

deTec2 Core HG

Safety light curtain

SICK
Sensor Intelligence.



Described product

deTec2 Core HG

Manufacturer

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Original document

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Contents

1	About this document.....	6
1.1	Scope.....	6
1.2	Target groups and structure of these operating instructions.....	6
1.3	Additional information.....	7
1.4	Symbols and document conventions.....	7
2	Safety information.....	9
2.1	General safety notes.....	9
2.2	Correct use.....	9
2.3	Requirements for the qualification of personnel.....	10
3	Product description.....	11
3.1	Structure and function.....	11
3.2	Product characteristics.....	12
3.2.1	Hardened front screen.....	12
3.2.2	Absence of blind zones.....	12
3.2.3	Automatic calibration of the protective field width.....	12
3.2.4	Status indicators.....	12
3.3	Example applications.....	14
4	Project planning.....	16
4.1	Manufacturer of the machine.....	16
4.2	Operator of the machine.....	16
4.3	Design.....	16
4.3.1	Scanning range and protective field width.....	17
4.3.2	Minimum distance from the hazardous point.....	17
4.3.3	Minimum distance to reflective surfaces.....	20
4.3.4	Protection against interference from systems in close proximity to each other.....	21
4.4	Integrating into the electrical control.....	22
4.4.1	Restart interlock.....	24
4.4.2	External device monitoring (EDM).....	25
4.4.3	Connection diagrams.....	25
4.5	Testing plan.....	26
4.5.1	Test rod check.....	27
4.5.2	Visual check of the machine and the protective device.....	28
5	Mounting.....	30
5.1	Safety.....	30
5.2	Unpacking.....	30
5.3	Installation.....	31
5.3.1	Mounting the QuickFix bracket.....	32
5.3.2	Mounting the FlexFix bracket.....	34
5.3.3	Mounting the upgrade bracket.....	37

6	Electrical installation.....	40
6.1	Safety.....	40
6.2	System connection (M12, 5-pin).....	41
6.3	System connection via connection cable (M12, 5-pin to 8-pin).....	41
7	Commissioning.....	42
7.1	Security.....	42
7.2	Overview.....	42
7.3	Switching on.....	43
7.4	Sender and receiver alignment.....	43
7.4.1	Aligning the sender and receiver.....	43
7.4.2	Alignment with the QuickFix bracket.....	44
7.4.3	Alignment with the FlexFix bracket or with the upgrade bracket.....	45
7.4.4	Indication of the alignment quality.....	46
7.5	Check during commissioning and modifications.....	47
8	Operation.....	48
8.1	Safety.....	48
8.2	Regular thorough check.....	48
9	Maintenance.....	49
9.1	Safety.....	49
9.2	Regular cleaning.....	49
9.3	Regular thorough check.....	50
10	Troubleshooting.....	51
10.1	Safety.....	51
10.2	Fault indicators.....	51
11	Decommissioning.....	54
11.1	Protection of the environment.....	54
11.2	Disposal.....	54
12	Technical data.....	55
12.1	Data sheet.....	55
12.2	Response time.....	57
12.3	power consumption.....	58
12.4	Length of cable.....	58
12.5	Table of weights.....	59
12.6	Dimensional drawings.....	60
13	Ordering information.....	61
13.1	Scope of delivery.....	61
13.2	Ordering information.....	61
14	Accessories.....	62

14.1	Brackets.....	62
14.2	Mounting accessories.....	64
14.3	Weld spark guard.....	65
14.4	Connectivity.....	65
14.5	Alignment aid.....	66
14.6	Deflector mirrors.....	67
14.6.1	Mounting.....	67
14.6.2	Change in scanning range using deflector mirrors.....	67
14.6.3	Deflector mirror PNS75 - ordering information.....	68
14.6.4	Deflector mirror PSN125 - ordering information.....	68
14.7	Mirror columns and device columns.....	69
14.7.1	Mirror columns.....	69
14.7.2	Device columns.....	69
14.8	Cleaning agent.....	69
14.9	Test rods.....	70
15	Annex.....	71
15.1	Compliance with EU directives.....	71
15.2	Checklist for initial commissioning and commissioning.....	72
15.3	Note on specified standards.....	73
16	List of figures.....	74
17	List of tables.....	75

1 About this document

These operating instructions contain information required during the life cycle of the safety light curtain.

These operating instructions are available to all those who work with the safety light curtain.

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

1.1 Scope

These operating instructions only apply to the deTec2 Core HG safety light curtain with the following type label entry in the “Operating Instructions” field:

- 8021977

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

8021977

1.2 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 (e.g., CE authorized representatives, compliance officers, persons 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 safety light curtain: Project planning, mounting, electrical installation, commissioning, operation, and maintenance.

In many applications, the target groups are assigned as follows to the manufacturer and the organization operating the machine in which the safety light curtain is integrated:

Area of responsibility	Target group	Special chapters of these operating instructions ¹⁾
Manufacturer	Project developers (planners, developers, designers)	Project planning, page 16 Technical data, page 55 Accessories, page 62
	Installers	Mounting, page 30
	Electricians	Electrical installation, page 40
	Safety experts	Project planning, page 16 Commissioning, page 42 Technical data, page 55 Checklist for initial commissioning and commissioning, page 72
operating company	Operator	Operation, page 48 Troubleshooting, page 51
	Maintenance personnel	Maintenance, page 49 Troubleshooting, page 51 Ordering information, page 61

¹⁾ Chapters not listed here are intended for all target groups. All target groups must take into account the safety and warning instructions of the complete operating instructions!

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

1.3 Additional information

www.sick.com

The following information is available on the Internet:

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

1.4 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

This chapter contains information on general safety for the safety light curtain.

More safety information about specific usage situations of the safety light curtain is available in the respective chapters.

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.

2.2 Correct use

Overview

The deTec2 Core HG safety light curtain is an electro-sensitive protective device (ESPE) and is suitable for the following applications:

- Hazardous point protection
- Access protection
- Hazardous area protection

The deTec2 Core HG safety light curtain must be only 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 deTec2 Core HG safety light curtain 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



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 safety light curtain works as an indirect protective measure and cannot provide protection from parts thrown out nor from emitted radiation. Transparent objects are not detected.

- ▶ Only use the safety light curtain as an indirect protective measure.



DANGER

Risk of injury due to damage to the front screen

The front screen is made of glass. Glass splinters or damage can change the optical characteristics or lead to injury.

- ▶ Replace the device if the front screen is scratched or damaged.

Reasonably foreseeable misuse

Among others, the deTec2 Core HG safety light curtain is **not** suitable for the following applications:

- Outdoors
- Underwater
- In explosion-hazardous areas
- At altitudes over 3,000 m above sea level
- In environments with enhanced ionizing radiation
- In environments where glass splinters pose a risk

2.3 Requirements for the qualification of personnel

The safety light curtain 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.

An operator may clean the safety light curtain and carry out specific checks as instructed. More information for the operator of the machine: [see "Regular cleaning", page 49](#), [see "Operation", page 48](#).

3 Product description

This chapter provides information on the operation of the safety light curtain and shows examples of its range of use.

3.1 Structure and function

The deTec2 Core HG safety light curtain is an electro-sensitive protective device (ESPE) consisting of a sender and receiver.

A series of parallel infrared light beams form a protective field between sender and receiver that protects the hazardous area (hazardous point, access, and hazardous area protection). When one or more beams are completely interrupted, the safety light curtain 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 the two components is not required.

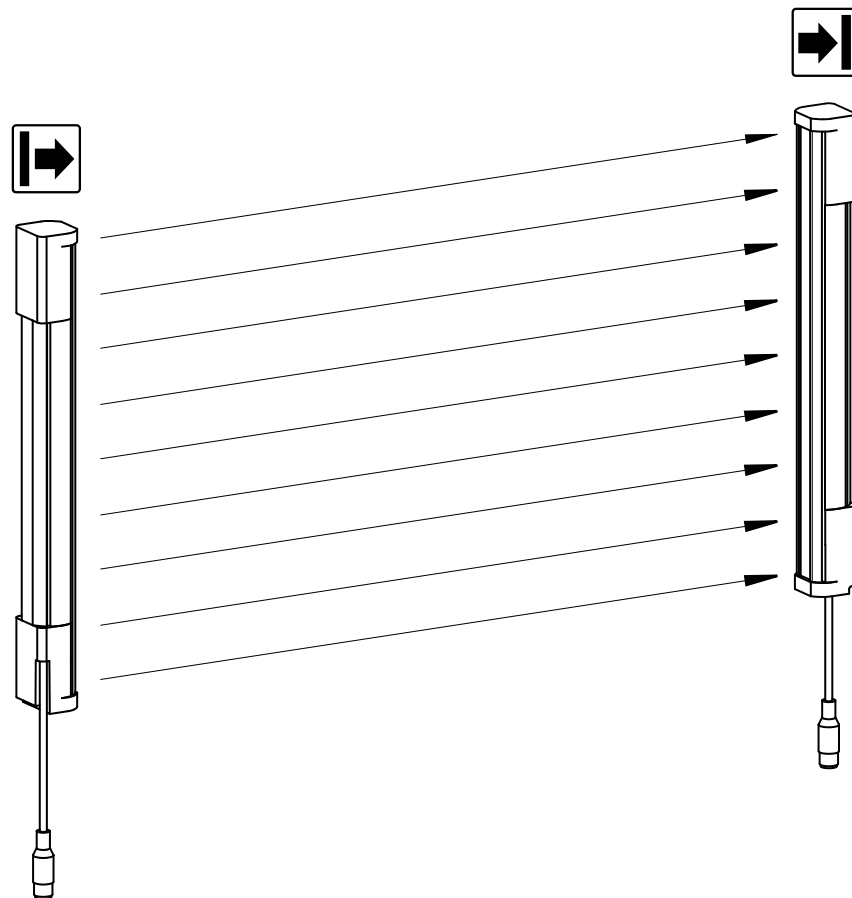


Figure 1: Sender and receiver

Protective field width

The protective field width is the dimension of the light path between sender and receiver. The maximum protective field width is limited by the scanning range.

Resolution

The resolution describes the size of the smallest object detected by the safety light curtain in the protective field. The resolution corresponds to the diameter of the test rod belonging to the safety light curtain, which is reliably detected when in the protective field.

With the appropriate resolution, the safety light curtain provides finger and hand protection.

Information on protective field height, protective field width, and resolution: see ["Data sheet", page 55](#).

Interrelationship: Resolution and scanning range

The available resolution variants are 14 mm (0 m to 7 m scanning range) and 30 mm (0 m to 10 m scanning range).

The scanning range is the maximum protective field width. It depends on the resolution variant.

The scanning range is reduced by the use of deflector mirrors and/or a weld spark guard. More information: see ["Deflector mirrors", page 67](#), see ["Weld spark guard", page 65](#).

3.2 Product characteristics

3.2.1 Hardened front screen

The front screen of the safety light curtain deTec2 Core HG (hardened glass) has a high resistance to chemicals and is suitable for environments in which coolants and lubricants or cleaning agents are used.

A list of all substances that have been tested for compatibility with the device materials is available from SICK on request.

3.2.2 Absence of blind zones

The design and construction of the safety light curtain extends the protective function of a device to the end of the housing without any blind spots. The absence of blind zones reduces the space requirement when integrated in the machine.

3.2.3 Automatic calibration of the protective field width

When switched on, the safety light curtain automatically calibrates to the protective field width.

3.2.4 Status indicators

The sender and receiver LEDs indicate the operational status of the safety light curtains.

Sender indicators

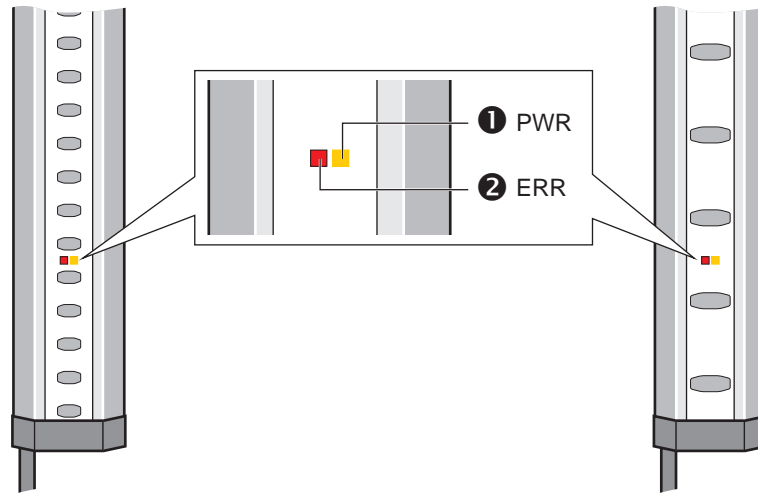


Figure 2: Sender indicators

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

For a complete overview of the fault indications: see "Fault indicators", page 51.

Receiver indicators

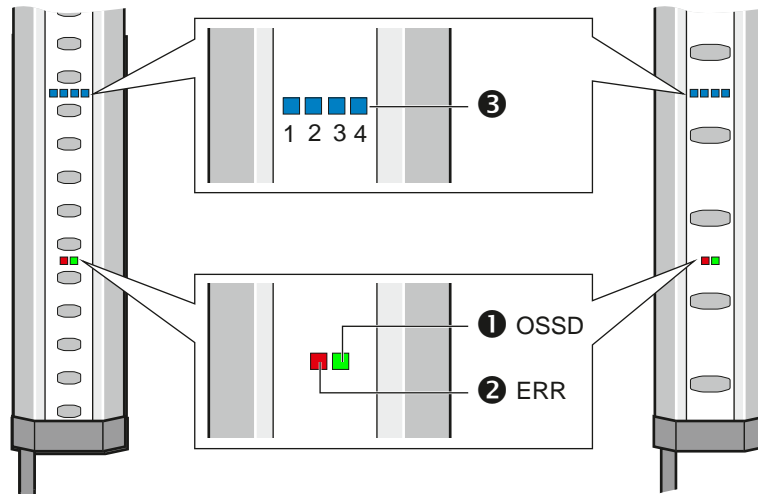


Figure 3: Receiver indicators

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.

