OPERATING INSTRUCTIONS

TWINOX4

Safety light curtain

SICK
Sensor Intelligence.

Described product

TWINOX4

Manufacturer

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Legal information

Original document

This document is an original document of SICK AG.

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1 About this document

1.1 Purpose of 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.

1.2 Scope

This document applies to the following products:

- Product code: TWINOX4
- “Operating instructions” type label entry: 8022762

Document part number:

- This document: 8022848
- Available language versions of this document: 8022762

You can find the current version of all documents at www.sick.com.

1.3 Target groups of these operating instructions

Some sections of these operating instructions are intended for certain target groups. However, the entire operating instructions are relevant for intended use of the product.

Table 1: Target groups and selected sections of these operating instructions

Target group	Sections of these operating instructions
Project developers (planners, developers, designers)	"Project planning", page 19 "Configuration", page 47 "Technical data", page 67 "Accessories", page 74
Installers	"Mounting", page 35
Electricians	"Electrical installation", page 44
Safety experts (such as CE authorized representatives, compliance officers, people who test and approve the application)	"Project planning", page 19 "Configuration", page 47 "Commissioning", page 53 "Technical data", page 67 "Checklist for initial commissioning and commissioning", page 80
Operators	"Operation", page 57 "Troubleshooting", page 62
Maintenance personnel	"Maintenance", page 60 "Troubleshooting", page 62

1.4 Additional information

www.sick.com

The following information is available on the Internet:

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

1.5 Symbols and document conventions

The following symbols and conventions are used in this document:

Warnings 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
Highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

Instructions to action

► The arrow denotes instructions to action.

1. The sequence of instructions for action is numbered.
2. Follow the order in which the numbered instructions are given.

✓ The check mark denotes the result of an instruction.

LED symbols

These symbols indicate the status of an LED:

○ The LED is off.
◉ The LED is flashing.
● The LED is illuminated continuously.

Sender and receiver

These symbols indicate the sender and receiver of the device:

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

2 Safety information

2.1 General safety notes

Integrating the product

DANGER
The product can not offer the expected protection if it is integrated incorrectly.

- ► Plan the integration of the product in accordance with the machine requirements (project planning).
- ► Implement the integration of the product in accordance with the project planning.

Mounting and electrical installation

DANGER
Death or severe injury due to electrical voltage and/or an unexpected startup of the machine

- ► Make sure that the machine is (and remains) disconnected from the voltage supply during mounting and electrical installation.
- ► Make sure that the dangerous state of the machine is and remains switched off.

Repairs and modifications

DANGER
Improper work on the product
A modified product may not offer the expected protection if it is integrated incorrectly.

- ► Apart from the procedures described in this document, do not repair, open, manipulate or otherwise modify the product.

Commissioning

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.

2.2 Intended use

Overview

The TWINOX4 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 product may be used in safety functions.

The TWINOX4 safety light curtain must only be used within the limits of the prescribed and specified technical data and operating conditions at all times.

Any instance of improper use, incorrect modification, or manipulation of the TWINOX4 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.

2.3 Improper use

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.

Among others, the TWINOX4 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 increased levels of ionizing radiation

2.4 Requirements for the qualification of personnel

The product must be configured, installed, connected, commissioned, and serviced by qualified safety personnel only.

Project planning

You need safety expertise to implement safety functions and select suitable products for that purpose. You need expert knowledge of the applicable standards and regulations.

Mounting, electrical installation and commissioning

You need suitable expertise and experience. You must be able to assess if the machine is operating safely.

Configuration

You need suitable expertise and experience. You must be able to assess if the machine is operating safely.

Operation and maintenance

You need suitable expertise and experience. You must be instructed in machine operation by the machine operator. For maintenance, you must be able to assess if the machine is operating safely.

3 Product description

3.1 Structure and function

Overview

The TWINOX4 safety light curtain consists of 2 identical twin sticks. Each twin stick contains both the sender as well as the receiver unit, see figure 1, page 10. The two twin sticks are installed so that each sender and receiver unit are located opposite one another.

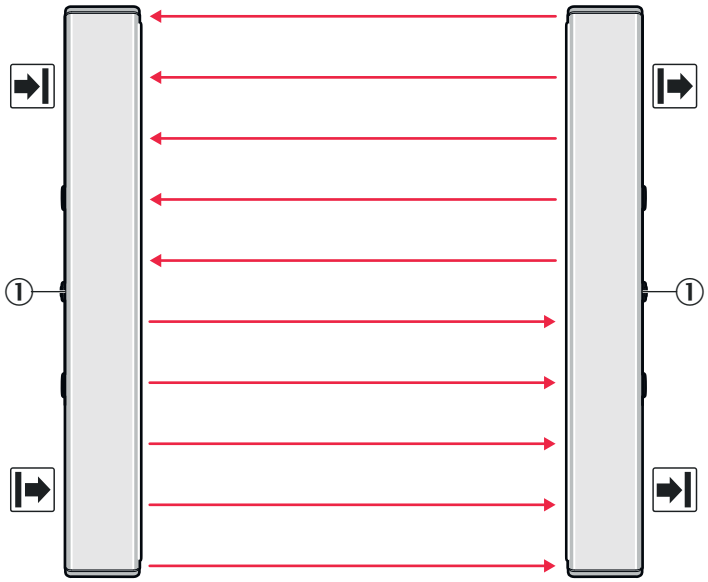


Figure 1: Device components of the safety light curtain

① Cable outlet

Safety light curtain principle

The protective field is between the two twin sticks and is defined by the protective field height and the protective field width.

The two twin sticks automatically synchronize themselves optically. Each twin stick provides an OSSD and a so-called multifunctional connection. The OSSDs are integrated into the machine controller. Either a reset button or an EDM can be connected to the multifunctional connections.

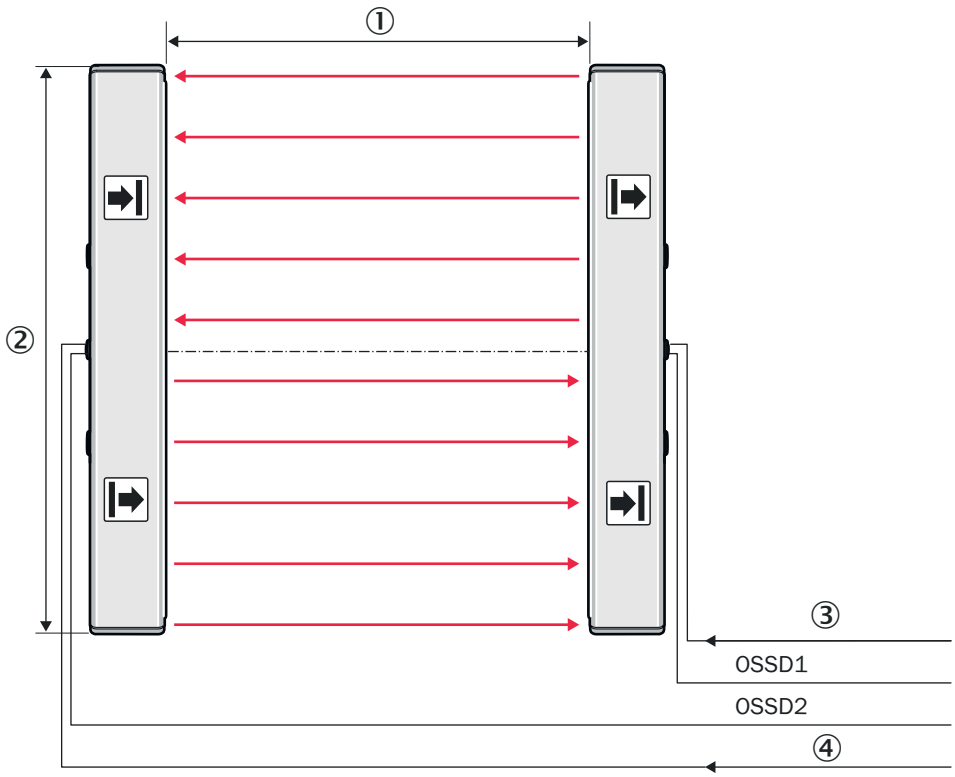


Figure 2: Safety light curtain principle

① Protective field width
② Protective field height
③ E.g. reset button
④ E.g. EDM

Protective field height

The protective field height indicates the range within which the test rod belonging to the safety light curtain is reliably detected.

The protective field height depends on the size of the safety light curtain.

Protective field width

The protective field width is the dimension of the light path between the twin sticks. 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.

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

Scanning range

The scanning range is the maximum protective field width.

The scanning range is reduced by using deflector mirrors.

Prerequisites for the protective function of the TWINOX4 safety light curtain

The TWINOX4 safety light curtain can only fulfill its protective function when the following requirements are satisfied:

- It must be possible to electrically influence the control of the machine.
- It must be possible to change the dangerous state of the machine into a safe state.
- The TWINOX4 safety light curtain must be arranged so that objects are reliably detected upon entry into the hazardous area.
- The reset button must be mounted outside of the hazardous area so that it cannot be actuated by a person who is inside the hazardous area. In addition, the operator must have a complete overview of the hazardous area when actuating the reset button.
- When setting up and using the devices, the applicable statutory and regulatory requirements must be observed.

Further topics

- "Data sheet", page 67
- "Deflector mirrors", page 76
- "Technical data", page 67
- "Dimensional drawings", page 71

3.2 Product characteristics

3.2.1 Housing

The safety light curtain TWINOX4 has been designed to be easy to clean. It has a stainless-steel housing and a front screen made from chemically prestressed glass, and is used, for example, in pharmaceutical plants.

3.2.2 Device overview

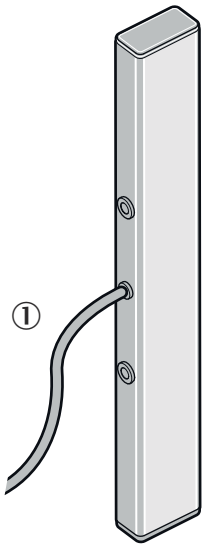


Figure 3: Device overview

① System cable, 10 m, 5-wire

3.2.3 Beam coding

Depending on its configuration, the safety light curtain operates with 1 of 2 beam codings: code 1 or code 2. In order to avoid mutual interference between 2 neighboring safety light curtains, one can be operated with code 1 and the other with code 2.

3.2.4 Restart interlock

The safety light curtain has an integrated restart interlock. The function can be configured during commissioning.

A restart interlock prevents the machine from starting again once the protective device has been triggered. First, the operator must press a reset pushbutton to return the protective device to monitoring status. Then, in a second step, the operator can restart the machine.

The reset pushbutton can be connected locally to the extension connection or in the control cabinet.

3.2.5 External device monitoring (EDM)

The safety light curtain has integrated external device monitoring. The function can be configured during commissioning.

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

In order to use 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 switch correctly when the OSSDs are switched off.

3.2.6 System connection

Overview

The safety light curtain comes with a 10 m long permanently installed five-wire system cable.

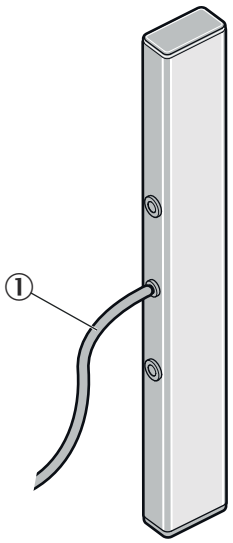


Figure 4: System connection wires

① System connection

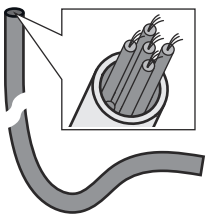


Figure 5: System connection wires

Functions of the safety light curtain

- Restart interlock
- External device monitoring (EDM)

Further topics

- "Restart interlock", page 13
- "External device monitoring (EDM)", page 13
- "Test rod check", page 31

3.2.7 Flexible control cabinet cabling and status indication on both sides

The safety light curtain can be connected to the control cabinet via separate connection cables for each twin stick.

The OSSD status and the status of the protective field are indicated via LEDs, if applicable, the configured RES or EDM additional function is as well.

3.2.8 Status indicators

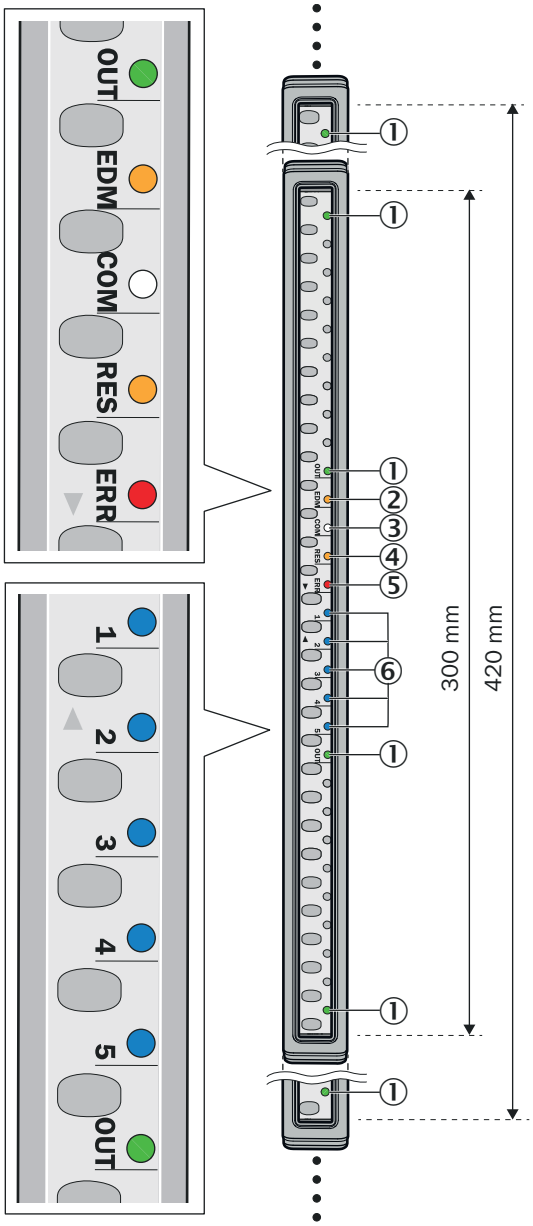


Figure 6: LEDs on the twin sticks

① OUT
② EDM
③ COM
④ RES
⑤ ERR
⑥ 1, 2, 3, 4, 5

figure 6 shows the LEDs of the safety light curtain. The OUT LED (①) is mounted in multiple locations and can light up red or green. It is only labeled OUT in two locations on the safety light curtain.

Lit up LEDs indicate a specific status of the safety light curtain. Flashing LEDs demand action.

