

OPERATING INSTRUCTIONS

miniTwin2



Safety light curtain

GB



SICK
Sensor Intelligence.





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Device change history

Device change history

The following table describes technical changes that have been made to the device during product updates. The change status of the device can be seen from the supplementary revision number “(Rev. #)” in the *Ident No.* field on the type label.

 Sick AG D-79183 Waldkirch Made in Germany	Type of unit	C2MT-01234BBC03BE0	Ident No.	1 207 847 (Rev. 1)	Height of guarded area	120mm
	Operating instructions	8013480/V114	Serial No.	1123 0105	Resolution	34mm
	Safety category	Type2 / Cat.2, PL d / SILCL 2	Supply voltage	DC 24V ± 20%	Scanning range	max. 8m
	   IEC 61496 / EN ISO 13849 / EN 62061, IEC 61508		Power consumpt.	2,5 W	Response time	13ms

Revision number in the <i>Ident No.</i> field	Change	Further information
No revision number	Initial device version	
(Rev. 1)	Addition of the <i>cross-circuit monitoring</i> function	Chapter 5.1.1, page 44

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1 About this document

Please read this chapter carefully before working with this documentation and the miniTwin2.

1.1 Function of this document

These operating instructions are designed to address *the technical personnel of the machine manufacturer* or the *machine operator* in regards to safe mounting, installation, configuration, electrical installation, commissioning, operation and maintenance of the miniTwin2 safety light curtain.

These operating instructions do *not* provide instructions for operating machines on which the safety light curtain is, or will be, integrated. Information on this is to be found in the appropriate operating instructions for the machine.

1.2 Target group

These operating instructions are addressed to *planning engineers, machine designers* and *operators* of plants and systems which are to be protected by one or several miniTwin2 safety light curtains. It also addresses people who integrate the miniTwin2 into a machine, initialise its use, or who are in charge of servicing and maintaining the device.

1.3 Scope

These operating instructions are original operating instructions.

Note These operating instructions apply to the miniTwin2 safety light curtain with the following entry on the type label in the field *Operating Instructions*: 8013480/V114

This document is part of SICK part number 8013480 (operating instructions “miniTwin2” in all available languages).

1.4 Information depth

These operating instructions contain information on:

- mounting
- electrical installation
- commissioning and configuration
- care and maintenance
- fault, error diagnosis and troubleshooting
- part numbers
- conformity and approval

Planning and using protective devices such as the miniTwin2 also require specific technical skills which are not detailed in this documentation.

When operating the miniTwin2, the national, local and statutory rules and regulations must be observed.

General information on accident prevention using opto-electronic protective devices can be found in the SICK competence brochure “Guidelines Safe Machinery”.

miniTwin2

- Note** We also refer you to the SICK homepage on the Internet at www.sick.com. Here you will find information on:
- sample applications
 - a list of frequently asked questions regarding the miniTwin2
 - these operating instructions in different languages for viewing and printing
 - the latest certificates on the prototype test, the EC declaration of conformity and other documents

1.5 Abbreviations

COM	Communication
EDM	External device monitoring
ERR	Error
ESPE	Electro-sensitive protective equipment (e.g. miniTwin2)
OSSD	Output signal switching device
RES	Reset

1.6 Symbols used

Recommendation Recommendations are designed to give you some assistance in your decision-making process with respect to a certain function or a technical measure.

Note Refer to notes for special features of the device.

- , ●, ○ LED symbols describe the state of a diagnostics LED. Examples:
- The LED is illuminated constantly.
 - The LED is flashing.
 - The LED is off.

➤ Take action ... Instructions for taking action are shown by an arrow. Read carefully and follow the instructions for action.



WARNING

Warning!

A warning indicates an actual or potential risk or health hazard. They are designed to help you to prevent accidents.

Read carefully and follow the warning notices!

The term “dangerous state”

The dangerous state (standard term) of the machine is always shown in the drawings and diagrams of this document as a movement of a machine part. In practical operation, there may be a number of different dangerous states:

- machine movements
- electrical conductors
- visible or invisible radiation
- a combination of several risks and hazards

2 On safety

This chapter deals with your own safety and the safety of the equipment operators.

- Please read this chapter carefully before working with the miniTwin2 or with the machine protected by the miniTwin2.

2.1 Qualified safety personnel

The miniTwin2 safety light curtain must be installed, connected, commissioned and serviced only by qualified safety personnel. Qualified safety personnel are defined as persons who ...

- due to their specialist training and experience have adequate knowledge of the power-driven equipment to be checked

and

- have been instructed by the responsible machine owner in the operation of the machine and the current valid safety guidelines

and

- are sufficiently familiar with the applicable official health and work safety regulations, directives and generally recognized engineering practice (e.g. DIN standards, VDE stipulations, engineering regulations from other EC member states) that they can assess the work safety aspects of the power-driven equipment

and

- who have access to these operating instructions and who have read them.

As a rule these are qualified safety personnel from the ESPE manufacturer or also those persons who have been appropriately trained at the ESPE manufacturer, are primarily involved in checking ESPE and are allocated the task by the organisation operating the ESPE.

2.2 Applications of the device

The miniTwin2 safety light curtain is an electro-sensitive protective equipment (ESPE) type 2 according to EN 61496-1. The safety level of the miniTwin2 corresponds to category 2 PL d according to EN ISO 13849-1 and SIL2 according to IEC 61508.

The miniTwin2 safety light curtain is suitable for:

- hazardous point protection (finger and hand protection)
- hazardous area protection
- access protection

Access to the hazardous point must be allowed only through the protective field. The plant/system is not allowed to start as long as personnel are within the hazardous area. Refer to section 3.3 "Application examples" on page 14 for an illustration of the protection modes.



WARNING

Only use the safety light curtain as an indirect protective measure!

An opto-electronic protective device provides indirect protection, e.g. by switching off the power at the source of the hazard. It cannot provide protection from parts thrown out, nor from emitted radiation. Transparent objects are not detected.

Depending on the application, mechanical guards may be required in addition to the safety light curtain.

2.3 Correct use

The miniTwin2 safety light curtain must be used only as defined in section 2.2 “Applications of the device”. It must be used only by qualified personnel and only on the machine where it has been installed and initialised by qualified safety personnel in accordance with these operating instructions.

If the device is used for any other purposes or modified in any way – also during mounting and installation – any warranty claim against SICKAG shall become void.

2.4 General safety notes and protective measures



WARNING

Safety notes

Please observe the following procedures in order to ensure the correct and safe use of the miniTwin2 safety light curtain.

- The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the safety light curtain, in particular:
 - Machinery Directive 2006/42/EC
 - Work Equipment Directive 2009/104/EC
 - the work safety regulations/safety rules
 - other relevant health and safety regulations

Manufacturers and operators of the machine on which the safety light curtain is used are responsible for obtaining and observing all applicable safety regulations and rules.

- The notices, in particular the test regulations (see section 6.7 “Test notes” on page 56) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- Only qualified safety personnel may change the configuration (see section 2.1 “Qualified safety personnel” on page 8). Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device.

The person who makes the change is also responsible for the correct protective function of the device.

- The tests must be carried out by qualified safety personnel or specially qualified and authorised personnel and must be recorded and documented to ensure that the tests can be reconstructed and retraced at any time.
- The operating instructions must be made available to the operator of the machine where the miniTwin2 safety light curtain is fitted. The machine operator is to be instructed in the use of the device by qualified safety personnel and must be instructed to read the operating instructions.
- To meet the requirements of the relevant product standards (e.g. EN 61496-1), the external voltage supply for the devices (SELV) must be able to bridge a brief mains failure of 20 ms. The power supply must provide safe mains isolation (SELV/PELV) and have a current limit of max. 8 A. Power supplies according to EN 60204-1 satisfy this requirement. Suitable power supplies are available as accessories from SICK (see section 10.6 “Accessories” on page 77).

2.5 Environmental protection

The miniTwin2 safety light curtain has been designed to minimise environmental impact. It uses only a minimum of power and natural resources.

- At work, always act in an environmentally responsible manner.

2.5.1 Disposal

Unusable or irreparable devices should always be disposed as per the applicable national regulations on waste disposal (e.g. European waste code 16 02 14).

- Notes**
- We would be pleased to be of assistance on the disposal of this device. Contact us.
 - Information on the individual materials in the miniTwin2 is given in chapter 9 “Technical specifications” on page 64.

2.5.2 Separation of materials



WARNING

Only qualified safety personnel are allowed to separate materials!

Caution is required when dismantling devices. There is a risk of injuries.

Before you send the devices for appropriate recycling, it is necessary to separate the different materials in the miniTwin2.

- Separate the housing from the rest of the parts (in particular the circuit boards).
- Send the separated parts for recycling as appropriate (see Tab. 1).

Tab. 1: Overview on disposal by components

Components	Disposal
Product	
Housing	Metal recycling (aluminium)
Front screen	Plastic recycling
Bracket	Plastic recycling or metal recycling (aluminium)
End cap	Plastic recycling
Circuit boards	Electronic recycling
Plug connector	Electronic recycling
Connection plug and cable	Electronic recycling
Packaging	
Cardboard, paper	Paper/cardboard recycling
Polyethylene packaging	Plastic recycling

3 Product description

This chapter provides information on the special features and properties of the miniTwin2 safety light curtain. It describes the construction and the operating principle of the device.

➤ Please read this chapter before mounting, installing and commissioning the device.

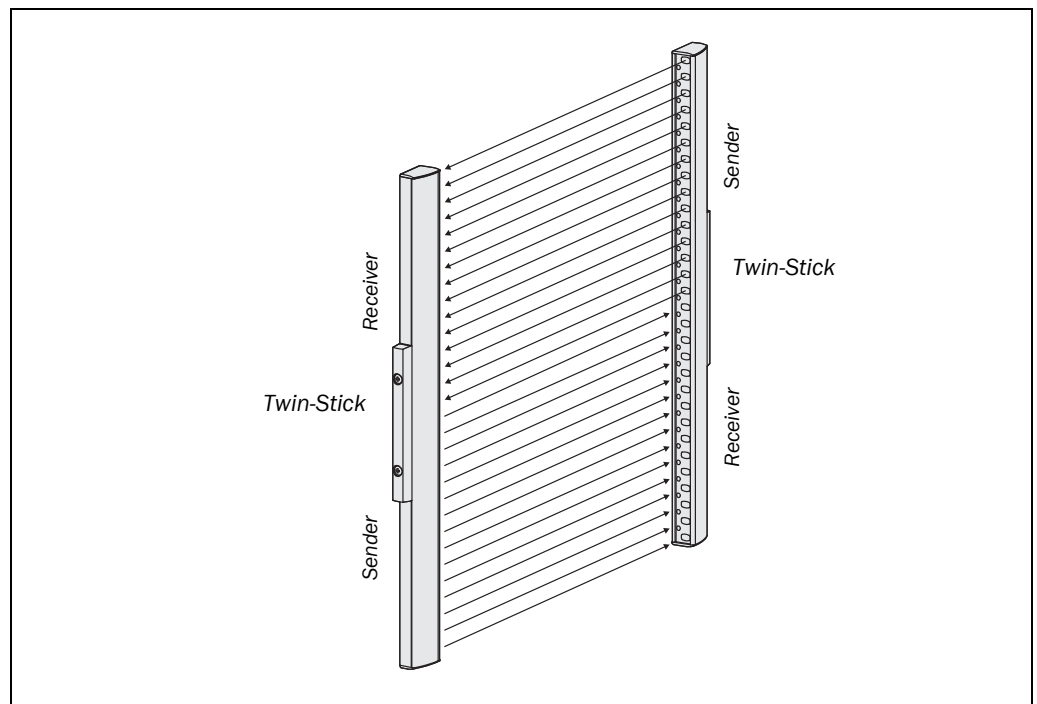
3.1 Special features

- small size, as a result very flexible in use on small systems or machines
- protective operation with Reset
- external device monitoring (EDM)
- status display with LEDs
- cascading of up to three miniTwin2 safety light curtains
- automatic beam coding, as a result low susceptibility to interference and high availability, even with several systems mounted side by side

3.2 Operating principle of the device

3.2.1 Device components

Fig. 1: Device components of the miniTwin2 safety light curtain



The miniTwin2 safety light curtain comprises two **identical Twin Sticks** of small size. Each Twin Stick contains both a sender unit and a receiver unit (Fig. 1). The two Twin Sticks are mounted such that sender unit and receiver unit are opposite each other. The housing shape makes mounting intuitive.

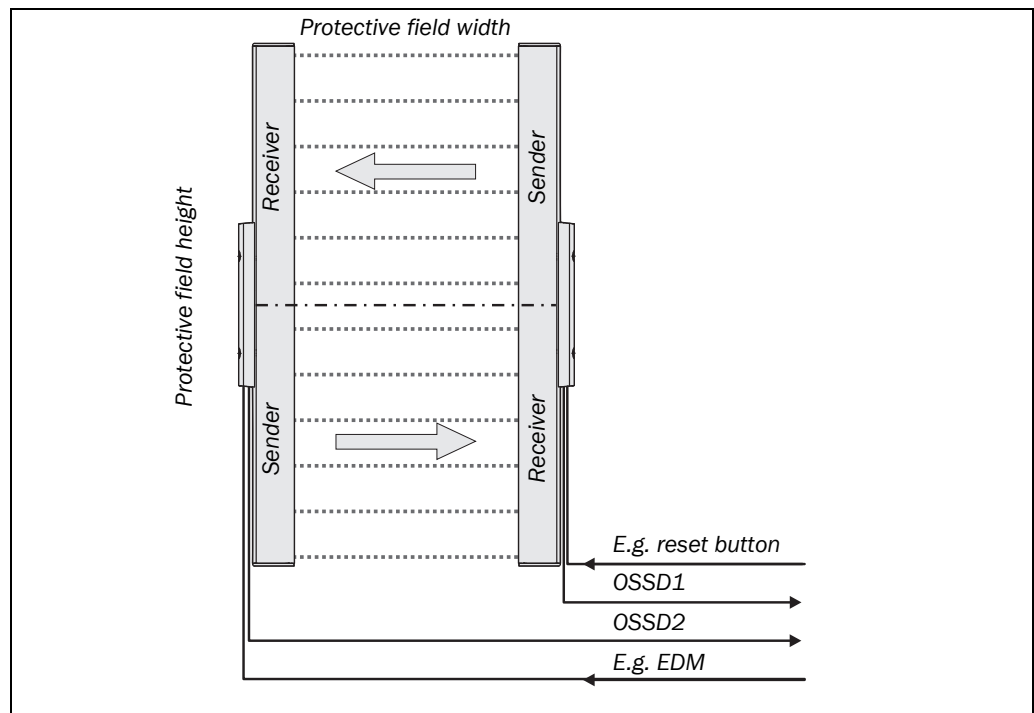
3.2.2 Operating principle safety light curtain

Between these two Twin Sticks is the protective field, defined by the protective field height and the protective field width.

The construction size determines the *protective field height* of the appropriate system. For the exact protective field height, please see Fig. 48 in section 9.3 “Dimensional drawings” on page 68.

The *protective field width* is derived from the dimension of the light path between the Twin Sticks and must not exceed the maximum permissible protective field width (see chapter 9 “Technical specifications” on page 64).

Fig. 2: Operating principle miniTwin2 safety light curtain



The two Twin Sticks automatically synchronise themselves optically. Each Twin Stick has an OSSD and a so-called multifunction connection. The OSSDs are integrated into the machine controller. It is possible to connect either a reset button or external device monitoring (EDM) to the multifunction connections.

Prerequisites for the protective function of the miniTwin2 safety light curtain

The miniTwin2 safety light curtain operates correctly as a protective device only if the following conditions are met:

- The control of the machine must be electrical.
- It must be possible to achieve a safe state on the machine at any time.
- The miniTwin2 safety light curtain must be mounted in such a way that objects penetrating into the hazardous area are safely identified.
- The reset button must be fitted outside the hazardous area such that it cannot be operated by a person working inside the hazardous area. When operating the reset button, the operator must have full visual command of the hazardous area.
- The statutory and local rules and regulations must be observed when installing and using the device.

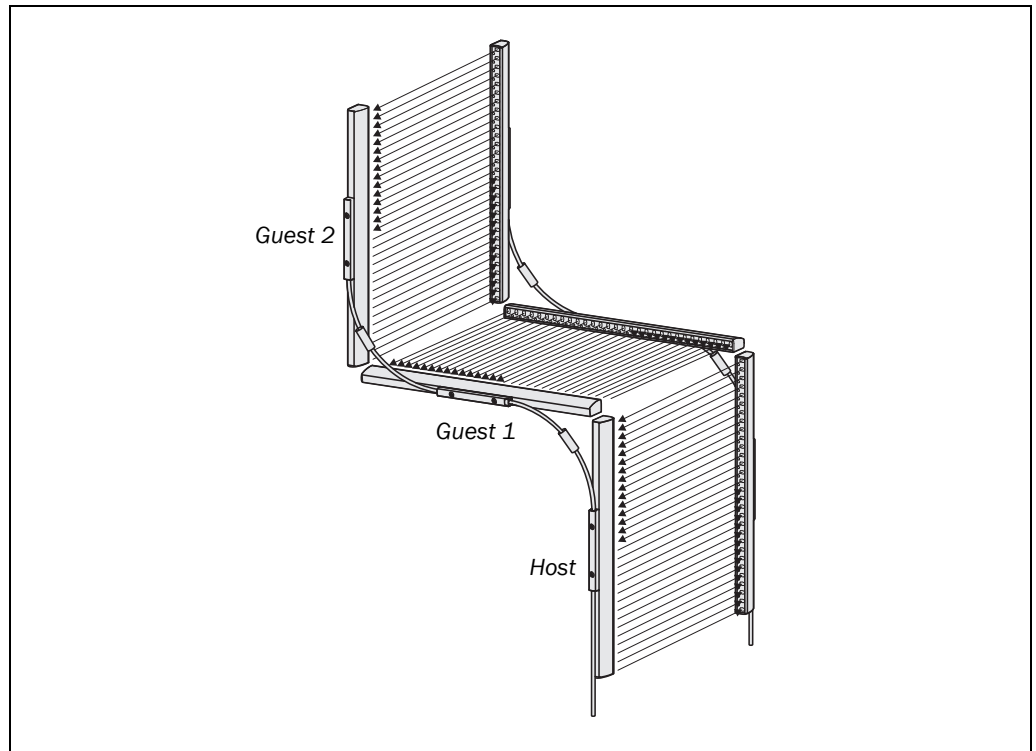
miniTwin2

3.2.3 Cascading

To provide effective presence detection a maximum of three miniTwin2 can be connected in series as “cascade”.

The device connected to the control cabinet is the main sensor, called *host*. The subsequent sensors are called *guest 1* and *guest 2*. On the host you can configure the Reset and EDM functions.

