fault, this is the only way to ensure that there can be no potential difference between the 0 V connections of the loads and those of the corresponding protective device.

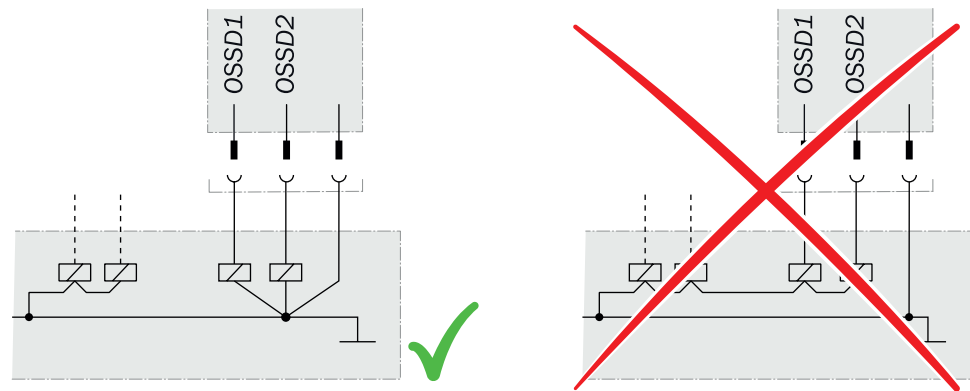


Figure 32: No potential difference between load and protective device

**Further topics**

- ["Integrating into the electrical control", page 22](#)

**6.2 System connection (M12, 5-pin)**

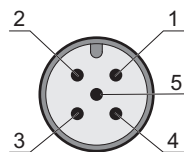


Figure 33: System connection (male connector, M12, 5-pin)

Table 3: System connection pin assignment (male connector, M12, 5-pin)

Pin	Wire color <sup>1)</sup>	Sender	Receiver
1	Brown	+24 V DC (voltage supply input)	+24 V DC (voltage supply input)
2	White	Reserved	OSSD1 (output signal switching device 1)
3	Blue	0 V DC (voltage supply input)	0 V DC (voltage supply input)
4	Black	Reserved	OSSD2 (output signal switching device 2)
5	Gray	Not connected	Not connected

<sup>1)</sup> Applies to the extension cables recommended as accessories.

Connection diagrams for the electrical installation: see ["Integrating into the electrical control", page 22](#).

### 6.3 System connection via connection cable (M12, 5-pin to 8-pin)

An optional connection cable is available to connect the 5-pin system connection to an existing 8-pin female connector. The connection cable can be used to replace an existing M4000 multiple light beam safety device with a deTem4 Core Ex multiple light beam safety device, without having to route new cables.

# 7 Commissioning

## 7.1 Safety



### DANGER

Hazard due to lack of effectiveness of the protective device

When changes are made to the machine, the effectiveness of the protective device may be affected unintentionally.

- ▶ After every change to the machine and changes to the integration or operational and secondary conditions of the multiple light beam safety device, check the protective device for effectiveness and recommission as specified in this chapter.
- 



### DANGER

Dangerous state of the machine

- ▶ Make sure that the dangerous state of the machine is (and remains) switched off during mounting, electrical installation, and commissioning.
  - ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during mounting, electrical installation, and commissioning.
- 



### WARNING

Hazard due to lack of effectiveness of the protective device

- ▶ Before commissioning the machine, make sure that the machine is first checked and released by qualified safety personnel.
  - ▶ Only operate the machine with a perfectly functioning protective device.
- 



### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

1. Make sure that the optical properties of the protective housing of the sender and receiver are not changed during operation, e.g., by:
    - Beading water, mist, frost, or ice formation on the protective housing. Remove condensation of this kind or other types of contamination, then restart the receiver.
    - Scratches or damage to the protective housing. Replace the protective housing of the respective sender or receiver if its protective housing is scratched or damaged.
  2. Make sure that all reflective surfaces and objects maintain a minimum distance from the protective field.
  3. Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the protective field.
- 

### Further topics

- ["Minimum distance from reflective surfaces", page 20](#)

## 7.2 Overview

The mounting and electrical installation work must be completed before commissioning as described in the following chapters:

- ["Design", page 17](#)
- ["Integrating into the electrical control", page 22](#)
- ["Mounting", page 29](#)
- ["Electrical installation", page 42](#)

## 7.3 Switching on

After switching on, the sender and receiver initialize. All light emitting diodes of the sender and receiver briefly light up. After initialization, the receiver displays the alignment quality using four blue light emitting diodes. Once the multiple light beam safety device is aligned (OSSD LED: green), the alignment display switches off after a certain period of time, and only the PWR LED of the sender and the OSSD LED of the receiver continue to light up.

In the event of a fault, the red fault light emitting diode flashes on the respective device. The red fault light emitting diode in combination with the blue light emitting diodes show the cause of the fault on the side of the receiver, see ["Troubleshooting", page 56](#).

## 7.4 Sender and receiver alignment

### Overview

After mounting and electrical installation, the sender and receiver must be aligned with each other.

### Important information



#### DANGER

Dangerous state of the machine

- ▶ Make sure that the dangerous state of the machine is (and remains) switched off during the alignment process.
- ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during the alignment process.

### Further topics

- ["Indication of the alignment quality", page 50](#)

### 7.4.1 Aligning the sender and receiver

#### Important information



#### NOTE

If alignment is not possible when mounting the device directly, then use the optional alignment bracket.

#### Prerequisites

- Sender and receiver have been mounted at the correct height

#### Approach

1. Ensure that the multiple light beam safety device can rotate in the bracket. If required, loosen the fixing screws a little.
2. Switch on the voltage supply for the multiple light beam safety device.
3. Roughly align the sender with the receiver by rotating it.

4. Align the receiver with the sender. To do this, rotate the receiver so that as many blue alignment quality light emitting diodes as possible light up on the receiver.
5. If required, align the sender more precisely to the receiver so that as many alignment quality light emitting diodes as possible light up on the receiver.
6. If required, align the receiver more precisely to the sender so that as many alignment quality light emitting diodes as possible light up on the receiver.
7. When at least three (preferably four) alignment quality LEDs light up on the receiver, fasten the components in the brackets. Torque: 28 Nm... 28.5 Nm.
8. Switch the voltage supply off and then on again.
9. Check the alignment quality light emitting diodes to make sure that the components are still correctly aligned with each other.