Table 2: Meaning of LEDs

Position	LED	Display	Comment
①	OUT	● Green ● Red	LED lights up green when protective field is free (OSSD on).
			LED lights up red when protective field is interrupted (OSSD off).
②	EDM	● Orange	External device monitoring configured.
		☀ Orange	For the configuration of EDM at the first OSSD status change, the safety light curtain expects the change from 24 V to 0 V at the multifunctional input. Or: In combination with the ERR-LED ☀ red: External device monitoring reports defective contactor
③	COM	● White	External communication active (e.g. for service)
		☀ White	No optical communication to another twin stick . Or: Feedback when deactivating configuration.
④	RES	● Orange	Reset configured.
		☀ Orange	Reset configured. Or: In combination with ERR-LED ☀ red and EDM-LED ☀ orange: error with configuration or cabling.
⑤	ERR	● Red	Protective field interrupted.
		☀ Red	Error.
⑥	1, 2, 3, 4, 5	● Blue	Indication of the alignment quality.
		☀ Blue	In combination with ERR-LED ☀ red: display of an error.

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

Further topics

- "Diagnostic LEDs", page 62
- "Status indicators", page 15
- "Aligning the twin sticks to one another", page 55

3.3 Example applications

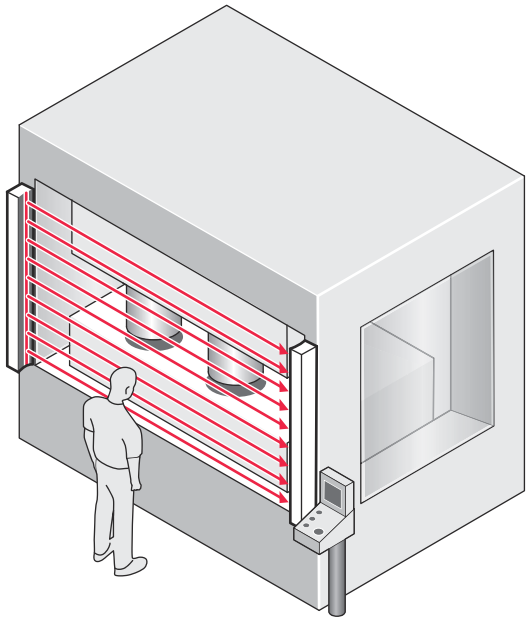


Figure 7: Hazardous point protection

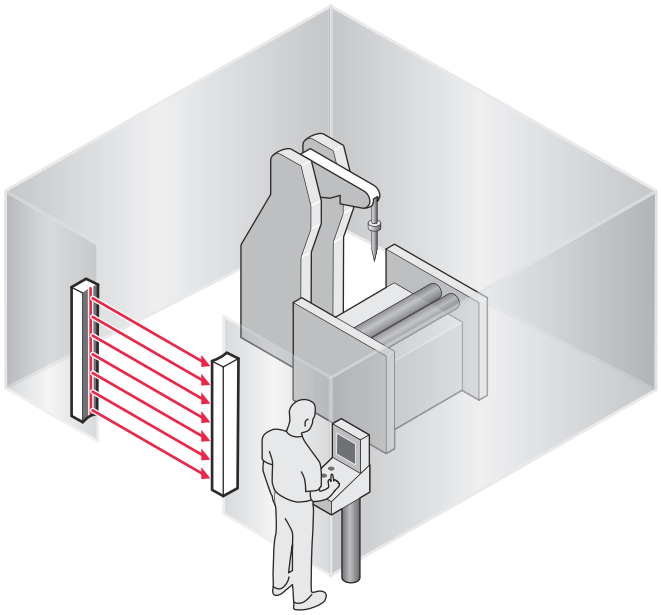


Figure 8: Access protection

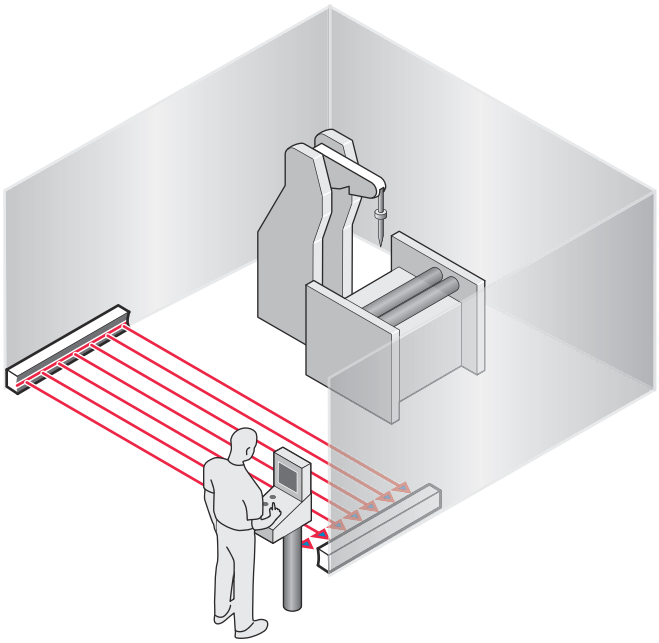


Figure 9: Hazardous area protection

4 Project planning

4.1 Manufacturer of the machine

The manufacturer of the machinery must carry out a risk assessment and apply appropriate protective measures. Further protective measures may be required in addition to the product.

The product must not be tampered with or changed, except for the procedures described in this document.

The product must only be repaired by the manufacturer of the product or by someone authorized by the manufacturer. Improper repair can result in the product not providing the expected protection.

4.2 Operating entity of the machine

Changes to the electrical integration of the product in the machine controller and changes to the mechanical mounting of the product necessitate a new risk assessment. The results of this risk assessment may require the entity operating the machine to meet the obligations of a manufacturer.

After each change to the configuration, it is necessary to check whether the protective measure provides the necessary protection. The person making the change is responsible for ensuring that the protection measure provides the necessary protection.

The product must not be tampered with or changed, except for the procedures described in this document.

The product must only be repaired by the manufacturer of the product or by someone authorized by the manufacturer. Improper repair can result in the product not providing the expected protection.

4.3 Design

Overview

This chapter contains important information about the design.

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.

- ► Make sure that the following construction requirements are met so that the safety light curtain can fulfill its protective function.
  - Twin sticks 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 interlock) are necessary when it is possible for people to be located between the protective device and the danger point without being detected.

DANGER
Hazard due to lack of effectiveness of the protective device

Certain types of light radiation can influence the protective device, e.g., light radiation from fluorescent lamps with electronic ballast installed in the path of the beam, or beams from laser pointers directed at the receiver unit of a twin stick.

► If this type of light radiation is present in the environment of the protective device, take additional measures to ensure that the protective device does not become dangerous.

Further topics

- "Mounting", page 35

4.3.1 Scanning range and protective field width

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

Scanning range

The scanning range limits the maximum protective field width.

The scanning range is reduced by using deflector mirrors.

Protective field width

The protective field width is the dimension of the light path between the twin sticks of a system.

Further topics

- "Technical data", page 67
- "Deflector mirrors", page 76

4.3.2 Minimum distance from the hazardous point

Overview

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.

Calculating the minimum distance according to ISO 13855

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

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

- Machine stopping time (time interval between triggering the sensor function and the end of the machine's dangerous state)
- Response time of the protective device
- 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 (CFR 29), Part 1910.217

b) Standards: ANSI B11.19

Complementary information

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

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

Further topics

- "Response time", page 69

4.3.2.1 Calculating minimum distance from the hazardous point

Important information

DANGER
Minimum distance from the hazardous point is too small

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

► Calculate the minimum distances for the machine in which the safety light curtain is integrated.
► When mounting the safety light curtain, observe the minimum distance.

Procedure

The example shows the calculation of the minimum distance in accordance with ISO 13855 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).

1. First, calculate S using the following formula:
   $S = (K \times T) + 8 \times (d - 14\ mm)$
   Where:
   - S = Minimum distance in millimeters (mm)
   - K = Approach speed (walking and/or gripping speed) of a person or a body part (mm/s), e.g., 2,000 mm/s
   - T = Machine stopping time + response time of the safety light curtain after interruption in the light path in seconds (s)
   - d = Resolution of the safety light curtain in millimeters (mm)
2. If the result S is ≤ 500 mm, then use the determined value as the minimum distance.
3. If the result S is > 500 mm, then recalculate S with an approach speed of 1,600 mm/s as follows:
   $S = 1{,}600\ mm/s \times T + 8 \times (d - 14\ mm)$
4. If the new value S is > 500 mm, then use the newly determined value as the minimum distance.
5. If the new value S is ≤ 500 mm, then use 500 mm.

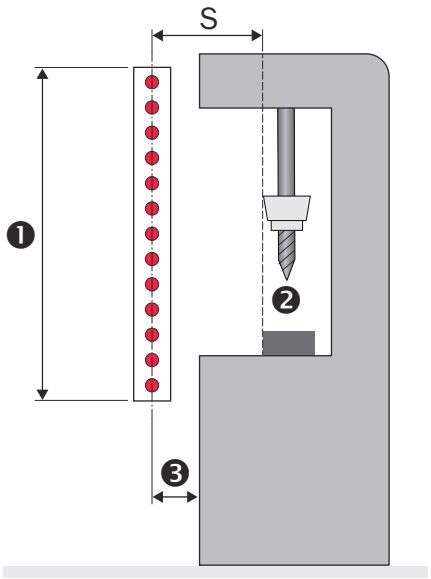


Figure 10: Minimum distance to hazardous point for orthogonal (right-angled) approach to protective field

① Protective field height

② Hazardous point

③ Depending on the application and distance, persons must be prevented from standing behind the protective device.

Example calculation

Machine stopping time = 290 ms

Response time after interruption of the light path = 30 ms

Resolution of the safety light curtain = 14 mm

T = 290 ms + 30 ms = 320 ms = 0.32 s

S = 2,000 mm/s × 0.32 s + 8 × (14 mm – 14 mm) = 640 mm

S > 500 mm, therefore:

S = 1,600 mm/s × 0.32 s + 8 × (14 mm – 14 mm) = 512 mm

4.3.2.2 Taking reach over into account

In accordance with ISO 13855, it must not be possible to defeat the ESPE. 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.

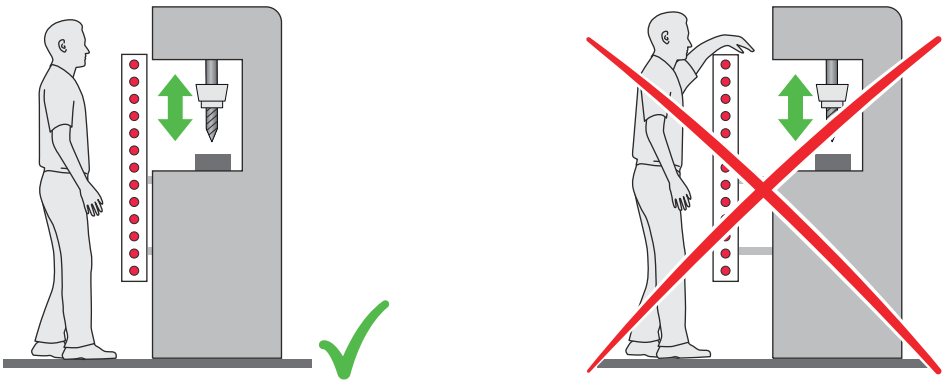


Figure 11: Representation of the accessibility of ESPE by reaching over. Left: Protective field that cannot be reached over. Right: Protective field that can be reached over.

4.3.3 Minimum distance from reflective surfaces

Overview

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

Therefore, all reflective surfaces and objects (e.g. material bins, machine table, etc.) must maintain a minimum distance (a) from the 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 the twin sticks (protective field width).

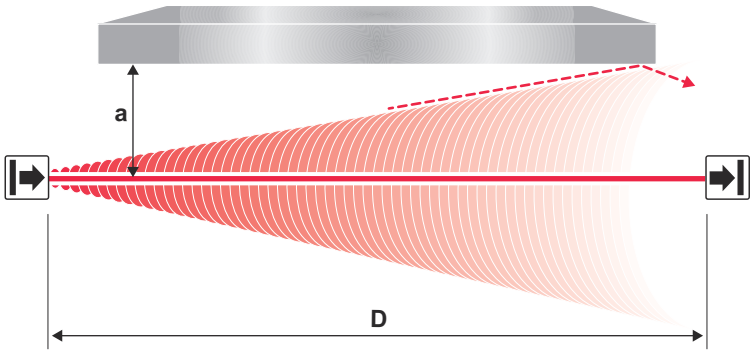


Figure 12: Minimum distance from reflective surfaces

Important information

DANGER

Hazard due to lack of effectiveness of the protective device

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

Determining minimum distance to reflective surfaces

The minimum distance can be determined as follows:

- ► Determine the distance between the twin sticks D in meters (m).
- ► Read the minimum distance a in millimeters (mm) in the graph or calculate it based on the respective formula table 3:

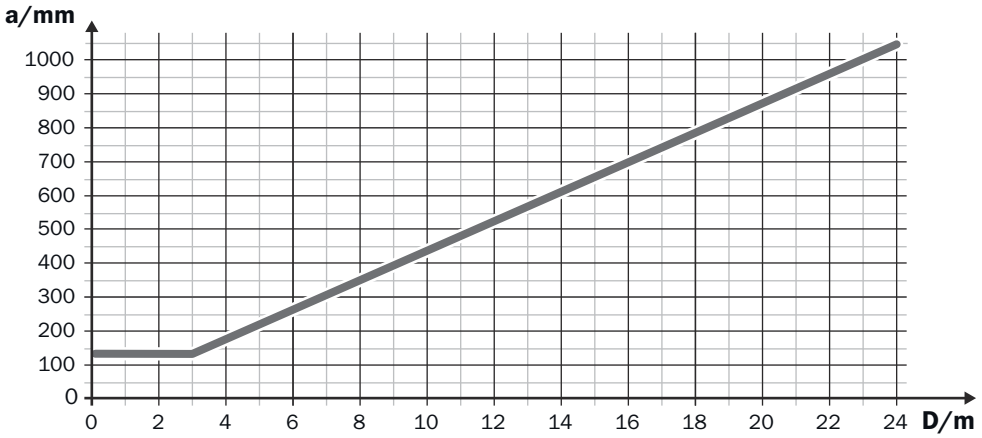


Figure 13: Graph of minimum distance from reflective surfaces

Table 3: Formula for calculating the minimum distance from reflective surfaces

Distance D between twin sticks in m	Calculation of the minimum distance (a) from reflective surfaces in mm
D ≤ 3 m	a = 131 mm
D > 3 m	a = tan (2.5°) × 1000 mm/m × D = 43.66 × 1 mm/m × D

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

Overview

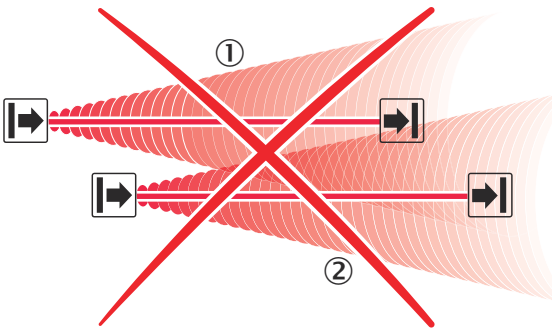


Figure 14: Preventing mutual interference from system ① and system ②

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

Important information

DANGER
Hazard due to lack of effectiveness of the protective device

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

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

Preventing interference between systems in close proximity to each other

The following measures prevent interference from systems in close proximity:

- Different beam coding for neighboring systems
- Optically opaque partitions

Further topics

- "Using beam coding", page 25

4.3.4.1 Using beam coding

Important information

DANGER
Hazard due to lack of effectiveness of the protective device

Different beam codings only prevent mutual interference if both safety light curtains are of type TWINOX4.