Fig. 3: Cascading of the miniTwin2 safety light curtain



The miniTwin2 can be connected together as required and form, without configuration, a functional cascaded system. After disconnecting cascaded systems to form individual systems, the individual miniTwin2 can also be used as a standalone devices without configuration.

Whether a device is used as a cascaded device or as a standalone device is defined by the connection plug.



WARNING

Check the effectiveness of the protective device after any change to a system using the test rod!

Check the effectiveness of the protective device as described in section 6.7 “Test notes” on page 56.

Benefits of cascading

- no additional external circuitry required, quick to connect
- resolution and protective field height may differ among the individual systems

Limits of cascading

- The maximum protective field width must be guaranteed for each individual system!
- The maximum cable length between two cascaded systems must not exceed 3 metres.
- You must maintain a minimum distance between the protective fields on the miniTwin2 host and miniTwin2 guest 2 (see section 4.1.3 “Minimum distance for cascaded systems” on page 25).

3.3 Application examples

Fig. 4: Hazardous point protection using a miniTwin2 safety light curtain (left)

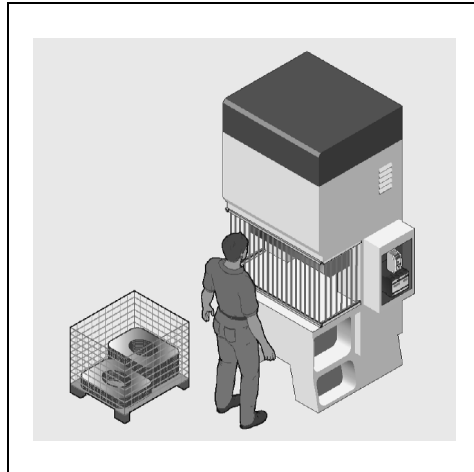


Fig. 5: Hazardous area protection using a miniTwin2 safety light curtain (right)

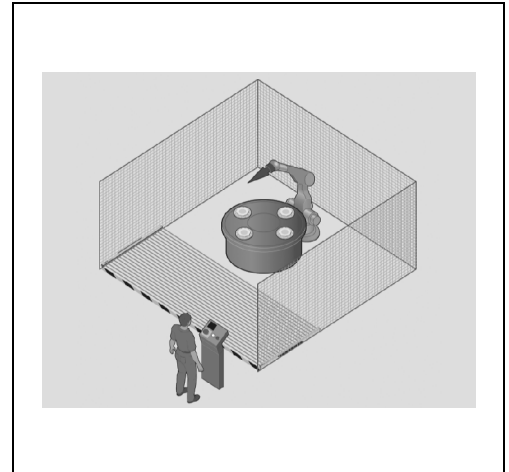
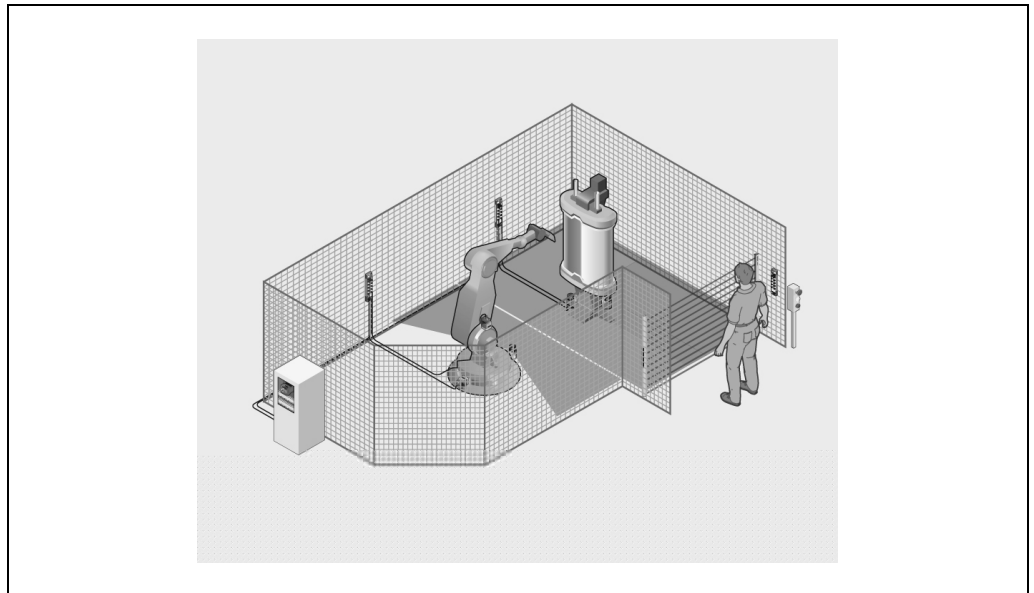


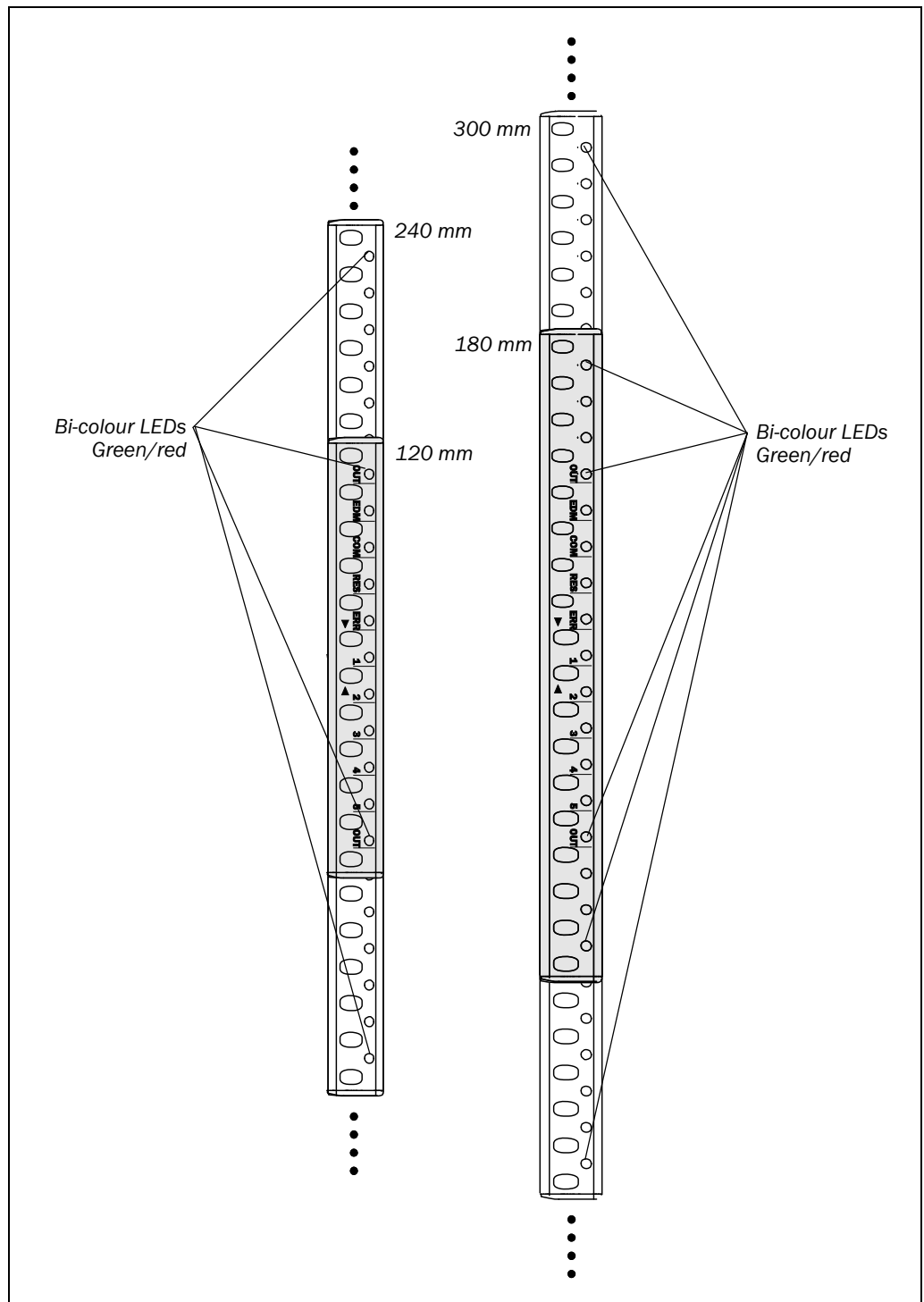
Fig. 6: Access protection using a miniTwin2 safety light curtain



miniTwin2

3.4 Status indicators

Fig. 7: Status indicators on the miniTwin2



- Notes**
- Illuminated LEDs indicate the status of the miniTwin2 safety light curtain. Flashing LEDs prompt you to take an action.
 - Fig. 7 shows the two smallest protective field heights 120 and 180 mm. In the case of safety light curtains with larger protective fields (240 mm, 300 mm etc.) the LED displays are always in the middle of the protective field. These miniTwin2 have further bi-colour LEDs that are fitted every 60 mm above and below the status indicators.

Tab. 2: Meaning of the status indicators

LED	Display	Comment
OUT	● Green/red	Bi-colour LED illuminates green, if protective field unoccupied (OSSD on)
		Bi-colour LED illuminates red, if protective field infringed (OSSDs off)
EDM	● Orange	External device monitoring configured
	☉ Orange	For the configuration of EDM on the first OSSD status change, the safety light curtain expects a change from 24 V to 0 V on the multifunction input. Or: In connection with the ERR LED ☉ Red: External device monitoring signalling faulty contactor
COM	● White	External communication active (e.g. for service)
	☉ White	No optical communication to another Twin Stick Or: Feedback on the deactivation of the configuration
RES	● Orange	Reset configured
	☉ Orange	Reset required Or: In connection with the ERR LED ☉ Red and the EDM LED ☉ Orange: Error in the configuration or the cabling. Please refer to chapter 8 on page 62.
ERR	● Red	Protective field infringed
	☉ Red	Error. Please refer to chapter 8 on page 62.
1, 2, 3, 4, 5	● Blue	Indication of the quality of the alignment. Please refer to section 6.2 on page 53.
	☉ Blue	In connection with the ERR LED ☉ Red: Display of an error. Please refer to chapter 8 on page 62. Or: Feedback on the deactivation of the configuration

3.5 Configurable functions

This section describes the functions of the miniTwin2 safety light curtain that can be configured.



WARNING

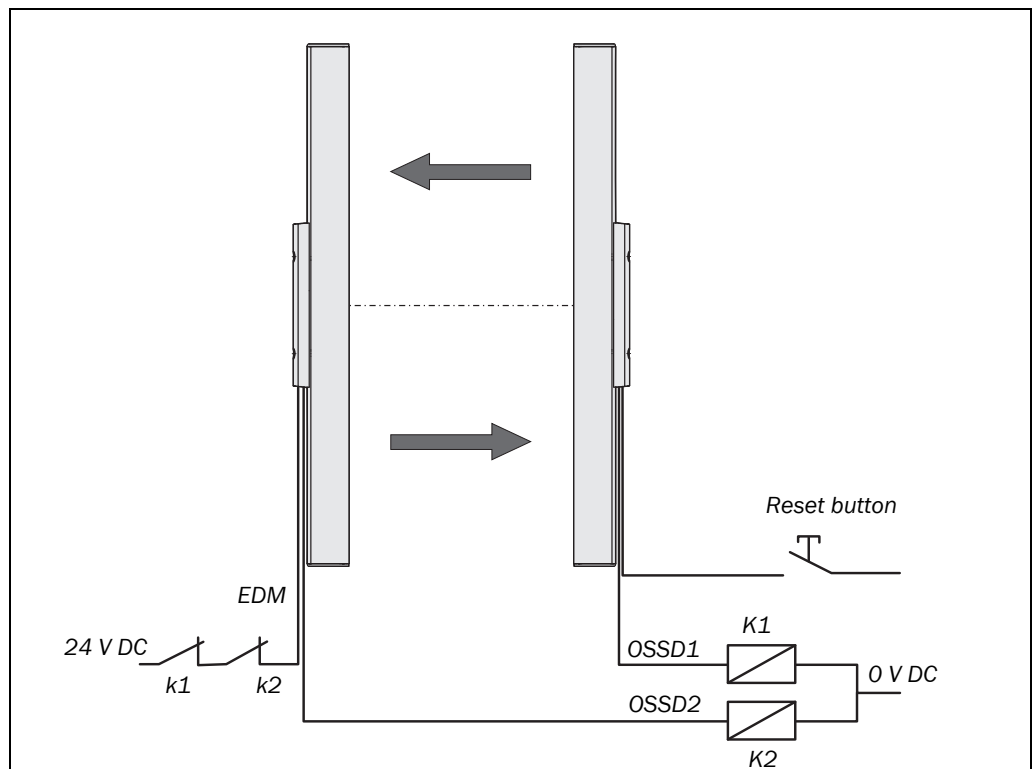
Test the protective device after any changes!

Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore check the effectiveness of the protective device (see section 6.7 “Test notes” on page 56).

The person who makes the change is also responsible for the correct protective function of the device.

Reset and external device monitoring can be configured on the miniTwin2 safety light curtain.

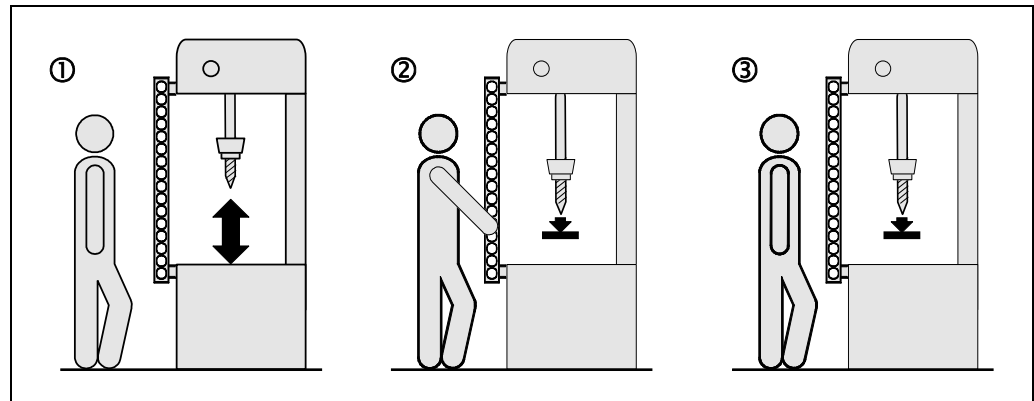
Fig. 8: Configurable functions



- Reset is configured by activating the reset button with a specific cycle (see section 6.5 “Configuration of the Reset function” on page 55).
- If the input is wired correctly to the contactors, the external device monitoring (EDM) is configured automatically the first time the OSSDs are switched (see sections 5.5 “External device monitoring (EDM)” on page 49 and 6.6 “Configuration of the external device monitoring (EDM)” on page 56).

3.5.1 Reset

Fig. 9: Outline drawing of the protective operation



The dangerous state of the machine (①) is interrupted if the light path is broken (②), and is not re-enabled (③) until the operator presses the reset button.

Note Do not confuse reset and the restart interlock with the starting interlock on the machine. The starting interlock prevents the machine starting after switching on. Reset and the restart interlock prevent the machine starting again after an error or an interruption of the light path.

- You can only implement a restart interlock via an external machine restart interlock: The miniTwin2 has no control over the restart.
- You can implement a reset using the Reset function on the miniTwin2: The miniTwin2 controls the machine start.



WARNING

Ensure on the usage of the Reset function that an erroneous start-up cannot result in a dangerous situation!

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Tab. 3: Permissible configuration of the restart interlock

The possible combinations of reset and restart interlock are shown in the following table:

Reset function of the miniTwin2	Restart interlock of the machine	Permissible application
Deactivated	Deactivated	Only if the safety light curtain cannot be stood behind. Observe EN 60 204-1!
Deactivated	Activated	All
Activated	Deactivated	Only if the safety light curtain cannot be stood behind. Observe EN 60 204-1! Note: It must be ensured that with the power supply to the machine switched on, access to the hazardous area is only possible via the active protective field on the safety light curtain. If this condition is not met, e.g. during maintenance work on the machine with a side cover open, it is imperative the supply of power to the machine is interrupted!
Activated	Activated	All (see "Reset and restart interlock on the machine" further below).



WARNING

It is imperative you configure the application with restart interlock if it is possible to stand behind the safety light curtain!

The miniTwin2 is unable to verify if the restart interlock of the machine is operable. If in applications in which it is possible to stand behind the safety light curtain you deactivate both the internal Reset function and the external restart interlock, you will place the machine operator in acute danger.

Notes

- The electrical connection of the reset button is described in section 5.4 "Reset button" on page 48.
- Section 6.5 "Configuration of the Reset function" on page 55 describes how to configure the function.

Reset and restart interlock on the machine

If you activate reset on the miniTwin2 and implement a restart interlock on the machine, then reset and restart interlock each have a dedicated button.

After actuation of the reset button ...

- the miniTwin2 activates the output signal switching devices.
- the safety light curtain switches to green.

Only the external restart interlock prevents the machine from restarting. After pressing the reset button for the miniTwin2, the operator must also press the restart button for the machine. If the reset button and the restart button are not pressed in the specified sequence, the dangerous state remains disrupted.

Recommendation

The reset button prevents the accidental and inadvertent operation of the external restart button. The operator must first acknowledge the safe state with the reset button.

3.5.2 External device monitoring (EDM)

The EDM checks if the contactors actually de-energize when the protective device responds. If you activate external device monitoring, then the miniTwin2 checks the contactors after each interruption to the light path and prior to the machine restart. The EDM can so identify if one of the contactors has welded, for instance. In this case the external device monitoring places the system in a safe operational state. The OSSDs are not re-activated in this case.

- Notes**
- The electrical connection for the external device monitoring is described in section 5.5 “External device monitoring (EDM)” on page 49.
 - Section 6.6 “Configuration of the external device monitoring (EDM)” on page 56 describes how to configure the function.

4 Mounting

This chapter describes the preparation and completion of the mounting of the miniTwin2 safety light curtain. The mounting requires two steps:

- determining the necessary minimum distance
- mounting using the available brackets (see section “Safety light curtains” in the SICK product catalogue “Industrial Safety Systems” or www.sick.com)

The following steps are necessary after mounting:

- completing the electrical connections (chapter 5)
- alignment of the miniTwin2 safety light curtain (section 6.2)
- testing the installation (section 6.7)

4.1 Determining the minimum distance

The safety light curtain must be mounted with sufficient minimum distance:

- from the hazardous point
- from reflective surfaces



WARNING

No protective function without sufficient minimum distance!

The reliable protective effect of the safety light curtain depends on the system being mounted with the correct minimum distance from the hazardous point.

4.1.1 Minimum distance from the hazardous point

A minimum distance must be maintained between the safety light curtain and the hazardous point. This ensures that the hazardous point can only be reached after the dangerous state of the machine has been completely stopped.