**NOTE**

Once three blue alignment quality light emitting diodes light up, alignment is good and availability is stable.

Please note that body parts or objects between the sender and receiver (e.g., hand, tool, AR60 optional laser alignment aid) will impair the function of the alignment quality LEDs. Remove all objects from this area to allow the alignment quality to be assessed.

**Complementary information**

The AR60 optional laser alignment aid can be used to facilitate alignment. To ensure that the indication of the alignment quality cannot be impaired, place the AR60 optional laser alignment aid with the adapter between the light beams of the multiple light beam safety device.

Since the AR60 optional laser alignment aid is positioned in the protective field of the multiple light beam safety device with the adapter, a maximum of two blue alignment quality LEDs light up and the OSSD LED lights up red. To check whether the OSSD LED of the receiver lights up green, remove the AR60 optional laser alignment aid.

**7.4.2 Aligning the sender, receiver, and deflector mirror****Approach**

1. Ensure that the sender and receiver are mounted correctly and, in particular, at the right height.
2. Ensure that the multiple light beam safety device can rotate in the bracket. If necessary, loosen the fixing screws slightly.
3. Switch on the voltage supply for the multiple light beam safety device.
4. Place the laser alignment aid near the bottom light beam on the sender.
5. Rotate the sender and adjust the height of the mirror column so that the laser beam hits the bottom mirror of the first mirror column.
  - The laser beam should hit the center of the mirror horizontally.
  - The laser beam should hit the mirror vertically with the same deviation from the center of the mirror that the laser of the laser alignment aid has from the bottom light beam.
6. Secure the sender in the brackets. Torque: 28 Nm ... 28.5 Nm.
  - The alignment may shift slightly when the screws are tightened. However, do not correct the setting.
7. Place the laser alignment aid near the bottom light beam on the receiver.
8. Rotate the receiver so that the laser beam hits the bottom mirror of the first mirror column.
  - The laser beam should hit the center of the mirror horizontally.
  - The laser beam should hit the mirror vertically with the same deviation from the center of the mirror that the laser of the laser alignment aid has from the bottom light beam.



9. Rotate the bottom mirror of the first mirror column so that the laser beam hits the bottom mirror of the second mirror column. If no other mirror column is available, the laser beam must hit the bottom beam of the sender.
10. Repeat step 9 for the subsequent mirror columns, until the laser beam hits the sender.
11. Perform steps 7 to 10 for all beams from the bottom to the top.
  - Align each individual mirror separately.
  - When deflecting using mirrors, the angle of incidence is the same as the emergence angle. Rotating the mirror slightly results in a deflection that is twice as great.
  - Only part of the original ray beam is ever transmitted via deflector mirrors. The alignment tolerance is reduced with each additional deflection.
12. Switch the voltage supply off and then on again.
13. Check the alignment quality LEDs to make sure that the components are still correctly aligned with each other.

**NOTE**

Once three blue alignment quality light emitting diodes light up, alignment is good and availability is stable.

Please note that body parts or objects between the sender and receiver (e.g., hand, tool, AR60 optional laser alignment aid) will impair the function of the alignment quality LEDs. Remove all objects from this area to allow the alignment quality to be assessed.

**NOTE**

The AR60 optional laser alignment aid can be used to facilitate alignment.

To ensure that the indication of the alignment quality is not impaired, place the AR60 optional laser alignment aid with the adapter between the light beams of the multiple light beam safety device.

**Further topics**

- ["Accessories", page 67](#)

### 7.4.3 Alignment with the alignment bracket

The alignment bracket offers you the following adjustment options for aligning the sender and receiver with each other:

- Rotate ( $\pm 45^\circ$ )

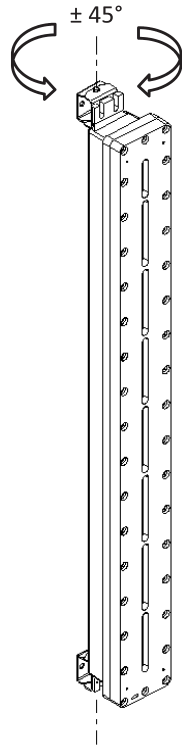


Figure 34: Alignment bracket: rotate

#### 7.4.4 Indication of the alignment quality

##### Important information



##### NOTE

Once three blue alignment quality light emitting diodes light up, alignment is good and availability is stable.

Please note that body parts or objects between the sender and receiver (e.g., hand, tool, AR60 optional laser alignment aid) will impair the function of the alignment quality LEDs. Remove all objects from this area to allow the alignment quality to be assessed.

##### Indication of the alignment quality

Table 4: Indication of the alignment quality

Indication	OSSD light emitting diode	Meaning
Alignment quality light emitting diodes		
No light emitting diode lights up	● Red	Alignment is insufficient or a light beam is interrupted at least partially. The receiver cannot synchronize with the sender.
1 light emitting diode lights up	● Red	Alignment is insufficient or a light beam is interrupted at least partially.
2 light emitting diodes light up	● Red	Alignment is insufficient or a light beam is interrupted at least partially.
2 light emitting diodes light up	● Green	Alignment is not yet sufficient for stable availability.
3 light emitting diodes light up	● Green	Alignment is good, stable availability. <sup>1)</sup>

Indication		Meaning
Alignment quality light emitting diodes	OSSD light emitting diode	
4 light emitting diodes light up	● Green	Alignment is very good.

○ LED off. ● LED flashes. ● LED illuminates.

- 1) If the light path is very long, there is a possibility that all four alignment quality light emitting diodes will not light up even when alignment is excellent.

#### Further topics

- ["Diagnostic LEDs", page 56](#)

## 7.5 Check during commissioning and modifications

The check must detect if it is possible to enter the hazardous area without being detected.

- ▶ Carry out the checks according to the instructions from the manufacturer of the machine and from the operating entity.

## 8 Operation

### 8.1 Safety

---



#### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Maintenance work, alignment work, fault diagnoses, and any changes to the integration of the protective device in the machine must only be carried out by qualified personnel.
  - ▶ The effectiveness of the protective device must be checked following such work.
- 



#### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Make sure that the optical properties of the front screens of the sender and receiver are not changed, e.g., by:
    - Beading water, mist, frost, or ice formation. If applicable, remove films or other types of contamination, disconnect the voltage supply of the receiver and then switch it back on.
    - Scratches or damage. Replace the device whose front screen is scratched or damaged.
  - ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the light beams.
  - ▶ Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the light beams.
- 



#### **NOTE**

This document does not provide instructions for operating the machine in which the multiple light beam safety device is integrated.