For a complete overview of the fault indications: see "Fault indicators", page 51.

3.3 Example applications

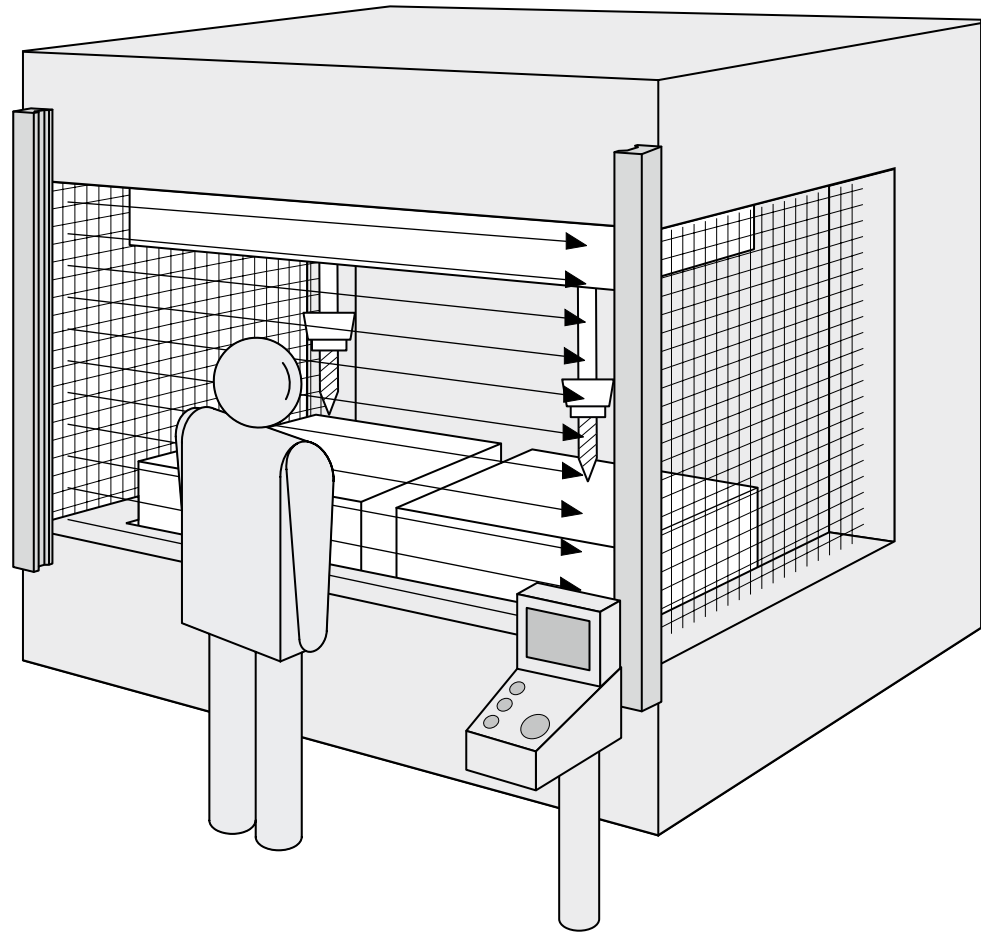


Figure 4: Hazardous point protection

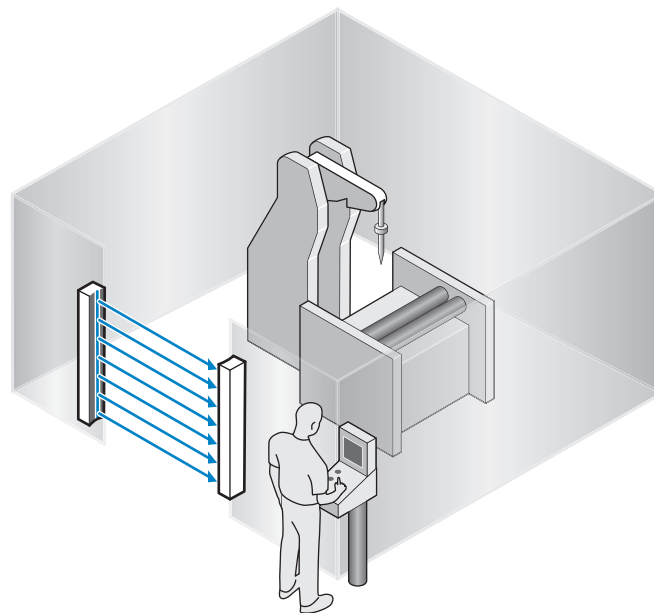


Figure 5: Access protection

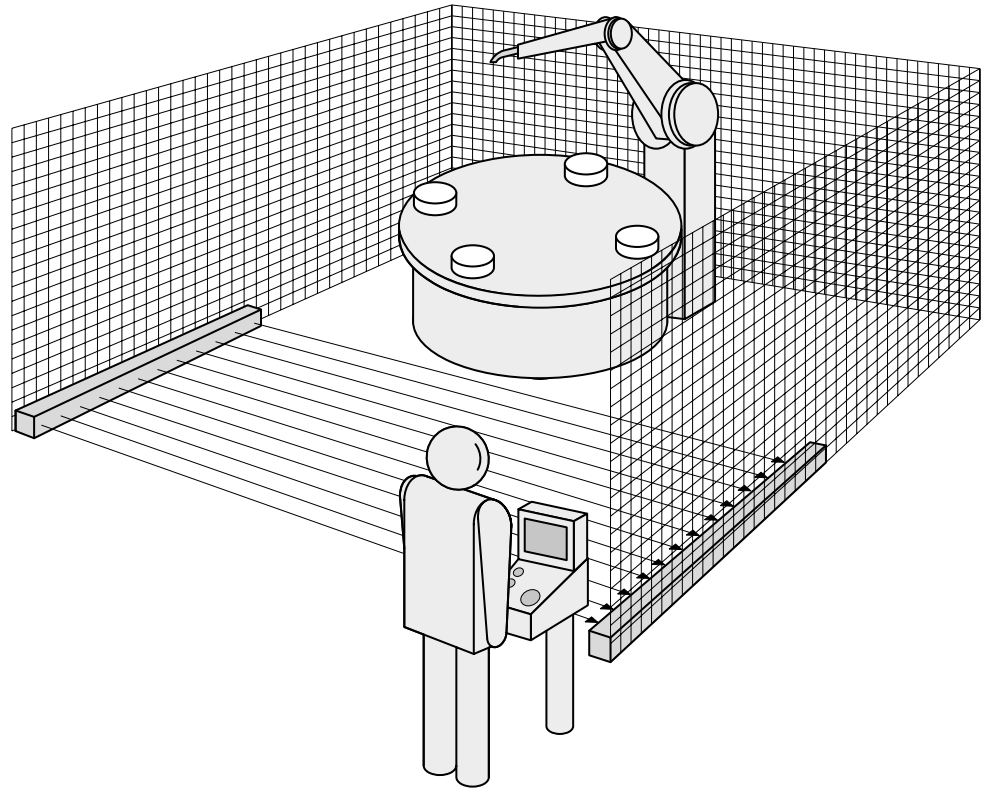


Figure 6: Hazardous area protection

4 Project planning

This chapter includes important information about the proper integration of the safety light curtain in machines for planners, developers and designers.

4.1 Manufacturer of the machine



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.

- ▶ Conduct a risk assessment and 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 safety light curtain with components from other safety light curtains.
 - ▶ Apart from for the procedures described in this document, the components of the safety light curtain must not be opened.
 - ▶ The components of the safety light curtain must not be tampered with or changed.
 - ▶ Do not carry out any repairs on the device components. Improper repair of the protective device can lead to a loss of the protective function.
-

4.2 Operator of the machine



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 safety light curtain in the machine control and changes to the mechanical installation of the safety light curtain require another risk assessment. The results of this risk assessment may require the operator of the machine to meet the obligations of a manufacturer.
 - ▶ Apart from the procedures described in this document, the components of the safety light curtain must not be opened.
 - ▶ The components of the safety light curtain must not be tampered with or changed.
 - ▶ Do not carry out any repairs on the device components. Improper repair of the protective device can lead to a loss of the protective function.
-

4.3 Design

This chapter contains important information about the design.

Information about the individual steps for mounting the device: [see "Mounting", page 30](#).

**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 construction requirements are met so that the safety light curtain 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.
 - Reaching under, over, and around as well as moving the safety light curtain must be prevented.
 - Check whether additional safety measures (e.g. restart interlocking) are necessary when it is possible for people to be located between the protection system and the danger point without being detected.

4.3.1 Scanning range and protective field width

Scanning range

The scanning range limits the maximum protective field width. The protective field width cannot change during operation, see ["Technical data", page 55](#).

The scanning range is reduced by using deflector mirrors and/or a weld spark guard, see ["Deflector mirrors", page 67](#) and ["Weld spark guard", page 65](#).

Protective field width

The protective field width is the dimension of the light path between sender and receiver.

The protective field width is automatically calibrated when the safety light curtain is switched on during initialization and must not be changed during operation.

**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 safety light curtain can only be mounted on machines on which the protective field width does not change when the safety light curtain is switched on.

4.3.2 Minimum distance from the hazardous point

A minimum distance must be maintained between the safety light curtain and the hazardous point. This distance is required to prevent a person or part of their body from reaching the hazardous point before the end of the machine's dangerous state.

**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 safety light curtain is integrated.
- ▶ When mounting the safety light curtain, observe the minimum distance.

Calculate minimum distance

The calculation of the minimum distance is based on international and 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 dangerous state of the machine)
- Response time of the protective device, see "Response time", page 57
- Reach or approach speed of the person
- Resolution (detection capability) of the safety light curtain
- Type of approach: orthogonal (at right angles) or parallel
- 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



NOTE

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



NOTE

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

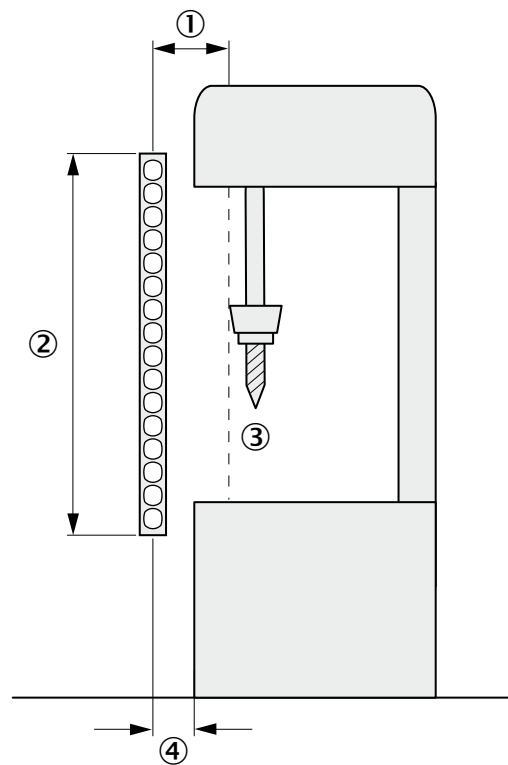


Figure 7: Minimum distance to hazardous point for orthogonal (right-angled) approach to protective field

- ① Minimum distance S
- ② Protective field height
- ③ Hazardous point

- ④ Depending on the application and distance, persons must be prevented from standing behind the protective device.

Calculation example of the minimum distance S according to ISO 13855

The example shows the calculation of the minimum distance for an orthogonal (right-angled) approach to the protective field. A different calculation may be required depending on the application and the ambient conditions (e.g., for a protective field parallel to or at any angle to the direction of approach or an indirect approach).

- First, calculate S using the following formula:

$$S = 2,000 \text{ mm/s} \times T + 8 \times (d - 14 \text{ mm})$$
 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)
 - d = resolution of the safety light curtain in millimeters (mm)
 The reach or approach speed is already included in the formula.
- If the result S is ≤ 500 mm, then use the determined value as the minimum distance.
- If the result S is > 500 mm, then recalculate S as follows:

$$S = 1,600 \text{ mm/s} \times T + 8 \times (d - 14 \text{ mm})$$
- If the new value S is > 500 mm, then use the newly determined value as the minimum distance.
- If the new value S is ≤ 500 mm, then use 500 mm.

Example calculation

Machine stopping time = 290 ms

Response time after interruption of the light path = 30 ms

Resolution of the safety light curtain = 14 mm

$T = 290 \text{ ms} + 30 \text{ ms} = 320 \text{ ms} = 0.32 \text{ s}$

$S = 2,000 \text{ mm/s} \times 0.32 \text{ s} + 8 \times (14 \text{ mm} - 14 \text{ mm}) = 640 \text{ mm}$

$S > 500$ mm, therefore:

$S = 1,600 \text{ mm/s} \times 0.32 \text{ s} + 8 \times (14 \text{ mm} - 14 \text{ mm}) = 512 \text{ mm}$

Taking reaching over into account

If access to the hazardous area by reaching over a protective field cannot be prevented, the height of the protective field and minimum distance of the ESPE must be determined. This is done by comparing the calculated values based on the possible detection of limbs or body parts with the values resulting from reaching over the protective field. The greater value resulting from this comparison must be used.



Figure 8: Representation of the accessibility of electro-sensitive protective device by reaching over. Left: Protective field that cannot be reached over. Right: Protective field that can be reached over.

4.3.3 Minimum distance to reflective surfaces

**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, remain undetected.

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

The light beams from the sender may be deflected by reflective surfaces and dispersive media. This may 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 protective field. This minimum distance (a) must be maintained on all sides of the protective field. This applies in horizontal, vertical and diagonal directions as well as at the end of the safety light curtain. 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 (protective field width).