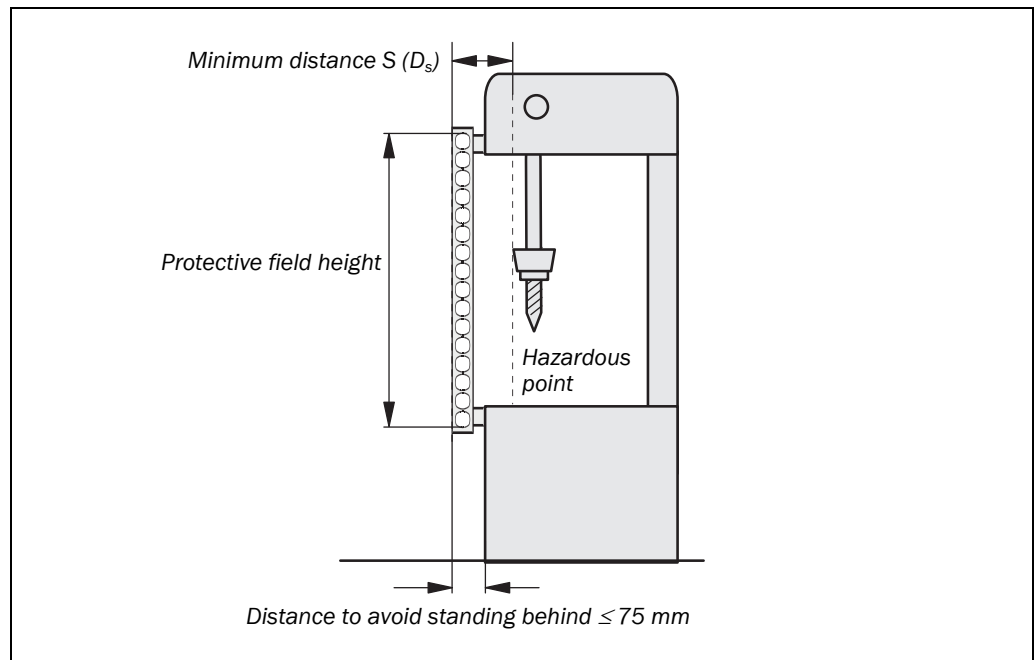
The minimum distance as per EN ISO 13 855 and EN ISO 13 857 depends on:

- stopping/run-down time of the machine or system
(the stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device, e.g. miniTwin2 consisting of host and guest (response times see 9.1 “Data sheet” on page 64)
- reach or approach speed
- resolution of the safety light curtain and/or beam separation
- other parameters that are stipulated by the standard depending on the application

Under the authority of OSHA and ANSI the minimum distance as specified by ANSI B11.19:2003-04, Annex D and Code of Federal Regulations, Volume 29, Part 1910.217 ... (h) (9) (v) depends on:

- stopping/run-down time of the machine or system (the stopping/run-down time is shown in the machine documentation or must be determined by taking a measurement.)
- response time of the entire protective device, e.g. miniTwin2 consisting of host and guest (response times see 9.1 “Data sheet” on page 64)
- reach or approach speed
- other parameters that are stipulated by the standard depending on the application

Fig. 10: Minimum distance from the hazardous point



How to calculate the minimum distance S according to EN ISO 13 855 and EN ISO 13 857:

Note The following calculation shows an example calculation of the minimum distance. Depending on the application and the ambient conditions, a different calculation may be necessary.

➤ First, calculate S using the following formula:

$$S = 2000 \times T + 8 \times (d - 14) \text{ [mm]}$$

Where ...

T = Stopping/run-down time of the machine

+ Response time of the protective device after light path interruption [s]

d = Resolution of the safety light curtain [mm]

S = Minimum distance [mm]

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

- If the result S is ≤ 500 mm, then use the determined value as the minimum distance.
- If the result S is > 500 mm, then recalculate S as follows:

$$S = 1600 \times T + 8 \times (d - 14) \text{ [mm]}$$
- If the new value S is > 500 mm, then use the newly determined value as the minimum distance.
- If the new value S is ≤ 500 mm, then use 500 mm as the minimum distance.

Example:

Stopping/run-down time of the machine = 290 ms

Response time after light path interruption = 30 ms

Resolution of the safety light curtain = 14 mm

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

$$S = 2000 \times 0.32 + 8 \times (14 - 14) = 640 \text{ mm}$$

$S > 500 \text{ mm}$, for this reason:

$$S = 1600 \times 0.32 + 8 \times (14 - 14) = \underline{512 \text{ mm}}$$

How to calculate the minimum distance D_s according to ANSI B11.19:2003-04, Annex D and Code of Federal Regulations, Volume 29, Part 1910.217 ... (h) (9) (v):

Note The following calculation shows an example calculation of the minimum distance. Depending on the application and the ambient conditions, a different calculation may be necessary.

➤ Calculate D_s using the following formula:

$$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$$

Where ...

D_s = The minimum distance in inches (or millimetres) from the hazardous point to the protective device

H_s = A parameter in inches/second or millimetres/second, derived from data on approach speeds of the body or parts of the body. Often 63 inches/second (1600 mm/second) is used for H_s .

T_s = Stopping/run down time of the machine tool measured after the final control element

T_c = Response time of the control system

T_r = Response time of the entire protective device after light path interruption

T_{bm} = Additional time to compensate for the lack of brake wear monitoring

Note Any additional response times must be accounted for in this calculation.

D_{pf} = An additional distance added to the overall minimum distance required. This value is based on intrusion toward the hazardous point prior to actuation of the electro-sensitive protective equipment (ESPE). Values range from 0.25 inches to 48 inches (6 to 1220 millimetres) or more depending on application.

Example:

For perpendicular protection using an opto-electronic protective device with an object sensitivity (effective resolution) less than 2.5 inches (64 millimetres), D_{pf} can be approximated based on the following formula:

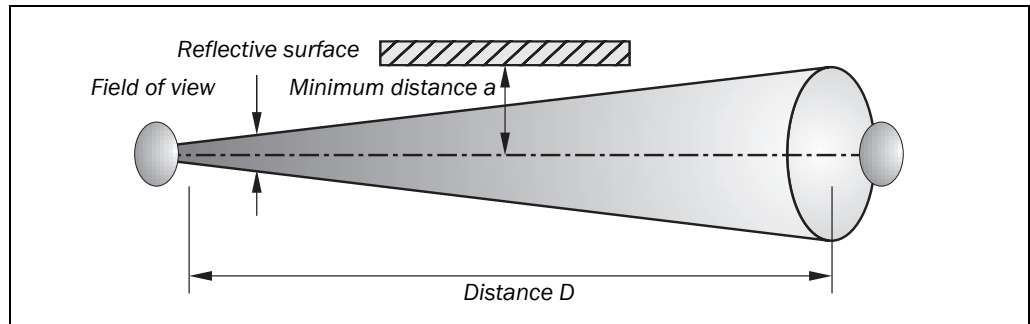
$$D_{pf} (\text{inches}) = 3.4 \times (\text{effective resolution} - 0.276), \text{ but not less than } 0.$$

4.1.2 Minimum distance to reflective surfaces

The light beams from the safety light curtain may be deflected by reflective surfaces. This can result in failure to identify an object.

All reflective surfaces and objects (e.g. material bins) must therefore be located at a minimum distance a from the protective field of the system. The minimum distance a depends on the distance D between the Twin Sticks.

Fig. 11: Minimum distance to reflective surfaces

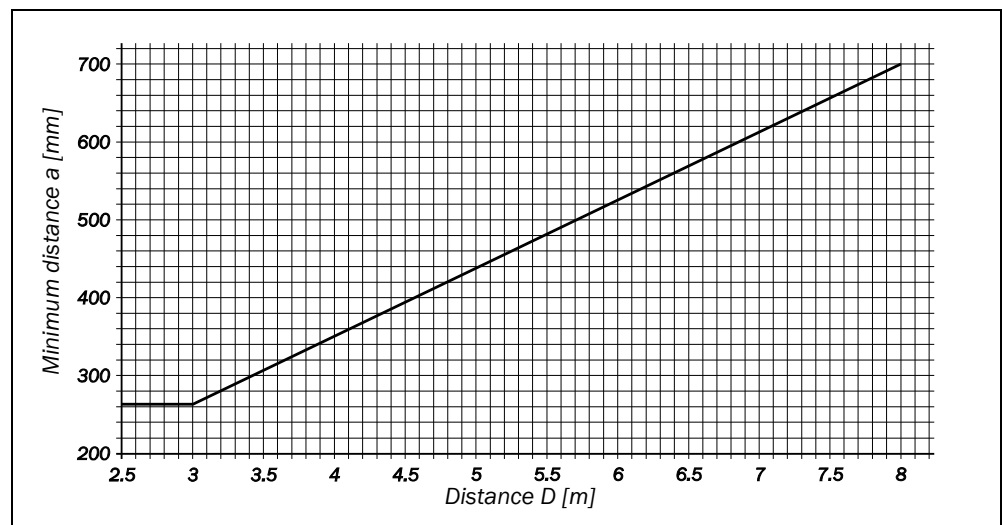


Note The field of view of the sender and receiver optics is identical.

How to determine the minimum distance from reflective surfaces:

- Determine the distance D [m] between the Twin Sticks.
 - Up to a protective field width of 3 m, the minimum distance is at least 262 mm.
- For a protective field width of more than 3 m, read the minimum distance a [mm] from the graph:

Fig. 12: Graph, minimum distance from reflective surfaces



Or:

- Calculate the minimum distance for a protective field width of more than 3 m using the formula

$$a \text{ [mm]} = \tan 5^\circ \times D \text{ [m]} \times 1000$$

Example:

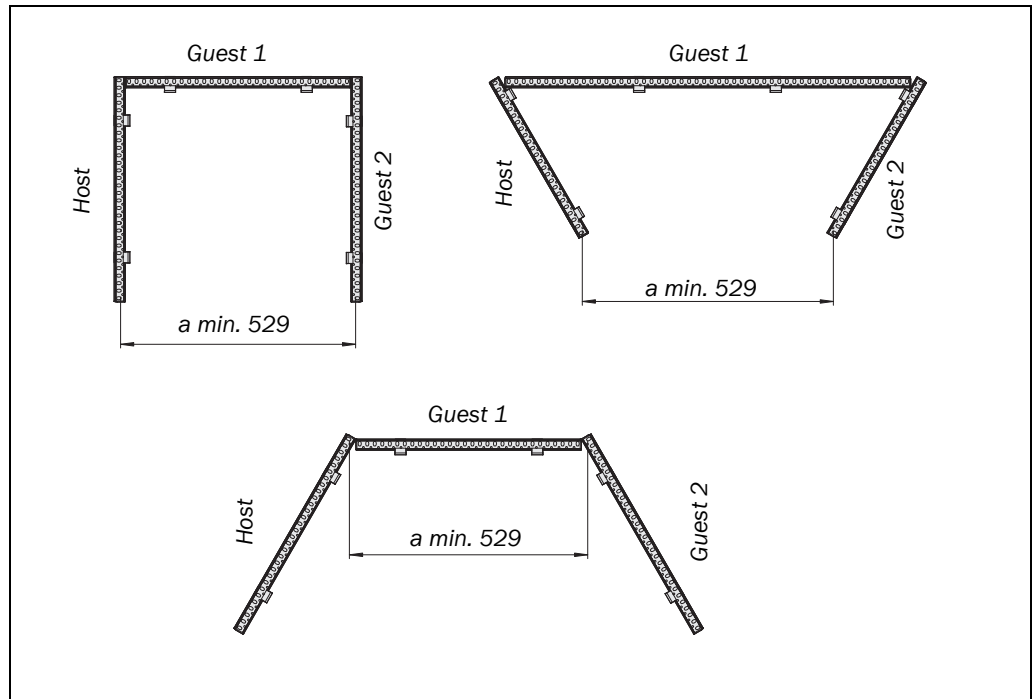
$$a = \tan 5^\circ \times 4 \text{ m} \times 1000$$

$$a = 349.95 \text{ mm} \sim 350 \text{ mm}$$

4.1.3 Minimum distance for cascaded systems

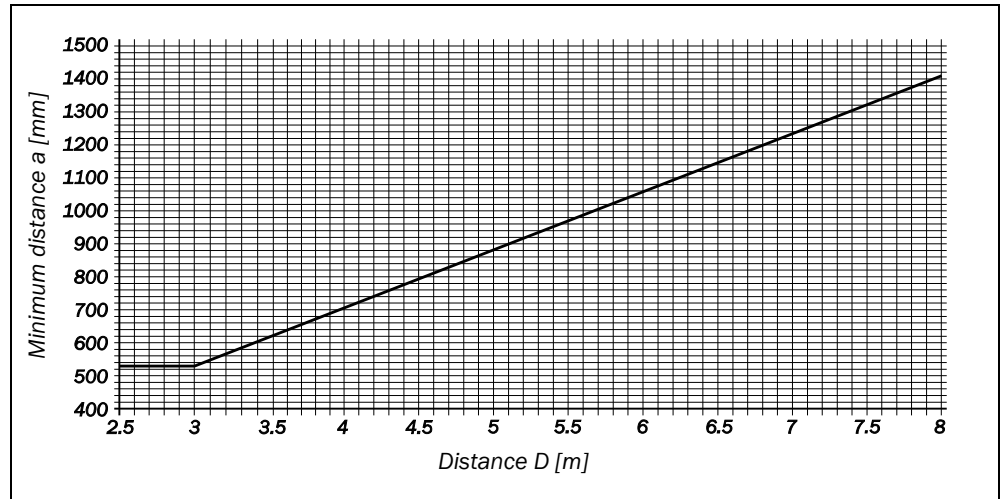
In a cascaded system with a protective field width of up to 3 m you must maintain a minimum distance of 529 mm between the host and guest 2 during mounting.

Fig. 13: Minimum distance between host and guest 2 (mm)



- For a protective field width of more than 3 m, read the minimum distance a [mm] from the graph:

Fig. 14: Diagram minimum distance between host and guest 2



Or:

- Calculate the minimum distance for a protective field width of more than 3 m using the formula

$$a \text{ [mm]} = \tan 10^\circ \times D \text{ [m]} \times 1000$$

Example:

$$a = \tan 10^\circ \times 4 \text{ m} \times 1000$$

$$a = 705.31 \text{ mm} \sim 706 \text{ mm}$$

4.2 Steps for mounting the device

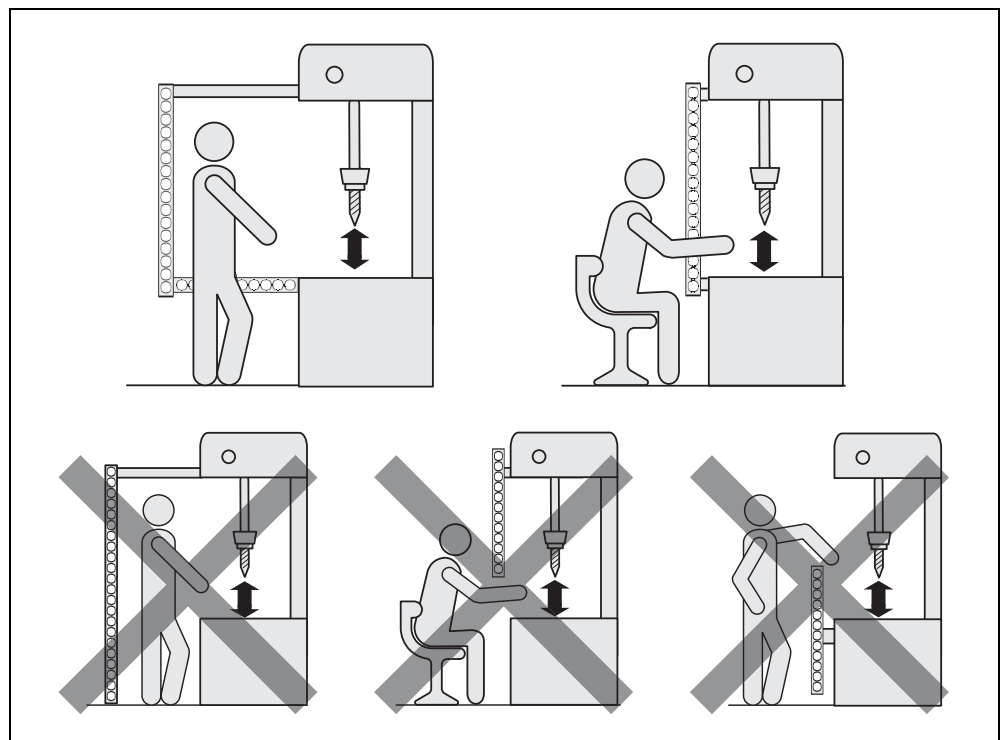


WARNING

Special features to note during mounting:

- Always mount the Twin Sticks on a flat surface.
- During mounting, ensure that the safety light curtain is aligned correctly. The two housings for the Twin Sticks must be exactly opposite each other.
- Take suitable measures to attenuate vibration if the shock requirements are above the values given in section 9.1 “Data sheet” on page 64.
- Observe the minimum distance of the system during mounting. On this subject read the section 4.1 “Determining the minimum distance” on page 21.
- Mount the safety light curtain such that reaching under, reaching over or standing behind the safety light curtain is not possible and that the safety light curtain cannot be displaced.