---

### 8.2 Regular thorough check

The check must detect if it is possible to enter the hazardous area without being detected. Such possibilities may exist due to modifications, manipulations or external influences.

- ▶ Carry out the checks according to the instructions from the manufacturer of the machine and from the operating entity.

## 9 Maintenance

### 9.1 Safety



#### **DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Do not do repair work on device components.
- ▶ Do not make changes to or manipulate device components.
- ▶ Apart from the procedures described in this document, the device components must not be opened.



#### **DANGER**

Risk of ignition or explosion

- ▶ Disconnect the voltage supply before any maintenance work is carried out to avoid igniting hazardous atmospheres.
- ▶ Only reconnect the voltage supply once you have completed the maintenance work.



#### **DANGER**

Risk of ignition or explosion

- ▶ If you have to remove the cover when working on the multiple light beam safety device, make sure that the joints and o-ring are clean and undamaged before refitting the cover.



#### **DANGER**

Risk of ignition or explosion

- ▶ Use fixing screws with a yield point of at least 640 MPa to attach the cover to the explosion-proof enclosure.

### 9.2 Regular cleaning

#### **Overview**

Depending on the ambient conditions of the multiple light beam safety device, the front screens must be cleaned regularly and in the event of contamination. Static charges can cause dust particles to be attracted to the front screen.

The weld spark guard and deflector mirrors must be cleaned regularly and in the event of contamination.

#### **Important information**



#### **DANGER**

Risk of ignition or explosion

Static discharge could cause explosions in hazardous atmospheres.

- ▶ Always use anti-static cleaning agents to prevent static charge.
- ▶ Do not clean the device using a dry cloth.



### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Regularly check the degree of contamination on all components based on the application conditions.
  - ▶ Observe the information on the regular rod test check.
- 



### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Make sure that the optical properties of the front screens of the sender and receiver are not changed, e.g., by:
    - Beading water, mist, frost, or ice formation. If applicable, remove films or other types of contamination, disconnect the voltage supply of the receiver and then switch it back on.
    - Scratches or damage. Replace the device whose front screen is scratched or damaged.
  - ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the light beams.
  - ▶ Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the light beams.
- 



### DANGER

Hazard due to unexpected starting of the machine

- ▶ Make sure that the dangerous state of the machine is and remains switched off during the cleaning.
  - ▶ Make sure that the outputs of the multiple light beam safety device do not affect the machine during cleaning.
- 



### NOTICE

- ▶ Do not use any aggressive cleaning agents.
  - ▶ Do not use any abrasive cleaning agents.
  - ▶ We recommend anti-static cleaning agents.
  - ▶ We recommend the use of anti-static plastic cleaner (SICK part number 5600006) and the SICK lens cloth (SICK part number 4003353).
- 

### Approach

1. Remove dust from the front screen using a soft, clean brush.
2. Then wipe the front screen with a clean, damp cloth.
3. Check the position of the sender and receiver.
4. Check the effectiveness of the protective device. Information on how to check the effectiveness.

### Further topics

- ["Test rod check", page 27](#)

### 9.3 Regular thorough check

The check must detect if it is possible to enter the hazardous area without being detected. Such possibilities may exist due to modifications, manipulations or external influences.

- ▶ Carry out the checks according to the instructions from the manufacturer of the machine and from the operating entity.

## 10 Troubleshooting

### 10.1 Safety



**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Immediately shut the machine down if the behavior of the machine cannot be clearly identified.
- ▶ Immediately put the machine out of operation if you cannot clearly identify or allocate the fault and if you cannot safely remedy the fault.
- ▶ Secure the machine so that it cannot switch on unintentionally.



**DANGER**

Hazard due to unexpected starting of the machine

- ▶ When any work is taking place, use the protective device to secure the machine or to ensure that the machine is not switched on unintentionally.



**DANGER**

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Do not do repair work on device components.
- ▶ Do not make changes to or manipulate device components.
- ▶ Apart from the procedures described in this document, the device components must not be opened.



**NOTE**

Additional information on troubleshooting can be found at the responsible SICK subsidiary.

### 10.2 Diagnostic LEDs

#### 10.2.1 Fault indicators

In the event of a fault, the type of fault is indicated by the light emitting diode display on the sender or receiver.

**Sender**

Table 5: Fault indicator on the sender

PWR-LED	ERR-LED	Possible cause	Rectification
○	○	No supply voltage or supply voltage is too low or internal fault	Check the voltage supply, see "Technical data", page 60. Switch the voltage supply off and then on again. If the fault persists, replace the sender, see "Ordering information", page 66.



PWR-LED	ERR-LED	Possible cause	Rectification
○	● Red	The voltage was too high when operating the sender.	Check the voltage supply, see "Technical data", page 60. Replace the sender, see "Ordering information", page 66.
● Yellow	● Red	Fault in the supply voltage	Check the voltage supply and the power supply unit, see "Technical data", page 60. Switch the voltage supply off and then on again. If the fault persists, replace the defective components, see "Ordering information", page 66.
● Yellow	● Red	The sender identified an internal fault.	Switch the voltage supply off and then on again. If the fault persists, replace the sender, see "Ordering information", page 66.

○ LED off. ● LED flashes. ● LED illuminates.

## Receiver

Table 6: Fault indicator on the receiver

OSSD LED	ERR-LED	Alignment quality LEDs				Possible cause	Rectification
		1	2	3	4		
● Red	● Red	● Blue	○	○	○	An internal fault has occurred.	Switch the voltage supply off and then on again. If the fault persists, replace the receiver, see "Ordering information", page 66.
● Red	● Red	○	● Blue	○	○	Fault in the supply voltage	Check the voltage supply and the power supply unit, see "Technical data", page 60. Switch the voltage supply off and then on again. If the fault persists, replace the defective components, see "Ordering information", page 66.