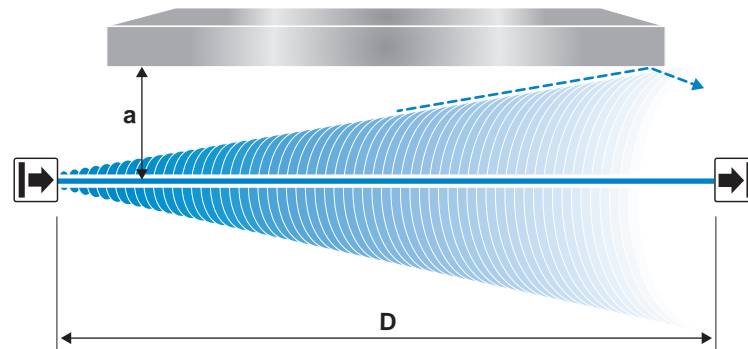


Figure 9: Minimum distance to reflective surfaces

How to determine the minimum distance from 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](#):

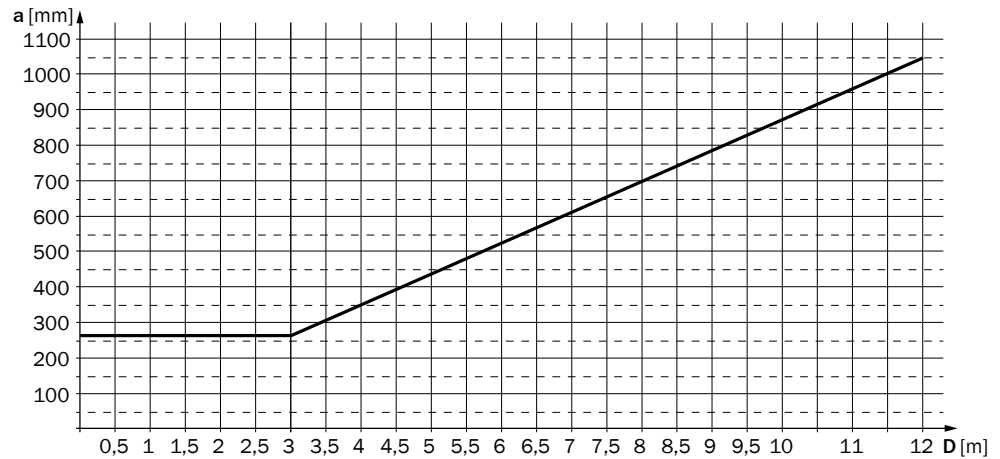


Figure 10: Graph, minimum distance from reflective surfaces

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

Distance between sender and receiver D in m	Calculating the minimum distance for reflective surfaces a in mm
$D \leq 3$ m	$a = 262$ mm
$D > 3$ m	$a = \tan(5^\circ) \times 1,000 \text{ mm/m} \times D = 87.49 \times 1 \text{ mm/m} \times D$

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



DANGER

Hazard due to lack of effectiveness of the protective device

Systems of safety light curtains that operate in close proximity to each other can interfere with each other.

- Use appropriate measures to prevent systems in close proximity from interfering with each other.

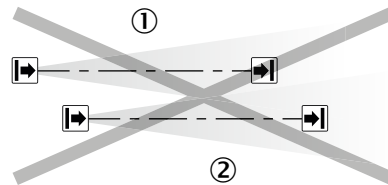


Figure 11: Preventing mutual interference from system ① and system ②

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.

Reversed direction of transmission

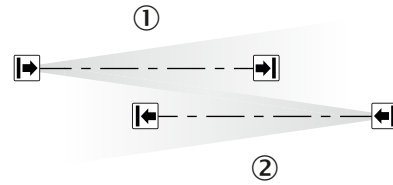


Figure 12: Trouble-free operation due to reversed direction of transmission of system ① and system ②

In the figure, the direction of transmission of systems in close proximity to each other is reversed. System ② is not affected by the beams of system ①.

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 40.](#)

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 safety relays or a safety controller, for example.



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 safety light curtain 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.
 - A restart interlock must be implemented depending on applicable national regulations or required reliability of the safety function. Because the safety light curtain 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 applicable national regulations or 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.

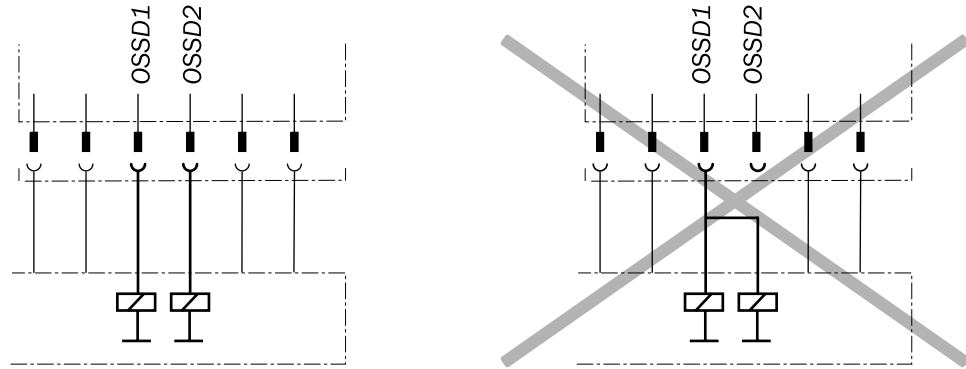


Figure 13: Dual-channel and isolated connection of OSSD1 and OSSD2

- 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 (safety outputs) 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.

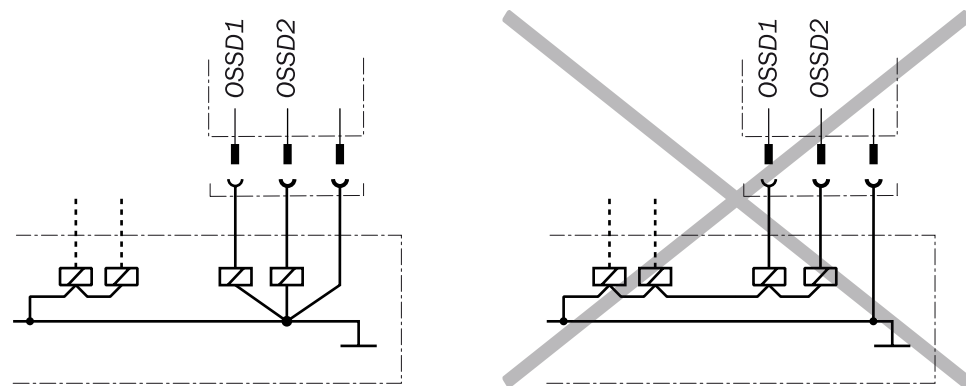


Figure 14: No potential difference between load and protective device



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 safety light curtain 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

The two outputs are short-circuit protected to 24 V DC and 0 V. When the protective field is clear, the OSSDs are in the ON state and the signal level is HIGH (non-isolated). In the event of an interruption in the light path or device fault, the OSSDs are in the OFF state and the signal level is LOW (above 1.5 k Ω to 0 V).

The safety light curtain 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 safety light curtain can fulfill its protective function.

- The external voltage supply of the safety light curtain must be capable of jumpering a brief power failure of 20 ms as specified in IEC 60204-1.
- The power supply unit must ensure safe isolation according to IEC 61140 (SELV/PELV). Suitable power supply units are available as accessories from SICK, see "Accessories", page 62.

4.4.1 Restart interlock

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.

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

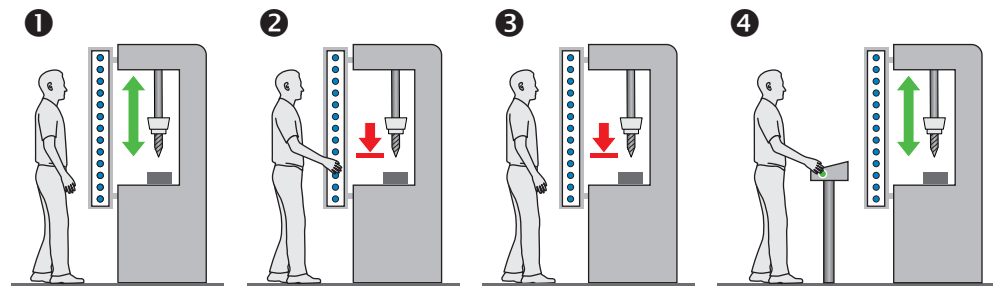


Figure 15: Schematic representation of operation with restart interlock

The dangerous state of the machine (①) is brought to an end if the light path is interrupted (②) and is not re-enabled (③) until the operator presses the reset pushbutton located outside the hazardous area (④). 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.

The safety light curtain does not have an internal restart interlock. If required, a restart interlock must therefore be implemented externally via the circuitry or the control, e.g., in connection with the SICK switching amplifier UE48-20S/UE48-30S.

4.4.2 External device monitoring (EDM)

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.



NOTE

Because the safety light curtain 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

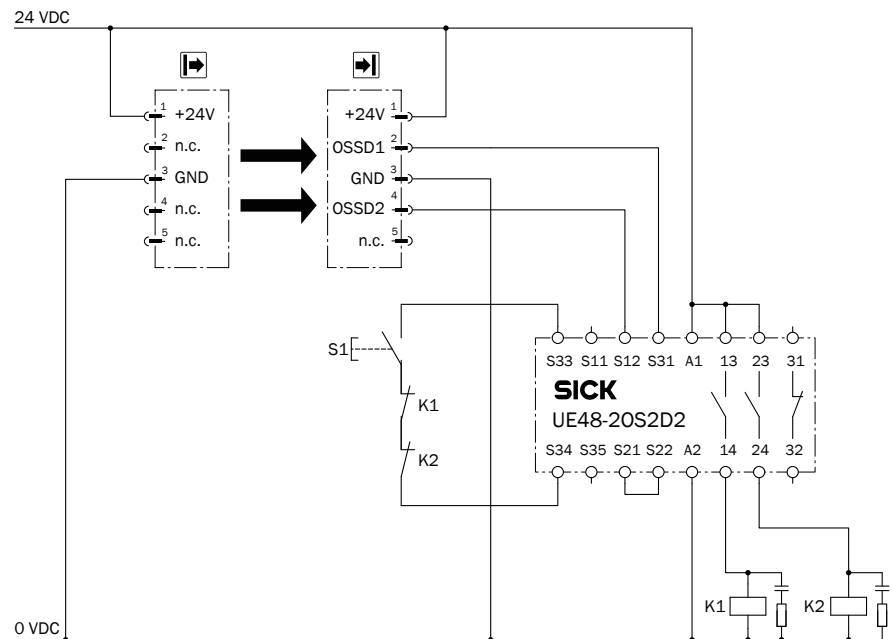


Figure 16: Connection diagram for UE48-20S with restart interlock and external device monitoring

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

Functionality

When the protective field is clear, the OSSD1 and OSSD2 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 OSSD1 and OSSD2 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 OSSD1 and OSSD2 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 thorough 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 qualified safety personnel?
 - Can the check be completed by 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 72)?
 - 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 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.

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 rod test check is used to check whether the hazardous point is only accessible via the protective field of the safety light curtain and whether the protective device is able to identify each time the hazardous point is approached.

The test is carried out with an opaque test rod whose diameter corresponds to the resolution of the safety light curtain.

Important information



DANGER

Use of incorrect test rods

Persons or parts of the body to be protected may not be detected in operation.

- ▶ Only use the included test rod with the diameter specified on the type label of the safety light curtain.
 - ▶ Do not use any test rods with a similar or the same diameter of other safety light curtains.
-



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 safety light curtain have no effect on the machine during the check of the components.
-



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 safety light curtain must be checked by qualified safety personnel.
-

Prerequisites

- The OSSD LED lights up green.

Approach

1. Move the test rod slowly through the area to be protected (e.g., machine opening), as indicated by the arrow, [see figure 17, page 28](#).
2. Watch the OSSD LED on the receiver during the check. The OSSD LED on the receiver should continuously light up red. The OSSD LED must not illuminate green.

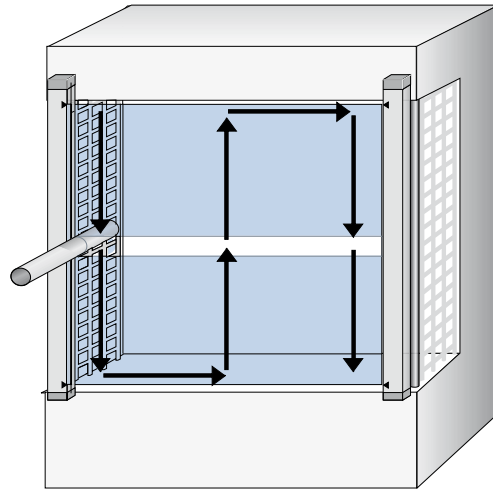


Figure 17: Test rod check: Step 1

3. Then, guide the test rod along the edges of the area to be protected, as indicated by the arrow, see figure 18.
4. Watch the OSSD LED on the receiver during the check. The OSSD LED on the receiver should continuously light up red. The OSSD LED must not illuminate green.

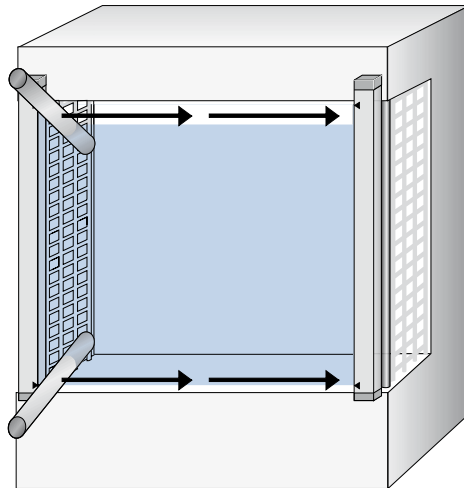


Figure 18: Test rod check: Step 3

5. If one or more deflector mirrors are used, then the test rod should also be guided slowly through the area to be protected directly in front of the deflector mirrors.
6. Watch the OSSD LED on the receiver during the check. The OSSD LED on the receiver should continuously light up red. The OSSD LED must not illuminate green.

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

For information on the requirements for properly mounting the safety light curtain, see ["Design", page 16](#).



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 safety light curtain 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.
-



NOTE

Mount the device in the following order.

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 61](#)

5.3 Installation

Overview

The QuickFix bracket or the optional FlexFix bracket is used to mount the sender and receiver. In many cases, the QuickFix bracket is enough for installation. The FlexFix bracket makes it possible to rotate sender and receiver around the axis of the device and to align it accurately.