Fig. 15: The correct mounting (above) must eliminate the errors (below) standing behind, reaching under and reaching over

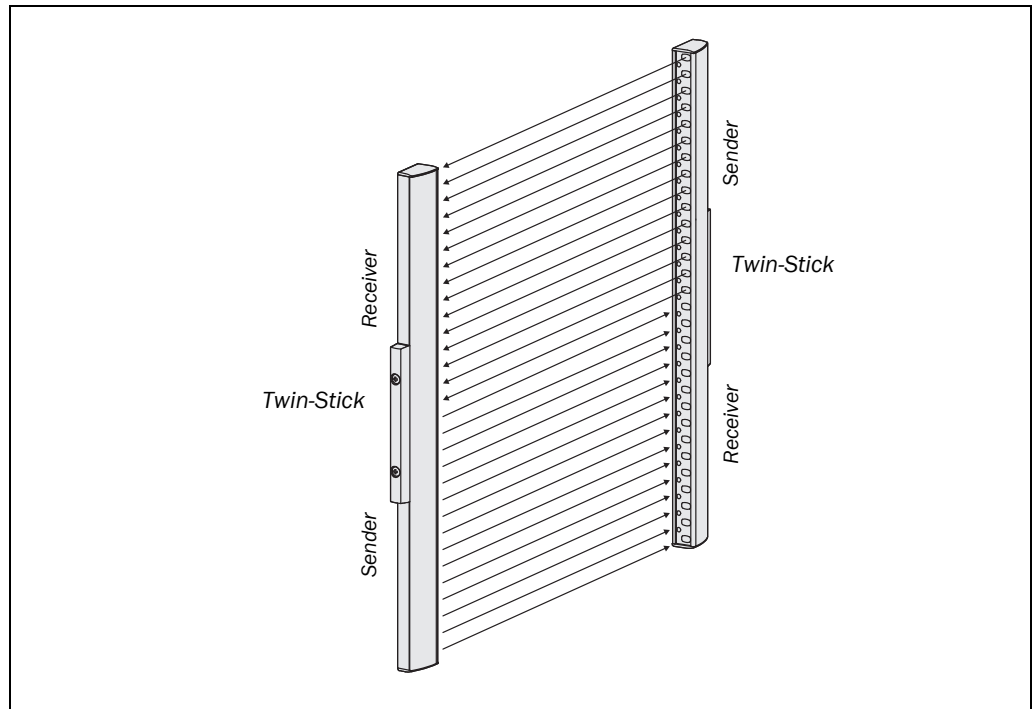


- Once the system is mounted, one or several of the enclosed self-adhesive safety information labels must be affixed:
 - Use only information labels which the operators of the machine can understand.
 - Affix the information labels such that they are easily visible by the operators during operation. After attaching additional objects and equipment, the information labels must not be concealed from view.
 - Affix the information label “Important Information” to the system in close proximity to the miniTwin2.

miniTwin2

4.2.1 Mounting direction of the Twin Sticks

Fig. 16: Mounting direction of the Twin Sticks



The miniTwin2 safety light curtain comprises two **identical Twin Sticks** of small size. Each Twin Stick contains both a sender unit and a receiver unit (Fig. 1). The two Twin Sticks are mounted such that sender unit and receiver unit are opposite each other. The housing shape makes mounting intuitive.

Note After the electrical installation, you can check the quality of the alignment of the safety light curtain (see section 6.2 on page 53). Please ensure even during mounting that the Twin Sticks are aligned.

4.2.2 Mounting possibilities

The miniTwin2 can be fastened in the following ways:

Tab. 4: Mounting possibilities

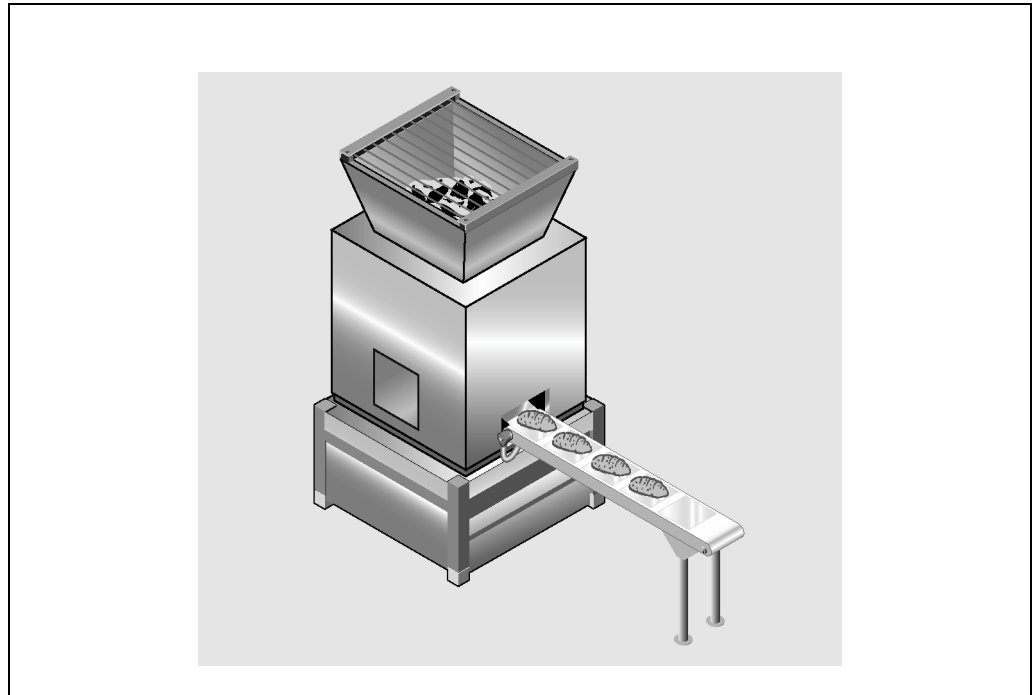
Bracket	Protective field height	Application characteristics	Page
O-Fix	≥ 180 mm	<ul style="list-style-type: none"> Fixed mounting position Flush Not suitable for cascading. 	28
C-Fix	≥ 180 mm	<ul style="list-style-type: none"> Flexible mounting position 	30
L-Fix	≤ 540 mm	<ul style="list-style-type: none"> Fixed mounting position Not suitable for cascading. 	32
Combination C-Fix/L-Fix	≥ 240 mm	<ul style="list-style-type: none"> Fixed mounting position of the L-Fix bracket Flexible mounting position of the C-Fix bracket 	34
C-Fix-Flex	≥ 180 mm	<ul style="list-style-type: none"> Flexible mounting position Flexible alignment of the protective field 	36

Refer on the internet to www.sick.com for additional information.

4.2.3 Mounting with O-Fix bracket

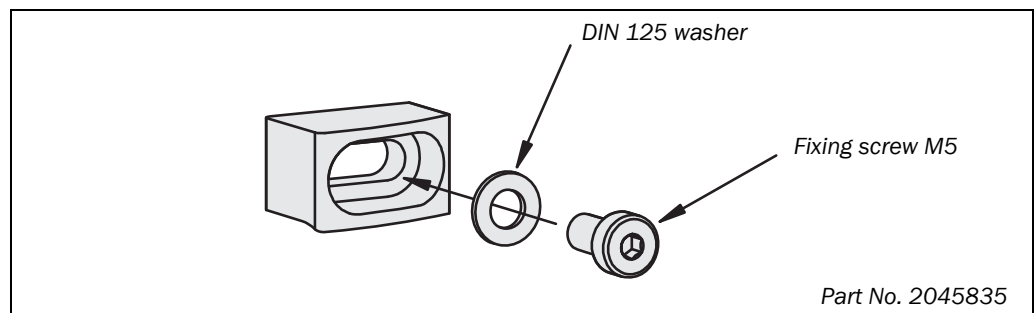
Using the O-Fix bracket you can mount the safety light curtain flat, e.g. directly on the machine base.

Fig. 17: Application example for mounting with O-Fix bracket



The O-Fix bracket is mounted at the top and bottom of the miniTwin2 safety light curtain. The length of the related Twin Stick is increased by ca. 13 mm by the O-Fix bracket (see dimensional drawing in section 9.3.2 on page 69).

Fig. 18: O-Fix bracket

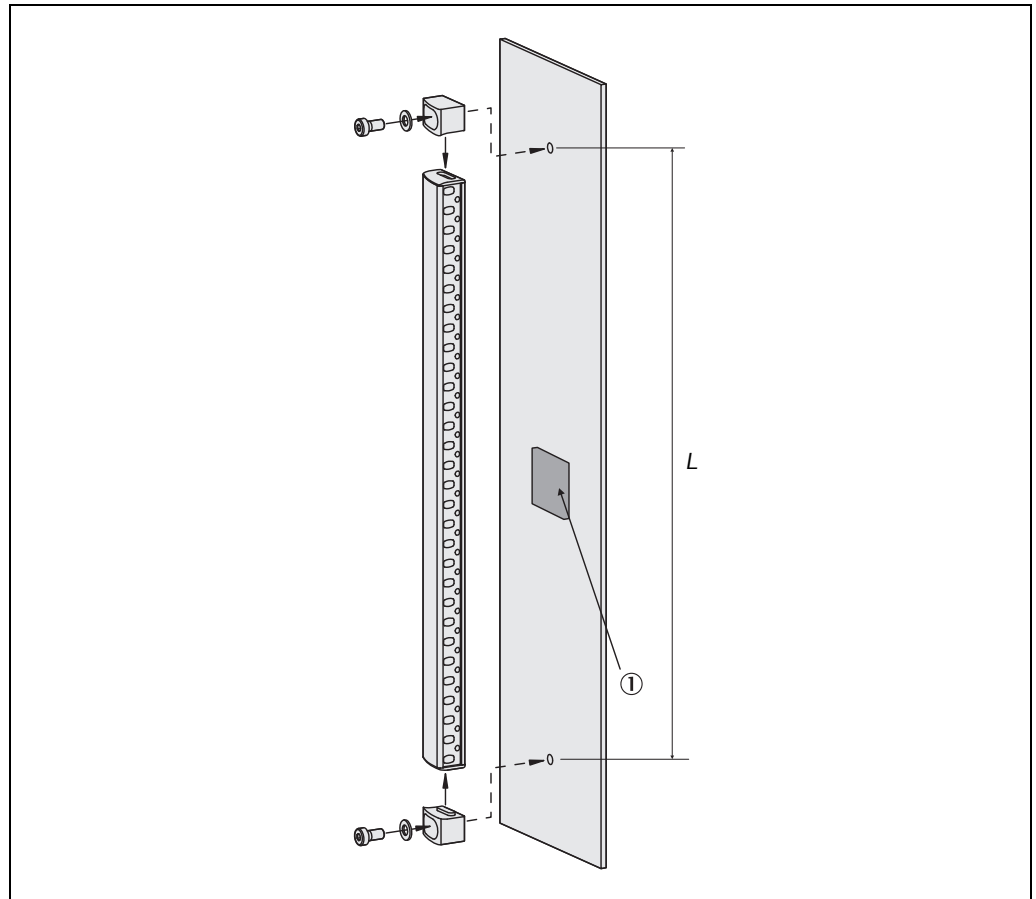


How to mount the miniTwin2 using O-Fix brackets:

- First mount the two O-Fix brackets in the correct positions, however do not tighten the fixing screws yet.
- Insert the Twin Stick between the two O-Fix brackets. In applications in which high vibration may occur, bond the Twin Stick to the mounting surface in the middle of the device using double-sided adhesive tape from a device length of 600 mm (see ① in Fig. 19 on page 29).
- Then fasten the screws of the O-Fix bracket to a torque of 5 Nm. Higher torques can damage the brackets; lower torques provide inadequate protection against displacement.

miniTwin2

Fig. 19: Mounting of the miniTwin2 with O-Fix bracket



Tab. 5: Hole distance for mounting with O-Fix bracket

Construction size of the Twin Stick [mm]	Hole distance L [mm]
120	132.6
180	192.6
240	252.6
300	312.6
360	372.6
420	432.6
480	492.6
540	552.6
600	612.6
660	672.6
720	732.6
780	792.6
840	852.6
900	912.6
960	972.6
1020	1032.6
1080	1092.6
1140	1152.6
1200	1212.6

4.2.4 Mounting with C-Fix bracket

The C-Fix bracket can be positioned very flexibly on the Twin Stick. It does not increase the length of the miniTwin2 safety light curtain.

Using the C-Fix bracket, Twin Sticks can be mounted with a butt joint or at right angles to each other without a reduction in the resolution at the butt joints.

Fig. 20: Application example for mounting with C-Fix bracket

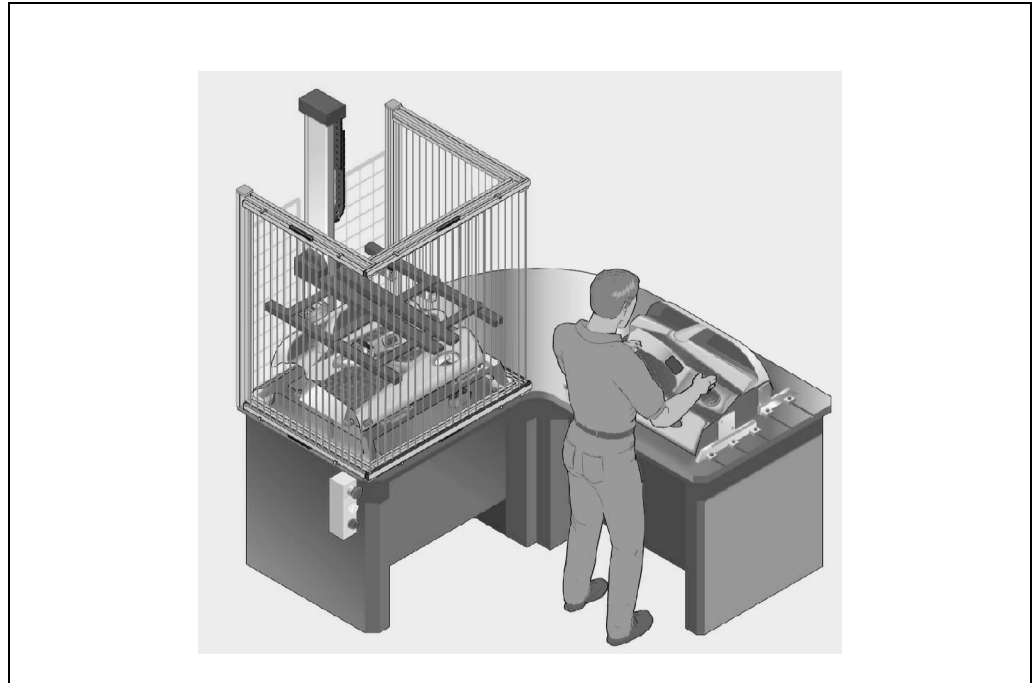
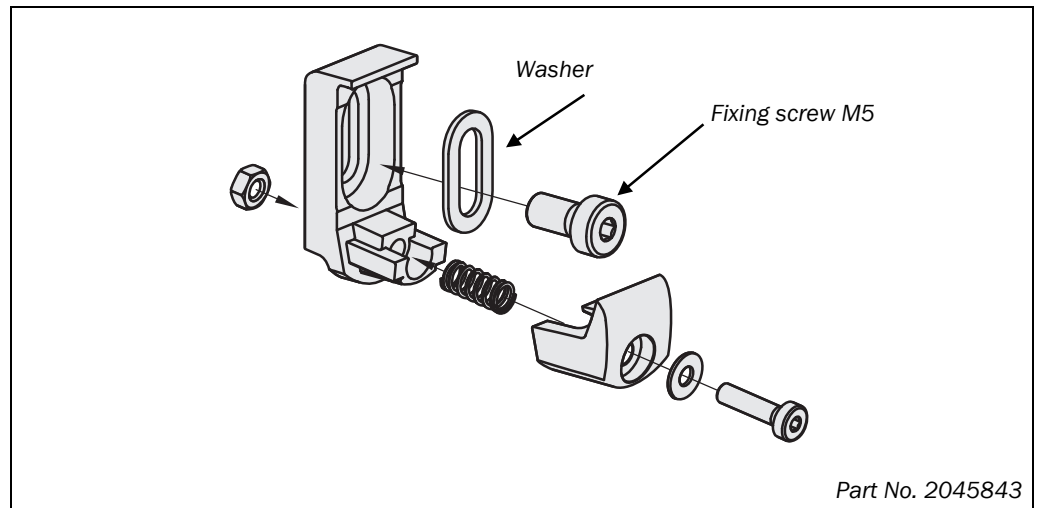


Fig. 21: C-Fix bracket



miniTwin2

How to mount the miniTwin2 with C-Fix brackets:

Note The C-Fix bracket can not be used on a device with a protective field height of 120 mm.

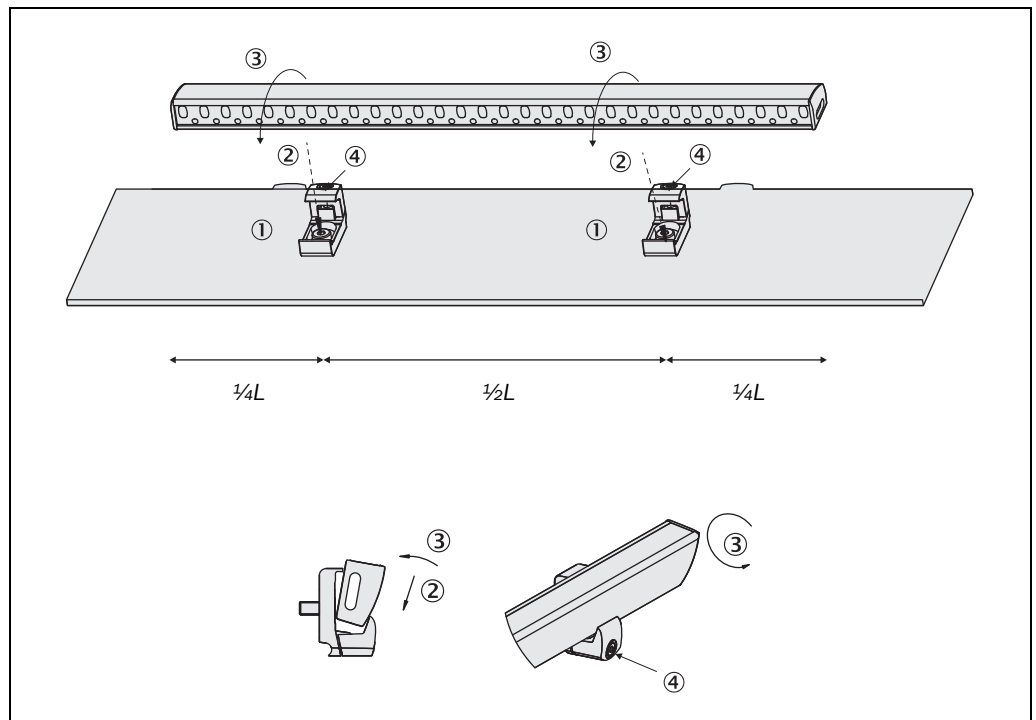
- Mount the C-Fix brackets (①) such that the Twin Stick is positioned at the correct height.

Recommendation

In applications in which juddering and vibration can occur as well as for sizes ≥ 360 mm we recommend mounting the brackets a distance of one quarter of the length of the Twin Stick from the end of the Twin Stick.

- Fasten the M5 screws to a torque approx. 3 Nm. Higher torques can damage the brackets; lower torques provide inadequate protection against displacement.