OSSD LED	ERR-LED	Alignment quality LEDs				Possible cause	Rectification
		1	2	3	4		
● Red	⦿ Red	○	○	● Blue	○	The receiver has recognized beams from several senders.	Check the distance to senders of the same type. Make sure that beams from another sender cannot hit the receiver, see <a href="#">"Protection against interference from systems in close proximity to each other"</a> , page 22. Switch the voltage supply off and then on again.
● Red	⦿ Red	○	○	○	● Blue	A fault or unexpected status was identified on the OSSDs of the system connection (e.g., overvoltage, short-circuit to HIGH or short-circuit to LOW, cross-circuit, permissible load capacity exceeded)	Check the system wiring for a fault. Make sure that the OSSDs have been wired correctly, see <a href="#">"Integrating into the electrical control"</a> , page 22. Switch the voltage supply off and then on again. If the fault persists, replace the defective components, see <a href="#">"Ordering information"</a> , page 66.

○ LED off. ⦿ LED flashes. ● LED illuminates.

## 11 Decommissioning

### 11.1 Protection of the environment

The multiple light beam safety device is designed to minimize its impact on the environment. It consumes little power and natural resources.

- ▶ Always act in an environmentally responsible manner at work. For this reason, please note the following information regarding disposal.

### 11.2 Disposal

Always dispose of serviceableness devices in compliance with local/national rules and regulations with respect to waste disposal.



#### NOTE

We will be glad to help you dispose of these devices on request.

## 12 Technical data

### 12.1 Data sheet

#### Features

Table 7: Features

deTem4 Core Ex	
Dimension of the light path <sup>1)</sup>	
Device with a short scanning range	
Minimum	0.5 m ... 12.6 m
Typical	0.5 m ... 14.2 m
Device with a long scanning range	
Minimum	8.4 m ... 58.8 m
Typical	8.4 m ... 75.6 m
Number of beams, depending on type	2, 3, or 4
Beam separation, depending on type	500 mm, 400 mm, or 300 mm
Response time	20 ms
Synchronization	Optical

<sup>1)</sup> If the light path is very long, there is a possibility that all four alignment quality light emitting diodes will not light up even when alignment is good.

#### Safety-related parameters

Table 8: Safety-related parameters

deTem4 Core Ex	
Type	Type 4 (IEC 61496-1)
Safety integrity level <sup>1)</sup>	SIL3 (IEC 61508)
SIL claim limit <sup>1)</sup>	SILCL3 (IEC 62061)
Category	Category 4 (ISO 13849-1)
Performance level <sup>1)</sup>	PL e (ISO 13849-1)
PFHd (mean probability of a dangerous failure per hour)	$3.0 \times 10^{-9}$
T <sub>M</sub> (mission time)	20 years (ISO 13849-1)
Safe state when a fault occurs	At least one OSSD is in the OFF state.

<sup>1)</sup> For more detailed information on the exact configuration of your machine, please consult your respective SICK subsidiary.

#### Interfaces

Table 9: Interfaces

deTem4 Core Ex	
Connection	Flying leads, 5-wire, 30 m preassembled
Length of cable	≤ 50 m
E.g., wire cross-section 0.34 mm <sup>2</sup> , copper cable	≤ 15 m
E.g., wire cross-section 0.5 mm <sup>2</sup> , copper cable	≤ 30 m

**Electrical data**

Table 10: Electrical data

deTem4 Core Ex	
<b>Operating data</b>	
Protection class <sup>1)</sup>	III (IEC 61140)
Supply voltage $U_V$ <sup>2) 3)</sup>	24 V DC (19.2 V DC ... 28.8 V DC)
Residual ripple <sup>4)</sup>	$\leq \pm 10\%$
<b>Current consumption</b>	
Sender	$\leq 50$ mA
Receiver	$\leq 150$ mA
<b>Power consumption</b>	
Sender	$\leq 1.44$ W
Receiver	$\leq 4.32$ W
Power-up delay of sender and receiver after supply voltage is applied	$\leq 2$ s
<b>Output signal switching devices (OSSDs)</b>	
Type of output	2 PNP semiconductors, short-circuit protected <sup>5)</sup> , cross-circuit monitored
Duration of OFF state	$\geq 100$ ms
Switch-on delay	Typical $3 \times$ response time
Output voltage for ON state (HIGH) <sup>6)</sup>	$(U_V - 2.25 \text{ V}) \dots U_V$
Output voltage for OFF state (LOW) <sup>6) 7)</sup>	0 V ... 2.0 V
Output current for ON state (HIGH)	$\leq 300$ mA per OSSD
Leakage current	$\leq 2$ mA per OSSD
Load capacity	$\leq 2.2$ $\mu$ F
Load inductance	$\leq 2.2$ H
<b>Test pulse data <sup>8)</sup></b>	
Test pulse width	$\leq 300$ $\mu$ s (typical 150 $\mu$ s)
Test pulse rate	$3 \text{ s}^{-1} \dots 10 \text{ s}^{-1}$ (typical $5 \text{ s}^{-1}$ )
<b>Permissible cable resistance</b>	
Between device and load <sup>9)</sup>	$\leq 2.5$ $\Omega$
Supply cable <sup>10)</sup>	$\leq 1$ $\Omega$

1) SELV/PELV safety/protective extra-low voltage.

2) The external voltage supply must bridge a brief power failure of 20 ms as specified in IEC 60204-1. Suitable power supply units are available as accessories from SICK.

3) A fuse rated maximum 2 A shall be installed in the isolated 24 V DC power supply circuit to the device in order to limit the available current.

4) Within the limits of  $U_V$ .

5) Applies to the voltage range between -30 V and +30 V.

6) According to IEC 61131-2.

7) The specified values are the switching voltage passed to the device. If higher voltages are impressed from the outside, the maximum value of 2.0 V can be exceeded.

8) When active, the outputs are tested cyclically (brief LOW). When selecting the downstream controllers, make sure that the test pulses do not result in deactivation when using the above parameters.

9) The cable resistance of the individual wires to the downstream controller must not exceed this value, to ensure that a cross-circuit between the outputs is safely detected. (Observe standard IEC 60204-1 too.)

10) The supply cable must not be used to connect other loads with the exception of the sender.