► In the case of systems in close proximity that are of a different type, take different measures to prevent mutual interference.

Using beam coding

Use suitable beam codings to prevent mutual interference from neighboring systems.

► Configure one safety light curtain with code 1 and the other safety light curtain with code 2.

The system automatically performs the coding. As soon as a system is influenced by another system with an identical code, a fault occurs. During the next power-up, the code is converted and operation is no longer possible.

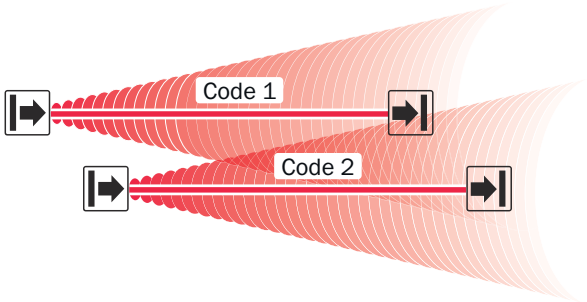


Figure 15: Trouble-free operation due to beam coding

In the figure, the beam coding of systems in close proximity to each other is different. The system with code 2 is not affected by the beams of the system with code 1.

4.4 Integrating the equipment into the electrical control

Overview

This section contains important information about integration into the electrical control system. Information about the individual steps for the electrical installation of the device: see "Electrical installation", page 44.

Important information

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 product can fulfill its protective function.

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.

- 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
- 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 controller 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

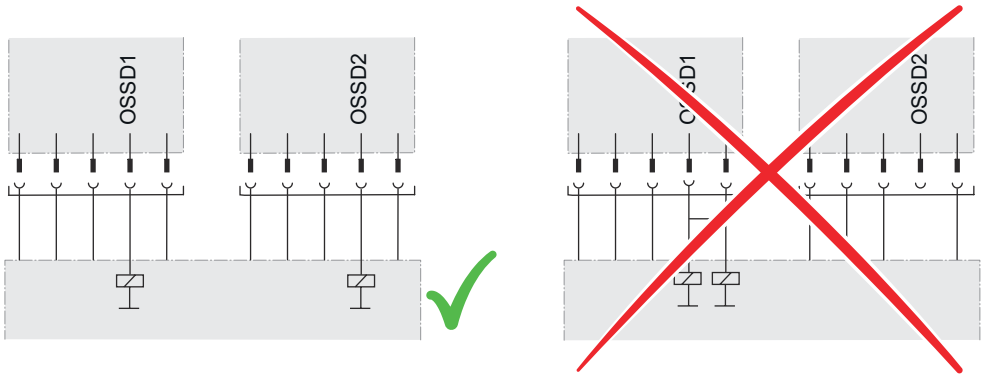


Figure 16: Dual-channel and isolated connection of OSSD1 and OSSD2

- 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 loads are connected to the OSSDs (switching outputs) that then also switch if controlled with negative voltage (e.g., electro-mechanical contactor without reverse polarity protection diode), the 0 V connections of these loads and those of the corresponding protective device must be connected 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.

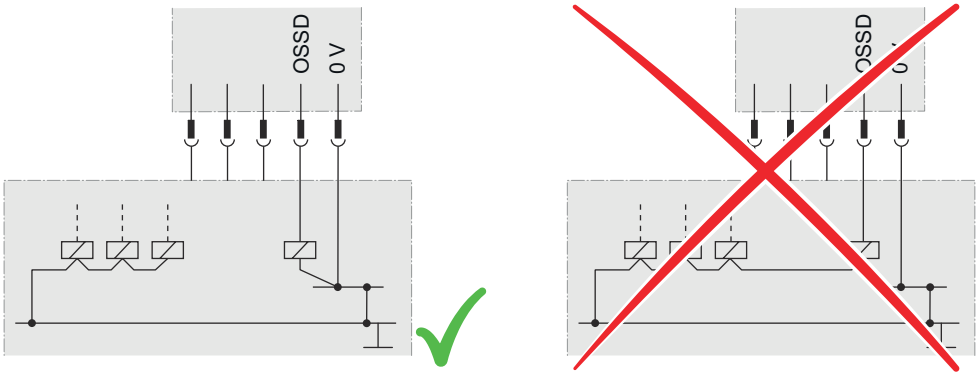


Figure 17: No potential difference between load and protective device

DANGER
Hazard due to unexpected starting of the machine

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

► Make sure that a restart interlock is implemented.

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).

Requirements for the electrical control of the machine

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

The protective device complies with the rules for electromagnetic compatibility (EMC) for the industrial sector.

NOTE
Using the device in residential areas may cause radio interference. The operating entity is responsible for taking appropriate measures (e.g., shielding).

The following requirements are met:

- The external voltage supply of the protective device must be capable of buffering brief power failures 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.

4.4.1 Protective operation without reset and/or without EDM

If the TWINOX4 safety light curtain is configured in protective operation without reset and/or EDM, the respective multifunctional connection or both multifunctional connections must be routed to 0 V.

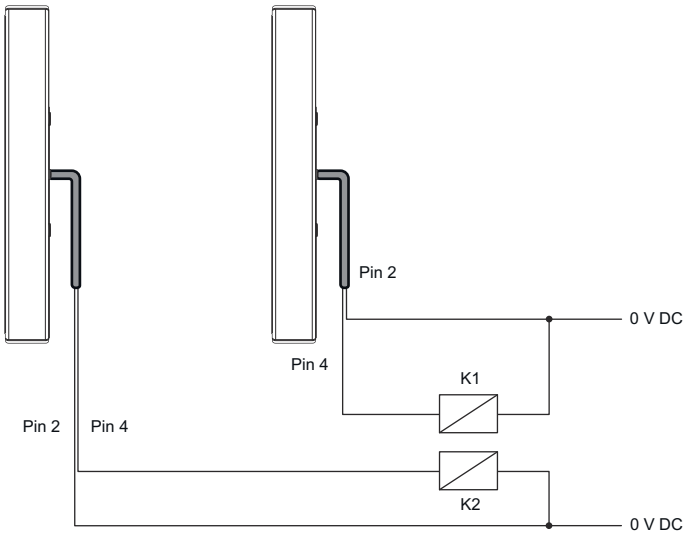


Figure 18: Connection of multifunctional connections in protective operation without reset and/or without EDM

4.4.2 Restart interlock

Overview

The safety light curtain has an internal 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.

Important information

DANGER

Hazard due to unexpected starting of the machine

The machine may not restart if the OSSDs switch to the ON state once the reset pushbutton has been pressed. The control must ensure that the machine only restarts if the machine start button is also pressed after the reset pushbutton.

► Make sure that the machine can only restart once the reset pushbutton and start button have been pressed in the specified order.

Operating principle

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

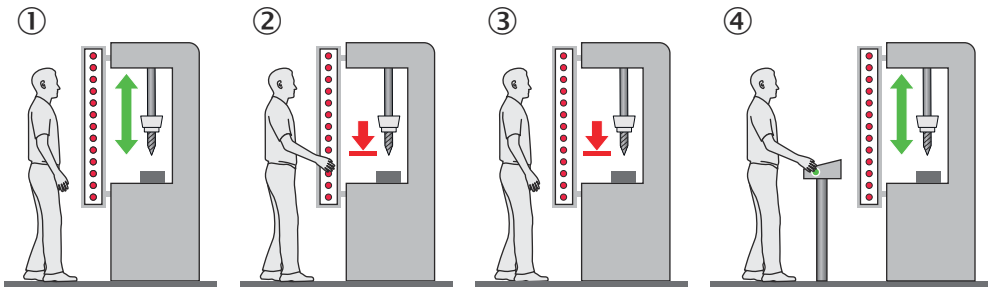


Figure 19: Schematic representation of operation with restart interlock

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 applicable national regulations, a restart interlock must be available if it is possible to stand behind the protective device. Observe IEC 60204-1.

The following applies to the restart interlock:

- If the protective field is clear once the machine has been switched on or following an interruption, the OSSDs do not switch to the ON state
- If someone presses the reset pushbutton and then lets go of it when the protective field is clear, the OSSDs switch to the ON state
- The machine may not restart yet. The operator must also press the machine start button after having pressed the reset pushbutton.

Internal restart interlock and reset

A reset device (e.g., a reset pushbutton) must be connected to allow the restart interlock to be used.

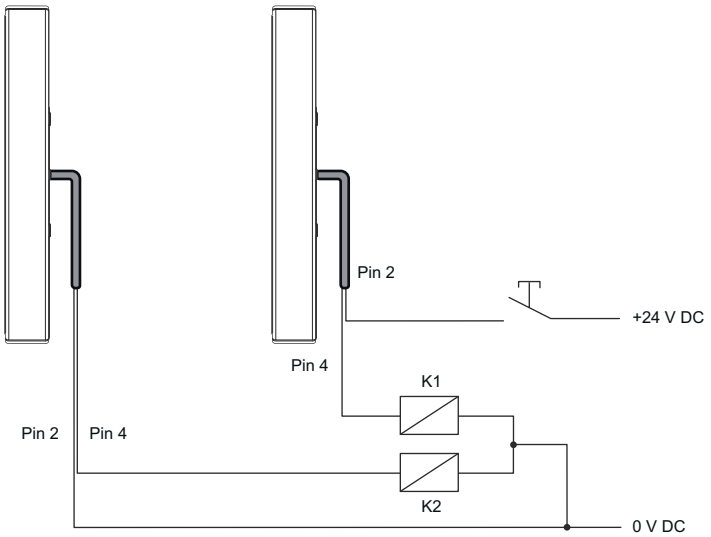


Figure 20: Electrical diagram of the reset device

The restart interlock is configured once the reset pushbutton has been connected.

Only one reset pushbutton may be connected to a single safety light curtain.

For a single system, the reset pushbutton can be connected to the 5-pin system connection.

When the restart interlock is configured, the RES LED signals when the reset pushbutton needs to be pressed.

Further topics

- "Configuring reset", page 48

4.4.3 External device monitoring (EDM)

Overview

The safety light curtain has internal external device monitoring.

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.

Prerequisites

- Use positively guided contactors for shutting down the machine.
- Connect the auxiliary contacts of the positively guided contactors to the external device monitoring (EDM).

Operating principle

If external device monitoring is configured, the safety light curtain then checks the contactors after every interruption to the light path and before the machine restarts. External device monitoring is then able to detect if one of the contactor contacts is welded, for instance. In this case, the OSSDs remain in the OFF state.

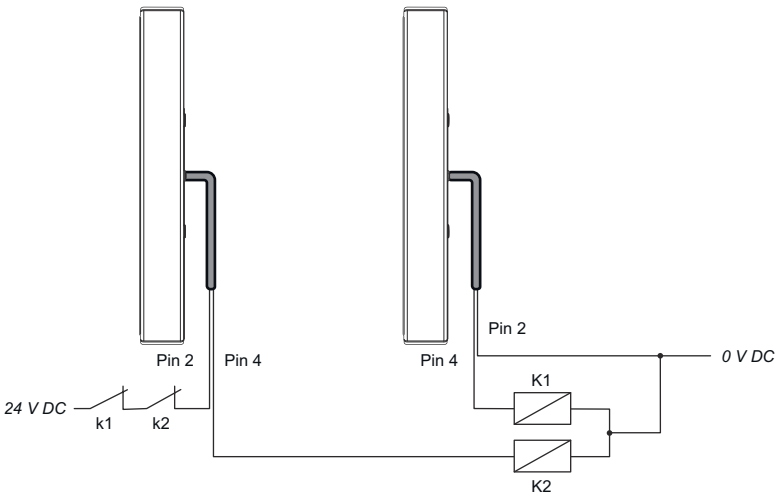


Figure 21: Electrical diagram of external device monitoring (EDM)

The external device monitoring must be implemented electrically so that the two N/Cs (k1, k2) close in a positively guided manner when the contactors (K1, K2) reach their de-energized position once the protective device has responded. 24 V are then present at the input of external device monitoring. If 24 V are not present once the protective device has responded, one of the contactors is defective and external device monitoring prevents the machine from restarting.

4.5 Testing plan

The manufacturer of the machine and the operator 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

Before commissioning the machine and after making changes, you must check whether the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

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 personnel specially qualified and authorized to do so?
- Does the check have to be documented in a traceable manner?
- Can the check be carried out according to a check list?
- 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 to the machine?
- Does the hazardous area being secured have to be checked with a test rod?

► Define all guidelines for the check.

Regular thorough check

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

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
  - Visual check of the machine and the protective device
- 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.

Further topics

- "Checklist for initial commissioning and commissioning", page 80
- "Test rod check", page 31
- "Visual check of the machine and the protective device", page 33

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 OUT LED lights up green or the RES LED flashes orange during the check!

- ► If the OUT LED lights up green or the RES LED flashes orange during the test, even if only briefly, work must stop at the machine.
- ► In this case, the mounting and configuration of the safety light curtain must be checked by qualified safety personnel (siehe "Mounting", Seite 35).
- ► Before inserting the test rod, check whether the OUT LED lights up green if the reset function is deactivated or the RES LED flashes orange if the reset function is configured (“reset required”). If this is not the case, this status must first be induced. The check is otherwise meaningless.

Procedure

1. Move the test rod slowly through the area to be protected (e.g., machine opening), as indicated by the arrow, see figure 22.
2. Watch the OUT LED and the RES LED during the check. The OUT LED should continuously light up red. The RES LED must not flash orange.

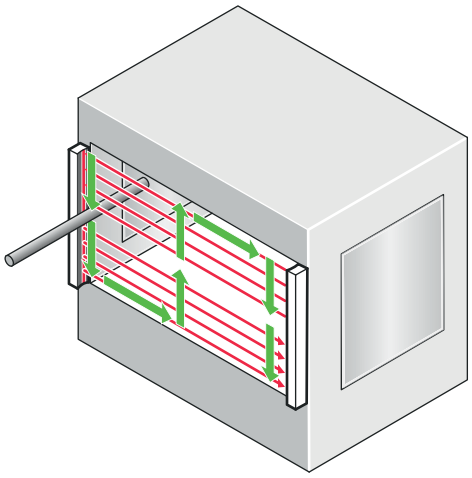


Figure 22: Test rod check: Step 1

3. Then, guide the test rod along the edges of the area to be protected, as indicated by the arrow, see figure 23.
4. Watch the OUT LED and the RES LED during the check. The OUT LED should continuously light up red. The RES LED must not flash orange.