Fig. 22: Mounting of the miniTwin2 with C-Fix brackets



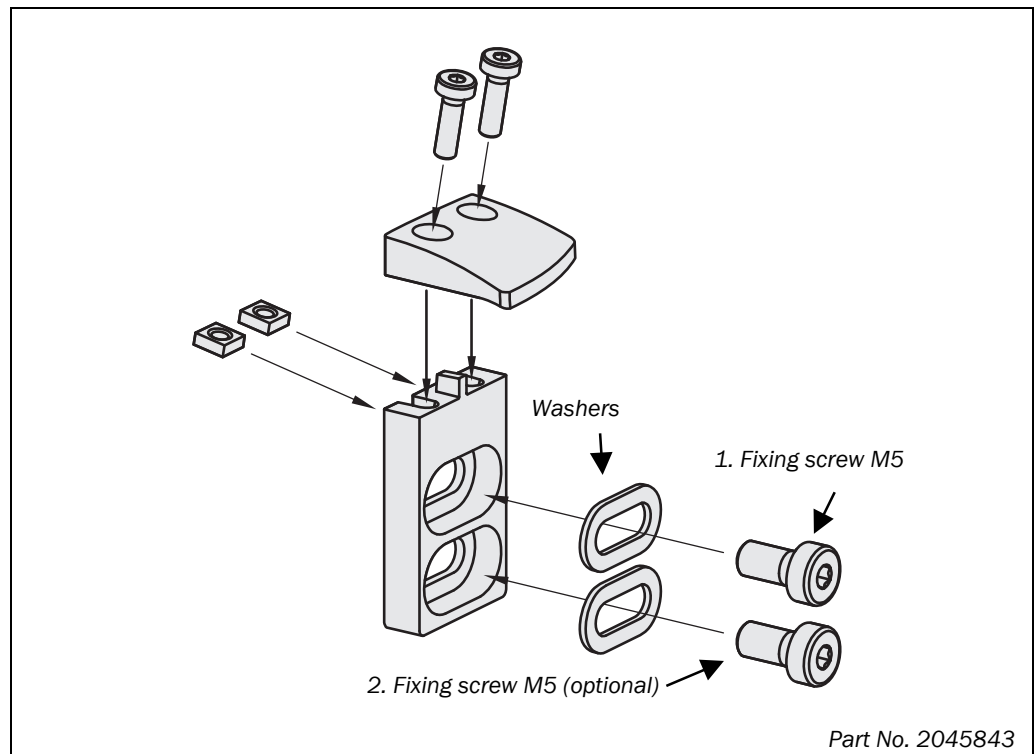
- Fit the Twin Stick in the C-Fix brackets and press it down gently (②).
- Rotate the Twin Stick to the rear until it engages in the C-Fix brackets (③).
- Move the Twin Stick to the required position.
- Fasten the M3 screws for the C-Fix brackets to a torque of approx. 1.5 Nm to fix the Twin Stick (④).

4.2.5 Mounting with L-Fix bracket

Mount the 120 mm miniTwin2 with the aid of two L-Fix brackets.

Note Mounting with two L-Fix brackets is only allowed up to a size of 540 mm.

Fig. 23: L-Fix bracket



Note ➤ Fasten the screws of the L-Fix bracket to a torque of approx. 3 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.

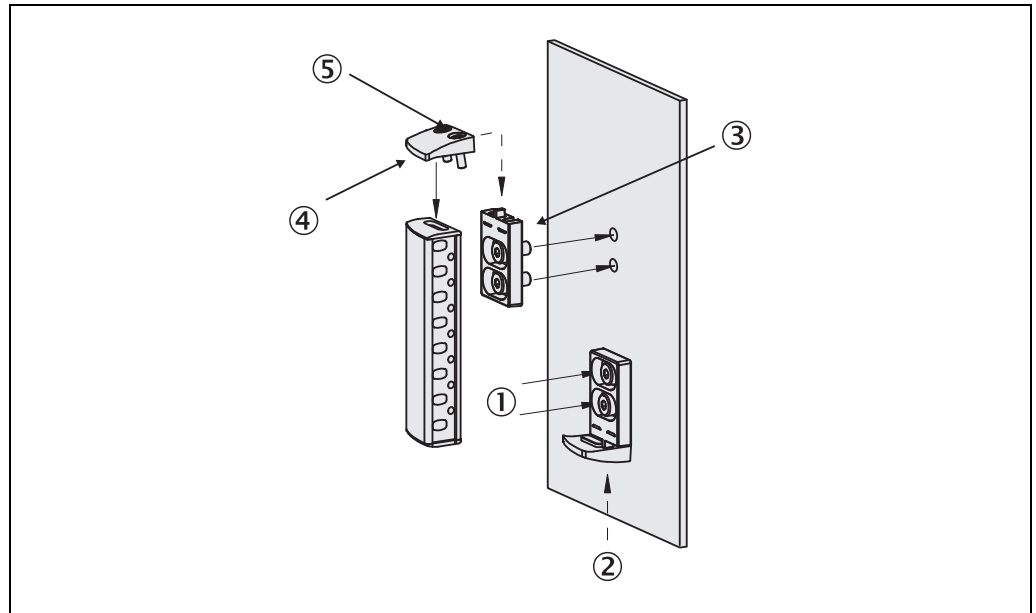
miniTwin2**How to mount the L-Fix bracket:**

- Mount the bottom L-Fix bracket (①) with end piece (②) fitted on the mounting surface such that the Twin-Stick is at the correct height.
- Mount the mounting plate (③) for the top L-Fix bracket such that the Twin Stick protrudes at the top by up to 1 mm.

Recommendation

- From a size of 420 mm use two fixing screws per mounting plate, to obtain increased protection against twisting of the L-Fix bracket.
- Fit the end piece (④) for the L-Fix bracket to the top end cap on the Twin Stick.
- Fasten the screws for the L-Fix bracket (⑤) to a torque of approx. 1.5 Nm, to obtain an adequate bracket clamping force.

Fig. 24: Mounting of the miniTwin2 with L-Fix bracket



4.2.6 Mounting with C-Fix bracket and L-Fix bracket

The C-Fix bracket can be combined with the L-Fix bracket. Then both the position of the safety light curtain is fixed and the flexible mounting of a C-Fix bracket is provided.

Recommendation

In applications in which juddering and vibration can occur as well as for sizes ≥ 360 mm we recommend mounting the brackets a distance of one quarter of the length of the Twin Stick from the end of the Twin Stick.

Fig. 25: Application example for mounting with C-Fix and L-Fix bracket

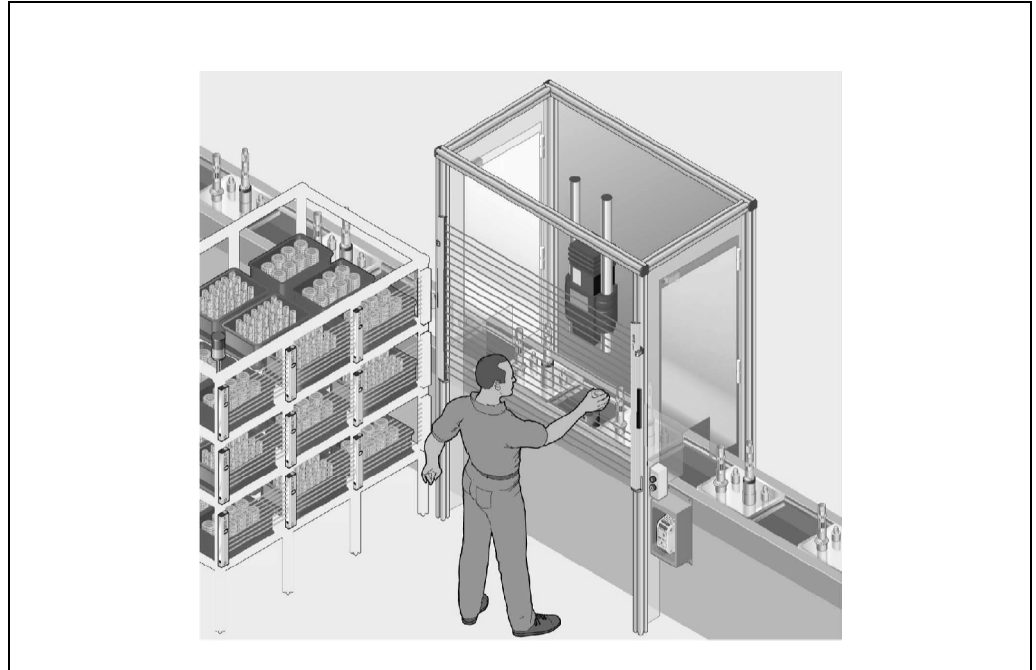
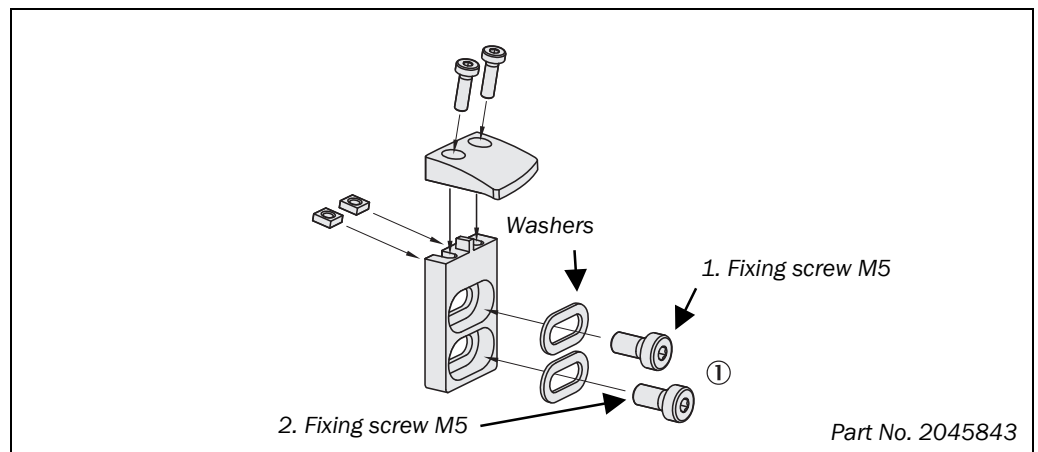


Fig. 26: L-Fix bracket

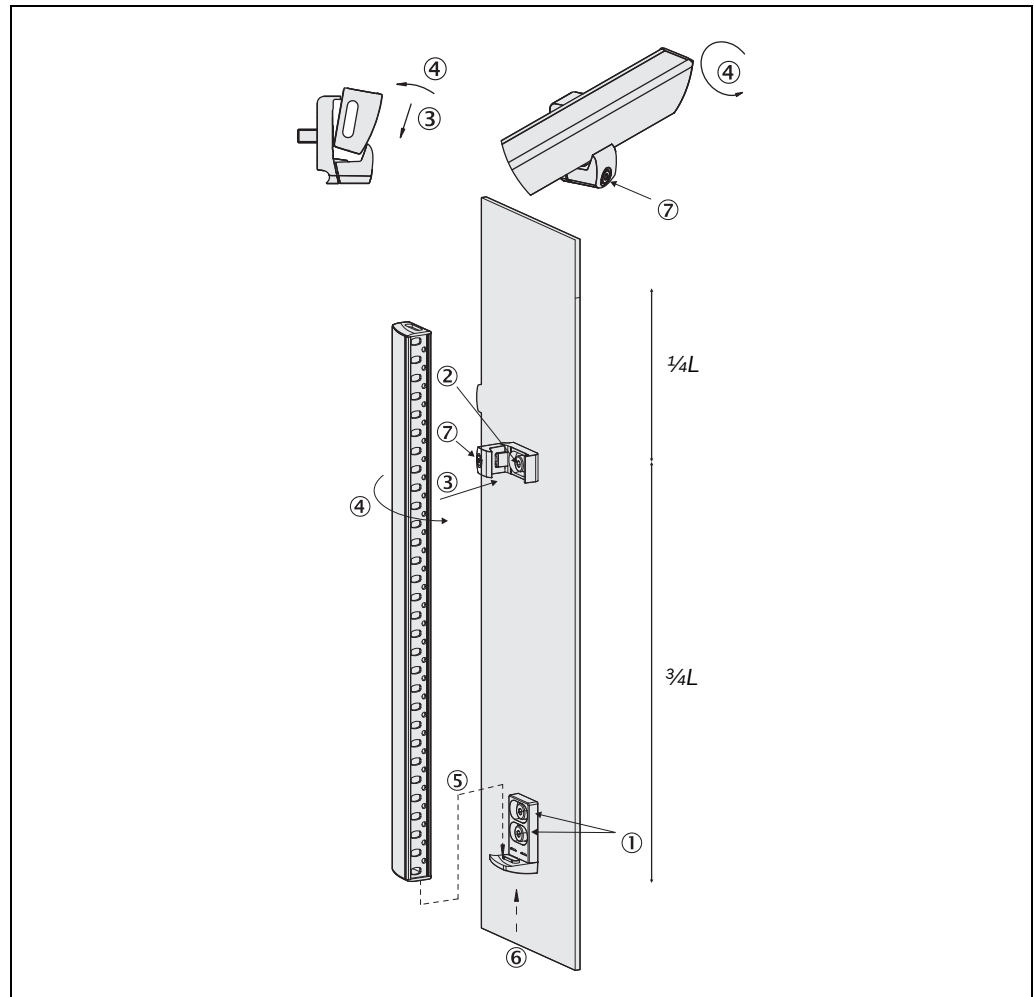


miniTwin2

How to mount the miniTwin2 using C-Fix brackets and L-Fix brackets:

- Mount the L-Fix bracket such that the Twin Stick is positioned at the correct height.
- Lightly tighten the first of the two fixing screws M5 (①).
Ensure the L-Fix bracket is initially only lightly fixed and does not twist.
- Now tighten the second of the two fixing screws M5 (①), also lightly.
- Now alternately fasten the two screws to a torque of approx. 3 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.

Fig. 27: Mounting of the miniTwin2 with C-Fix bracket and L-Fix bracket



- Mount the C-Fix bracket (②) on the other end of the Twin Stick.

Recommendation

- From devices with a size of 360 mm we recommend mounting an additional C-Fix bracket near the L-Fix bracket in case of high transverse forces on the housing.
- Fit the Twin Stick in the C-Fix bracket and press it down gently (③).
- Rotate the Twin Stick to the rear until it engages in the C-Fix bracket (④).
- Move the Twin Stick down until it is seated correctly in the L-Fix bracket (⑤).
- Fasten the M3 screws of the L-Fix bracket (⑥) to a torque of approx. 1,5 Nm.
- Fasten the M3 screws for the C-Fix bracket to a torque of approx. 1.5 Nm to fix the Twin Stick (⑦).

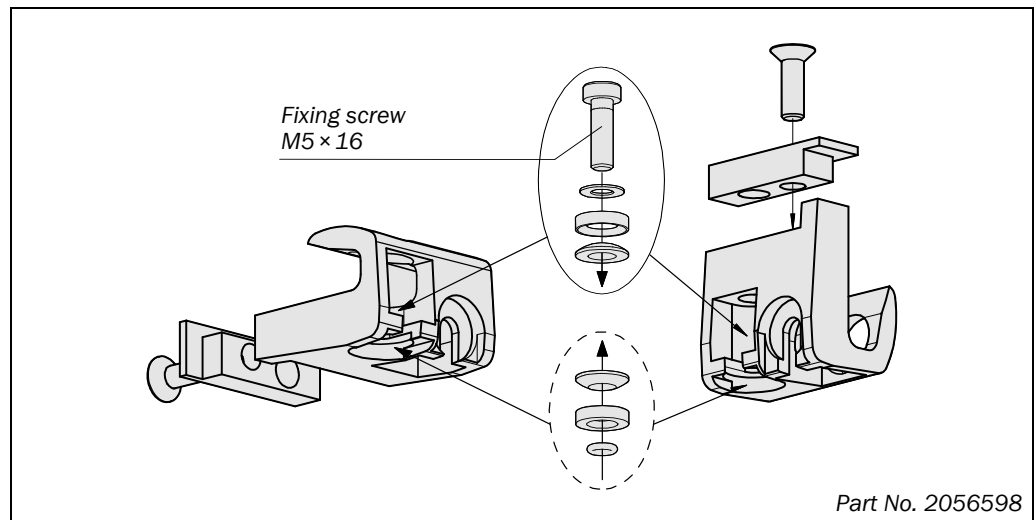
4.2.7 Mounting with C-Fix-Flex bracket

The C-Fix-Flex bracket can be positioned very flexibly on the Twin Stick. It does not increase the length of the safety light curtain miniTwin2.

Using the C-Fix-Flex bracket, Twin Sticks can be mounted with a butt joint or at right angles to each other without a reduction in the resolution at the butt joints.

Using the C-Fix-Flex bracket the Twin Sticks can be mounted such that the protective field is either parallel or perpendicular to the mounting surface. The C-Fix-Flex bracket makes it possible to correct the mounting angle by $\pm 4^\circ$.

Fig. 28: C-Fix-Flex bracket



How to mount the miniTwin2 using C-Fix-Flex brackets:

Note The C-Fix-Flex bracket can not be used on a device with a protective field height of 120 mm.

- First mount the C-Fix-Flex brackets (①) hand-tight and such that the Twin Stick is positioned at the correct height.

Recommendation

In applications in which juddering and vibration can occur as well as for sizes ≥ 360 mm we recommend mounting the brackets a distance of one quarter of the length of the Twin Stick from the end of the Twin Stick.