**Mechanical data**

Table 11: Mechanical data

	deTem4 Core Ex
Housing cross-section	142 mm × 163 mm, plus bracket, see "Dimensional drawings", page 63
Weight	Dependent on the number of beams, see "Table of weights", page 62

**Ambient data**

Table 12: Ambient data

	deTem4 Core Ex
Enclosure rating	IP 66 (IEC 60529) <sup>1)</sup>
Ambient operating temperature <sup>2) 3)</sup>	-20 °C ... +55 °C
Storage temperature	-30 °C ... +70 °C
Air humidity (non-condensing)	15% ... 95%
Vibration resistance <sup>4)</sup>	5 g, 10 Hz ... 55 Hz (IEC 60068-2-6)
Shock resistance <sup>5)</sup>	10 g, 16 ms (IEC 60068-2-27)

- 1) In order to achieve enclosure rating IP 66, washers must be used for the fixing screws on the enclosure cover.
- 2) The temperature difference between sender and receiver must not exceed 25 K.
- 3) The cable belonging to the device incl. the associated connection plug must not be flexibly mounted under -25 °C.
- 4) Test conditions per axis: 1 octave/minute, amplitude: 0.35 mm, 20 sweeps.
- 5) Test conditions per axis: 1,000 shocks.

**Miscellaneous data**

Table 13: Miscellaneous data

	deTem4 Core Ex
Wavelength of sender	Near-infrared (NIR), invisible
Effective aperture angle (EAA) <sup>1)</sup>	≤ 2.5°
Speed of the test rod at which the test rod is safely detected <sup>2)</sup>	0 m/s ... 1.6 m/s

- 1) Distance between sender and receiver  $D \geq 3$  m.
- 2) Direction of movement and axis of the test rod perpendicular to the light beam.

**12.2 Table of weights**

Table 14: Weight of sender and receiver

Number of beams	Weight in kg <sup>1)</sup>	
	Sender	Receiver
2	29.4	29.4
3	37.72	37.72
4	45.88	45.88

- 1) Tolerance: ± 50 g

12.3 Dimensional drawings

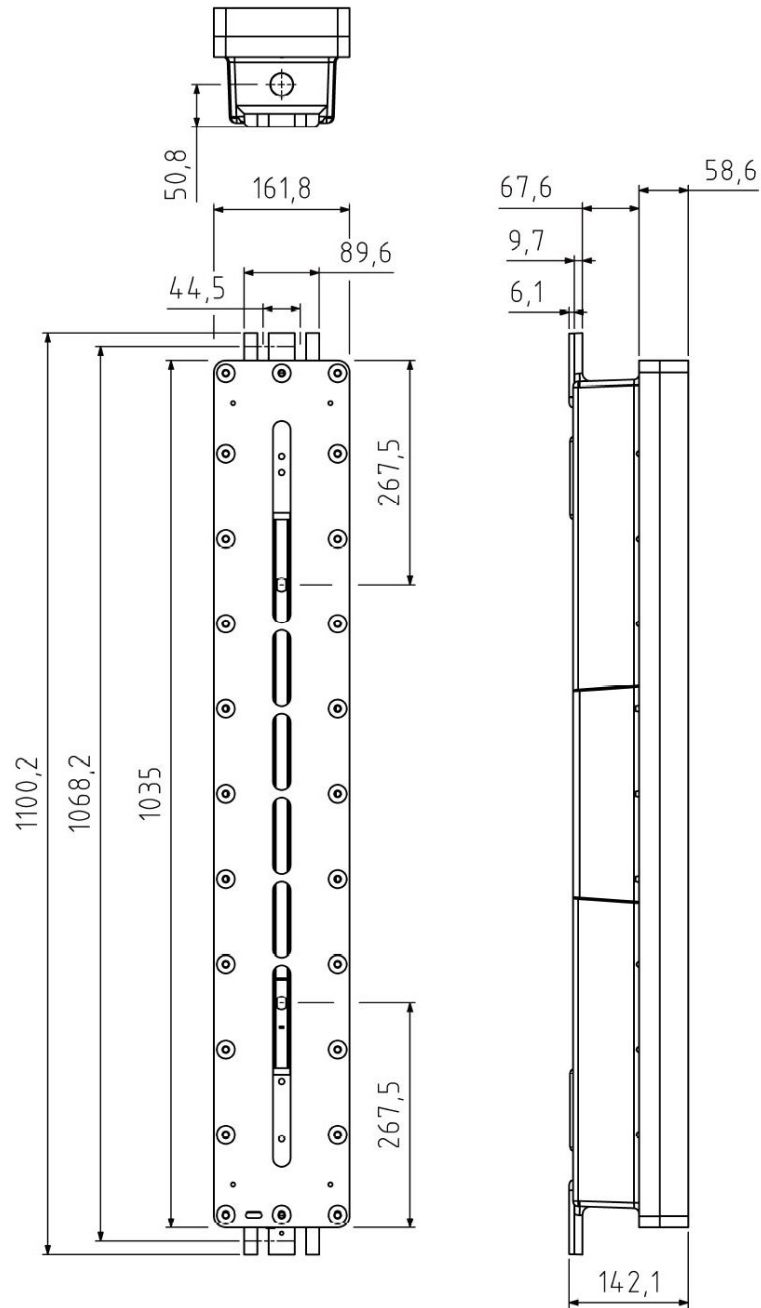


Figure 35: Dimensional drawing of sender and receiver, 2 beams, beam separation 500 mm