Important information



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.

- ▶ It is vital that you observe the minimum distances calculated for your machine: see "[Minimum distance from the hazardous point](#)", page 17, see "[Minimum distance to reflective surfaces](#)", page 20.
 - ▶ Mount the safety light curtain such that it is not possible to reach below, above, around, or behind the safety light curtain, and that the light curtain cannot be repositioned.
-



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 safety light curtain can only be mounted on machines on which the protective field width does not change when the safety light curtain is switched on.
-



NOTE

- ▶ Read this section completely before mounting the brackets.
 - ▶ Read the information on aligning the sender and receiver, "[Sender and receiver alignment](#)", page 43.
-



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.
-

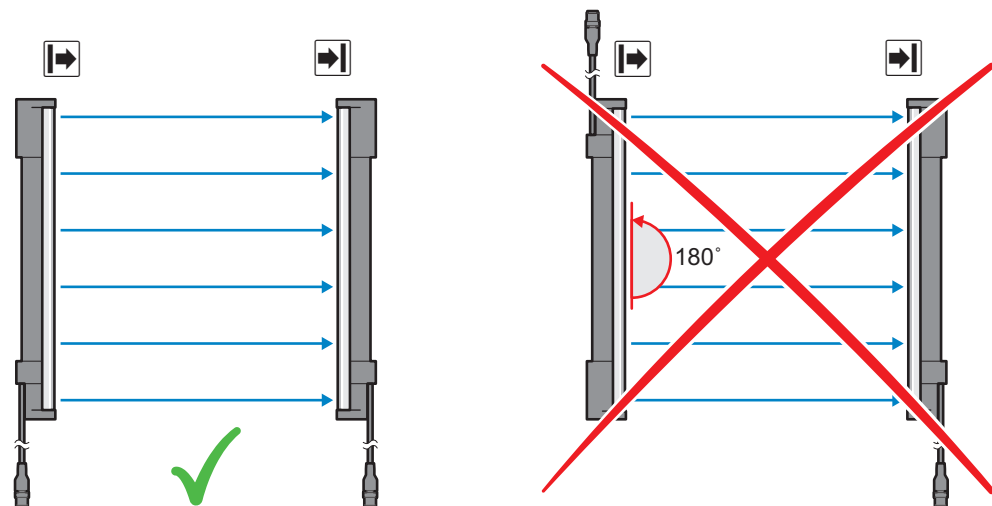


Figure 19: Sender and receiver must not be installed at 180° rotated relative to each other

Approach

- ▶ Mount the sender and receiver on a level surface.
- ▶ Mount the sender and receiver such that a right-angled protective field is established, i.e., when mounted vertically at the same height. For minor adjustments when aligning, the sender and receiver can be adjusted longitudinally in the brackets, see ["Ausrichten mit der QuickFix-Halterung"](#) see ["Ausrichten mit der FlexFix-Halterung oder mit der Austauschhalterung"](#).
- ▶ If possible, mount the top bracket at a height such that the offset in the safety light curtain housing is resting on the bracket. This prevents the safety light curtain from sliding down during mounting.
- ▶ Tighten the screws used to mount the bracket to a torque of 5 Nm to 6 Nm. Tighten the screws used to secure the safety light curtain in the bracket to a torque of 2.5 Nm to 3 Nm. Higher torques can damage the bracket, while lower torques are not secure enough to prevent the safety light curtain from moving.
- ▶ When mounting, make sure that 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 the components are parallel.

5.3.1 Mounting the QuickFix bracket

Overview

2 QuickFix brackets are used to mount the sender and receiver.

The QuickFix bracket consists of 2 parts, which are pushed into each other. The two individual parts are connected with an M5 screw and the housing (sender or receiver) is clamped with form-fit clamping.

The two mounting surfaces for the brackets of the sender or receiver must be parallel and lie in the same plane.

Important information



NOTE

The following should be considered when mounting the QuickFix bracket:

- Select the appropriate length of the M5 screw to prevent any risk of injury from an overrun.
- When selecting the screw length, observe the wall thickness and the depth of the countersunk screw of the QuickFix bracket, [see figure 33, page 62](#)



NOTE

The QuickFix bracket has cable routing. Depending on the installation, the cable routing can make mounting easier.

Mount QuickFix bracket on a machine or profile frame

Table 2: Lateral and rear mounting with the QuickFix bracket

Mounting type	Description
On the side	Fasten the M5 screw to the machine or profile frame through the QuickFix bracket. A screw nut or threaded hole is required on the machine or profile frame (❶).
	Fasten the M5 screw to the QuickFix bracket through the machine or profile frame. A screw nut is required for each QuickFix bracket (❷).
	Fasten the M5 screw to the profile frame through the QuickFix bracket. A sliding nut is required on the profile frame (❸).
On the back	Fasten the M5 screw to the machine or profile frame through the QuickFix bracket. A screw nut or threaded hole is required on the machine or profile frame (❹).

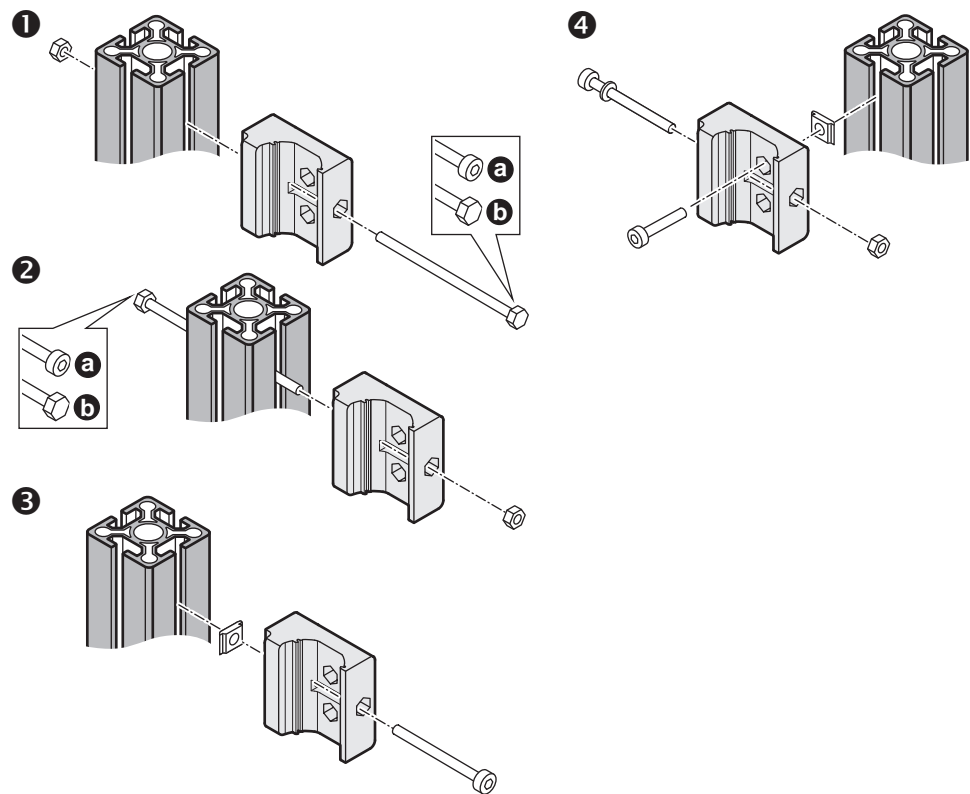


Figure 20: Mounting the QuickFix bracket to a profile

- ① Mounting on the side
- ② Mounting on the side
- ③ Mounting on the side
- ④ Mounting on the back

5.3.2 Mounting the FlexFix bracket

Overview

In the FlexFix bracket, the sender and receiver can be rotated $\pm 15^\circ$ around their longitudinal axis.

2 FlexFix brackets are used to mount the sender and receiver.

Important information



NOTICE

The housing of the safety light curtain can become scratched if the screw heads protrude when the FlexFix brackets are mounted on the back.

This can be avoided by taking one of the following measures:

- ▶ Use flat-head screws with washers.
- ▶ If using cylinder head screws, use 2 screws per bracket and no washers.



NOTE

The FlexFix mounting kit (part number 2073543) contains 2 FlexFix brackets, one alignment tool, and the required screws, sliding nuts, and washers.

5.3.2.1 Mounting the FlexFix bracket on a machine or profile frame

Important information**NOTE**

When selecting the screw length, observe the wall thickness of the FlexFix bracket, see figure 34, page 63.

Mounting type

Table 3: Lateral and rear mounting with the FlexFix bracket

Mounting type	Description
On the side	With the M5 screw through the FlexFix bracket to the machine or profile frame. A screw nut or threaded hole is required on the machine or profile frame.
On the back	With the M5 screw through the FlexFix bracket to the machine or profile frame. A screw nut or threaded hole is required on the machine or profile frame.

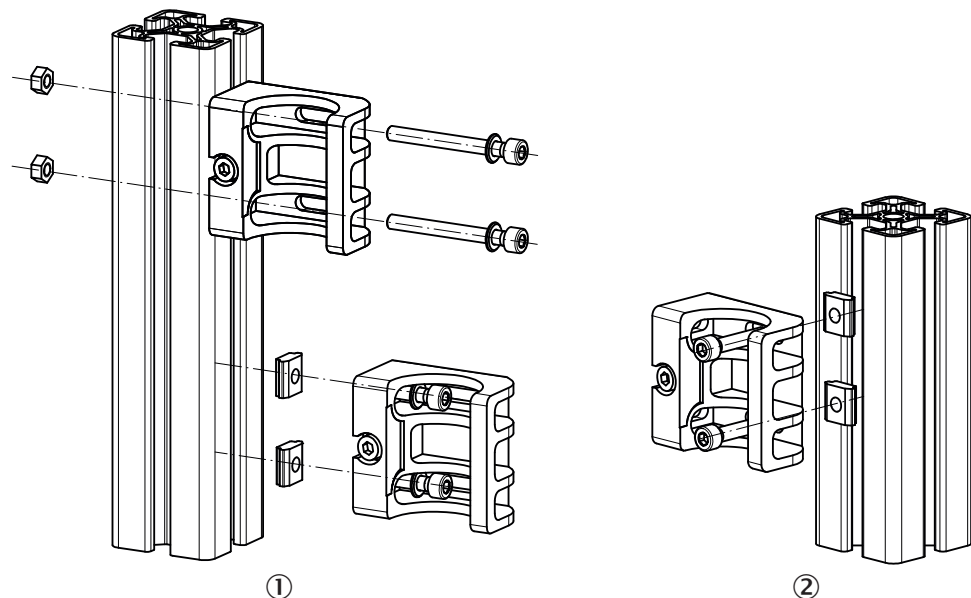


Figure 21: Mount FlexFix brackets to a profile frame

- ① Mounting on the side
- ② Mounting on the back

Approach

1. After mounting the FlexFix brackets, screw the sender and receiver into the FlexFix brackets from the front and align the sender and receiver.

**NOTE**

The safety light curtain can only be screwed in when both FlexFix brackets are in alignment.

Recommendation:

1. Only hand-tighten the screws on the FlexFix brackets at first.
2. Align the two FlexFix brackets. To do this, place a straightedge or spirit level, for example, at the screw mounting surfaces of the FlexFix brackets that are not being used.
3. Tighten the screws.

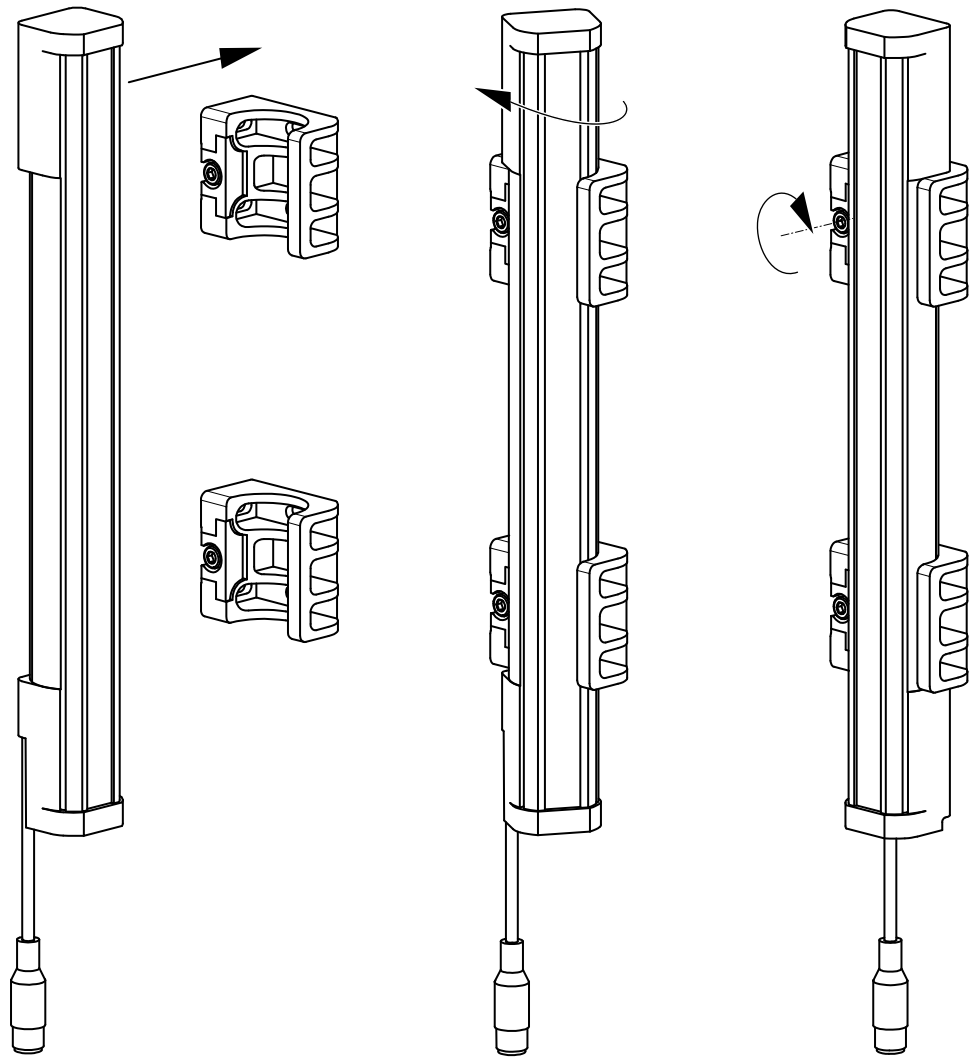


Figure 22: Inserting the safety light curtain in the FlexFix brackets

2. Use an M5 screw to fix the position of the sender and receiver in the FlexFix bracket.

Further topics

- ["Sender and receiver alignment", page 43](#)

5.3.2.2 Mount FlexFix bracket to the back of a device column

Overview

The FlexFix bracket can be mounted in the device column using sliding nuts.