- Insert the Twin Stick in the C-Fix-Flex brackets and push it to the rear until it engages (②).
- Move the Twin Stick to the required position.
- Fasten the M3 screws for both C-Fix-Flex brackets to a torque of approx. 1.5 Nm to fix the Twin Stick (③).
- Correct the angle of the bracket for optimal alignment (④).
- Fasten the M5 fixing screws of both C-Fix-Flex brackets to a torque of approx. 5 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration (⑤).

miniTwin2

Fig. 29: Mounting using C-Fix-Flex bracket, protective field parallel to the mounting surface

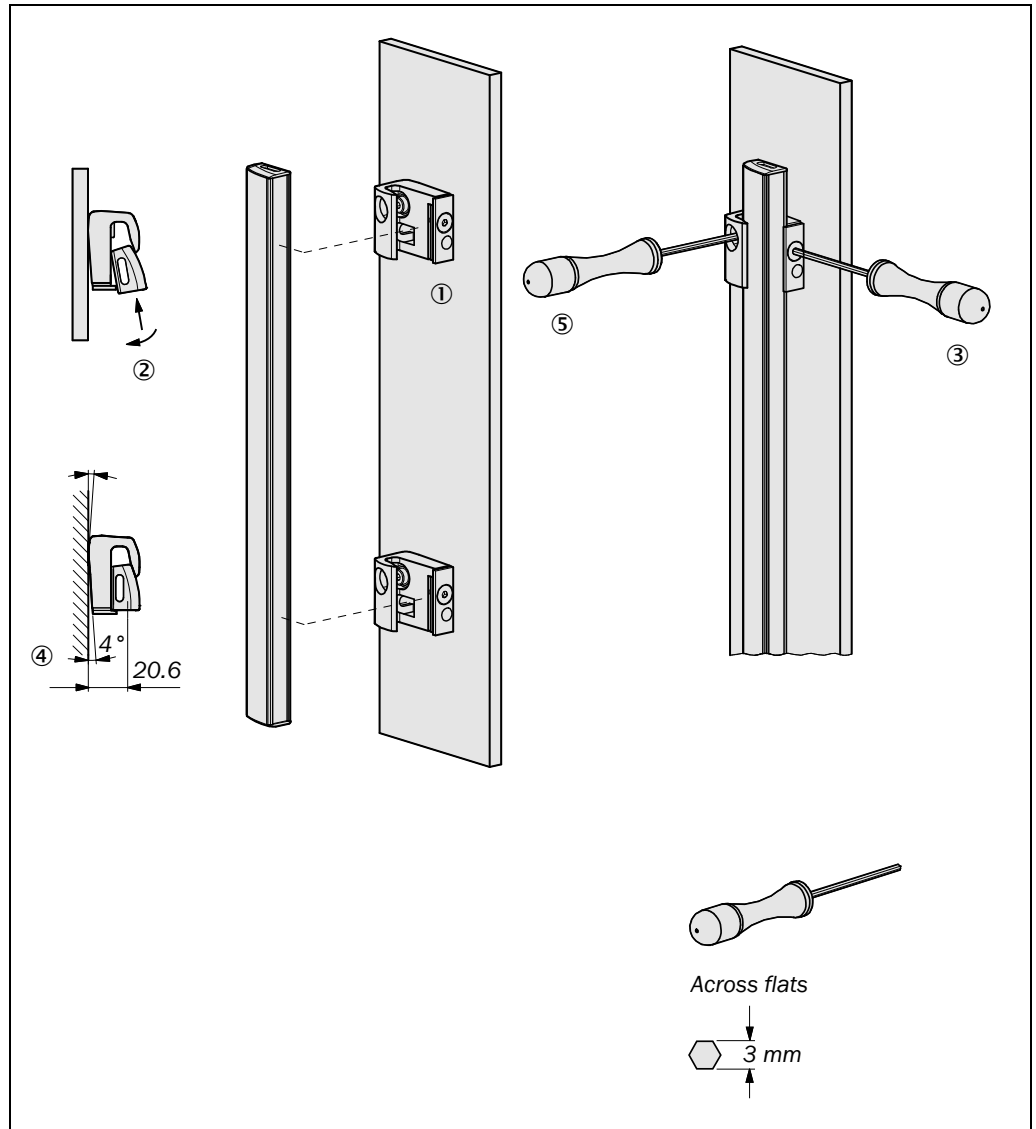
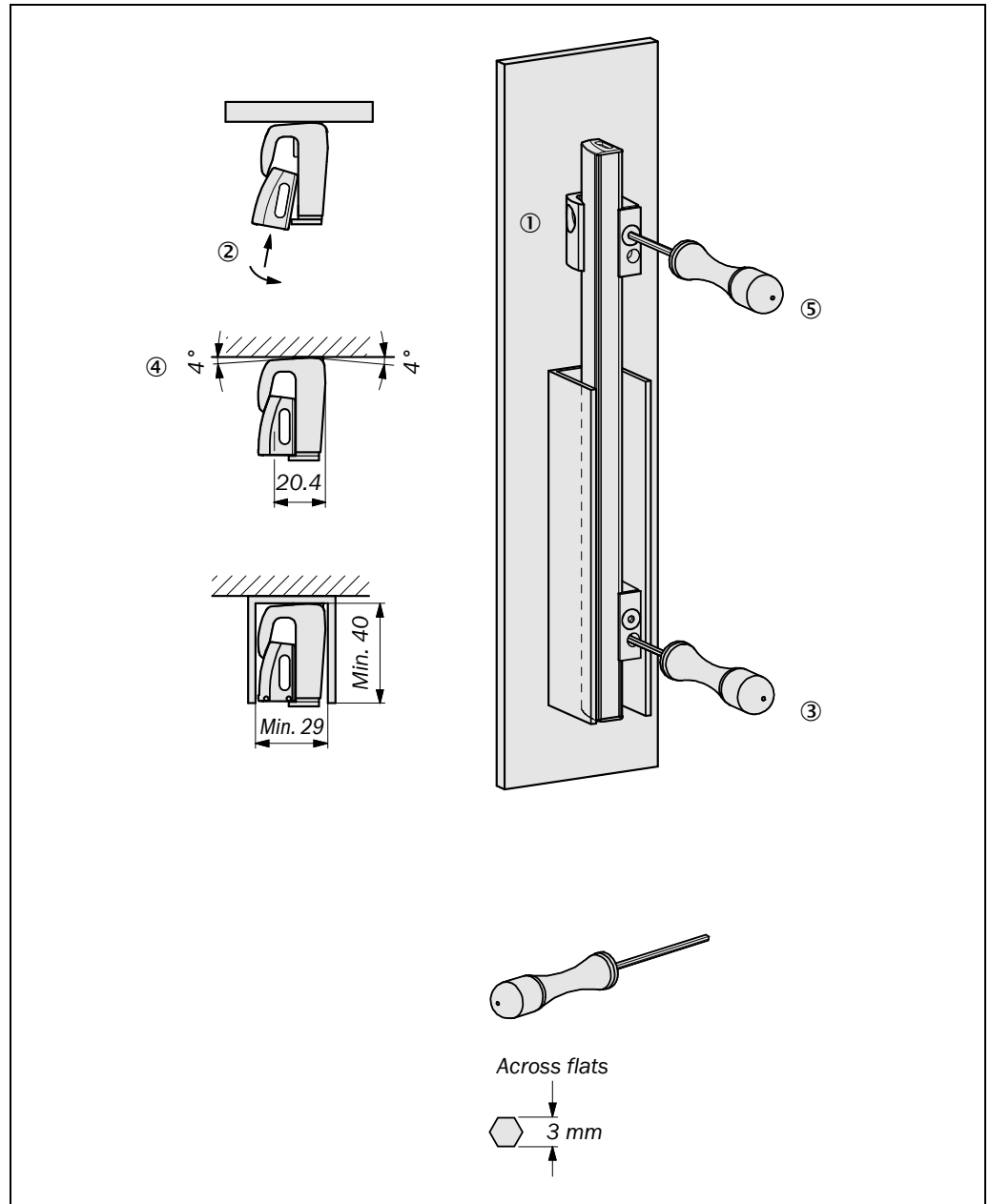


Fig. 30: Mounting using C-Fix-Flex bracket, protective field perpendicular to the mounting surface

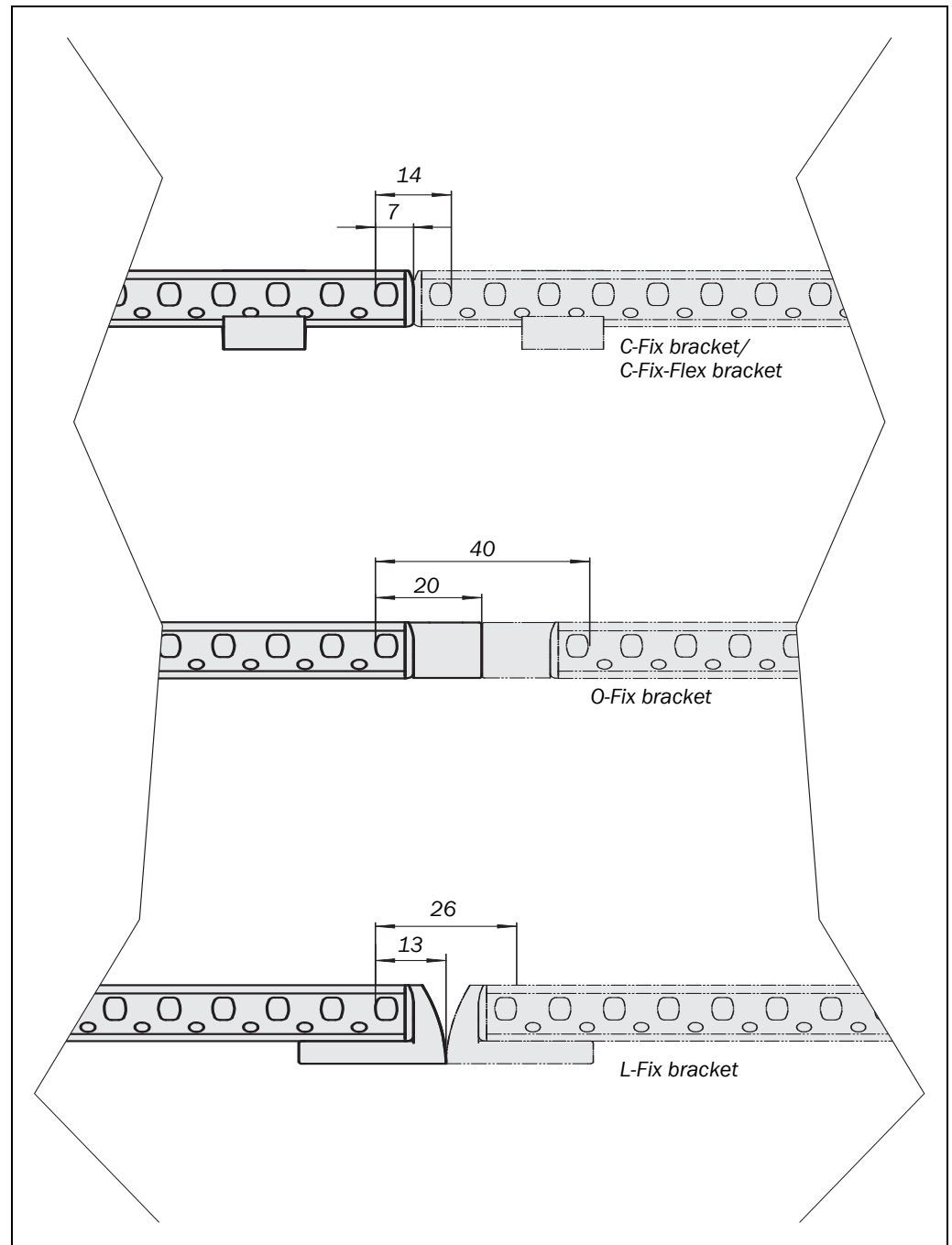


4.3 Resolution at the end of the Twin Sticks

If you mount several safety light curtains with butt joints or mount a safety light curtain on a wall, then the resolution will vary at the butt joints or the ends of the Twin Sticks depending on the type of bracket. Fig. 31 shows:

- The resolution between two Twin Sticks (higher value).
- The resolution for a butt joint between a Twin Stick and a wall or the floor (lower value).

Fig. 31: Resolution between Twin Sticks mounted with a butt joint or with a wall-mounted Twin Stick (mm)
Example: Twin-Sticks with 14 mm resolution



5 Electrical installation



WARNING

Switch the entire machine/system off line!

The machine/system could unintentionally start up while you are connecting the devices.

- Ensure that the entire machine/system is disconnected during the electrical installation.

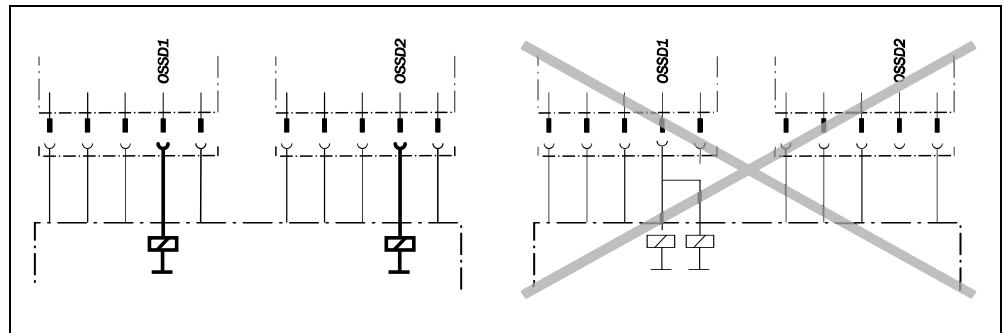
Ensure that downstream contactors are monitored!

Downstream contactors must be positively guided and monitored (see section 5.5 “External device monitoring (EDM)” on page 49)!

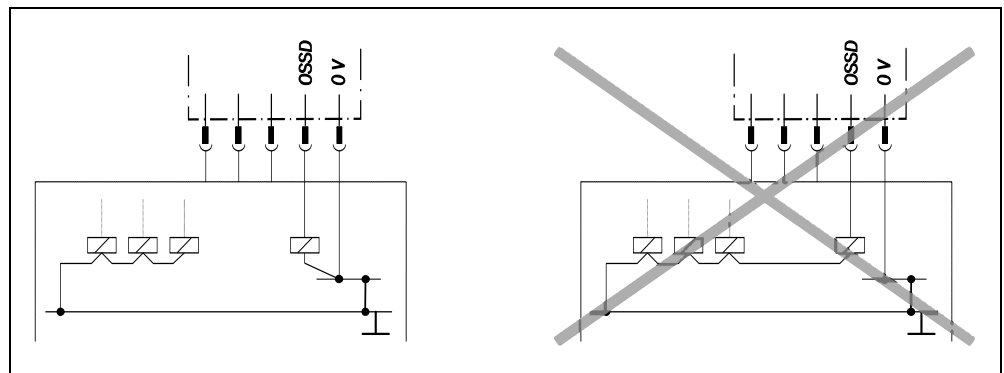
Connect OSSD1 and OSSD2 separately!

You are not allowed to connect OSSD1 and OSSD2 together, otherwise signal safety will not be ensured.

- Ensure that the machine controller processes the two signals separately.



- If you connect loads to the OSSDs that are not reverse polarity protected, then you must connect the 0 V connections for these loads and the related protective device separately, one after the other, to the same 0 V terminal strip. Only then is it ensured that in the case of a fault, it is not possible for a potential difference to form between the 0 V connections for the loads and the related protective device.



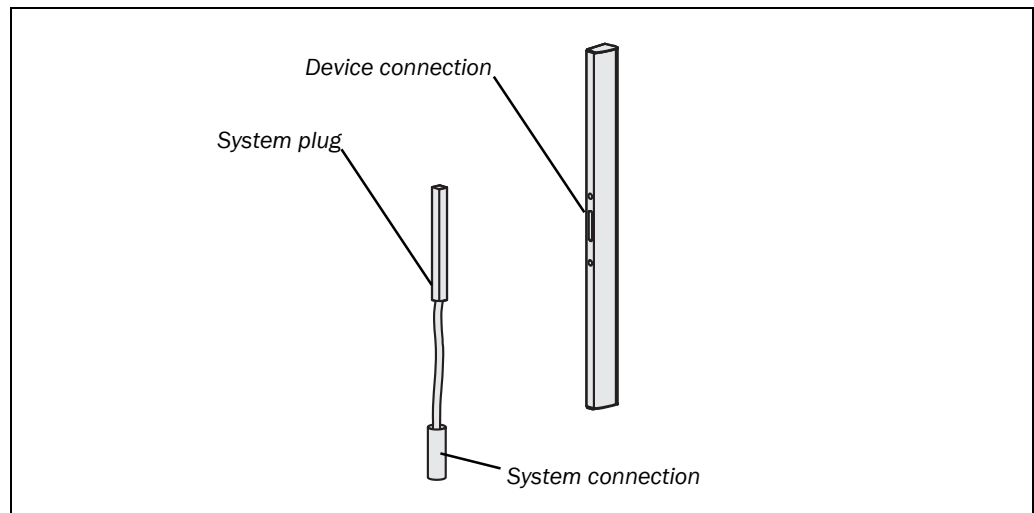
miniTwin2

- Notes**
- The two outputs are protected against short-circuits to 24 V DC and 0 V. When the light path is clear, the signal level on the outputs is HIGH DC (at potential), when the light path is interrupted or there is a device fault the outputs are LOW DC.
 - The miniTwin2 safety light curtain meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.
 - To ensure full electromagnetic compatibility (EMC), functional earth (FE) must be connected.
 - To meet the requirements of the relevant product standards (e.g. EN 61496-1), the external voltage supply for the devices (SELV) must be able to bridge a brief mains failure of 20 ms. The power supply must provide safe mains isolation (SELV/PELV) and have a current limit of max. 8 A. Power supplies according to EN 60204-1 satisfy this requirement. Suitable power supplies are available as accessories from SICK (see section 10.6 "Accessories" on page 77).
 - The device connection and the extension connection (see Fig. 32 or Fig. 36) are only allowed to be connected when the device is electrically isolated.

5.1 System connection

The miniTwin2 safety light curtain is connected using a system plug on the device connection. For standalone devices a system plug with a system connection is available.

Fig. 32: Device connection and system plug with system connection



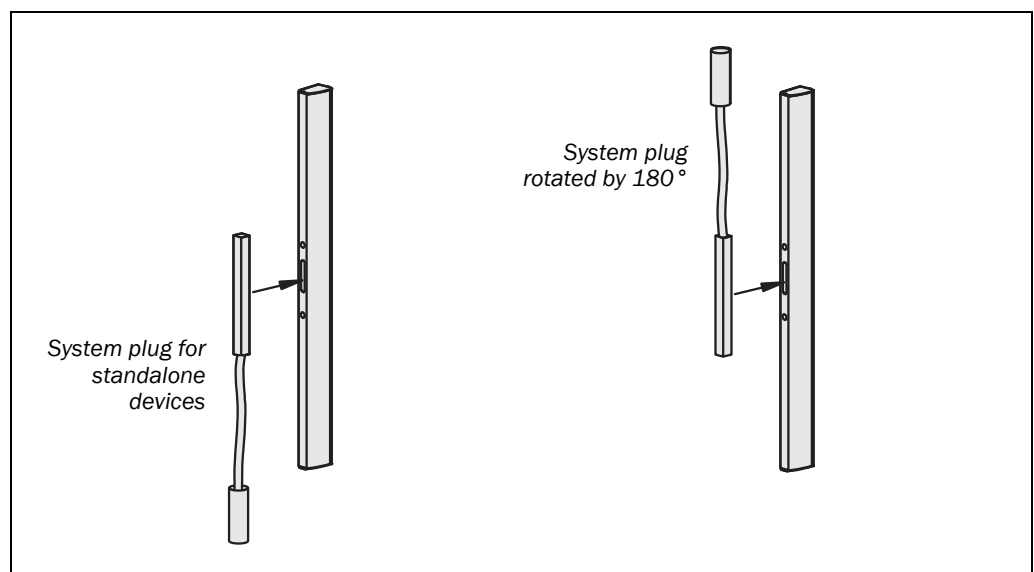
WARNING

Never connect cables directly to the device connection!

You are only allowed to undertake the electrical installation of the miniTwin2 safety light curtain with the aid of the pre-configured system plug (see Fig. 34 on page 43).

The system plug can also be fitted to the device connection rotated by 180°.