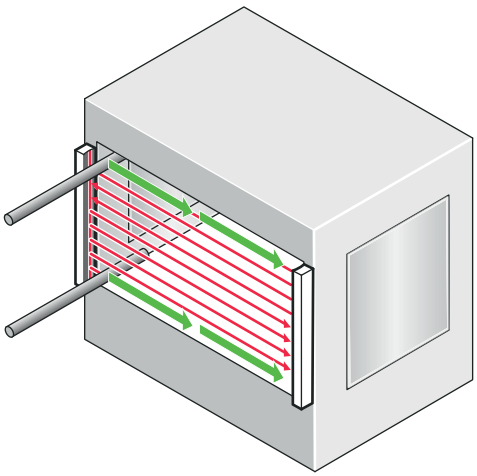


Figure 23: Test rod check: Step 3

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 OUT LED and the RES LED during the check. The OUT LED should continuously light up red. The RES LED must not flash orange.
7. After the test rod has been removed from the protective field, make sure that the protective field is clear. If the reset function is deactivated, the OUT LED lights up green again. If the reset function is configured, the RES LED flashes orange again.

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?
- Is the configuration of the protective device still the same?

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

5 Mounting

5.1 Safety

Important information

DANGER

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.

NOTE

Mount the device in the following order.

Prerequisites

- The safety light curtain has been designed correctly.

Further topics

- "Design", page 19
- "Technical data", page 67

5.2 Unpacking

Procedure

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

Further topics

- "Scope of delivery", page 73

5.3 Mounting

Important information

NOTE

- ► Read this section completely before installing the safety light curtain.
- ► Read the information on aligning the twin sticks.

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.

- ► Observe the calculated minimum distances for the machine in which the safety light curtain is integrated.
- ► Then, mount the safety light curtain such that it is not possible to reach over, under or around, or to stand 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 to machines on which the protective field width does not change when the safety light curtain is switched on.

CAUTION

To consider during mounting:

- ► Mount the twin sticks on a level surface.
- ► When mounting, make sure that the safety light curtain is aligned correctly. The two housings of the twin sticks must be located exactly opposite one another.
- ► Take appropriate measures for vibration damping if shock specifications exceed the values in the data sheet section.
- ► When mounting, observe the minimum distance of the system.
- ► Then, mount the safety light curtain such that it is not possible to reach over, under or to stand behind the safety light curtain, and that the light curtain cannot be repositioned.

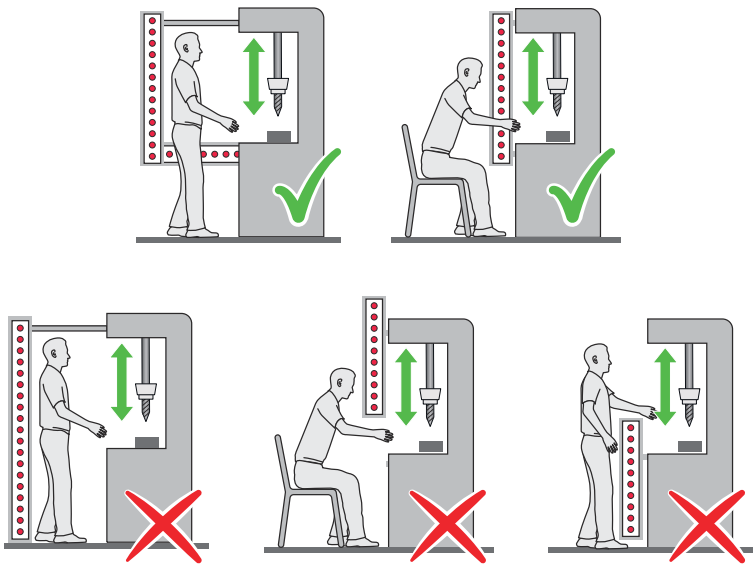


Figure 24: With correct mounting (above), the standing behind, reaching under and reaching over errors (below) must be ruled out.

Further topics

- "Minimum distance from the hazardous point", page 20
- "Minimum distance from reflective surfaces", page 23

- "Data sheet", page 67
- "Design", page 19

5.3.1 Mounting direction of the twin stick

Overview

The safety light curtain consists of 2 identical twin sticks. Each twin stick contains both the sender as well as the receiver unit. Install the twin sticks so that the optical elements are located opposite one another. To do so, rotate one twin stick by 180° so that the sender unit of twin stick 1 points towards the receiver unit of twin stick 2. If the EDM LED of twin stick 1 points towards LED 5 of twin stick 2, they have been installed correctly.

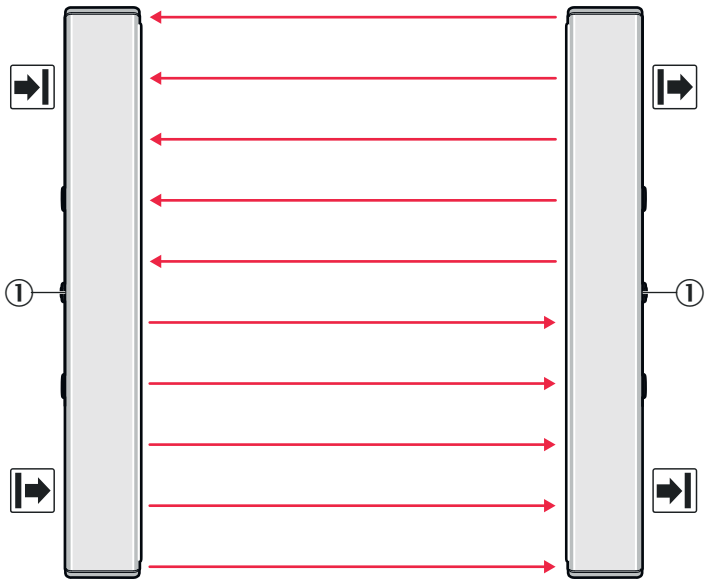


Figure 25: Mounting direction of the twin stick

① Cable outlet

NOTE

After electrical installation, the quality of the alignment of the safety light curtain can be checked. During mounting, make sure the twin sticks are aligned to one another.

Further topics

- "Alignment of the twin stick", page 54
- "Status indicators", page 15

5.3.2 Mounting options

Possible ways of mounting the TWINOX4:

- BEF-4SHAHMES1, ± 2° adjustment
- BEF-2SHAHMES1, up to ± 180° adjustment

Check the distance to reflective surfaces.

More information can be found at www.sick.com.

Further topics

- "Brackets", page 74
- "Minimum distance from reflective surfaces", page 23

5.3.3 Mounting with customer-supplied bracket

Overview

The TWINOX4 can be mounted using a custom bracket solution, e.g., to make alignment easier. 2 rivet nuts have been provided on the rear of the TWINOX4 for this purpose.

Feature	Value
Thread	M5
Screw-in depth	8 mm
Distance between rivet nuts	106 mm
Tightening torque	4 Nm ... 5 Nm
Cable bend radius	45 mm

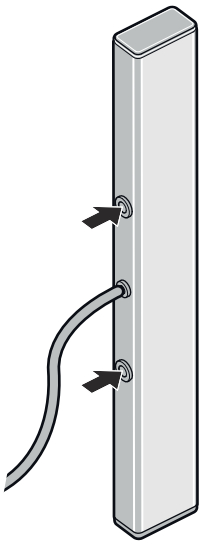


Figure 26: Mounting on rivet nuts with an M5 thread

Further topics

- "Dimensional drawings", page 71

5.3.4 Mounting with BEF-4SHAHMES1 bracket

Overview

The BEF-4SHAHMES1 adjustable bracket allows an alignment of approx. ± 2°. It can be mounted directly onto a profile rail, e.g., using the spacer. Suitable accessories for mounting have been provided. The fixed mounting distance is approx. 55 mm.

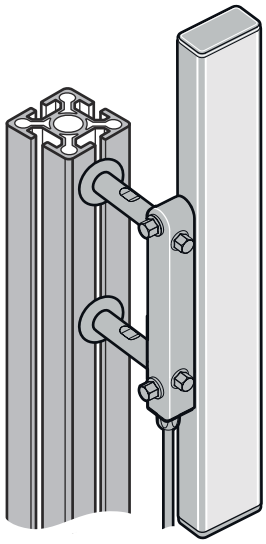


Figure 27: Mounting example with BEF-4SHAHMES1

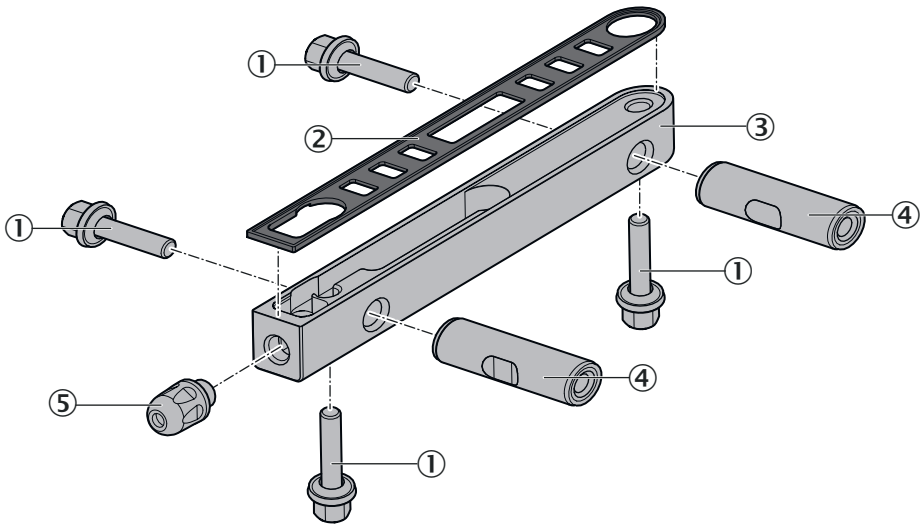


Figure 28: BEF-4SHAHMES1 bracket, part number 2101024

① 4 x M5x25 fixing screws with ball socket and spacer seal
② Bracket seal
③ Bracket base
④ 2 x spacer with spacer seal
⑤ Cable gland

Procedure

1. Unscrew the cable gland from the bracket base (①).
2. Feed the cable through the rectangular opening of the seal (②). Make sure the seal with the protruding edge is facing the bracket base.
3. Feed the cable through the bracket base from the inside to the outside and then through the cable gland (③) until the bracket is lying firmly against the TWINOX4.
4. Clamp the cable into the strain relief in the bracket base (④).
5. Position the bracket up against the rear of the twin stick and align the seal (⑤) correctly.
6. Screw on the bracket using two M5 screws with ball socket and spacer seal and using a maximum tightening torque of 4 Nm (⑥). Tighten the screws equally until the seals lie flush. Make sure the seals do not slip while doing so.

7. Screw in the cable gland until it is flush with the bracket base.
8. Mount the spacers onto the bracket base using two M5 screws with ball socket and spacer seal until they are flush with the bracket base (⑦).
9. Mount the entire bracket with TWINOX4 in the desired position with the help of the spacer.
10. Loosen the two M5 screws on the spacers slightly (⑦) and align the TWINOX4 at a maximum angle of ± 2°.
11. Tighten the two M5 screws on the spacers using a maximum tightening torque of 4 Nm. Tighten the screws equally until the seals lie flush. Make sure the seals do not slip while doing so.

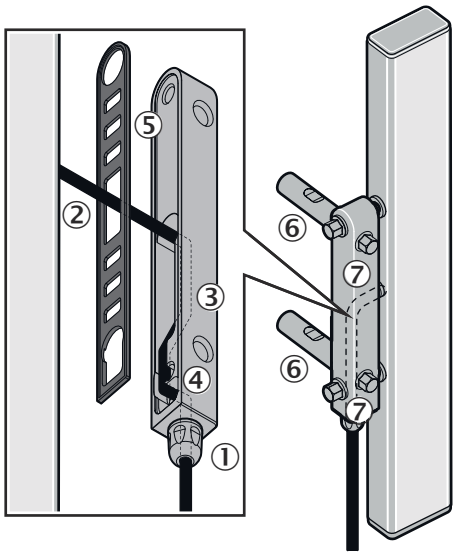


Figure 29: BEF-4SHAHMES1 bracket cable entry

Further topics

- "Brackets", page 74

5.3.5 Mounting with BEF-2SHAHMES1 bracket

Overview

The BEF-2SHAHMES1 bracket can be used with the long mounting bracket (2140151) or with the short mounting bracket (2140153).

When using the long mounting bracket (2140151), the twin stick can be rotated by ± 180° for alignment.

When using the short mounting bracket (2140153), the twin stick can be rotated by ± 110° for alignment.

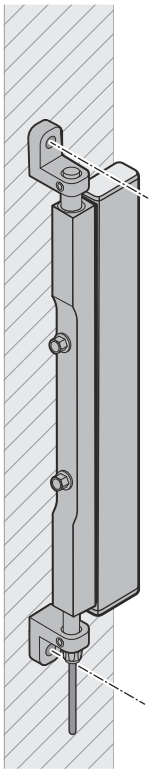


Figure 30: Mounting example with the BEF-2SHAHMES1 bracket and the short mounting bracket (part number 2140153)

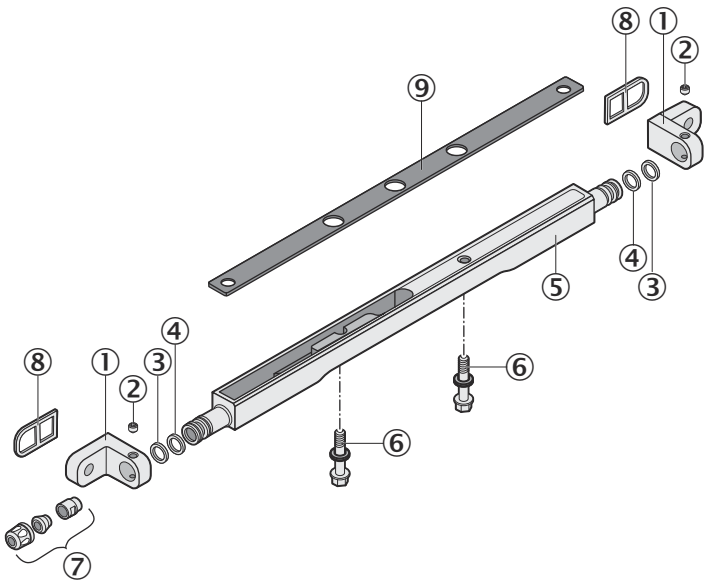


Figure 31: BEF-2SHAHMES1 (part number 2134472) with short mounting bracket (part number 2140153)

① Mounting bracket (part number 2140151 or 2140153)
② Setscrew
③ Sealing ring (outer slot)
④ Sealing ring (inner slot)
⑤ Bracket
⑥ M5 fixing screw and washer with permanently fixed sealing ring
⑦ Cable gland
⑧ Seal for mounting bracket
⑨ Seal for bracket

Procedure

1. At both ends of the bracket, slide on the sealing ring (④) up to the inner slot. Make sure that the narrow side of the trapezoidal sealing ring is located in the slot when doing so.
2. Slide the mounting bracket (①) onto the bracket until the outer slot is no longer visible.
3. At both ends of the bracket, slide on the sealing ring (③) up to the outer slot. Make sure that the narrow side of the trapezoidal sealing ring is located in the slot when doing so.
4. Slide the mounting bracket (①) back a little so that all sealing rings (③, ④) are covered.
5. Screw the setscrews (②) in a little to secure the mounting bracket to the bracket.
6. Guide the cable through the middle opening of the seal (⑨). Make sure that the protruding edge of the seal is facing the bracket.
7. Feed the cable through the bracket, the mounting bracket and the cable gland (⑦) until the bracket is lying firmly against the twin stick.
8. Position the bracket up against the rear of the twin stick and align the seal (⑨) correctly.
9. Screw on the bracket using 2 fixing screws with washers (⑥). Make sure the seal (⑨) does not slip while doing so. Tighten the screws uniformly. Tightening torque: 4 Nm ... 5 Nm.
10. Screw the cable gland (⑦) into the bracket as far as it will go.
11. Insert seals (⑧) between the mounting bracket and mounting surface. Mount the mounting bracket (with bracket and twin stick) in the desired position. Tighten the

screws equally until the seals lie flush. Make sure the seals do not slip while doing so.