If you wish to mount the sender and receiver in the center of the device column, use washers between the FlexFix brackets and the device column.

Approach

1. After mounting the FlexFix brackets, screw the sender and receiver into the FlexFix brackets from the front and align the sender and receiver.
2. Use an M5 screw to fix the position of the sender and receiver in the FlexFix bracket.

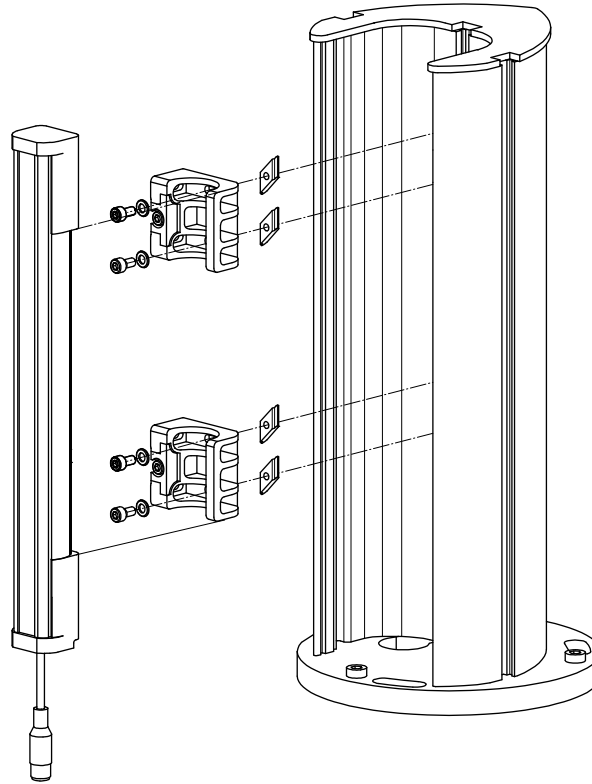


Figure 23: Mounting the FlexFix bracket to a device column (accessory)

Further topics

- ["Sender and receiver alignment", page 43](#)

5.3.3 Mounting the upgrade bracket

Overview

If an existing C2000 safety light curtain is mounted with a swivel-mount bracket or with a side bracket, it can be replaced with a deTec2 Core HG safety light curtain using an exchange bracket. There is no need to drill new holes, since the existing ones can be used for the upgrade bracket.

Approach

1. Mount the new safety light curtain so that the protective field is correctly positioned.
2. Use one of the following installation versions independent of the existing mounting situation:
 - For swivel mount bracket replacement (article number 2019649 or 2019659): installation version A or B
 - For side bracket replacement (part number 2019506): installation version C

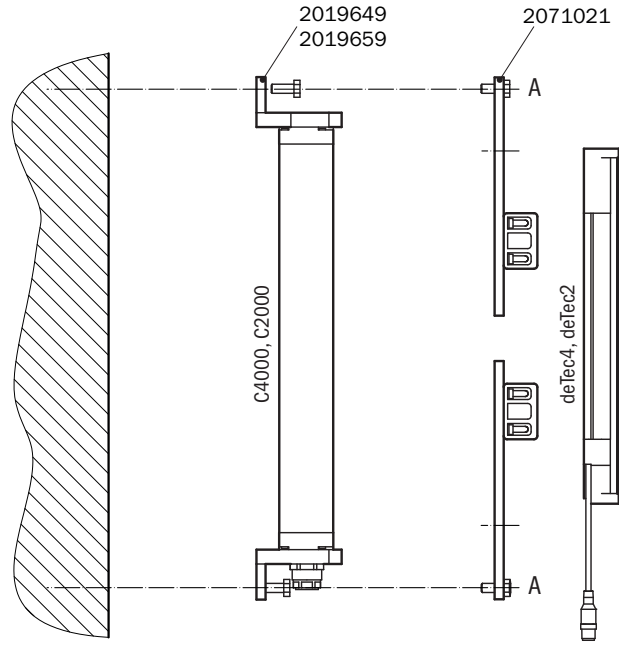


Figure 24: Upgrade bracket, installation version A

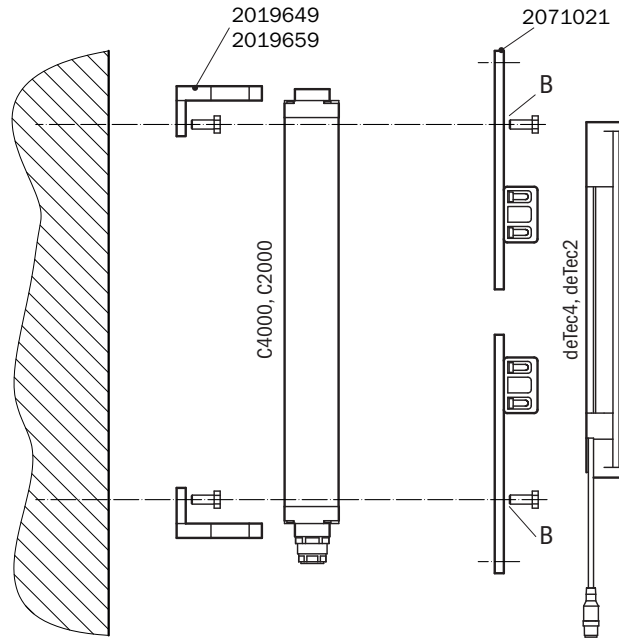


Figure 25: Upgrade bracket, installation version B

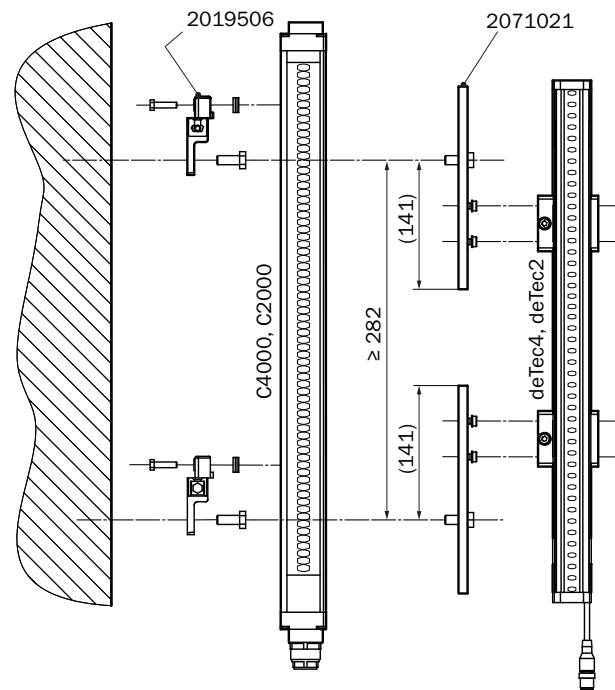


Figure 26: Upgrade bracket, installation version C

6 Electrical installation

6.1 Safety

Information on the requirements that must be met for safe integration of the safety light curtain into the control and electronics of the machine: see "Integrating into the electrical control", page 22.

Mounting should be completed before electrical installation.



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 voltage 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 safety light curtain have no effect on the machine during the electrical installation work.
- ▶ Use an appropriate voltage supply, see "Technical data", page 55.



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.

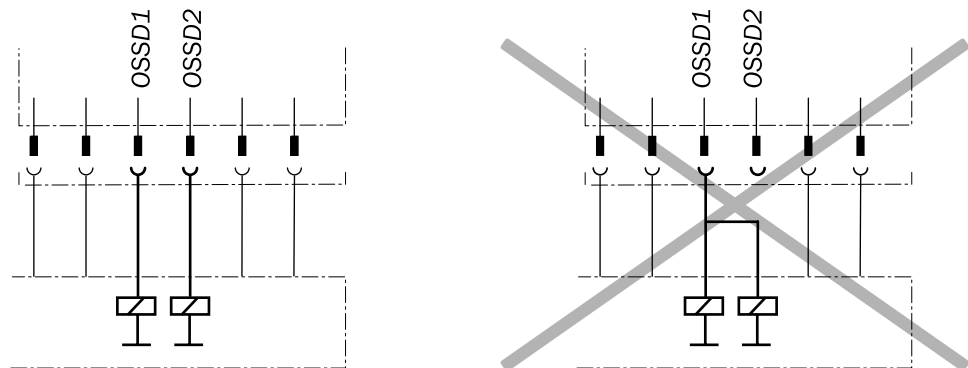


Figure 27: Dual-channel and isolated connection of OSSD1 and OSSD2



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.

- If you connect loads to the OSSDs (safety outputs) 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.

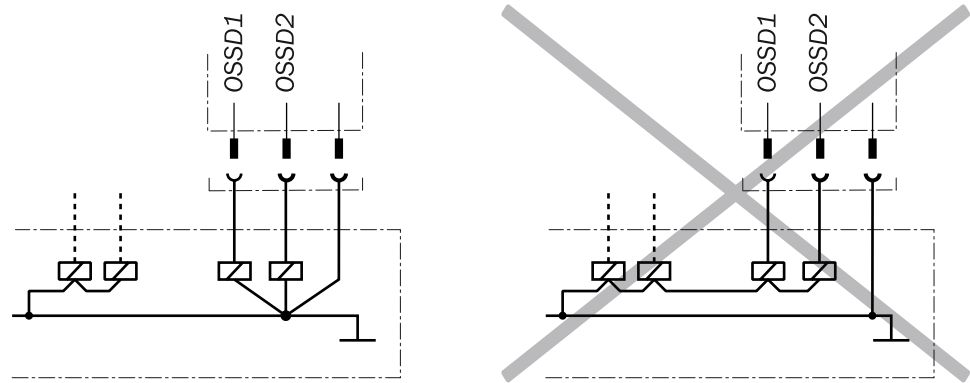


Figure 28: No potential difference between load and protective device

6.2 System connection (M12, 5-pin)

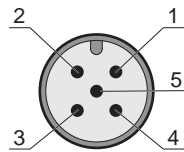


Figure 29: System connection (male connector, M12, 5-pin)

Table 4: System connection pin assignment (male connector, M12, 5-pin)

Pin	Wire color ¹⁾	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

¹⁾ 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 C2000 safety light curtain with a deTec2 Core HG, without having to route new cables.

7 Commissioning

7.1 Security

**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 safety light curtain, 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 safety light curtain do not affect the machine during mounting, electrical installation, and commissioning.

**DANGER**

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.

- ▶ 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 necessary, remove any residues of this type or any other form of contamination and restart the receiver.
 - Scratches or damage. If necessary, replace the respective sender or receiver if its front screen is scratched or damaged.
- ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the protective field, see "[Minimum distance to reflective surfaces](#)", page 20.
- ▶ 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 to 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 16
- "[Integrating into the electrical control](#)", page 22

- ["Mounting", page 30](#)
- ["Electrical installation", page 40](#)

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 safety light beam curtain 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 51](#).

7.4 Sender and receiver alignment

Overview

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



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 safety light curtain do not affect the machine during the alignment process.

Further topics

- ["Alignment with the QuickFix bracket", page 44](#)
- ["Alignment with the FlexFix bracket or with the upgrade bracket", page 45](#)
- ["Indication of the alignment quality", page 46](#)

7.4.1 Aligning the sender and receiver

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 safety light curtain do not affect the machine during the alignment process.

Approach

1. Make sure that the sender and receiver are mounted correctly.
2. Switch on the voltage supply to the safety light curtain.
3. Roughly align the sender to the receiver by rotating the sender.
4. Rotate the receiver to align it to the sender so that as many blue alignment quality LEDs as possible light up on the receiver.
5. If required, align the sender more precisely to the receiver so that as many blue alignment quality LEDs as possible light up on the receiver.

6. If required, align the receiver more precisely to the sender so that as many blue alignment quality LEDs 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: 2.5 Nm ... 3 Nm.
8. Switch the voltage supply off and then on again.
9. Check the alignment quality LEDs to make sure that the components are still correctly aligned with each other.



NOTE

Once 3 blue alignment quality light emitting diodes light up, alignment is good and availability is stable.

Please note that body parts or objects in the protective field (e.g., hand, tool, AR60 optional laser alignment aid) may impair the function of the alignment quality LEDs. Remove all objects from the protective field to allow the alignment quality to be assessed.

Complementary information

The optional AR60 laser alignment aid can be used for alignment.

Since the AR60 optional laser alignment aid is placed in the protective field of the safety light curtain 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, the AR60 laser alignment aid must be removed.