Fig. 33: Mounting of the system plug

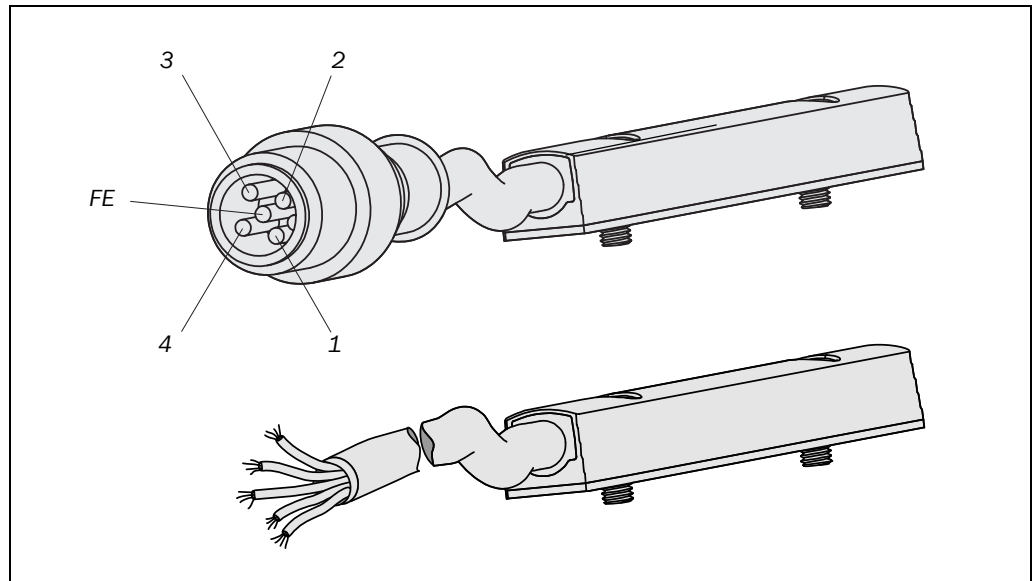


- Connect the system plug to the device connection with the device electrically isolated.
- Fasten the screws on the system plug to a maximum torque of 1 Nm.
- Then connect the system connection to the connection for your application.

miniTwin2

5.1.1 Pin assignment system connection

Fig. 34: Pin assignment system connection



Tab. 6: Pin assignment system connection

Pin	Wire colour	Meaning	Comment
1	Brown	24 V DC input	Voltage supply of the miniTwin2
2	White	Multifunction connection	<ul style="list-style-type: none"> • Connection of the reset button Or: <ul style="list-style-type: none"> • EDM connection Or: <ul style="list-style-type: none"> • 0 V DC (no function active)
3	Blue	0 V DC	Voltage supply of the miniTwin2
4	Black	OSSD	Output signal switching device
FE	Grey	Functional earth	To ensure full electromagnetic compatibility (EMC), functional earth (FE) must be connected.

Pre-assembled cables with flying leads are available for the connection to your application (see section 10.6 “Accessories” on page 77).

Laying the connecting cables in a common plastic-sheathed cable

The connections on the miniTwin are cross-circuit monitored, i.e. a short-circuit between OSSD wires will be detected!

You can therefore connect the connecting cables for both Twin Sticks to a two-way splitter M12 × 5 (see section 10.6 “Accessories” on page 77) and lay them in a common plastic-sheathed cable to the control cabinet or to a safety remote I/O with M12 × 5 connection.

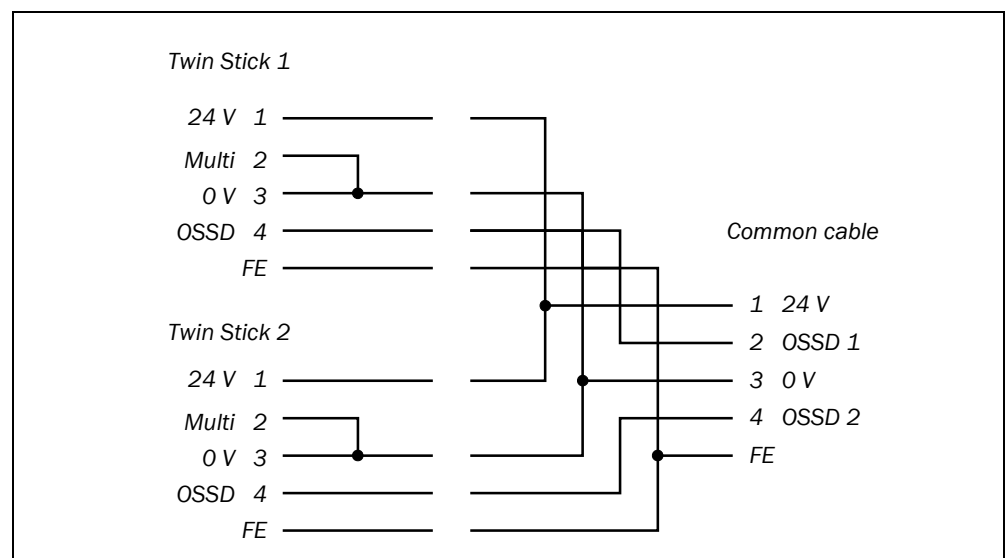


WARNING

Note the following requirements for cross-circuit monitoring!

- The cross-circuit monitoring only functions on devices that have a supplementary revision number “(Rev. #)” in the *Ident No.* field on the type label.
- In case of combinations of several devices, all devices must have a supplementary revision number “(Rev. #)” in the *Ident No.* field on the type label, otherwise cross-circuit monitoring will not function.
- The length of cable between a Twin Stick and the control cabinet must not exceed 10 m.
- The cable must be laid as per Fig. 35:

Fig. 35: Pin assignment for usage of common cable



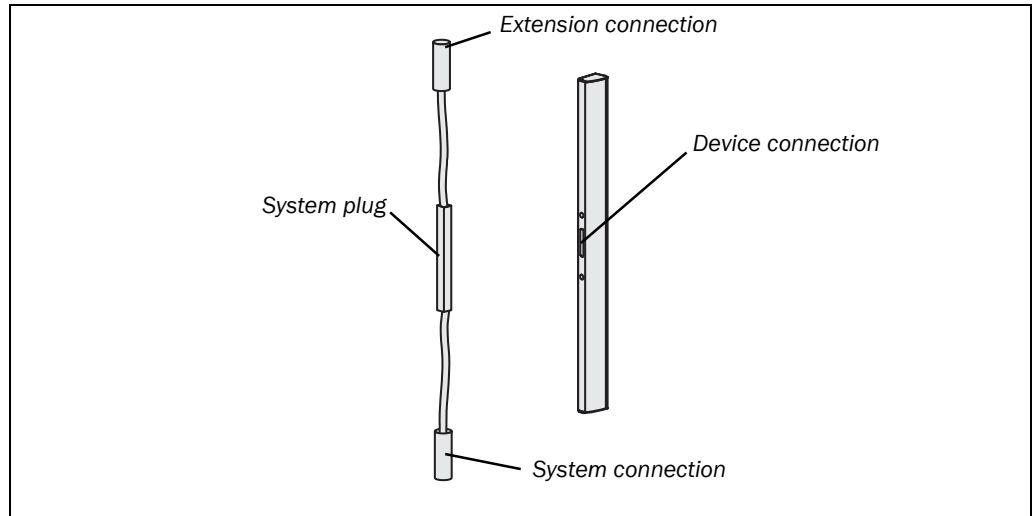
Note On the usage of a common cable, the miniTwin2 operates in protective operation. In this case the functions *external device monitoring (EDM)* and *reset* are not available.

miniTwin2

5.2 Cascading

A maximum of three miniTwin2 can be connected in series as “cascade”. For cascaded systems a system plug with a system connection M12 × 4 + FE (plug) and an extension connection M12 × 7 + FE (socket) is available.

Fig. 36: Device connection and system plug with system connection and extension connection



A cascaded system with several miniTwin2 safety light curtains is only configured by the selection of the system plug (standalone or cascade) and its cabling. No other measures are necessary.



WARNING

Use cables as short as possible between the devices in a cascaded system!

The maximum cable length between two cascaded systems must not exceed 3 metres. Protect the cascaded system against tampering with an optimised cable length or by laying the cable under a cover.

Tab. 7: System plug for cascaded systems

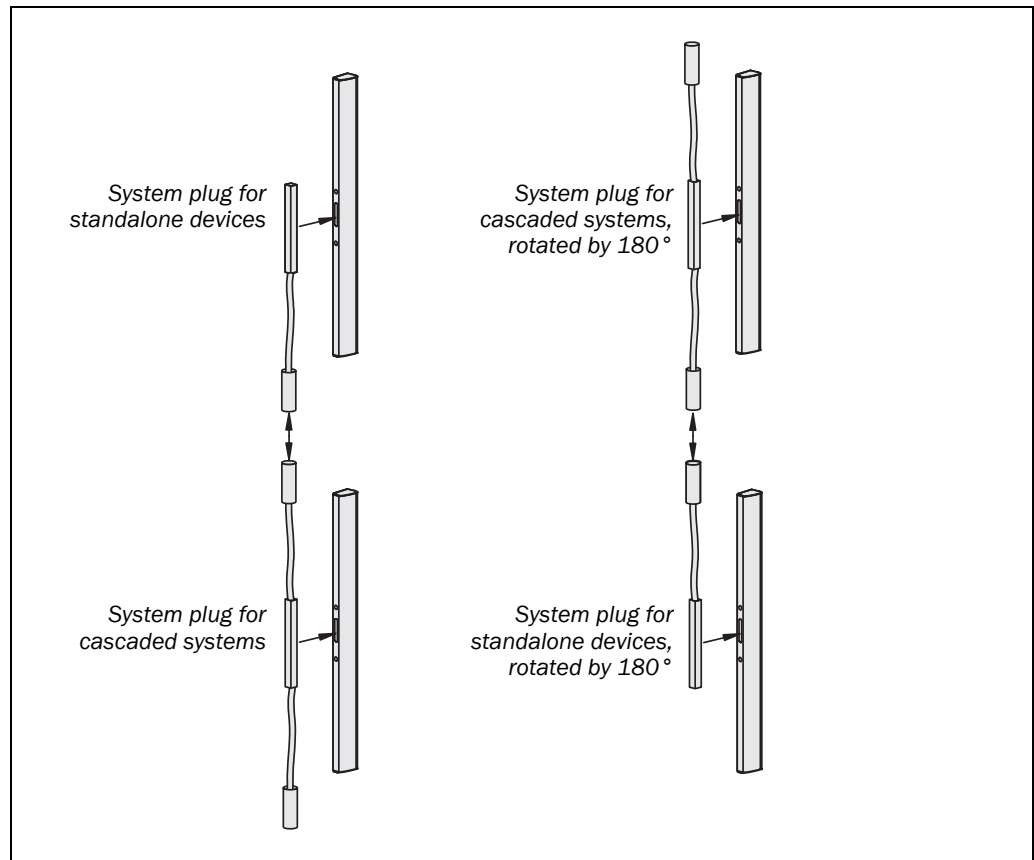
Tab. 7 shows which system plugs are needed for which device type in a cascaded system.

	Device type	System plug for standalone devices	System plug for cascaded systems
Host/guest	Host	-	■
	Guest 1	■	-
Host/guest/guest	Host	-	■
	Guest 1	-	■
	Guest 2	■	-

- Fasten the screws of the system plugs to a torque of 1 Nm.
- Connect the extension connections to the system connections.
- Connect the cascaded system to the system connection on the Twin Sticks that are used as hosts.

Both system plugs (system plug for standalone devices and system plug for cascaded systems) can also be fitted to the device connection rotated by 180°.

Fig. 37: Mounting the system plug on a cascaded system



5.2.1 Changes to cascaded systems

The individual safety light curtains can be used as standalone devices after the disconnection of cascaded systems if they are connected using a system plug for standalone devices.



WARNING

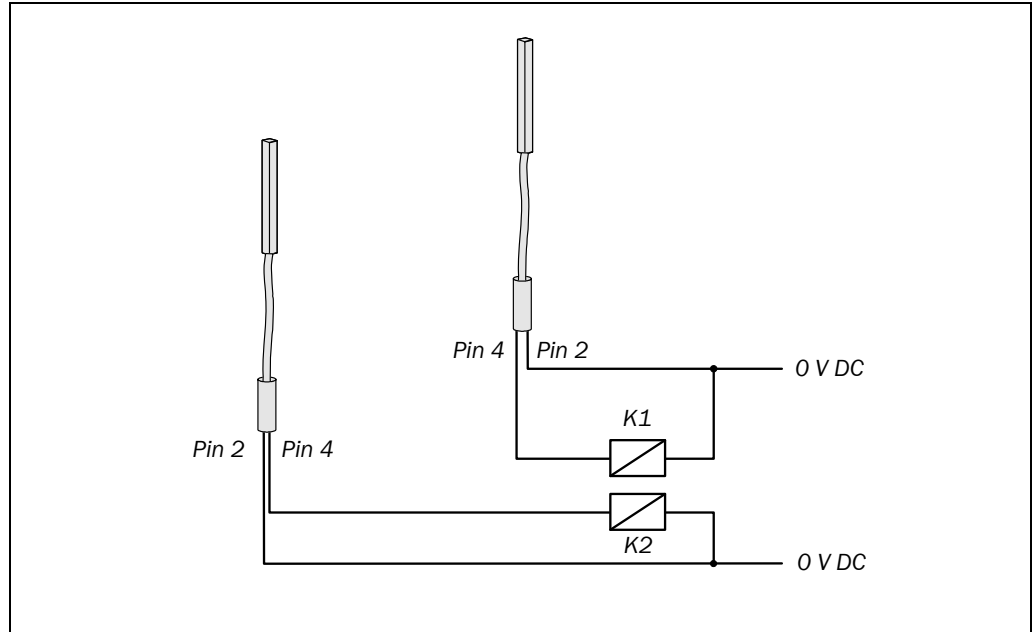
Check the effectiveness of the protective device after any change to a system using the test rod!

Check the effectiveness of the protective device as described in section 6.7 “Test notes” on page 56.

5.3 Protective operation without Reset and/or without EDM

If you configure the miniTwin2 safety light curtain in protective operation without Reset and/or without EDM, you must connect the related multifunction connection or both multifunction connections to 0 V.

Fig. 38: Connection of the multifunction connections in protective operation without Reset and without EDM



5.4 Reset button



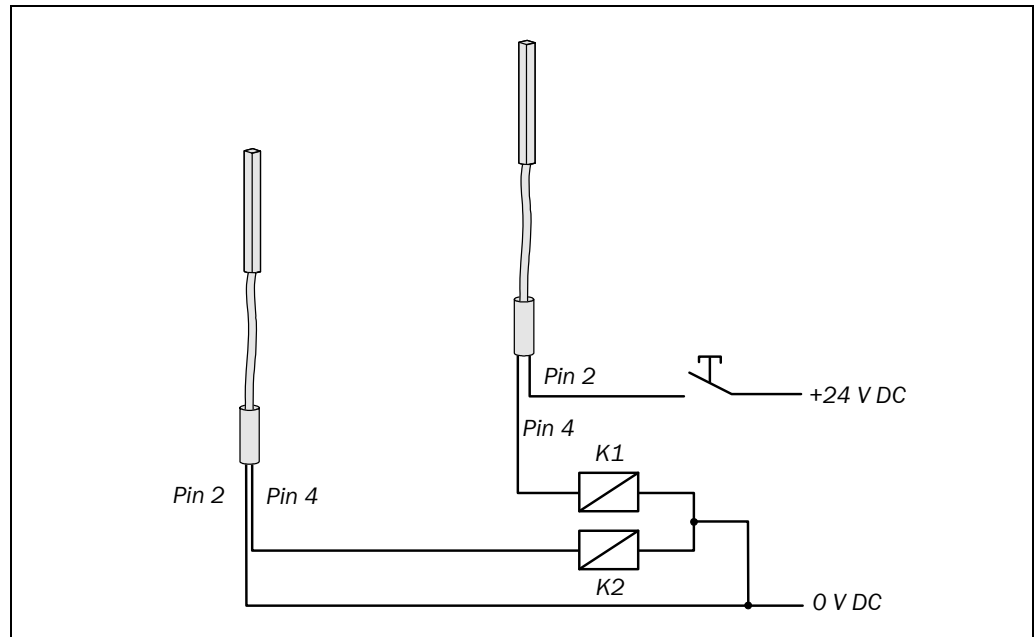
WARNING

Select the correct installation site for the reset button!

Install the reset button outside the hazardous area such that it cannot be operated from inside the hazardous area. When operating the reset button, the operator must have full visual command of the hazardous area.

The reset button is connected to **one** of the two Twin Sticks. If you connect a reset button to both Twin Sticks, the system will not switch the OSSDs to the "ON state".

Fig. 39: Connection of the reset button



WARNING

Re-configuration after device replacement!

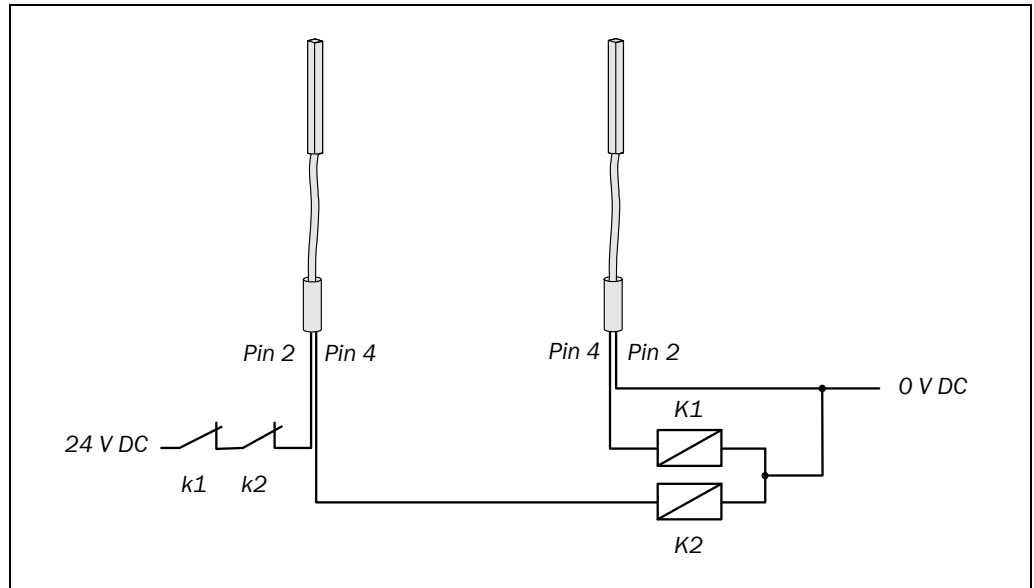
If you replace a safety light curtain with active Reset function with a replacement device, the Reset function must again be activated. It is not sufficient to make the electrical connections, because new devices are supplied ex factory with deactivated Reset function.

Note If you connect the reset button, then you must configure the function manually during commissioning (see section 6.5 "Configuration of the Reset function" on page 55).

5.5 External device monitoring (EDM)

The EDM checks if the contactors actually de-energize when the protective device responds. If, after an attempted switch-off, the EDM does not detect a response from the switched device within 300 ms, the EDM will deactivate the OSSDs again.