12. Loosen the 2 setscrews (②) of the mounting bracket (①) slightly and align the twin stick.
13. Tighten the 2 setscrews of the mounting bracket. Tightening torque: 3 Nm ... 4 Nm.
14. Seal the 2 setscrews of the mounting bracket against contamination, e.g., by applying silicone or a suitable cover (not included with delivery).

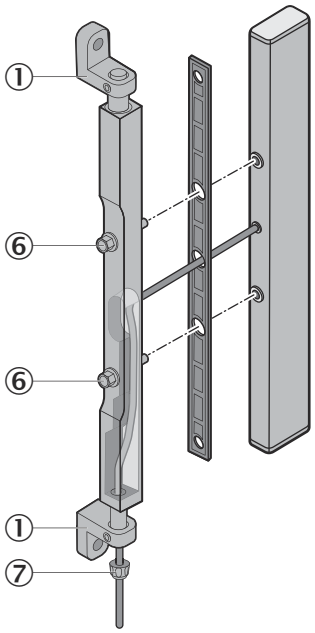


Figure 32: Cable in the BEF-2SHAHMES1 bracket with short mounting bracket (part number 2140153)

① Mounting bracket with setscrew
⑥ M5 fixing screw and washer with permanently fixed sealing ring
⑦ Cable gland

Further topics

- "Brackets", page 74

6 Electrical installation

6.1 Safety

Important information

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.
- ► Ensure that the outputs of the device have no effect on the machine during the electrical installation work.
- ► Use a suitable voltage supply.

DANGER
Hazard due to lack of effectiveness of the protective device
The dangerous state may not be stopped in the event of non-compliance.

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

DANGER
Hazard due to lack of effectiveness of the protective device
The dangerous state may not be stopped in the event of non-compliance.

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

DANGER
Hazard due to lack of effectiveness of the protective device
Malfunctions can occur if unused inputs are wired incorrectly.

- ► Unused inputs must either not be connected or be permanently switched to LOW.

Prerequisites

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

Example: Isolated connection of OSSD1 and OSSD2

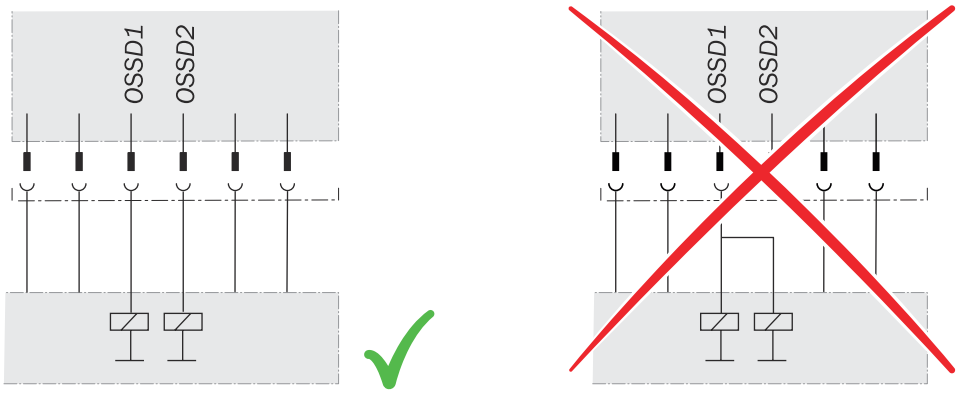


Figure 33: Dual-channel and isolated connection of OSSD1 and OSSD2

Avoiding any potential difference between load and protective device

- If the loads are connected to the OSSDs (switching outputs) that then also switch if controlled with negative voltage (e.g., electro-mechanical contactor without reverse polarity protection diode), the 0 V connections of these loads and those of the corresponding protective device must be connected separately and also directly to the same 0 V terminal strip. In the event of an error, 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.

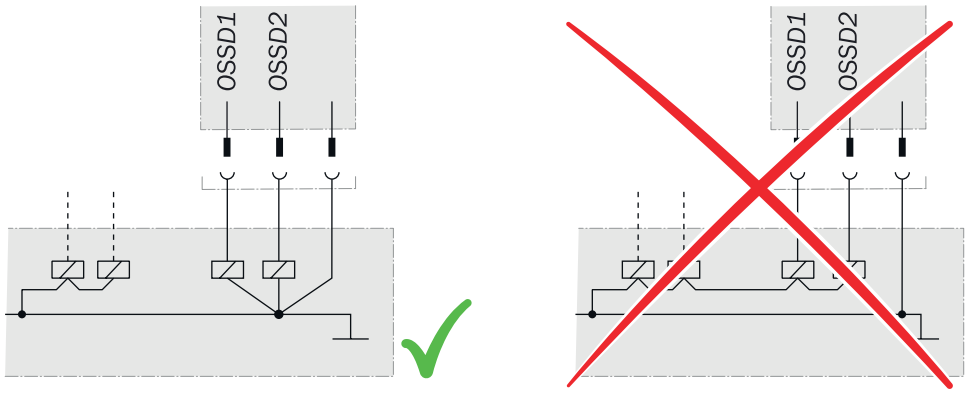


Figure 34: No potential difference between load and protective device

Further topics

- "Integrating the equipment into the electrical control", page 26

6.2 System connection

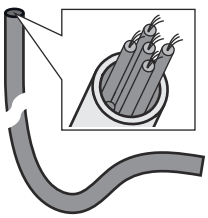


Figure 35: System connection wires

Table 4: System connection pin assignment

Pin	Wire color	Meaning	Comment
1	Brown	24 V DC input	Voltage supply
2	White	Multifunctional connection	• Connection of the reset button Or: • EDM connection Or: • 0 V DC (no function active)
3	Blue	0 V DC	Voltage supply
4	Black	OSSD	Switching output
FE	Gray	Functional earth	To fulfill the EMC requirements, the functional earth (FE) must be connected.

Further topics

- "Restart interlock", page 13
- "External device monitoring (EDM)", page 13
- "Connectivity", page 75
- "Test rod check", page 31

7 Configuration

7.1 Factory settings

Overview

The configurable functions have the following status when delivered:

Table 5: Configurable functions when delivered

Function	Configuration when delivered
Beam coding	Code 1
Restart interlock	Not configured
External device monitoring (EDM)	Not configured

To use the functions, you must configure the required functions.

Important information

CAUTION
Impaired protective function
Changes to the device's configuration may impair the protective function.

- ► The effectiveness of the protective device must be checked after any change to the configuration.
- ► The person carrying out the change is also responsible for maintaining the protective function of the device.

Further topics

- "Testing plan", page 30

7.1.1 Changing the configuration later

Overview

If a pre-configured safety light curtain is to be installed and wired in its future environment, the safety light curtain can be reset to its factory settings and re-configured in one single procedure.

Further topics

- "Indications when switching on", page 62

7.2 Configuring beam coding

Overview

Beam coding is always automatic. In the event of an optical fault caused by an adjacent system, the system experiences a fault (see fault display). After the next power-up, the code is automatically set to code 2.

7.3 Reset and external device monitoring (EDM)

Overview

Reset and external device monitoring can be configured at the TWINOX4 safety light curtain.

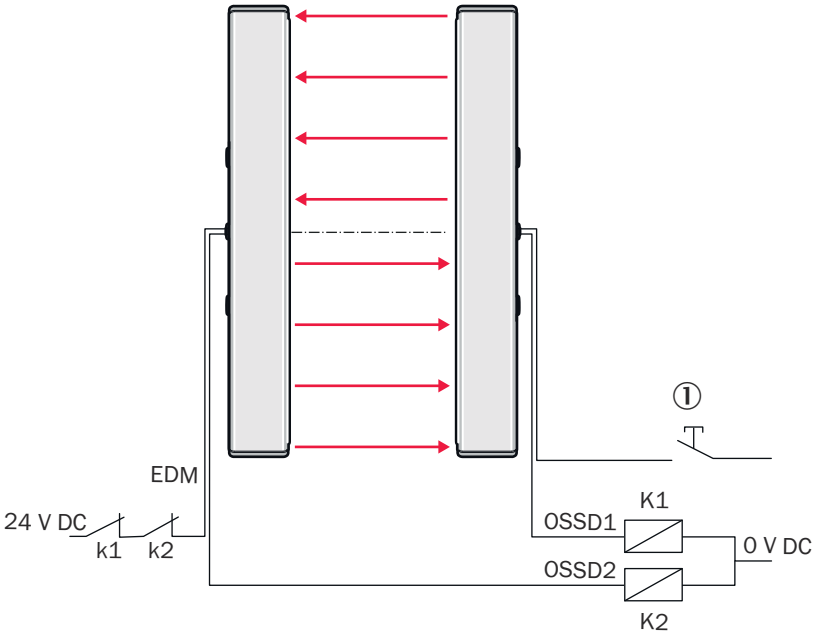


Figure 36: Reset button and external device monitoring (EDM)

① Reset button

- Resetting is configured through a certain cycle of actuation of the reset button.
- External device monitoring (EDM) is automatically configured through correct wiring of the input with the contactors during the first switching of the OSSDs.
- Each twin stick is configured separately.

Further topics

- "Configuring reset", page 48
- "External device monitoring (EDM)", page 30
- "Configuring external device monitoring (EDM)", page 49

7.3.1 Configuring reset

Overview

To activate the reset function, a reset button must be connected to the safety light curtain.

You have 4 min for configuring the function after switching on the safety light curtain. Otherwise the system completely locks 4 min after switching on (lock-out).

Important information

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.

Procedure

1. Ensure that the entire system or machine is in a non-dangerous state.
2. Switch on the safety light curtain.
✓ The RES LED and EDM LED flash orange.
3. Press and hold down the reset button within 4 min of switching on.
✓ After about 1 s, the EDM LED goes out.

4. Release the reset button within the next 2 s.

✓ When the protective field is clear, the RES LED flashes orange.

NOTE

If the reset button is released too late during configuration, the function is not activated. The RES LED and EDM LED flash orange. Restart the configuration process from step 3.

When the protective field is interrupted, the RES LED lights up orange.
Check the reset function. If the reset function was not activated, restart from step 1.

5. While the protective field is clear, press and release the reset button again.
The OSSD outputs are enabled and the reset button lights up orange.

✓ The configuration has been successfully completed.
Reset is permanently saved in the device. The function can only be deactivated with deliberate resetting of the configuration.
If the configuration is not completed within 4 min, the system locks completely (lock-out). In this case, restart from step 1.

Complementary information

If EDM or RES are not required, adapt the pin assignments on the system connection appropriately.

Further topics

- "Restart interlock", page 28
- "Deactivating reset and EDM", page 50
- "Internal restart interlock and reset", page 29
- "System connection", page 45

7.3.2 Configuring external device monitoring (EDM)

Procedure

The external device monitoring does not have to be activated separately.

1. Connect the switching element contacts at the external device monitoring input (EDM).
2. Switch on the safety light curtain and, if applicable, the connected relay/contactor.

✓ The first time the OSSDs are switched, the safety light curtain activates the external device monitoring and saves the configuration in the device.

✓ The EDM LED lights up orange.
EDM is permanently saved in the device. The function can only be deactivated with deliberate resetting of the configuration.

3. Then check the EDM function. If EDM was not activated, restart from step 1.

NOTE

The EDM signal (+24 V DC) must be present no later than within 4 min after switching on. Otherwise the system completely locks 4 min after switching on (lock-out).

Further topics

- "External device monitoring (EDM)", page 30
- "Deactivating reset and EDM", page 50

7.3.3 Deactivating reset and EDM

Overview

Deactivating reset and EDM resets both twin sticks back to their factory settings.

To deactivate the configuration, the optics in the center (① between the two triangular marks) or outside (②) must be covered in a certain order. You have up to 30 s for each of the following steps.

The COM LED (☼ white) is used as a timer for interrupting and releasing the protective field.

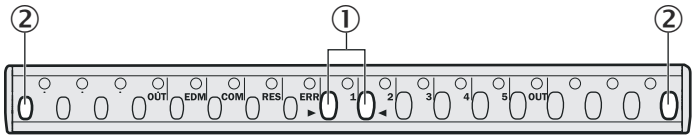


Figure 37: Intervention points when deactivating configuration

Important information

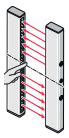
NOTE
If the COM LED lights up white two times in succession during deactivation of the configuration, the procedure has been canceled. In this case, restart from step 1.

Prerequisites

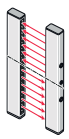
- The system or machine is in a non-dangerous state.
- The twin sticks are aligned. LEDs 1 to 5 (● blue) show the alignment quality. At least 3 of the 5 LEDs must light up so that the configuration can be deactivated.

Procedure

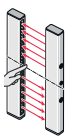
1. Switch the safety light curtain off and then back on and begin deactivation within 2 min.
2. Interrupt the protective field of the safety light curtain until the COM LED flashes white once (after about 3 s).



3. Stop the interruption within the next 30 s.
4. Keep the protective field of the safety light curtain clear until the COM LED flashes white once (after about 3 s).



5. Within the next 30 s, interrupt the protective field of the safety light curtain again in the center until the COM LED flashes white once (after about 3 s).

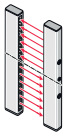


6. Stop the interruption within the next 30 s.

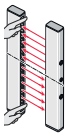
✓ The run direction of LEDs 1 to 5 (☼ blue) points outwards; it points to the next

interruption.