Further topics

- ["Mounting", page 30](#)

7.4.2 Alignment with the QuickFix bracket

Prerequisites

- The sender and receiver are mounted with a QuickFix bracket

Alignment with the QuickFix bracket

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

- Adjust vertically (H)

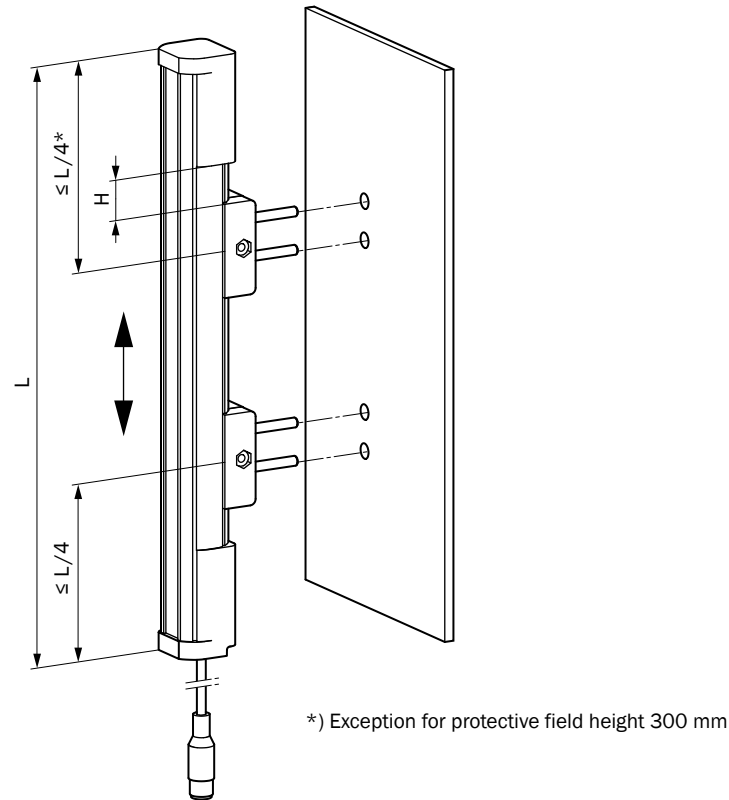


Figure 30: QuickFix bracket: adjust vertically

7.4.3 Alignment with the FlexFix bracket or with the upgrade bracket

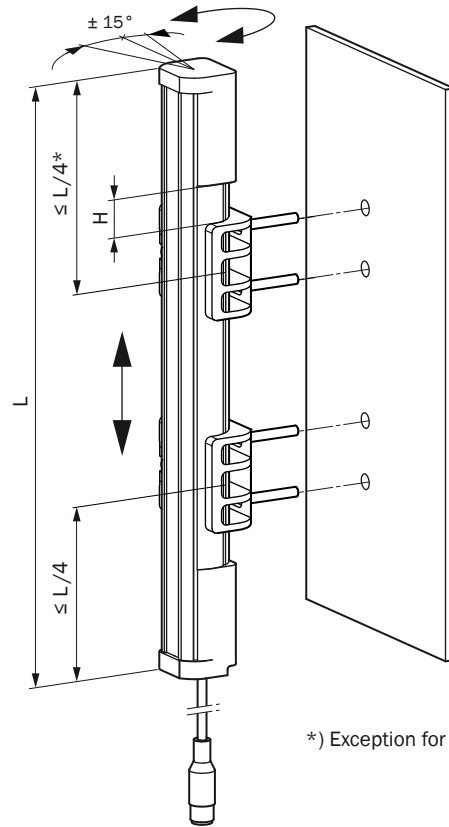
Prerequisites

- A FlexFix bracket or upgrade bracket is used to mount the sender and receiver.

Alignment with the FlexFix bracket or the upgrade bracket

The FlexFix bracket or upgrade bracket offer you the following adjustment options for aligning the sender and receiver with each other:

- Adjust vertically (H)
- Rotate ($\pm 15^\circ$)



*) Exception for protective field height 300 mm

Figure 31: FlexFix bracket: adjust vertically/rotate

7.4.4 Indication of the alignment quality

Important information



NOTE

Once 3 blue alignment quality light emitting diodes light up, alignment is good and availability is stable.

Please note that body parts or objects in the protective field (e.g., hand, tool, AR60 optional laser alignment aid) may impair the function of the alignment quality LEDs. Remove all objects from the protective field to allow the alignment quality to be assessed.

Indication of the alignment quality

Table 5: Indication of the alignment quality

Advertisement		Meaning
Blue LEDs	OSSD LED	
No LED lights up	● Red	Alignment is insufficient or the protective field is interrupted at least partially. The receiver cannot synchronize with the sender.
1 light emitting diode lights up	● Red	Alignment is insufficient or the protective field is interrupted at least partially.
2 light emitting diodes light up	● Red	Alignment is poor or the protective field is interrupted at least partially.
2 light emitting diodes light up	● Green	Alignment is not yet sufficient for stable availability.

Advertisement		Meaning
Blue LEDs	OSSD LED	
3 light emitting diodes light up	● Green	Alignment is good, stable availability. ¹⁾
4 light emitting diodes light up	● Green	Alignment is very good.

¹⁾ If the protective fields are very wide, there is a possibility that all four alignment quality LEDs will not light up even when alignment is good.

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 necessary, remove any residues of this type or any other form of contamination and restart the receiver.
 - Scratches or damage. If necessary, replace the respective sender or receiver if its front screen is scratched or damaged.
 - ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the protective field, [see "Minimum distance to reflective surfaces", page 20](#).
 - ▶ Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the protective field.
-

**NOTE**

This document does not provide information on operating the machine in which the safety light curtain 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

The safety light curtain is maintenance-free. Depending on the ambient conditions, regular cleaning is required.

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 injury due to damage to the front screen

The front screen is made of glass. Glass splinters or damage can change the optical characteristics or lead to injury.

- ▶ Replace the device if the front screen is scratched or damaged.
-

9.2 Regular cleaning

Overview

Depending on the ambient conditions of the safety light curtain, 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**

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 concerning test rod testing.
-



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 necessary, remove any residues of this type or any other form of contamination and restart the receiver.
 - Scratches or damage. If necessary, replace the respective sender or receiver if its front screen is scratched or damaged.
 - ▶ Make sure that all reflective surfaces and objects maintain a minimum distance from the protective field, see "[Minimum distance to reflective surfaces](#)", page 20.
 - ▶ Make sure that no dispersive media (e.g., dust, fog, or smoke) are within the calculated minimum distance from the protective field.
-



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 safety light curtain do not affect the machine during the cleaning process.
-



NOTICE

- ▶ Do not use aggressive cleaning agents.
 - ▶ Do not use abrasive cleaning agents.
 - ▶ We recommend anti-static cleaning agents.
 - ▶ We recommend using the anti-static plastic cleaner (SICK part number 5600006) or a standard commercially available glass cleaner 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 after cleaning.
4. Check the effectiveness of the protective device.

Further topics

- "[Operation](#)", page 48

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

This chapter describes how you identify and remedy faults that interrupt the function of the safety light curtain.

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

If you cannot remedy the fault with the help of the information provided in this chapter, please contact your respective SICK subsidiary.

10.2 Fault indicators

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

Sender

Table 6: Fault indicator on the sender

PWR LED (yellow)	ERR LED (red)	Possible cause	Rectification
○	○	No operating voltage or operating voltage is too low or internal fault	Check the voltage supply, see "Technical data", page 55. Switch off the power supply and on again. If the fault persists, replace the sender, see "Ordering information", page 61.
○	☀	The voltage was too high when operating the sender.	Check the voltage supply, see "Technical data", page 55. Replace the sender, see "Ordering information", page 61.
●	☀	Fault in the supply voltage	Check the voltage supply and power supply unit, see "Technical data", page 55. Switch off the power supply and on again. If the fault persists, replace the defective components, see "Ordering information", page 61.
☀	☀	The sender identified an internal fault.	Switch off the power supply and on again. If the fault persists, replace the sender, see "Ordering information", page 61.

Receiver

Table 7: Fault indicator on the receiver

OSSD LED (red)	ERR LED (red)	LED 1 2 3 4 (blue)	Possible cause	Rectification
●	☀	☀○○○	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 61.
●	☀	○☀○○	Fault in the supply voltage	Check the voltage supply and power supply unit, see "Technical data", page 55. Switch off the power supply and on again. If the fault persists, replace the defective components, see "Ordering information", page 61.

OSSD LED (red)	ERR LED (red)	LED 1 2 3 4 (blue)	Possible cause	Rectification
●	●	○○●○	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 "Protection against interference from systems in close proximity to each other" , page 21. Switch the voltage supply off and on again.
●	●	○○○●	A fault or unexpected state was identified on the OSSDs of the system connection (e. g. over voltage, 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 "Integrating into the electrical control" , page 22. Switch the voltage supply off and on again. If the fault persists, replace the defective components, see "Ordering information" , page 61.

11 Decommissioning

11.1 Protection of the environment

The safety light curtain has been designed to minimize its impact on the environment. It uses only minimum of power and natural resources.

- ▶ Always act in an environmentally responsible manner at work. 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

General system data

Table 8: General system data

	Minimum	Typical	Maximum
Protective field height, depending on type	300 mm ... 1,800 mm, 150-mm steps		
Resolution (detection capability), depending on the type	14 mm or 30 mm		
Protective field range ¹⁾ Resolution 14 mm Resolution 30 mm	0 m ... 7 m	0 m ... 8 m 0 m ... 15 m	
Protection class ²⁾	III (IEC 61140)		
Enclosure rating	IP 65 (IEC 60529) IP 67 (IEC 60529)		
Supply voltage V_s on the device ^{3) 4)}	19.2 V	24 V	28.8 V
Residual ripple ⁵⁾			± 10%
Synchronization	Optical		
Type	Type 2 (IEC 61496-1)		
Category	Category 2 (ISO 13849-1)		
Test rate	31 s ⁻¹		
Performance level ⁶⁾	PL c (ISO 13849-1)		
Safety Integrity Level ⁶⁾	SIL1 (IEC 61508)		
SIL claim limit ⁶⁾	SILCL1 (IEC 62061)		
PFHd (mean probability of a dangerous failure per hour)	3.1 × 10 ⁻⁸		
T_M (Mission Time)	20 years (ISO 13849-1)		
Safe state when a fault occurs	At least one OSSD is in the OFF state.		
Power-up delay of sender and receiver before ready			2 s

- 1) If the protective fields are very wide, there is a possibility that all four alignment quality LEDs will not light up even when alignment is good.
- 2) Safety extra-low voltage SELV/PELV
- 3) The external voltage supply must be capable of buffering brief power failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK.
- 4) 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.
- 5) Within the limits of U_v
- 6) For more detailed information on the exact configuration of your machine, please consult your respective SICK subsidiary.

Table 9: Mechanical data

deTec2 Core HG	
Housing material	Aluminum extruded profile
Front screen material	Chemically prestressed float glass

Sender

Table 10: Technical specifications, sender

	Minimum	Typical	Maximum
Wavelength of sender		Near-infrared (NIR) - invisible	
Weight	Depending on the protective field height, see "Table of weights", page 59		

Receiver

Table 11: Technical specifications, receiver

	Minimum	Typical	Maximum
Output signal switching devices (OSSDs)	2 PNP semiconductors, short-circuit protected ¹⁾ , cross-circuit monitored		
Response time	see "Response time", page 57		
Duration of OFF state	100 ms		
Switch-on delay		3 × response time	
ON state, switching voltage ²⁾ HIGH (U _{rms})	U _V - 2.25 V	24 V	U _V
OFF state, switching voltage LOW ^{2) 3)}	0 V	0 V	2.0 V
Current-carrying capacity of the OSSDs			300 mA ea.
Leakage current of the OSSDs			2 mA at each
Load capacity			2.2 μF ⁴⁾
Load inductance			2.2 h
Test pulse data ⁴⁾			
Test pulse range		150 μs ⁶⁾	300 μs ⁶⁾
Test pulse rate	3 s ⁻¹	5 s ⁻¹	10 s ⁻¹
Permissible conductor resistance			
between device and load ⁵⁾			2.5 Ω
Supply cable ⁶⁾			1 Ω

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

2) According to IEC 61131-2

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

4) Applies to devices marked "(Rev. 1)" on the "Ident No." type label entry. For devices not marked "(Rev. 1)", the following applies: Load capacity (maximum) = 30 nF.

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

6) Applies to devices marked "(Rev. 1)" on the "Ident No." type label entry. For devices not marked "(Rev. 1)", the following applies: Test pulse width (typical) = 300 μs; test pulse width (maximum) = 350 μs.

7) Make sure to limit the individual conductor resistance to the downstream controller to this value to ensure that a cross-circuit between the outputs is safely detected. (Also observe IEC 60204-1.)

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

Operating data

Table 12: Operating data

	Minimum	Typical	Maximum
Connection	M12, 5-pin		
Length of cable ¹⁾ e.g., wire cross-section 0.34 mm ² , copper cable e.g., wire cross-section 0.5 mm ² , copper cable			50 m 15 m 30 m
Ambient operating temperature ^{2) 3)}	-30 °C		+55 °C
Air humidity (non-condensing)	15 %		95 %
Storage temperature	-30 °C		+70 °C
Housing cross section	31 mm × 34 mm, plus bracket, see " Dimensional drawings ", page 60		
Vibration resistance ⁴⁾	5 g, 10 Hz ... 55 Hz (IEC 60068-2-6)		
Shock resistance ⁵⁾	10 g, 16 ms (IEC 60068-2-27)		

- 1) Maximum permissible conductor resistances must be observed.
- 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: 500 shocks

12.2 Response time

The response time depends on the resolution and protective field height of the system. The safety light curtain is available with the resolution of 14 mm or 30 mm.

Table 13: Response time dependent on the protective field height

Protective field height in mm	Response time in ms	
	Resolution 14 mm	Resolution 30 mm
300	11	10
450	12	10
600	13	10
750	13	11
900	14	11
1050	15	11
1200	16	12
1350	17	12
1500	18	13
1650	19	13
1800	20	13

12.3 power consumption

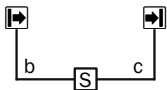
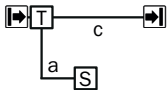
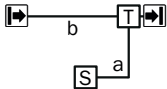
Table 14: Power consumption, sender and receiver

Protective field height in mm	Typical power consumption of sender in W		Typical power consumption of receiver in W ¹⁾	
	Resolution 14 mm	Resolution 30 mm	Resolution 14 mm	Resolution 30 mm
300	0,96	0,82	1,92	1,63
450	1,08	0,86	2,16	1,73
600	1,20	0,91	2,40	1,82
750	1,32	0,96	2,64	1,92
900	1,44	1,01	2,88	2,02
1050	1,56	1,06	3,12	2,11
1200	1,68	1,10	3,36	2,21
1350	1,80	1,15	3,60	2,30
1500	1,92	1,20	3,84	2,40
1650	2,04	1,25	4,08	2,50
1800	2,16	1,30	4,32	2,59

¹⁾ Power discharged again via the OSSDs depending on the connected OSSD load must be added to the table values.