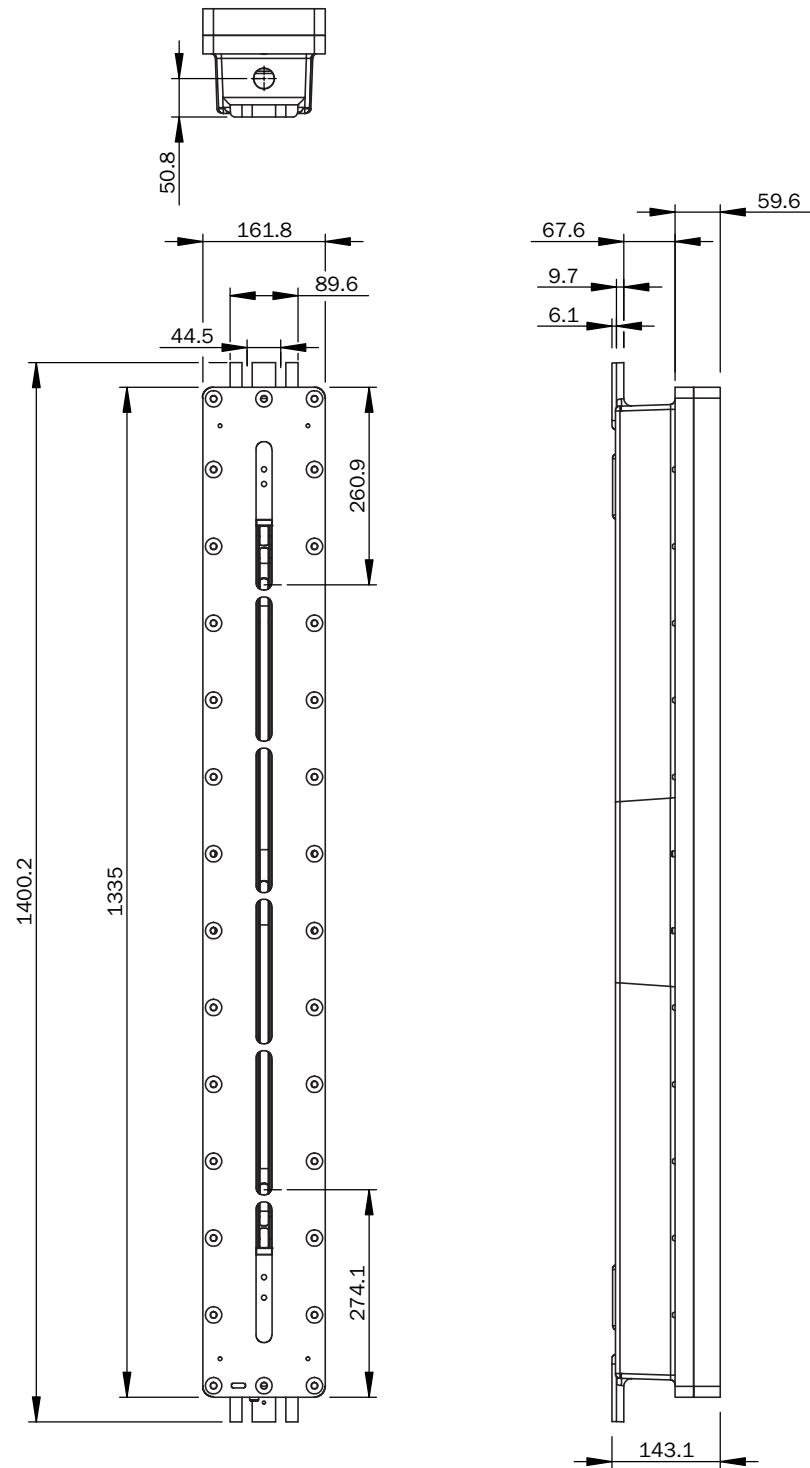


Figure 36: Dimensional drawing of sender and receiver, 3 beams, beam separation 400 mm



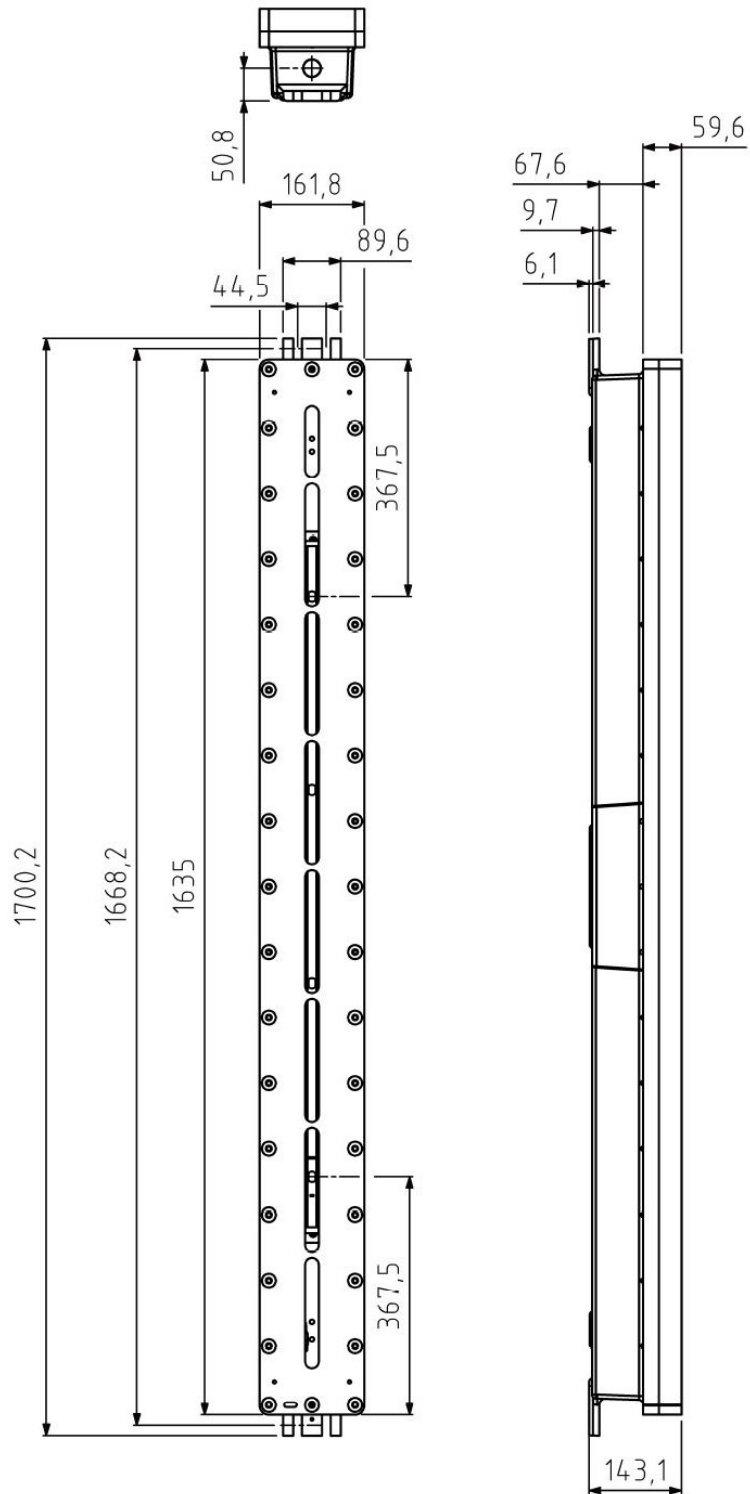


Figure 37: Dimensional drawing of sender and receiver, 4 beams, beam separation 300 mm