7. Keep the protective field of the safety light curtain clear until the COM LED flashes white once (after about 3 s).



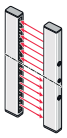
8. Within the next 30 s, interrupt the protective field of the safety light curtain externally until the COM LED flashes white once (after about 3 s).



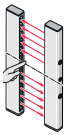
9. Stop the interruption within the next 30 s.

✓ The run direction of LEDs 1 to 5 (blue) points inwards; it points to the next interruption in the center.

10. Keep the protective field of the safety light curtain clear until the COM LED flashes white once (after about 3 s).



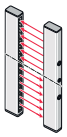
11. Within the next 30 s, interrupt the protective field of the safety light curtain again in the center until the COM LED flashes white once (after about 3 s).



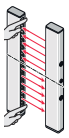
12. Stop the interruption within the next 30 s.

✓ The run direction of LEDs 1 to 5 (blue) points outwards; it points to the next interruption.

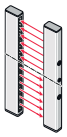
13. Keep the protective field of the safety light curtain clear until the COM LED flashes white once (after about 3 s).



14. Within the next 30 s, interrupt the protective field of the safety light curtain externally until the COM LED flashes white once (after about 3 s).



15. Stop the interruption within the next 30 s.
16. Keep the protective field of the safety light curtain clear until the COM LED flashes white and LEDs 1 to 5 flash blue three times (after about 3 s).



17. Switch off the safety light curtain within the following 2 min.
✓ EDM or reset is deactivated at the next switch-on.
18. After deactivating the configuration, check the wiring and adjust it to the desired function if necessary.
19. If EDM or reset must be reactivated after deactivating the configuration, the desired configuration must be repeated.
20. Check the effectiveness of the protective device.

Further topics

- "Configuring reset", page 48
- "Configuring external device monitoring (EDM)", page 49
- "Testing plan", page 30

7.4 Status indication on both sides

The OSSD status and the status of the protective field are indicated via LEDs on every twin stick.

8 Commissioning

8.1 Safety

Important information

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 section.

WARNING
Hazard due to lack of effectiveness of the protective device

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

Further topics

- "Minimum distance from reflective surfaces", page 23

8.2 Overview

Prerequisites

- Project planning has been completed correctly
- Mounting has been completed correctly
- Electrical installation has been completed correctly

Procedure

1. Switch on the voltage supply.
   - If the device is set to the factory settings, the OUT LED lights up green.
   - If the configuration does not match the wiring, the device display an error.
2. Configure the restart interlock if required. EDM is automatically configured.
3. After configuration is complete, align both twin sticks.
4. If 3 of the 5 blue LEDs light up, the safety light curtain switches to green. From this point in time, you have about 2 min to optimize the alignment of the twin stick.
5. Check alignment.
6. Check the protective device.

Further topics

- "Project planning", page 19
- "Mounting", page 35
- "Electrical installation", page 44
- "Configuration", page 47
- "Configuring reset", page 48
- "Alignment of the twin stick", page 54
- "Check during commissioning and modifications", page 56

8.3 When it is switched on

Overview

NOTE
Both twin sticks must always be switched on at the same time. When one of the twin sticks is taken out of operation, the second twin stick must be switched off briefly before switching on again.

After the safety light curtain is switched on, it goes through the power-up cycle. The LEDs indicate the device status during the power-up cycle.

The LEDs have the following meanings:

Table 6: LEDs during power-up cycle

LED	Meaning
● All LEDs	LED test. All LEDs light up briefly.
● Red	OSSD off, system is being activated
☼ White	No optical communication to another twin stick [1]
☼ White ● Blue 1	Communication to the second twin stick is being established
● Blue 1 to 5	Alignment quality display (goes out when sufficient alignment quality exists for 2 min)
● Green	OSSD off, system active, protective field free
● Orange RES	RES configured
● Orange EDM	EDM configured
Other display	Device error

Further topics

- "Indications when switching on", page 62
- "Configuring reset", page 48
- "Configuring external device monitoring (EDM)", page 49
- "Fault indicators", page 64

8.4 Alignment of the twin stick

Overview

Once mounting and electrical installation are complete, the twin sticks must be aligned with each other.

Important information

DANGER
Dangerous state of the machine

- ► Make sure that the dangerous state of the machine is (and remains) switched off during the alignment process.
- ► Ensure that the outputs of the ESPE have no effect on the machine during the alignment process.

1) During the initial commissioning of a twin stick, the LED flashes immediately to signal the first synchronization between the twin sticks. For all other power-up processes, the LED only flashes if the previous system partner does not answer within 20 s. In this case, communication can also be established with a replacement twin stick.

NOTE
During the alignment, observe the alignment quality indication and the bracket that is used to mount the twin sticks.

Further topics

- "Aligning the twin sticks to one another", page 55
- "Indication of the alignment quality", page 56
- "Diagnostic LEDs", page 62

8.4.1 Aligning the twin sticks to one another

Overview

After the safety light curtain has been mounted and connected, the two twin sticks must be aligned with each other. The beams of the sender optics must met exactly on the receiver optics.

The TWINOX4 safety light curtain signals the alignment quality with the blue LEDs (1 to 5), i.e. how well the two twin sticks are aligned with each other. If all LEDs light up, then alignment is optimal; if no LEDs light up, alignment is poor.

If 3 of the blue LEDs light up, the safety light curtain switches to green. From this point in time, you have about 2 minutes to optimize the alignment of the twin stick.

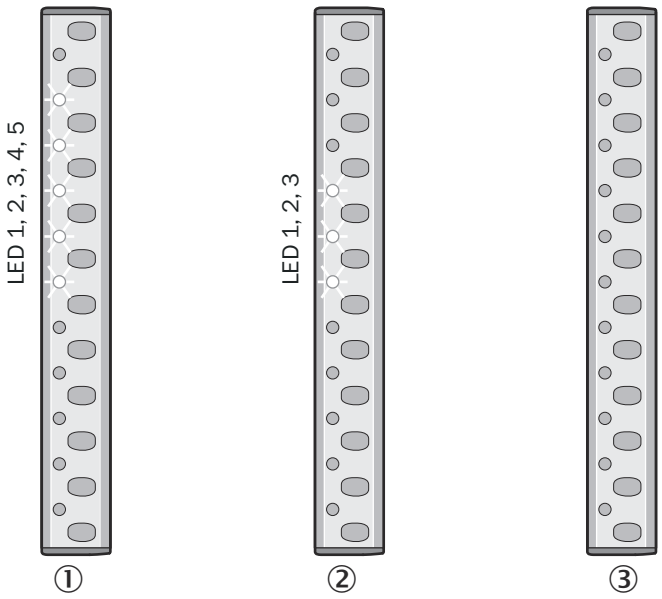


Figure 38: Alignment of the safety light curtain

① Optimal alignment
② Sufficient alignment
③ Insufficient alignment

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.
- ► Ensure that the outputs of the ESPE have no effect on the machine during the alignment process.

Prerequisites

- The twin sticks are correctly mounted

Procedure

1. Switch on the voltage supply for the safety light curtain.
✓ During initial commissioning, the COM LED flashes white and the two twin sticks establish communication [2].
2. Align the two twin sticks with one another so that LED 1 lights up blue as well.
✓ The two twin sticks start communicating with one another. During initial commissioning, the COM LED goes out after the communication phase (about 3 s). The alignment can now be optimized.
3. Align the two twin sticks with one another so that at least 3 but as many as possible of LEDs 1 to 5 light up blue.
When the maximum protective field width is utilized, the system might show moderate alignment quality during alignment with only 3 blue LEDs. The system still has a reserve of 30 %.
4. If the alignment quality is sufficient for 2 min, the system switches alignment mode off. LEDs 1 to 5 go out.
5. If the alignment needs to be redone, switch the voltage supply of both twin sticks off and back on and continue from step 2.
6. Finally, fasten the safety light curtain.
✓ The alignment of the twin sticks is complete.

Further topics

- "Indication of the alignment quality", page 56
- "Mounting", page 35
- "Accessories", page 74

8.4.2 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 of objects in the protective field (e.g., hand, tool) may impair the function of the alignment quality LEDs. Remove all objects from the protective field to allow the alignment quality to be assessed.

8.5 Check during commissioning and modifications

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

► Carry out the checks specified in the test plan of the manufacturer of the machine and the operating entity.

2) During the initial commissioning of a stick, the LED flashes immediately to signal the first synchronization between the sticks. For all other power-up processes, the LED only flashes if the previous system partner does not answer within 20 s. In this case, communication can also be established with a replacement stick.

9 Operation

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.

- ► Maintenance work, alignment work, error analyses, 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 twin sticks are not changed, e.g., by:
  - beading water, mist, frost, or ice formation. If applicable, remove films or other types of contamination, disconnect the voltage supply of the twin stick and then switch it back on.
  - Scratches or damage. Replace the device if the front screen is scratched or damaged.
- ► 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.

NOTE
This document does not provide instructions for operating the machine in which the safety light curtain is integrated.

Further topics

- "Minimum distance from reflective surfaces", page 23

9.2 Regular thorough check

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

- ► Carry out the checks specified in the test plan of the manufacturer of the machine and the operating entity.

9.3 LEDs

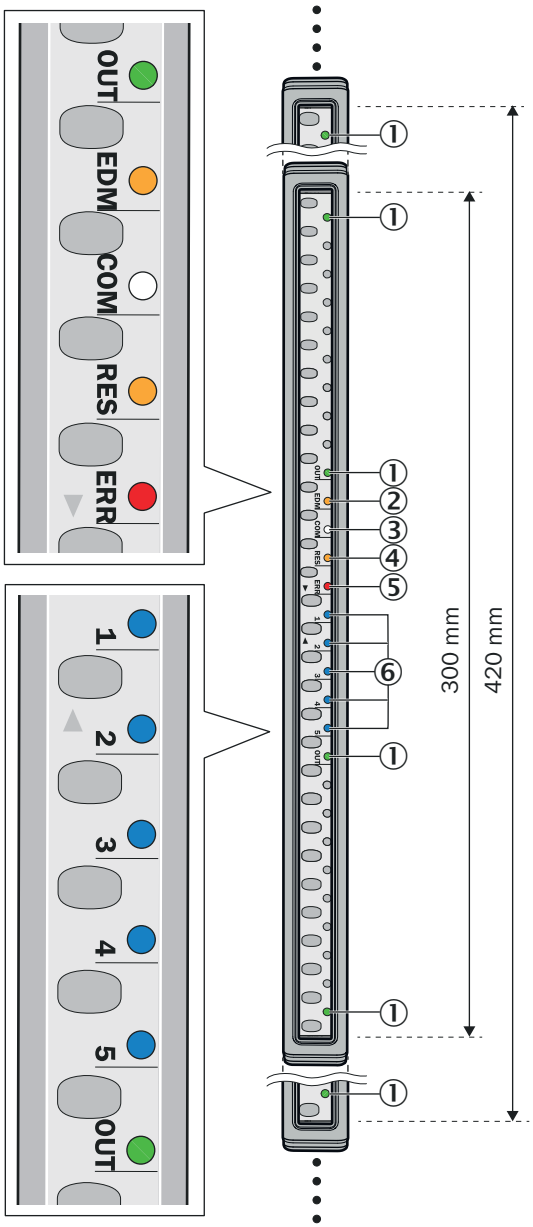


Figure 39: LEDs on the twin sticks

① OUT
② EDM
③ COM
④ RES
⑤ ERR
⑥ 1, 2, 3, 4, 5

figure 6 shows the LEDs of the safety light curtain. The OUT LED (①) is mounted in multiple locations and can light up red or green. It is only labeled OUT in two locations on the safety light curtain.

Lit up LEDs indicate a specific status of the safety light curtain. Flashing LEDs demand action.

Table 7: Meaning of LEDs

Position	LED	Display	Comment
①	OUT	● Green ● Red	LED lights up green when protective field is free (OSSD on).
			LED lights up red when protective field is interrupted (OSSD off).
②	EDM	● Orange	External device monitoring configured.
		☀ Orange	For the configuration of EDM at the first OSSD status change, the safety light curtain expects the change from 24 V to 0 V at the multifunctional input. Or: In combination with the ERR-LED ☀ red: External device monitoring reports defective contactor
③	COM	● White	External communication active (e.g. for service)
		☀ White	No optical communication to another twin stick . Or: Feedback when deactivating configuration.
④	RES	● Orange	Reset configured.
		☀ Orange	Reset configured. Or: In combination with ERR-LED ☀ red and EDM-LED ☀ orange: error with configuration or cabling.
⑤	ERR	● Red	Protective field interrupted.
		☀ Red	Error.
⑥	1, 2, 3, 4, 5	● Blue	Indication of the alignment quality.
		☀ Blue	In combination with ERR-LED ☀ red: display of an error.

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

10 Maintenance

10.1 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 deflector mirrors must also 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 twin sticks are not changed, e.g., by:
  - beading water, mist, frost, or ice formation. If applicable, remove films or other types of contamination, disconnect the voltage supply of the twin stick and then switch it back on.
  - Scratches or damage. Replace the device if the front screen is scratched or damaged.
- ► 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.

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 or abrasive cleaning agents.
- ► Recommendation: Use lens cleaner and lens cloths from SICK.

Procedure

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 twin sticks after cleaning.
4. Check the effectiveness of the protective device.

Further topics

- "Operation", page 57
- "Minimum distance from reflective surfaces", page 23

10.2 Regular thorough check

The thorough check is intended to ensure that the safety functions are fulfilling their planned purpose and whether persons are being adequately protected.

► Carry out the checks specified in the test plan of the manufacturer of the machine and the operating entity.

11 Troubleshooting

11.1 Security

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 error and if you cannot safely remedy the error.
- ► Secure the machine so that it cannot switch on unintentionally.

NOTE
Additional information on troubleshooting is available from your SICK subsidiary.

11.2 Diagnostic LEDs

11.2.1 Indications when switching on

Overview

NOTE
Both twin sticks must always be switched on at the same time. When one of the twin sticks is taken out of operation, the second twin stick must be switched off briefly before switching on again.

After the safety light curtain is switched on, it goes through the power-up cycle. The LEDs indicate the device status during the power-up cycle.

The LEDs have the following meanings:

Table 8: LEDs during power-up cycle

LED	Meaning
● All LEDs	LED test. All LEDs light up briefly.
● Red	OSSD off, system is being activated
☼ White	No optical communication to another twin stick [3]
☼ White ● Blue 1	Communication to the second twin stick is being established
● Blue 1 to 5	Alignment quality display (goes out when sufficient alignment quality exists for 2 min)
● Green	OSSD off, system active, protective field free
● Orange RES	RES configured
● Orange EDM	EDM configured
Other display	Device error

3) During the initial commissioning of a twin stick, the LED flashes immediately to signal the first synchronization between the twin sticks. For all other power-up processes, the LED only flashes if the previous system partner does not answer within 20 s. In this case, communication can also be established with a replacement twin stick.