12.4 Length of cable

Table 15: Maximum lengths of cable for wire cross-section 0.34 mm², copper wire

	Single system
Separate connecting cables for sender and receiver	 $b \leq 85 \text{ m}$ $c \leq 15 \text{ m}$
Connection of sender and receiver via T-connector on the sender	 $a + c \leq 15 \text{ m}$
Connection of sender and receiver via T-connector on the receiver	 $a \leq 15 \text{ m}$ $b \leq 85 \text{ m}$

S Control cabinet with safety relay or safety controller
T T-connector

12.5 Table of weights

Table 16: Weight of sender and receiver

Protective field height in mm	Weight in g ¹⁾	
	☐ Sender	☐ Receiver
300	290	300
450	430	440
600	570	580
750	700	710
900	840	850
1050	970	980
1200	1110	1120
1350	1240	1250
1500	1380	1390
1650	1510	1520
1800	1650	1660

1) Tolerance: ± 50g

12.6 Dimensional drawings

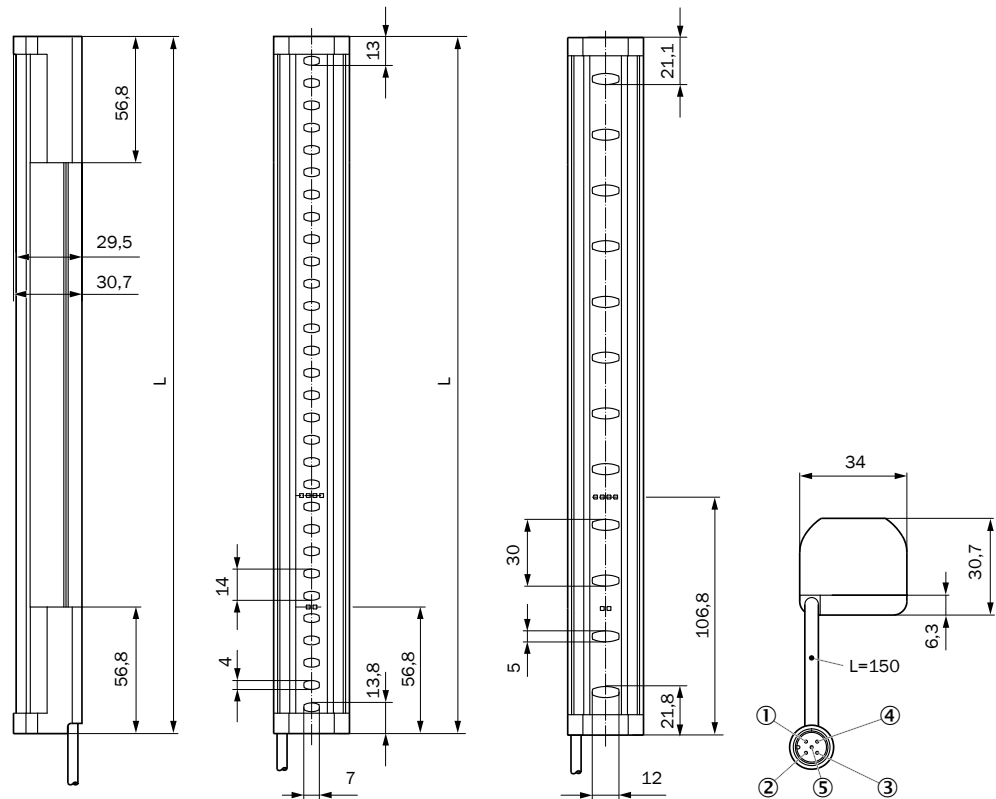


Figure 32: Dimensional drawing, sender and receiver

Table 17: Dimensions based on the protective field height, sender, and receiver

Protective field height, nominal in mm	Protective field height, effective = dimension L in mm ¹⁾
300	313
450	463
600	613
750	763
900	913
1050	1063
1200	1213
1350	1362
1500	1512
1650	1662
1800	1812

¹⁾ The effective protective field corresponds to the entire length of the housing. The test object defined in the standard IEC 61496-1 is recognized over the entire length of the housing. The limits of the protective field are identical to ends of the housing.

13 Ordering information

13.1 Scope of delivery

Items supplied, sender

- Sender

Items supplied, receiver

- Receiver
- Test rod with diameter corresponding to the resolution of the safety light curtain
- Safety note
- Mounting Instructions
- Downloadable operating instructions: www.sick.com

13.2 Ordering information

Ordering information is available at www.sick.com.

14 Accessories

14.1 Brackets

Part	Type code	Part number
QuickFix bracket (2x)	BEF-3SHABPKU2	2066048
FlexFix bracket (4x)	BEF-1SHABPKU4	2066614
FlexFix mounting kit (2x FlexFix brackets, alignment tool, and assembly materials for installation in device columns)	BEF-1SHABBKU2	2073543
Exchange bracket (kit with 4 brackets, mounting kit for replacement of swivel mount brackets 2019649 and 2019659 or side bracket 2019506 with the FlexFix bracket when using the bore holes provided)	BEF-1SHABP004	2071021

QuickFix bracket

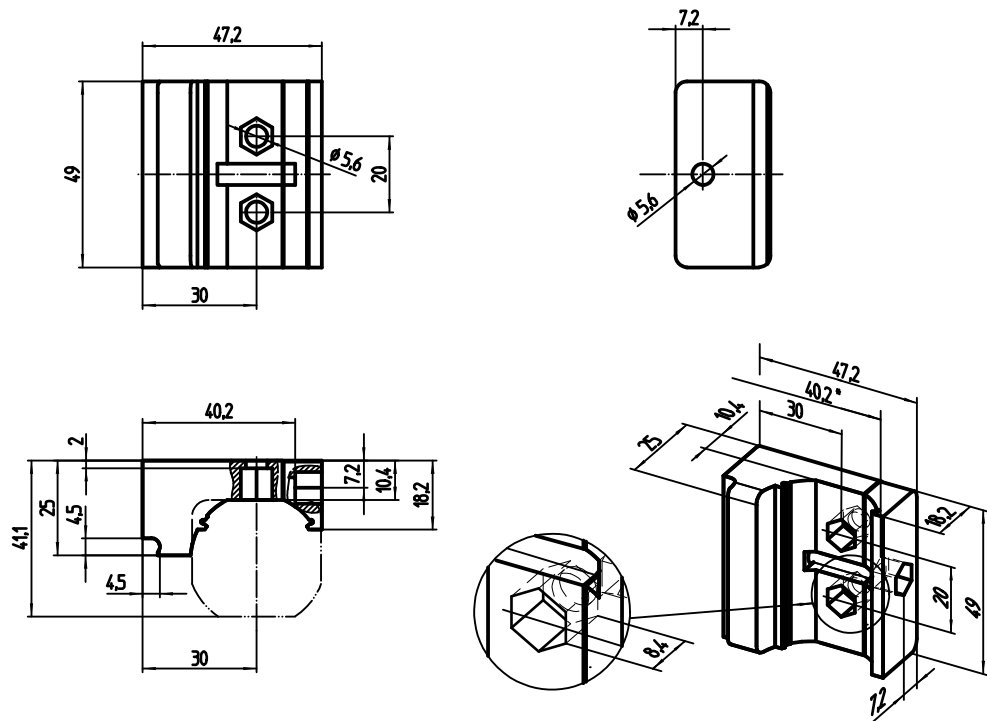


Figure 33: Dimensional drawing of the QuickFix bracket (2066048)

* Width of the housing up to the depression

FlexFix bracket

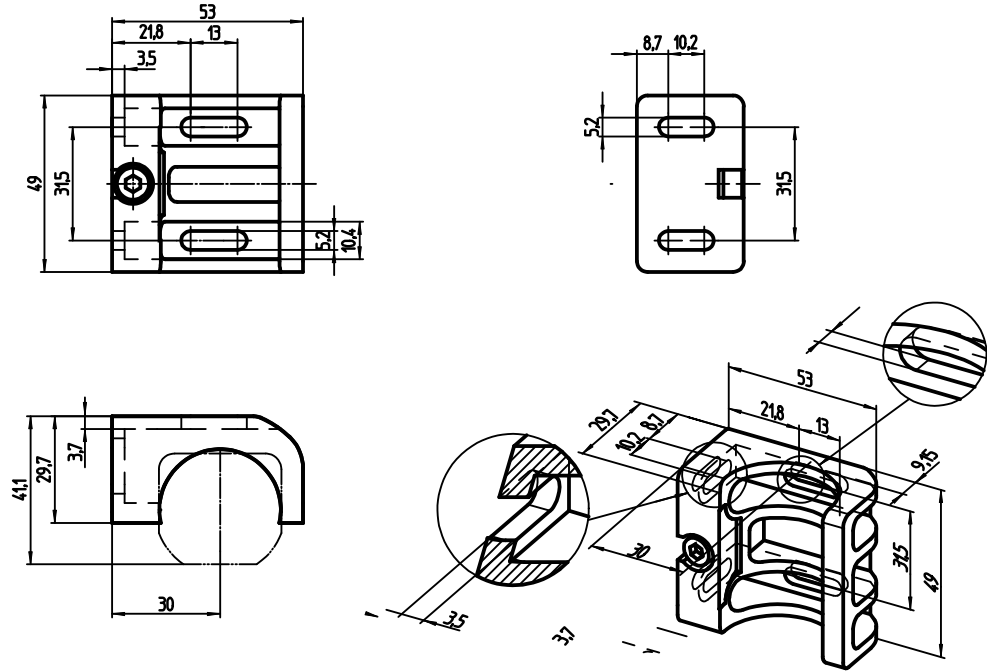


Figure 34: Dimensional drawing of the FlexFix bracket (2066614)

Exchange bracket

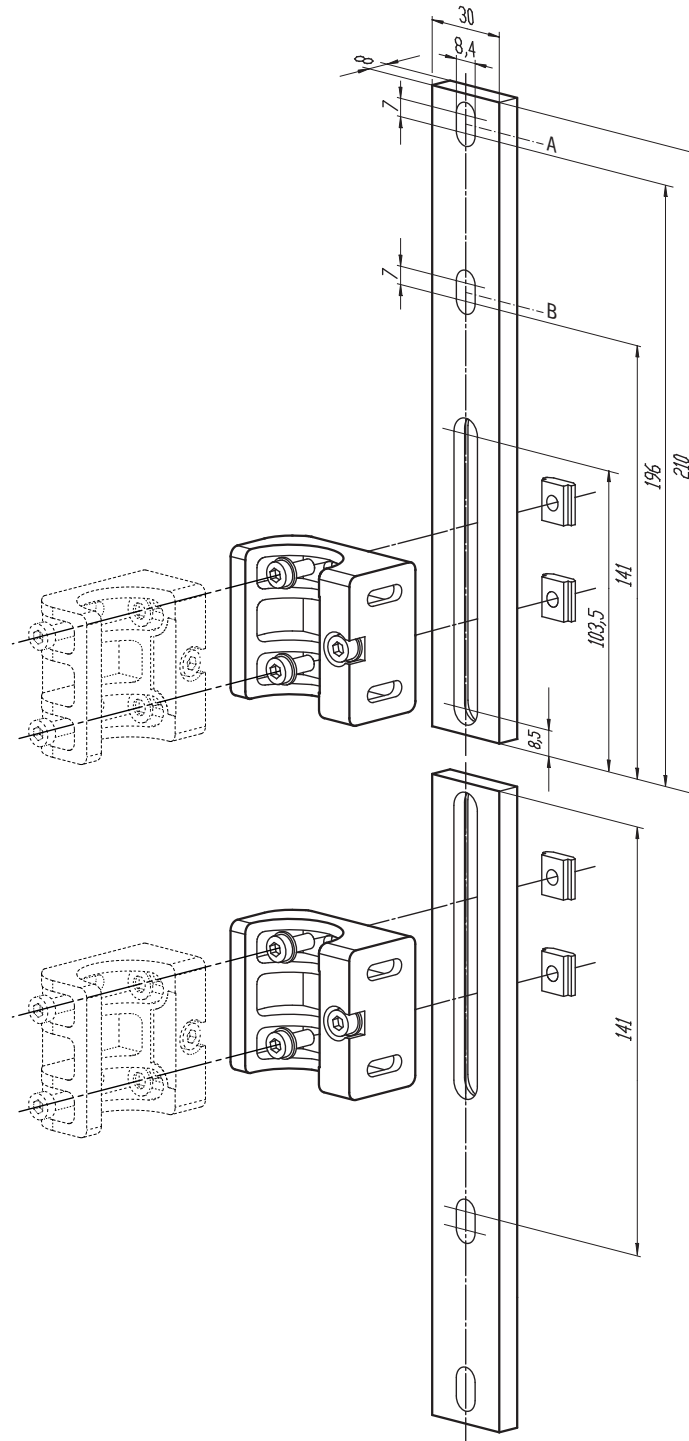


Figure 35: Dimensional drawing of the exchange bracket (2071021)

14.2 Mounting accessories

Table 18: Mounting accessories ordering information

Part	Part number
Alignment tool	4084133

14.3 Weld spark guard

Function and use

The weld spark guard can be used to protect the front screen of the safety light curtain.

The weld spark guard reduces the scanning range of the system by 15 %.