## 13 Ordering information

### 13.1 Scope of delivery

#### Items supplied, sender

- Sender
- Explosion-proof enclosure
- 2 FlexFix brackets with riser
- 2 handles
- 30 m system connection cables, flying leads

#### Items supplied, receiver

- Receiver
- Explosion-proof enclosure
- 2 FlexFix brackets with riser
- 2 handles
- 30 m system connection cables, flying leads
- Test rod with 30 mm diameter
- Safety note
- Mounting instructions
- Operating instructions on CD-ROM

### 13.2 Ordering information deTem4 Core Ex

Table 15: Ordering information, deTem4 Core Ex short scanning range

Number of beams	☐ Sender		☐ Receiver		☐☐☐ Sender and receiver	
	Part number	Type code	Part number	Type code	Part number	Type code
2	1097717	EXS-06D0250 A020	1097716	EXE-06D0250A 020	1097715	EXP-06D0250A 020
3	1097720	EXS-09D0340 A020	1097719	EXE-09D0340A 020	1097718	EXP-09D0340A 020
4	1097723	EXS-12D0430 A020	1097722	EXE-12D0430A 020	1097721	EXP-12D0430A 020

## 14 Accessories

### 14.1 Brackets

Table 16: Brackets ordering information

Part	Part number
FlexFix bracket with riser (2x)	2074627
Alignment bracket for explosion-proof enclosure (2x)	2072525

#### FlexFix bracket with riser

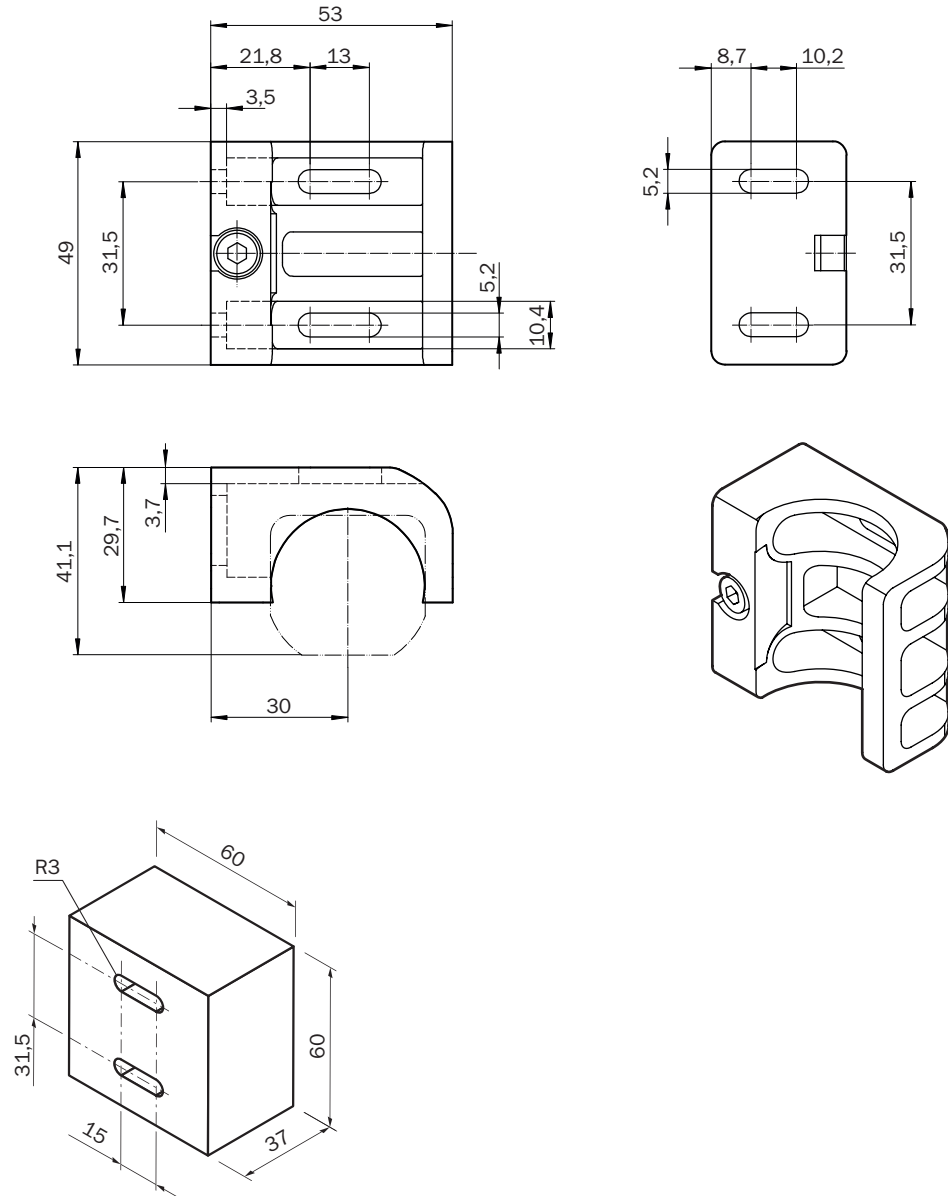


Figure 38: Dimensional drawing, FlexFix bracket with riser (2074627)

Alignment bracket

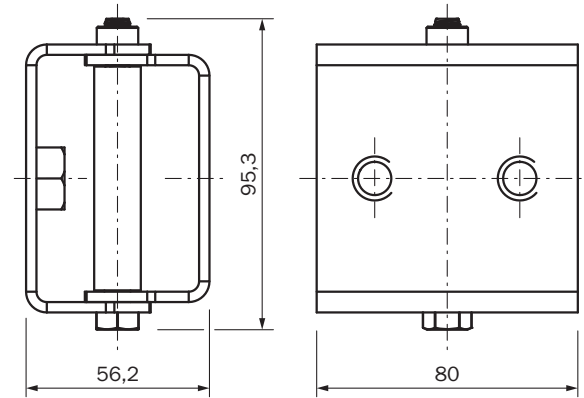


Figure 39: Dimensional drawing of the alignment bracket (2072525)