Further topics

- "Configuring reset", page 48
- "Configuring external device monitoring (EDM)", page 49
- "Fault indicators", page 64

11.2.2 Status indicator

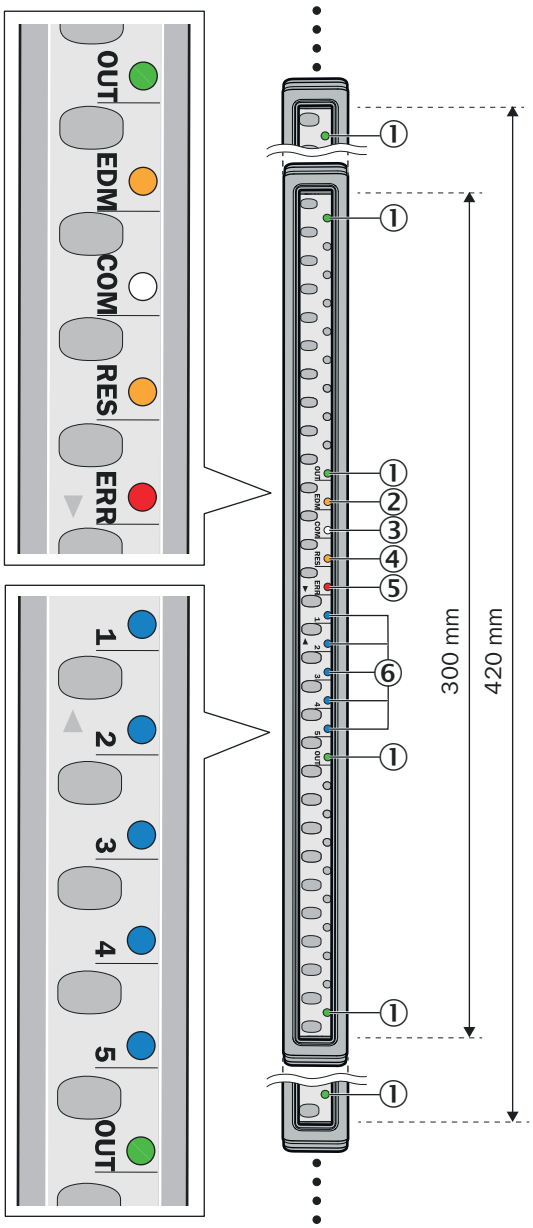


Figure 40: LEDs on the twin sticks

① OUT
② EDM
③ COM
④ RES
⑤ ERR
⑥ 1, 2, 3, 4, 5

figure 6 shows the LEDs of the safety light curtain. The OUT LED (①) is mounted in multiple locations and can light up red or green. It is only labeled OUT in two locations on the safety light curtain.

Lit up LEDs indicate a specific status of the safety light curtain. Flashing LEDs demand action.

Table 9: Meaning of LEDs

Position	LED	Display	Comment
①	OUT	● Green ● Red	LED lights up green when protective field is free (OSSD on).
			LED lights up red when protective field is interrupted (OSSD off).
②	EDM	● Orange	External device monitoring configured.
		✳ Orange	For the configuration of EDM at the first OSSD status change, the safety light curtain expects the change from 24 V to 0 V at the multifunctional input. Or: In combination with the ERR-LED ✳ red: External device monitoring reports defective contactor
③	COM	● White	External communication active (e.g. for service)
		✳ White	No optical communication to another twin stick . Or: Feedback when deactivating configuration.
④	RES	● Orange	Reset configured.
		✳ Orange	Reset configured. Or: In combination with ERR-LED ✳ red and EDM-LED ✳ orange: error with configuration or cabling.
⑤	ERR	● Red	Protective field interrupted.
		✳ Red	Error.
⑥	1, 2, 3, 4, 5	● Blue	Indication of the alignment quality.
		✳ Blue	In combination with ERR-LED ✳ red: display of an error.

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

Further topics

- "Diagnostic LEDs", page 62
- "Status indicators", page 15
- "Aligning the twin sticks to one another", page 55
- "Indication of the alignment quality", page 56

11.2.3 Fault indicators

Overview

This section describes what the fault indicators of the diagnosis LEDs mean and how to respond to them.

Table 10: LED fault indicators

Display	Possible cause	Troubleshooting
Red ERR Blue 1 Blue 2 Blue 3 Blue 4 Blue 5	System fault	► Switch the voltage supply of the TWINOX4 off and back on (renewed power-up). ► Check all plug connectors. ► Check the FE connection. ► Check the cable laying for interference (e.g. EMC).
Red ERR Blue 1 Blue 2 Blue 3 Blue 4 Blue 5	Short-circuit, cross-circuit or cable defect	► Check the function of the reset button. The pushbutton may be defective or being pressed continuously. ► Check the wiring for short-circuit to 24 V or 0 V. ► Check the wiring between the two OSSDs.
Red ERR Blue 1 Blue 2 Blue 3 Blue 4 Blue 5	Supply voltage too low	► Check the supply voltage and the power supply unit. Replace defective components if necessary.
Red ERR Blue 1 Blue 2 Blue 3 Blue 4 Blue 5	Fault due to ambient light	► Check the distance to reflective surfaces or to other safety light curtains. If necessary, mount non-reflective partitions.
Red ERR Blue 1 Blue 2 Blue 3 Blue 4 Blue 5	System error	► Switch the voltage supply of the TWINOX4 off and back on (renewed power-up). ► If the display also lights up during repeated power-up during the start-up phase, replace the device. ► If the display lights up during operation, contact SICK support.
White COM	Fault during communication between 2 twin sticks	► Check the alignment of the two twin sticks with one another. Or, if a twin stick has been replaced: ► Switch the voltage supply for both twin sticks off and then back on again.
Red ERR Orange EDM	EDM errors	► Check the contactors and their wiring, fix the wiring error if necessary.
Red ERR Orange EDM Orange RES	Error during configuration of EDM or reset or cabling of Pin 2	► Repeat configuration of EDM or reset. Or: ► Check the cabling Pin 2.
Orange EDM Orange RES	Configuration of EDM or reset not yet performed.	► Switch on the connected relay or the contactor. Or: ► Actuate the connected reset button. Or: ► Check the cabling Pin 2.

Further topics

- "Status indicators", page 15
- "Minimum distance from reflective surfaces", page 23
- "Configuring reset", page 48
- "Protective operation without reset and/or without EDM", page 28

12 Decommissioning

12.1 Disposal

Procedure

► Always dispose of unusable devices in accordance with national waste disposal regulations.

Complementary information

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

13 Technical data

13.1 Data sheet

Table 11: General system data

	Minimum	Typical	Maximum
Protective field height, depending on type	300 mm, 420 mm, 600 mm		
Resolution (detection capability)	14 mm		
Scanning range [1) 2)]	0 m ... 3.6 m	0 m ... 4.5 m	
Protection class [3)]	III (IEC 61140)		
Enclosure rating	IP65 (IEC 60529) IP67 (IEC 60529)		
Supply voltage U_V at the device [4)]	19.2 V	24 V	28.8 V
Residual ripple [5)]			±10%
Typ (IEC 61496)	Type 4		
Category (ISO 13849)	Category 4		
Performance level (ISO 13849) [6)]	PL e Note the optical performance characteristics! [7)]		
Safety integrity level (IEC 61508) [6)]	SIL 3		
Safety integrity level (IEC 62061) [6)]	SIL 3		
PFHd (mean probability of a dangerous failure per hour)			
Single system	4.3×10^{-9}		
T_M (mission time)	20 years (ISO 13849-1)		
Safe status when a fault occurs	At least one OSSD is in the OFF state.		
Power-up delay after supply voltage applied		3 s	
Wavelength		850 nm	
Output signal switching devices (OSSDs)	PNP semiconductor, short-circuit protected [8)], cross-circuit monitored		
Switching voltage [9)] HIGH (active, U_{eff})	U_V - 2.2 V	24 V	U_V
Switching voltage LOW (deactivated)	0 V	0 V	2 V
Switching current	0 mA		300 mA
Single system leakage current [10)]			0.25 mA
Load capacity			1 µF
Switching sequence	Depending on the load inductance		
Load inductance [11)]			2.2 H
Test pulse data [12)]			
Test pulse width	120 µs	150 µs	300 µs
Test pulse rate	3 s^{-1}	5 s^{-1}	10 s^{-1}
Permissible cable resistance			1.29 Ω
Current consumption			~ 161 mA (300 mm) ~ 193 mA (420 mm) ~ 224 mA (600 mm)

	Minimum	Typical	Maximum
Multifunctional connection			
Input voltage [9] HIGH (deactivated)	11 V	24 V	30 V
Input current HIGH	6 mA	15 mA	30 mA
Input voltage [9] LOW (active)	-3 V	0 V	5 V
Input current LOW	-2.5 mA	0 mA	0.5 mA
When used as EDM input			
Permissible contactor dropout time			300 ms
Permissible contactor pull in time			300 ms
When used as control switch input (reset button)			
Control switch actuation time	200 ms		
Weight	see "Table of weights", page 70		

1) The minimum scanning range specifies a range in which a function is guaranteed to operate correctly and safely under industrial conditions. A sufficient level of signal reserve to ensure very high availability is included in the calculation.
2) The typical scanning range indicates a range in which the ESPE functions perfectly and reliably under industrial conditions. The level of signal reserve is enough to ensure high availability.
3) SELV/PELV safety/protective extra-low voltage.
4) In order to fulfill the requirements of the relevant product standards (e.g. IEC 61496-1), the external voltage supply of the devices (SELV) must be able to bypass events, including a power outage of 20 ms. The power supply unit must ensure reliable network separation (SELV/PELV) and current limiting of max. 4 A. Power supply units according to EN 60204-1 fulfill this prerequisite. Suitable power supply units are available as accessories from SICK.
5) Within the limits of U_V.
6) For more detailed information on the exact configuration of your machine, please contact your relevant SICK subsidiary.
7) The performance level does not include any specific requirements regarding aspects such as optical performance features.
8) Applies for the voltage range between -30 V and +30 V.
9) According to IEC 61131-2.
10) In the event of a fault (interruption of the 0 V cable), the leak current at most flows in the OSSD cable. The downstream control element must detect this state as LOW. An FSPLC (fail-safe programmable logic controller) must detect this state.
11) If the switching sequence is low, the maximum permissible load inductance is higher.
12) When active, the outputs are tested cyclically (brief LOW). When selecting the downstream controllers, make sure that the test pulses do not result in deactivation when using the above parameters.

Table 12: Operating data

	Minimum	Typical	Maximum
System connection	Open cable end, 4-pin + FE, ≤ 10 m		
Length of cable			20 m
Wire cross-section	0.34 mm²		
Bend radius	45 mm		
Ambient operating temperature (UL/CSA: surrounding air temperature)	-20 °C		+55 °C
Air humidity (non-condensing)	15%		95%
Storage temperature	-25 °C		+70 °C
Housing cross-section	approx. 20 mm × 40 mm, see 3D model		
Vibration resistance [1]	5 … 150 Hz, 3,5 mm / 1 g (EN 60068-2-6)		
Shock resistance [2]	15 g / 6 ms (EN 60068-2-27)		
Class	3M4 (IEC TR 60721-4-3)		

1) Test conditions per axis: 1 octave/minute, 20 sweeps.
2) Test conditions per axis: 200 shocks.

Table 13: Housing, materials

	Material
Dimensions	See 3D model.
Housing	Stainless steel V4A, 1.4404, 316L
Surface finish	$R_a \leq 0.8$ µm
Front screen	Chemically prestressed float glass
Bracket	Stainless steel V4A, 1.4404, 316L
End cap	Stainless steel V4A, 1.4404, 316L
Seals	EPDM
Printed circuit boards	Glass fiber reinforced epoxy resin with flame retardant TBBPA
System connection	
Outer material of cable	TPU (PUR)
Packaging	Corrugated cardboard with polyethylene

13.2 Response time

Overview

The response time depends on the following parameters:

- Resolution
- Protective field height
- Beam coding

Response time for a single device

Table 14: Response time for a single device

	Minimum	Typical	Maximum
Response time at 14 mm resolution (protective field height 300 mm, 420 mm, 600 mm)	≤ 14 ms		
Power-down time[1)]	80 ms		
Power-up delay			200 ms

1) According to IEC 61496-2.

13.3 Power consumption

Table 15: Power consumption

Protective field height in mm	Maximum power consumption in W [1)]
300	3.1
420	3.7
600	4.3

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

13.4 Table of weights

TWINOX4

Table 16: Weight TWINOX4

Protective field height in mm	Weight in g
300	approx. 900
420	approx. 1,100
600	approx. 1,600

PNS75 and PNS125 deflector mirrors

Table 17: Weight of PNS75 and PNS125 deflector mirrors

Mirror height in mm	Weight in g	
	PNS75	PNS125
340	1035	1580
490	1435	2190
640	1850	2820