Ordering information

Table 19: Weld spark guard ordering information

Part	Part number
Weld spark guard	2069268

Mounting

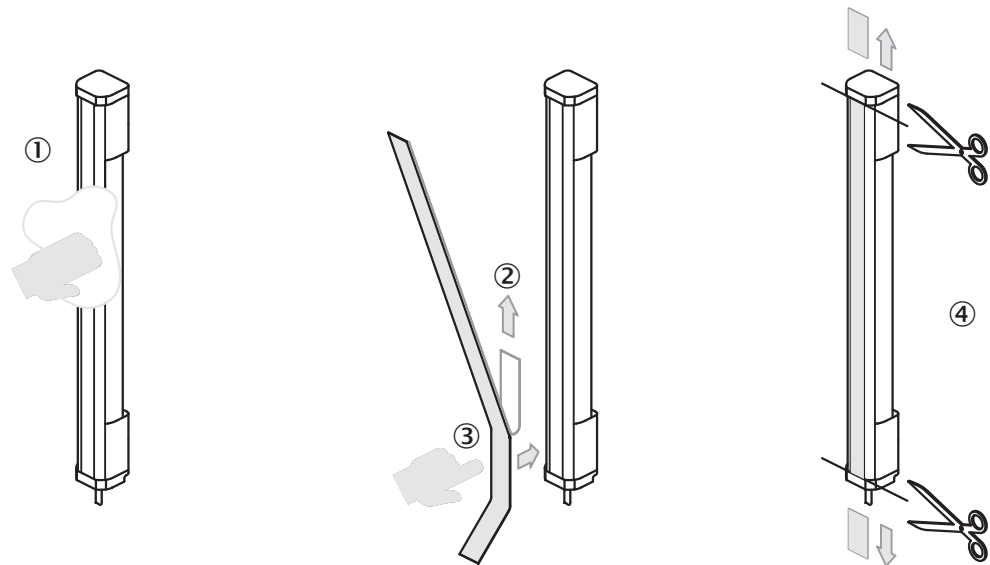


Figure 36: Mounting the weld spark guard

- ① Clean the front screen.
- ② Remove backing film
- ③ Press against the weld spark guard
- ④ Cut off excess ends

14.4 Connectivity

Cables

Table 20: Ordering information for M12 connecting cable, 5-pin (0.34 mm²)¹⁾

Part	Type code	Part number
Female connector, straight, 2 m cable, open end	DOL-1205-G02MC	6025906
Female connector, straight, 5 m cable, open end	DOL-1205-G05MC	6025907
Female connector, straight, 10 m cable, open end	DOL-1205-G10MC	6025908
Female connector, straight, 15 m cable, open end	DOL-1205-G15MC	6051946

¹⁾ Ambient operating temperature: Down to -30 °C with fixed installation.

Part	Type code	Part number
Female connector, straight, 20 m cable, open end	DOL-1205-G20MC	6050247
Female connector, straight, 30 m cable, open end	DOL-1205-G30MC	6050248
Female connector, angled, 2 m cable, open end	DOL-1205-W02MC	6025909
Female connector, angled, 5 m cable, open end	DOL-1205-W05MC	6025910
Female connector, angled, 10 m cable, open end	DOL-1205-W10MC	6025911

Table 21: Ordering information, connection cable (replacement of existing devices) ²⁾

Part	Type code	Part number
Connection cable, M12, 5-pin to M12, 8-pin	DSL-1285GM25034KM1	2070987
Connection cable, M12, 5-pin to M26, 7-pin	DSL-6187GM25034KM1	2070988
Connection cable, M12, 5-pin to M26, 12-pin	DSL-6182GM25034KM1	2070989

Distributor

Table 22: Distributor ordering information

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

Resistance terminal

Table 23: Resistance terminal ordering information

Part	Part number
Resistance terminal, 2.15 kΩ	2073807

Power supply units

Table 24: 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

14.5 Alignment aid

Table 25: Alignment aid ordering information

Part	Part number
Laser alignment aid AR60	1015741
Adapter	4070854

²⁾ Ambient operating temperature: Down to -30 °C with fixed installation

14.6 Deflector mirrors

Function and use

Deflector mirrors can be used to shape the protective field to secure hazardous points from multiple sides using a single safety light curtain.



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.

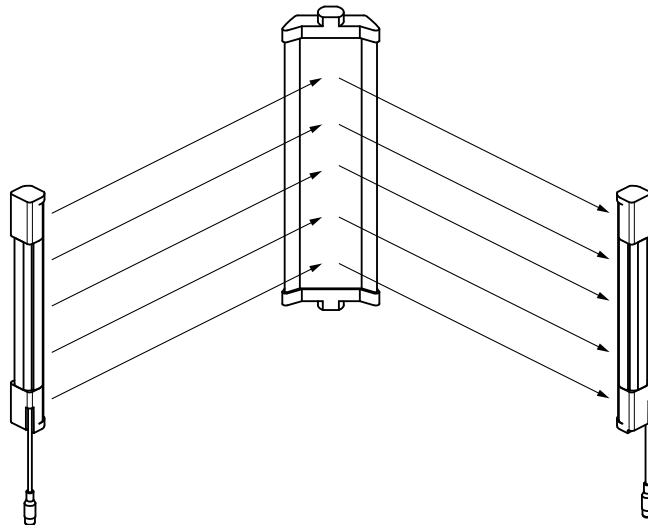


Figure 37: Example of use of deflector mirrors

Also pay attention to the mirror columns, see ["Mirror columns"](#), page 69.

14.6.1 Mounting

To mount the deflector mirrors, use the included swivel mount brackets.

14.6.2 Change in scanning range using deflector mirrors



NOTE

The use of deflector mirrors reduces the scanning range depending on the number of deflector mirrors in the protective field.

The information relates to 90° beam deflection per mirror and a protective field height of 900 mm.

Table 26: Scanning range with and without 1 or 2 deflector mirrors

Model name	Resolution	Scanning range, typical ¹⁾	Scanning range with 1 deflector mirror, typical ¹⁾	Scanning range with 2 deflector mirrors, typical ¹⁾
PNS75, PNS125	14 mm	8 m	7.2 m	6.4 m
PNS75, PNS125	30 mm	12 m	10.7 m	9.6 m

¹⁾ At a typical scanning range, there is a possibility that all four LEDs to indicate alignment quality do not light up even when alignment is good.

Example: Maximum distance when using deflector mirrors

Maximum distance D between sender/receiver and mirrors or between two mirrors (example applies to 90° beam deflection per mirror, protective field height 900 mm).

- PNS75: $D \leq 4$ m
- PNS125: $D \leq 8$ m

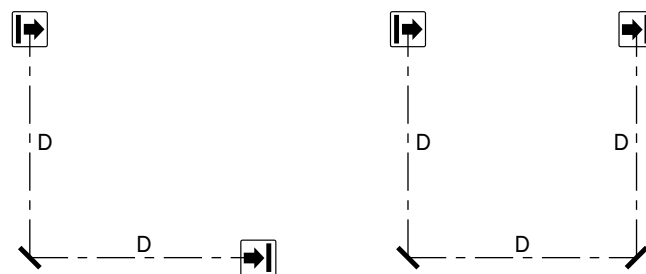


Figure 38: Maximum distance when using deflector mirrors

14.6.3 Deflector mirror PNS75 - ordering information

Table 27: Ordering information, deflector mirror PNS75

Mirror length in mm	Max. protective field height in mm	Type code	Part number
340	300	PNS75-034	1019414
490	450	PNS75-049	1019415
640	600	PNS75-064	1019416
790	750	PNS75-079	1019417
940	900	PNS75-094	1019418
1090	1050	PNS75-109	1019419
1240	1200	PNS75-124	1019420
1390	1350	PNS75-139	1019421
1540	1500	PNS75-154	1019422
1690	1650	PNS75-169	1019423
1840	1800	PNS75-184	1019424

14.6.4 Deflector mirror PSN125 - ordering information

Table 28: Ordering information, deflector mirror PSN125

Mirror length in mm	Max. protective field height in mm	Type code	Part number
340	300	PNS125-034	1019425
490	450	PNS125-049	1019426
640	600	PNS125-064	1019427
790	750	PNS125-079	1019428

Mirror length in mm	Max. protective field height in mm	Type code	Part number
940	900	PNS125-094	1019429
1090	1050	PNS125-109	1019430
1240	1200	PNS125-124	1019431
1390	1350	PNS125-139	1019432
1540	1500	PNS125-154	1019433
1690	1650	PNS125-169	1019434
1840	1800	PNS125-184	1019435

14.7 Mirror columns and device columns

14.7.1 Mirror columns

Observe the information on deflector mirrors, particularly on changing the scanning range, see ["Deflector mirrors"](#), page 67.

Table 29: Ordering information for mirror columns

Column height	Mirror length	Type code	Part number
1281.5 mm	1082 mm	PM3C13-00030000	1043453
1569 mm	1382 mm	PM3C15-00030000	1077525
1716.5 mm	1532 mm	PM3C17-00030000	1043454
2016.5 mm	1682 mm	PM3C19-00030000	1043455
2216.5 mm	1832 mm	PM3C20-00030000	1043456

14.7.2 Device columns

Table 30: Ordering information for device columns

Column height	Max. installation length	Type code	Part number
985 mm	965 mm	PU3H96-00000000	2045490
1185 mm	1165 mm	PU3H11-00000000	2045641
1285 mm	1265 mm	PU3H13-00000000	2045642
1570 mm	1550 mm	PU3H15-00000000	2068813
1740 mm	1720 mm	PU3H17-00000000	2045643
2040 mm	2020 mm	PU3H21-00000000	2045644
2270 mm	2250 mm	PU3H22-00000000	2045645
2420 mm	2400 mm	PU3H24-00000000	2045646

14.8 Cleaning agent

Table 31: Cleaning agent ordering information

Part	Part number
Anti-static plastic cleaner	5600006
Lens cloth	4003353

14.9 Test rods

Table 32: Ordering information, test rods

Part	Part number
Test rod 14 mm	2022599
Test rod 30 mm	2022602
Test rod holder	2052249

15 Annex

15.1 Compliance with EU directives

EU declaration of conformity (excerpt)

The undersigned, who represents the manufacturer below, hereby declares that the product complies with the regulations of the EU directive(s) below (including all relevant changes), and that it is based on the relevant standards and/or technical specifications.

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 (part number: see the type label entry in the "Ident. no." field).

15.2 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"/>

15.3 Note on specified standards

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

Table 33: 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 4208
IEC 60825	GB 7247.1
IEC 61131-2	GB/T 15969.1
IEC 61140	GB/T 17045
IEC 61496-1	GB/T 19436.1
IEC 61496-3	GB/T 19436.3
IEC 61508	GB/T 20438
IEC 62061	GB 28526
ISO 13849-1	GB/T 16855.1
ISO 13855	GB/T 19876

16 List of figures

1.	Sender and receiver.....	11
2.	Sender indicators.....	13
3.	Receiver indicators.....	13
4.	Hazardous point protection.....	14
5.	Access protection.....	14
6.	Hazardous area protection.....	15
7.	Minimum distance to hazardous point for orthogonal (right-angled) approach to protective field.....	18
8.	Representation of the accessibility of electro-sensitive protective device by reaching over. Left: Protective field that cannot be reached over. Right: Protective field that can be reached over.....	19
9.	Minimum distance to reflective surfaces.....	20
10.	Graph, minimum distance from reflective surfaces.....	21
11.	Preventing mutual interference from system ① and system ②.....	21
12.	Trouble-free operation due to reversed direction of transmission of system ① and system ②.....	22
13.	Dual-channel and isolated connection of OSSD1 and OSSD2.....	23
14.	No potential difference between load and protective device.....	23
15.	Schematic representation of operation with restart interlock.....	24
16.	Connection diagram for UE48-20S with restart interlock and external device monitoring.....	25
17.	Test rod check: Step 1.....	28
18.	Test rod check: Step 3.....	28
19.	Sender and receiver must not be installed at 180° rotated relative to each other.....	32
20.	Mounting the QuickFix bracket to a profile.....	34
21.	Mount FlexFix brackets to a profile frame.....	35
22.	Inserting the safety light curtain in the FlexFix brackets.....	36
23.	Mounting the FlexFix bracket to a device column (accessory).....	37
24.	Upgrade bracket, installation version A.....	38
25.	Upgrade bracket, installation version B.....	38
26.	Upgrade bracket, installation version C.....	39
27.	Dual-channel and isolated connection of OSSD1 and OSSD2.....	40
28.	No potential difference between load and protective device.....	41
29.	System connection (male connector, M12, 5-pin).....	41
30.	QuickFix bracket: adjust vertically.....	45
31.	FlexFix bracket: adjust vertically/rotate.....	46
32.	Dimensional drawing, sender and receiver.....	60
33.	Dimensional drawing of the QuickFix bracket (2066048).....	62
34.	Dimensional drawing of the FlexFix bracket (2066614).....	63
35.	Dimensional drawing of the exchange bracket (2071021).....	64
36.	Mounting the weld spark guard.....	65
37.	Example of use of deflector mirrors.....	67
38.	Maximum distance when using deflector mirrors.....	68

17 List of tables

1.	Formula for calculating the minimum distance for reflective surfaces.....	21
2.	Lateral and rear mounting with the QuickFix bracket.....	33
3.	Lateral and rear mounting with the FlexFix bracket.....	35
4.	System connection pin assignment (male connector, M12, 5-pin).....	41
5.	Indication of the alignment quality.....	46
6.	Fault indicator on the sender.....	52
7.	Fault indicator on the receiver.....	52
8.	General system data.....	55
9.	Mechanical data.....	56
10.	Technical specifications, sender.....	56
11.	Technical specifications, receiver.....	56
12.	Operating data.....	57
13.	Response time dependent on the protective field height.....	57
14.	Power consumption, sender and receiver.....	58
15.	Maximum lengths of cable for wire cross-section 0.34 mm ² , copper wire.....	58
16.	Weight of sender and receiver	59
17.	Dimensions based on the protective field height, sender, and receiver.....	60
18.	Mounting accessories ordering information.....	64
19.	Weld spark guard ordering information.....	65
20.	Ordering information for M12 connecting cable, 5-pin (0.34 mm ²)	65
21.	Ordering information, connection cable (replacement of existing devices)	66
22.	Distributor ordering information.....	66
23.	Resistance terminal ordering information.....	66
24.	Ordering information for power supply.....	66
25.	Alignment aid ordering information.....	66
26.	Scanning range with and without 1 or 2 deflector mirrors.....	68
27.	Ordering information, deflector mirror PNS75.....	68
28.	Ordering information, deflector mirror PSN125.....	68
29.	Ordering information for mirror columns.....	69
30.	Ordering information for device columns.....	69
31.	Cleaning agent ordering information.....	69
32.	Ordering information, test rods.....	70
33.	Note on specified standards.....	73

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