14.2 Mounting accessories

Table 17: Mounting accessories ordering information

Part	Part number
Alignment tool	4084133

14.3 Connectivity

Table 18: Cable gland ordering information

Part	Part number
Cable gland for the European market	5329001

The following accessories can only be used outside the explosion-hazardous area

Table 19: Distributor ordering information

Part	Type code	Part number
T distributor, 5-pin	DSC-1205T000025KM0	6030664

Table 20: Ordering information for power supply

Part	Type code	Part number
Output 24 V DC, 50 W (2.1 A), voltage supply NEC Class 2, SELV, PELV, input 120 V ... 240 V AC	PS50WE24V	7028789
Output 24 V DC, 95 W (3.9 A), voltage supply NEC Class 2, SELV, PELV, input 100 V ... 120 V/220 V ... 240 V AC	PS95WE24V	7028790

14.4 Alignment aid

The following accessories can only be used outside the explosion-hazardous area

Table 21: Alignment aid ordering information

Part	Part number
Laser alignment aid AR60	1015741
Adapter	4070854

## 14.5 Deflector mirrors

### 14.5.1 Function and use

Deflector mirrors can be used to shape the light path to secure hazardous points from multiple sides using a single multiple light beam safety device.



#### DANGER

Hazard due to lack of effectiveness of the protective device

Persons and parts of the body to be protected may not be recognized in case of non-observance.

- ▶ Only mount deflector mirrors to solid walls or machine components. The position of the deflector mirrors must not change after alignment.
- ▶ Do not use deflector mirrors if contamination, beading water, condensation, or frost on the deflector mirrors is to be expected.
- ▶ Make sure that the deflector mirrors are intact and free of scratches, contamination, beading water, condensation, frost, etc. at all times.

### 14.5.2 Change in scanning range using deflector mirrors



#### NOTE

The use of deflector mirrors reduces the sensing range depending on the number of deflector mirrors in the light path.

Table 22: Scanning range with and without 1 deflector mirror

Variant	Type	Scanning range, typical	Scanning range with 1 deflector mirror
Short scanning range	PNS75, PNS125	14.2 m	12.7 m
Long scanning range	PNS75, PNS125	75.6 m	68 m

### 14.5.3 Deflector mirror – ordering information

Table 23: Ordering information, deflector mirror

Part	Type code	Part number
Deflector mirror incl. mounting kit	PNS75-008	1026647

### 14.5.4 Deflector mirror PNS75 - ordering information

Table 24: Ordering information for PNS75 deflector mirror

Mirror length in mm	Max. protective field height in mm	Type code	Part number
640	600	PNS75-064	1019416
940	900	PNS75-094	1019418
1240	1200	PNS75-124	1019420
1540	1500	PNS75-154	1019422

### 14.5.5 Deflector mirror PNS125 - ordering information

Table 25: Ordering information for PNS125 deflector mirror

Mirror length in mm	Max. protective field height in mm	Type code	Part number
640	600	PNS125-064	1019427

Mirror length in mm	Max. protective field height in mm	Type code	Part number
940	900	PNS125-094	1019429
1240	1200	PNS125-124	1019431
1540	1500	PNS125-154	1019433

## 14.6 Test rods

Table 26: Ordering information, test rods

Part	Part number
Test rod 30 mm	2022602
Test rod holder	2052249

## 15 Annex

### 15.1 Compliance with EU directives

#### EU declaration of conformity (extract)

The undersigned, representing the manufacturer, herewith declares that the product is in conformity with the provisions of the following EU directive(s) (including all applicable amendments), and that the standards and/or technical specifications stated in the EU declaration of conformity have been used as a basis for this.

#### Complete EU declaration of conformity for download

You can call up the EU declaration of conformity and the current operating instructions for the protective device by entering the part number in the search field at [www.sick.com](http://www.sick.com) (part number: see the type label entry in the "Ident. no." field).

## 15.2 Note on specified standards

Standards are specified in this document. The table shows regional standards with similar or identical contents.

Table 27: Note on specified standards

Standard	Standard (regional)
	China
IEC 60068-2-6	GB/T 2423.10
IEC 60068-2-27	GB/T 2423.5
IEC 60204-1	GB 5226.1
IEC 60529	GB/T 4208
IEC 60825-1	GB 7247.1
IEC 61131-2	GB/T 15969.2
IEC 61140	GB/T 17045
IEC 61496-1	GB/T 19436.1
IEC 61496-3	GB 19436.3
IEC 61508	GB/T 20438
IEC 62061	GB 28526
ISO 13849-1	GB/T 16855.1
ISO 13855	GB/T 19876



## 15.3 Checklist for initial commissioning and commissioning

### Checklist for manufacturers or installers for installing electro-sensitive protective device (ESPE)

The details relating to the items listed below must be available no later than when the system is commissioned for the first time. However, these depend on the specific application (the requirements of which must be reviewed by the manufacturer or installer).

This checklist should be retained and kept with the machine documentation to serve as reference during recurring tests.

This checklist does not replace the initial commissioning, nor the regular inspection by qualified safety personnel.

Have the safety rules and regulations been observed in compliance with the directives and standards applicable to the machine?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the applied directives and standards listed in the declaration of conformity?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Does the protective device comply with the required PL/SIL claim limit and PFHd in accordance with EN ISO 13849-1/EN 62061 and the required type in accordance with EN 61496-1?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is access to the hazardous area or hazardous point only possible through the protective field of the ESPE?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Have appropriate measures been taken to protect (mechanical protection) or monitor (protective devices) any persons or objects in the hazardous area when protecting a hazardous area or hazardous point, and have these devices been secured or locked to prevent their removal?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching below, above or around the ESPE?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has the maximum shutdown and/or stopping time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has the ESPE been mounted such that the required minimum distance from the nearest hazardous point has been achieved?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the ESPE devices properly mounted and secured against manipulation after adjustment?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the required protective measures against electric shock in effect (protection class)?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is the control switch for resetting the protective devices (ESPE) or restarting the machine present and correctly installed?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the outputs of the ESPE (OSSDs or safety outputs via the network) integrated according to the required PL/SILCL in accordance with EN ISO 13849-1/EN 62061 and does the integration correspond to the circuit diagrams?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Has the protective function been checked in compliance with the test notes of this documentation?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the specified protective functions effective at every operating mode that can be set?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Is the ESPE effective over the entire period of the dangerous state?	Yes <input type="checkbox"/> No <input type="checkbox"/>
Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device?	Yes <input type="checkbox"/> No <input type="checkbox"/>

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