13.5 Dimensional drawings

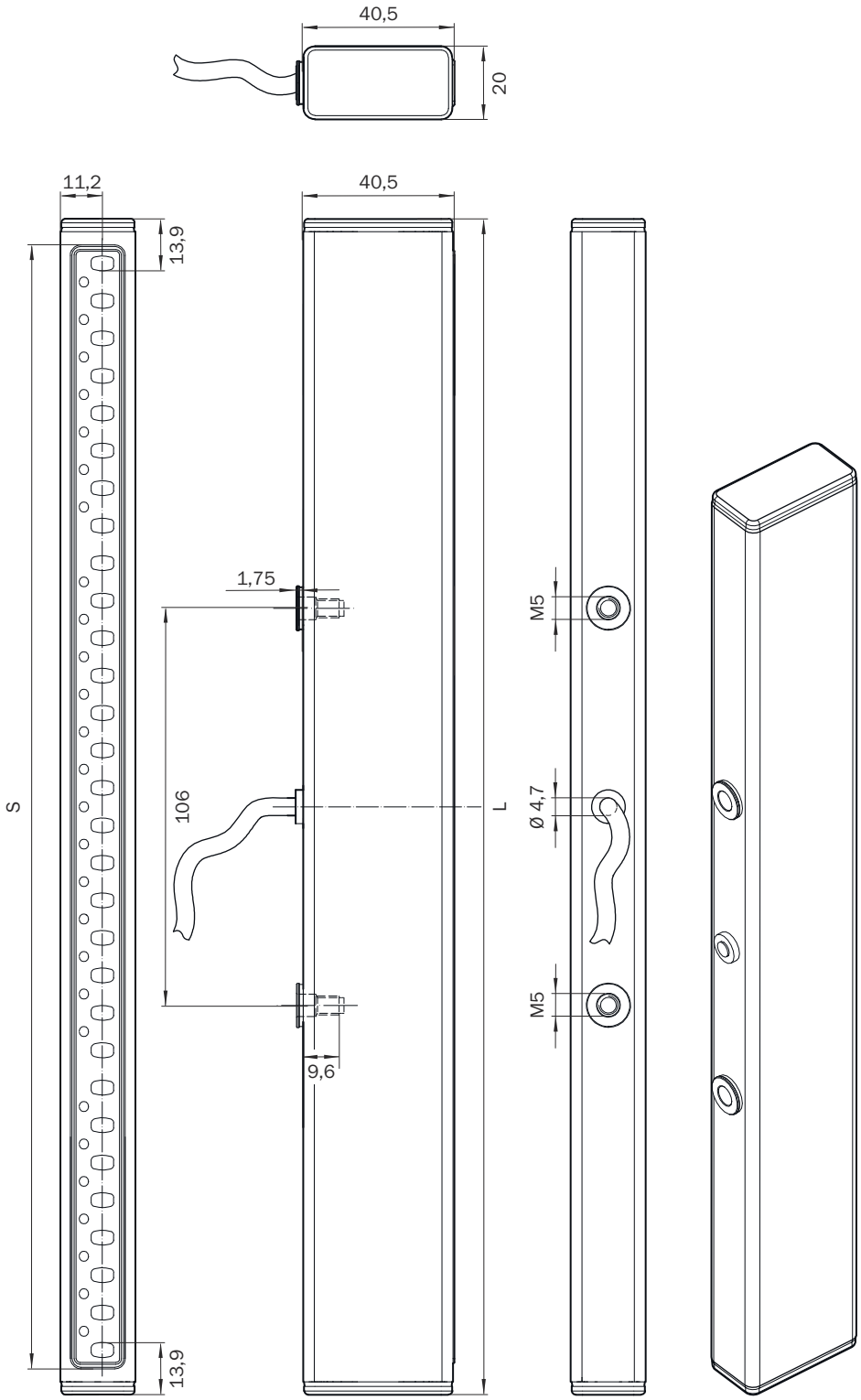


Figure 41: Dimensional drawing for the TWINOX4(mm)

Table 18: Dimensions based on the protective field height

Protective field height S, in mm	Housing length L, in mm
300	313.8
420	433.8

Protective field height S, in mm	Housing length L, in mm
600	613.8

14 Ordering information

14.1 Scope of delivery

Scope of delivery of twin stick

- Twin stick with pre-installed system cable
- Test rod with diameter corresponding to the resolution of the safety light curtain
- Safety note
- Installation Instructions
- Operating instructions for download: www.sick.com

14.2 Ordering information TWINOX4

Table 19: Ordering information TWINOX4

Protective field height in mm	Part	Type code	Part number
300	TWINOX4, stainless steel light curtain	C4IT-03014ABA01KA0	1094833
420	TWINOX4, stainless steel light curtain	C4IT-04214ABA01KA0	1094834
600	TWINOX4, stainless steel light curtain	C4IT-06014ABA01KA0	1094835

15 Accessories

15.1 Brackets

Table 20: Brackets ordering information

Part	Part number
BEF-4SHAHMES1, stainless steel bracket for 1 device, ± 2° adjustment	2101024
BEF-2SHAHMES1, stainless steel bracket for 1 device, up ± 180° adjustment (without mounting bracket)	2134472
BEF-2WNGHMES2 mounting bracket (long, with seal and setscrew) for BEF-2SHAHMES1, ± 180° adjustment, 2 pcs for 1 device	2140151
BEF-2WNKHMES2 mounting bracket (short, with seal and setscrew) for BEF-2SHAHMES1, ± 110° adjustment, 2 pcs for 1 device	2140153
Replacement seal for mounting bracket	4120178

BEF-4SHAHMES1

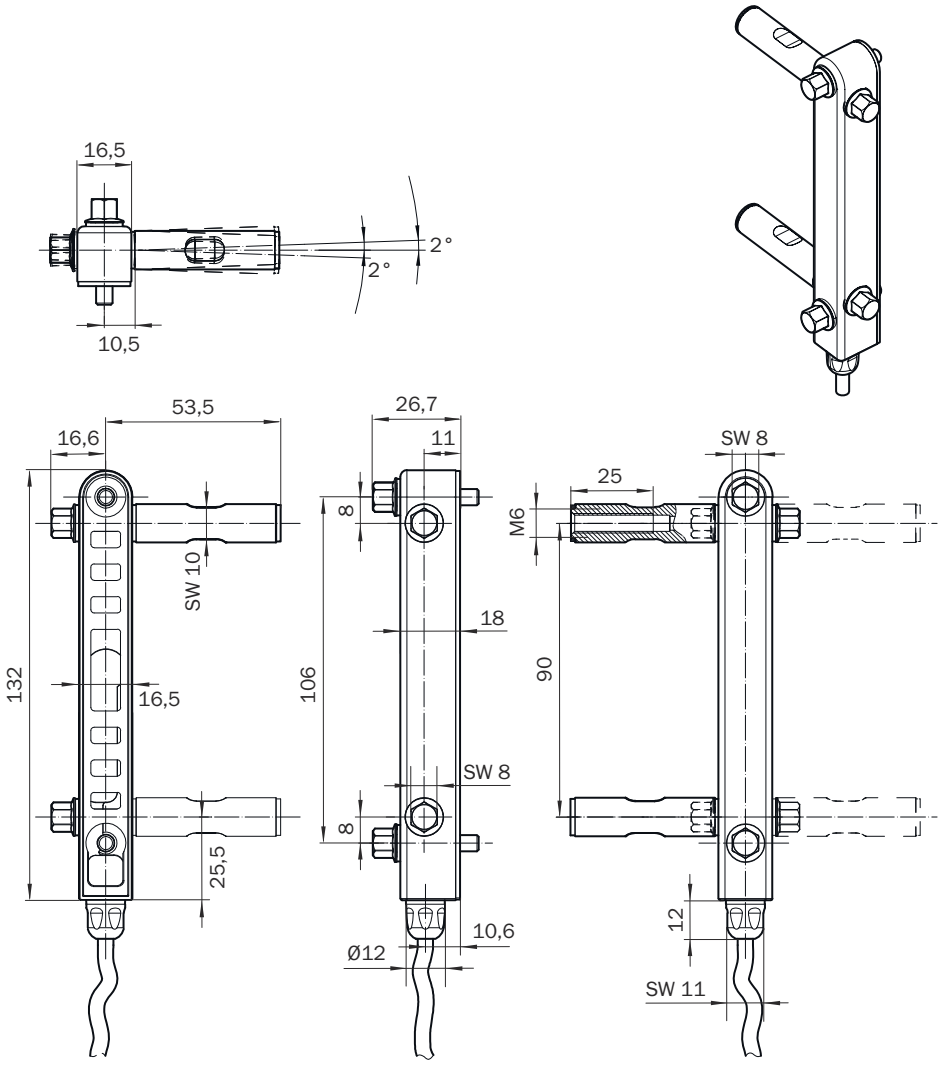


Figure 42: BEF-4SHAHMES1, stainless steel for 1 device, ± 2° adjustment, part number 2101024

BEF-2SHAHMES1

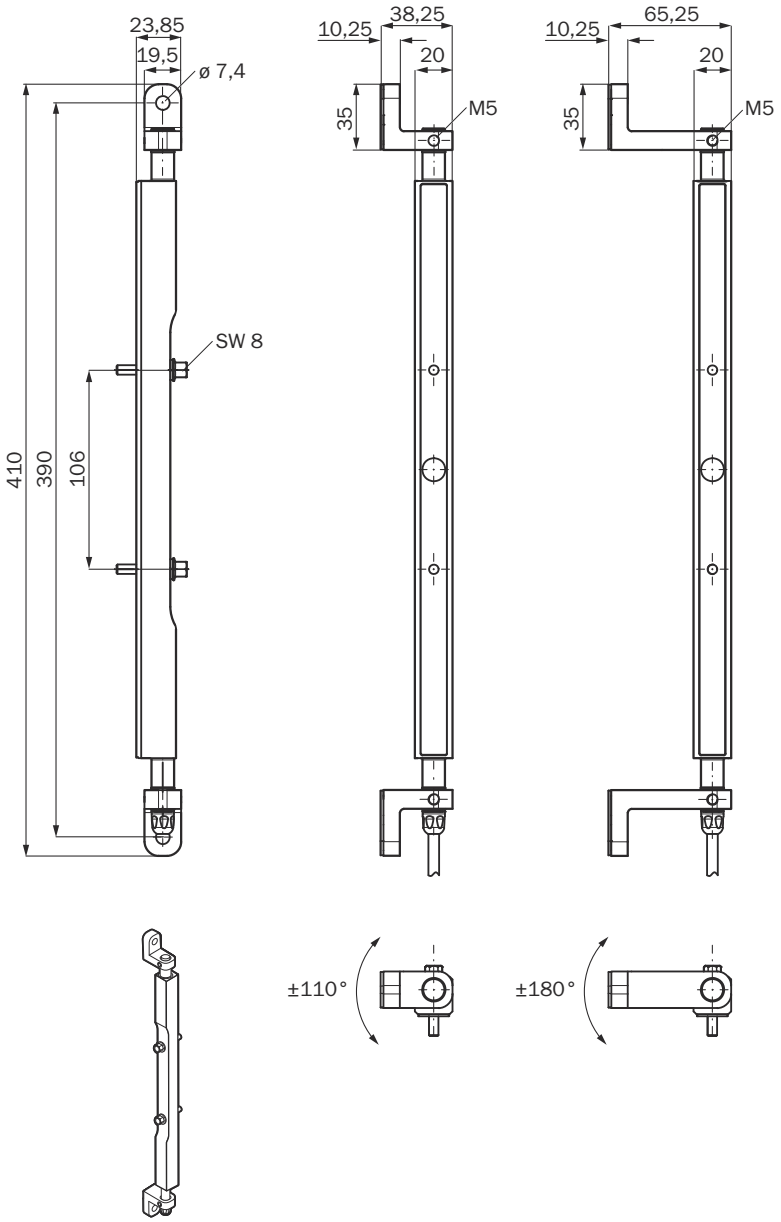


Figure 43: BEF-2SHAHMES1 with mounting brackets, stainless steel, for 1 device, up ± 180° adjustment, part number 2134472, 2140151, 2140153

15.2 Connectivity

Power supply units

Table 21: 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 AC ... 240 V AC	PS50WE24V	7028789
Output 24 V DC, 95 W (3.9 A), voltage supply NEC Class 2, SELV, PELV, input 100 V AC ... 120 V / 220 V AC ... 240 V AC	PS95WE24V	7028790

15.3 Deflector mirrors

15.3.1 Change in scanning range using deflector mirrors

Overview

The information relates to 90° beam deflection per mirror.

Important information

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

Table 22: Scanning range with and without 1 or 2 deflector mirrors

Type	Scanning range [1]	Scanning range with 1 deflector mirror [1]	Scanning range with 2 deflector mirrors [1]
PNS75, PNS125	3.6 m	3.2 m	2.9 m

1) The information in the table relates to 90° beam deflection per mirror. If you need more consultation on mirror applications, please contact your SICK contact. ⚠ Do not use deflector mirrors if beading water or heavy contamination on the deflector mirror is to be expected!

15.3.2 PNS75 deflector mirror

Table 23: Ordering information for PNS75 deflector mirror

Mirror height in mm	Max. protective field height in mm	Type codes	Part number
340	300	PNS75-034	1019414
490	450	PNS75-049	1019415
640	600	PNS75-064	1019416

Using deflector mirrors reduces the effective scanning range.

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.

Further topics

- "Data sheet", page 67

15.3.3 PNS125 deflector mirror

Table 24: Ordering information for PNS125 deflector mirror

Mirror height in mm	Max. protective field height in mm	Type codes	Part number
340	300	PNS125-034	1019425
490	450	PNS125-049	1019426

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

Using deflector mirrors reduces the effective scanning range.

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.

Further topics

- "Data sheet", page 67

16 Annex

16.1 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

16.1.1 EU declaration of conformity

Excerpt

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

- ROHS DIRECTIVE 2011/65/EU
- EMC DIRECTIVE 2014/30/EU
- MACHINERY DIRECTIVE 2006/42/EC

16.1.2 UK declaration of conformity

Excerpt

The undersigned, representing the following manufacturer herewith declares that this declaration of conformity is issued under the sole responsibility of the manufacturer. The product of this declaration is in conformity with the provisions of the following relevant UK Statutory Instruments (including all applicable amendments), and the respective standards and/or technical specifications have been used as a basis.

- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- Electromagnetic Compatibility Regulations 2016
- Supply of Machinery (Safety) Regulations 2008

16.2 Note on standards

Standards are specified in the information provided by SICK. The table shows regional standards with similar or identical contents. Not every standard applies to all products.

Table 25: Note on 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/T 5226.1
IEC 60529	GB/T 4208
IEC 60825-1	GB 7247.1
IEC 61131-2	GB/T 15969.2
IEC 61140	GB/T 17045
IEC 61496-1	GB/T 19436.1
IEC 61496-2	GB/T 19436.2
IEC 61496-3	GB 19436.3
IEC 61508	GB/T 20438

Standard	Standard (regional)
	China
IEC 62061	GB 28526
ISO 13849-1	GB/T 16855.1
ISO 13855	GB/T 19876

16.3 Checklist for initial commissioning and commissioning

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

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

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

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

Have the safety rules and regulations been observed in compliance with the directives and standards applicable to the machine?	Yes ☐ No ☐
Are the applied directives and standards listed in the declaration of conformity?	Yes ☐ No ☐
Does the protective device correspond to the required PL/SIL and PFHd in accordance with ISO 13849-1 / IEC 62061 and the required type in accordance with IEC 61496-1?	Yes ☐ No ☐
Is access to the hazardous area or hazardous point only possible through the protective field of the ESPE?	Yes ☐ No ☐
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 ☐ No ☐
Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching below, above or around the ESPE?	Yes ☐ No ☐
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 ☐ No ☐
Has the ESPE been mounted such that the required minimum distance from the nearest hazardous point has been achieved?	Yes ☐ No ☐
Are the ESPE devices properly mounted and secured against manipulation after alignment?	Yes ☐ No ☐
Are the required protective measures against electric shock in effect (protection class)?	Yes ☐ No ☐
Is the control switch for resetting the protective devices (ESPE) or restarting the machine present and correctly installed?	Yes ☐ No ☐
Are the outputs of the ESPE (OSSDs or safety outputs via the network) integrated according to the required PL/SIL in accordance with ISO 13849-1 / IEC 62061 and does the integration correspond to the circuit diagrams?	Yes ☐ No ☐
Has the protective function been checked in compliance with the test notes of this documentation?	Yes ☐ No ☐
Are the specified protective functions effective at every operating mode that can be set?	Yes ☐ No ☐
Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?	Yes ☐ No ☐
Is the ESPE effective over the entire period of the dangerous state?	Yes ☐ No ☐
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 ☐ No ☐

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