Fig. 40: Connecting the contact elements to the EDM



You must implement the external device monitoring electrically by the positively guided closing action of both N/C contacts (k1, k2) when the contact elements (K1, K2) reach their de-energized position after the protective device has responded. 24 V is then applied at the input of the EDM. If 24 V is not present after the response of the protective device, then one of the contact elements is faulty and the external device monitoring prevents the machine starting up again.

- Notes**
- If you connect contacts to be monitored to the external device monitoring input (EDM), then EDM is configured automatically during commissioning (see section 6.6 “Configuration of the external device monitoring (EDM)” on page 56).
 - You must connect the contacts to be monitored **together** on the external device monitoring input (EDM) **on a miniTwin2**.

5.6 Connection diagrams

Fig. 41: miniTwin2 in connection with UE10-2FG

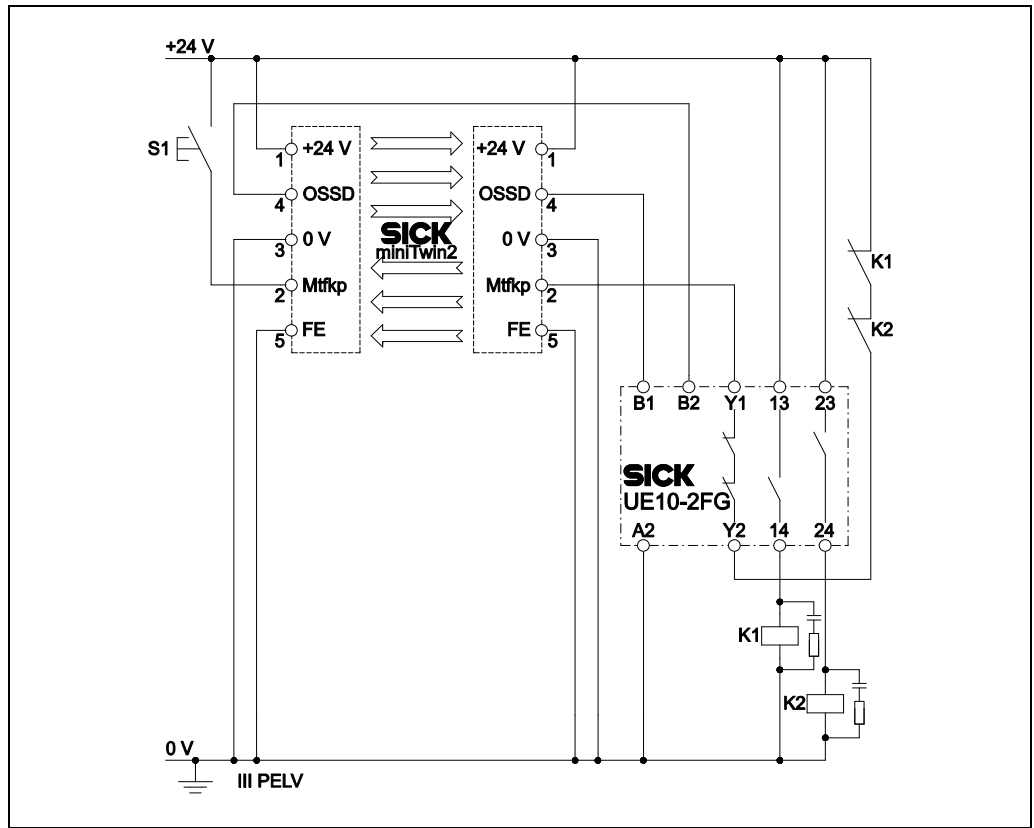
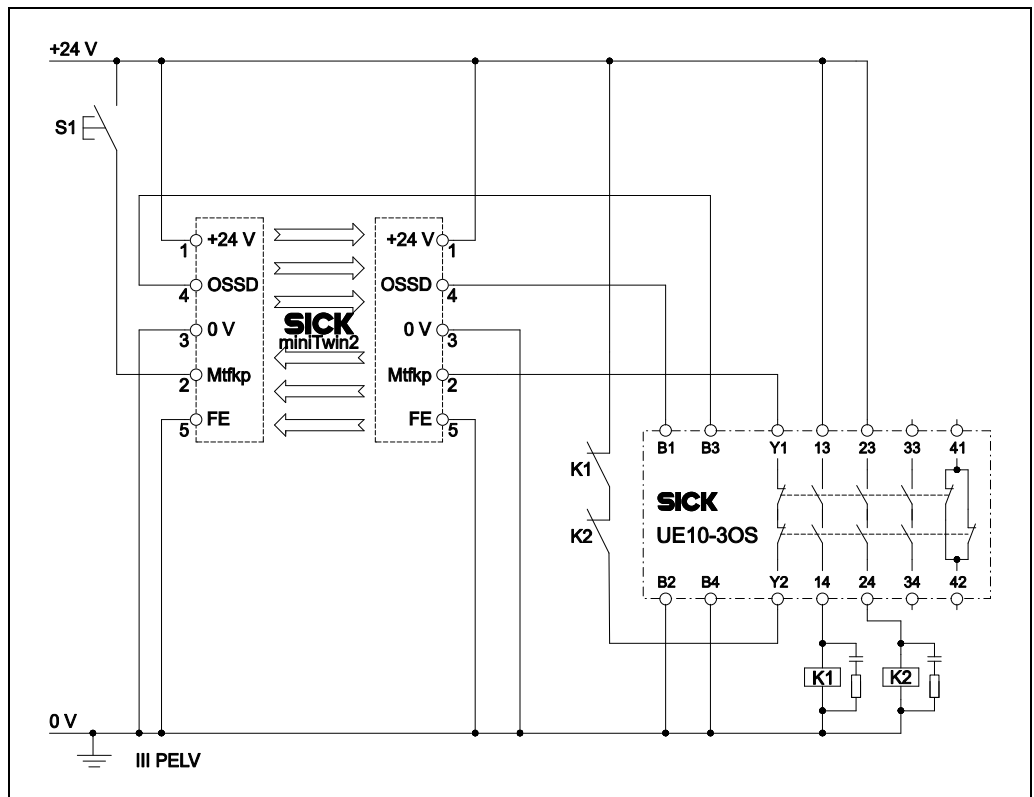


Fig. 42: miniTwin2 in connection with UE10-30S



miniTwin2

Fig. 43: miniTwin2 with Flexi Classic safety controller

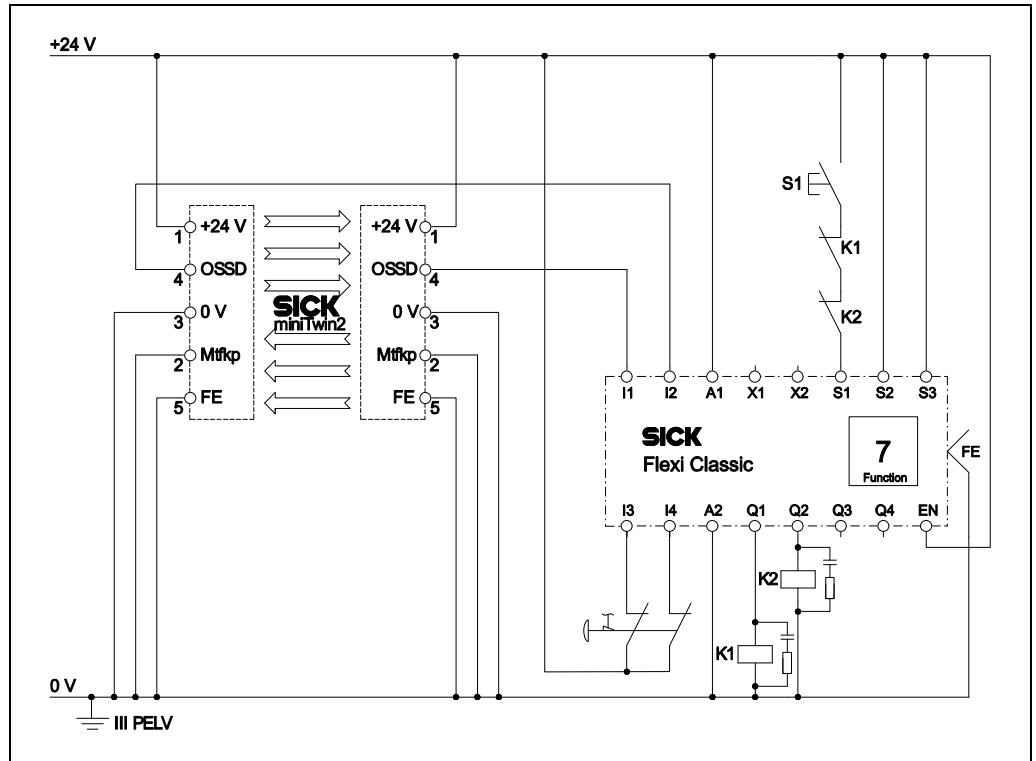
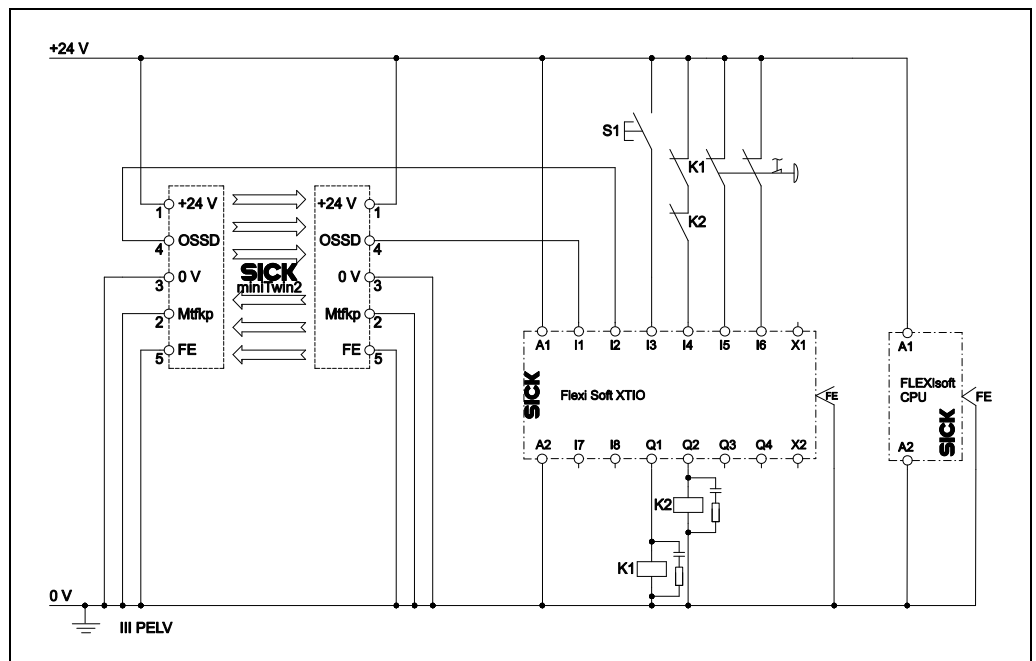


Fig. 44: miniTwin2 with Flexi Soft safety controller



6 Commissioning and configuration



WARNING

Commissioning requires a thorough check by qualified safety personnel!

Before you operate a system protected by the miniTwin2 safety light curtain for the first time, make sure that the system is first checked and released by qualified safety personnel. Please read the notes in chapter 2 “On safety” on page 8.

6.1 Display sequence during switching on

Note Both Twin Sticks must always be switched on at the same time. If you take one of the Twin Sticks out of operation, you must briefly switch off the second Twin Stick prior to switching on again.

After switching on the miniTwin2 safety light curtain runs through the power-up cycle. The LED display indicates the device status during the power-up cycle.

The displays have the following meaning:

Tab. 8: Displays shown during the power-up cycle

Display	Meaning
● All	LED test
● Red	OSSD off, system is being activated
☾ White	No optical communication to another Twin Stick ¹⁾
☾ White ● Blue 1	Communication with the second Twin Stick is being established
● Blue 1 to 5	Indication of the quality of the alignment (goes out if there is adequate alignment quality for 2 minutes)
● Green	OSSD on, system active, protective field unoccupied
● RES	RES configured (see 6.5 on page 55)
● EDM	EDM configured (see 6.6 on page 56)
Other display	Device error. See “Error displays of the diagnostics LEDs” on page 62.

¹⁾ During initial commissioning of a stick, the LED flashes immediately to signal initial synchronisation between the sticks. During all further power up processes, the LED only flashes if the previous system partner does not reply within 20 seconds. In this case the communication can also be established with a replacement stick.

6.2 Alignment of the safety light curtain



WARNING

Secure the system. No dangerous state possible!

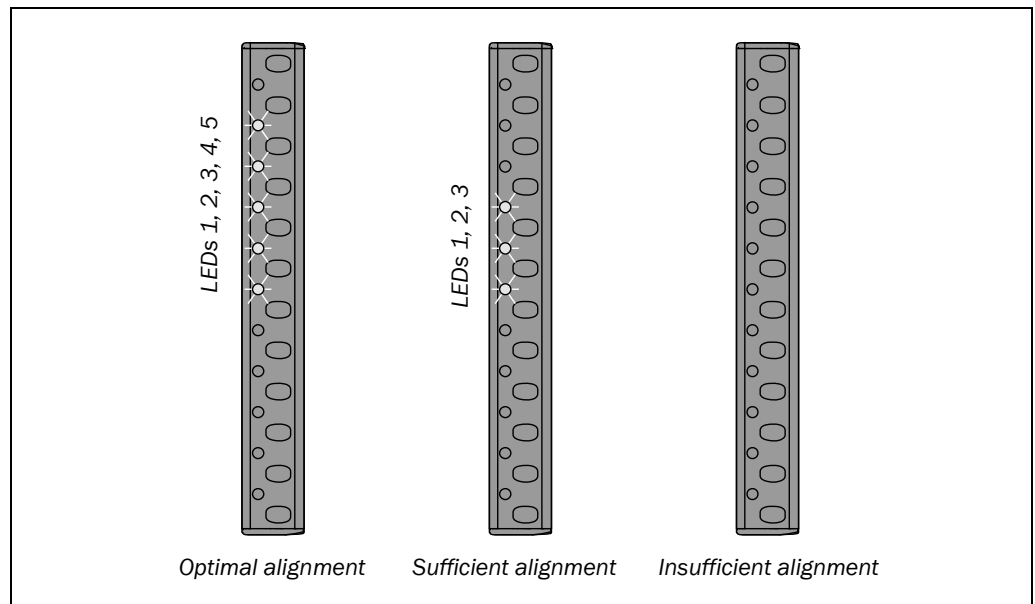
Ensure that the dangerous state of the machine is (and remains) switched off! During the alignment process, the outputs of the safety light curtain are not allowed to have any effect on the machine.

After the safety light curtain has been mounted and connected, the two Twin Sticks must be aligned in relation to each other. The light beams emitted by the sender optics must hit the receiver optics accurately.





The miniTwin2 safety light curtain signals the alignment quality with the aid of the blue LEDs (1 to 5), i.e. how well the two Twin Sticks are aligned with each other. If all LEDs illuminate, the alignment is optimal, if no LED illuminates, the alignment is poor.


If three of the blue LEDs illuminate, then the safety light curtain changes to green. You then have approx. 2 minutes to optimize the alignment of the Twin Sticks.

Fig. 45: Alignment of the safety light curtain



How to align the safety light curtain:

- Switch on the voltage supply of the safety light curtain.
During initial commissioning the COM LED flashes  **White** and the two Twin-Sticks establish communication²⁾.
- Align the two Twin Sticks such that LED 1 illuminates  **Blue**.
The two Twin Stick start to communicate. During initial commissioning the COM LED goes out  **White** after the communication phase (approx. 3 s). The alignment can now be optimised.
- Align the two Twin Sticks with each other such that at least 3 and as many as possible of the LEDs 1 to 5 illuminate  **Blue**.
- Fix the safety light curtain in place.

- Notes**
- Once there is adequate alignment quality for 2 minutes, the system switches off the alignment mode, the LEDs 1 to 5  **Blue** go out.
 - If you wish to readjust the alignment later, switch the voltage supply of both Twin Sticks off and back on again.
 - The host in a cascaded system continues to indicate red until all guests have been correctly aligned, even if the host is correctly aligned.
 - If the maximum protective field width of 5 m is used, in some circumstances the system may only indicate mediocre alignment quality with only 3 blue LEDs during alignment. The system then still has a reserve of 30%.

²⁾ During initial commissioning of a stick, the LED flashes immediately to signal initial synchronisation between the sticks. During all further power up processes, the LED only flashes if the previous system partner does not reply within 20 seconds. In this case the communication can also be established with a replacement stick.

6.3 Default delivery status

As delivered the miniTwin2 safety light curtain is configured as follows:

- reset: deactivated
- external device monitoring (EDM): deactivated

6.4 Configuration of protective operation without Reset and/or without EDM

If you configure the miniTwin2 safety light curtain in protective operation without Reset and/or without EDM, you must connect the related multifunction connection or both multifunction connections to 0 V. Otherwise the system locks completely 4 minutes after switching on (lock-out).

6.5 Configuration of the Reset function

To activate the Reset function, a reset button must be connected to the miniTwin2 safety light curtain (see section 5.4 on page 48).

You have 4 minutes to configure the function after switching on the safety light curtain. Otherwise the system locks completely 4 minutes after switching on (lock-out).






How to activate the Reset function of the miniTwin2:





WARNING

Ensure the system or machine is in a safe condition!

While you configure the safety light curtain, the system or the machine could start unintentionally. Ensure that the whole system or machine is in a safe condition during the configuration process.

- Ensure that the whole system or machine is in a safe condition.
- Switch the safety light curtain on.
The RES LED flashes  **Orange** and the EDM LED flashes  **Orange**.
- Press the reset button within 4 minutes of switching on.
After approx. 1 second the EDM LED  **Orange** goes out.
- Release the reset button within the next 2 seconds.
After you release the reset button, the RES LED  **Orange** flashes, reset is mandatory.
The configuration has been successfully completed.
If the protective field is obstructed, the RES LED illuminates  **Orange**.
- Ensure that the system or the machine is in a safe condition.
- Then check the Reset function. If Reset has not been activated, then repeat the whole process.

Note If during the configuration the reset button is released too late, the function is not activated. The RES LED flashes  **Orange** and the EDM LED flashes  **Orange**.

- Release the reset button within three seconds and repeat the configuration. If the button is not released within this period, the system locks completely (lock-out).

Note Reset is stored in non-volatile memory in the device. The function can only be deactivated by consciously resetting the configuration (see section 6.8 “Deactivating Reset and EDM“ on page 58).

6.6 Configuration of the external device monitoring (EDM)

You do not have to activate external device monitoring separately.

- Connect the contacts to be monitored to the external device monitoring input (EDM) (see section 5.5 “External device monitoring (EDM)” on page 49).
- Switch on the safety light curtain and any relay/contactors connected.
- 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 ● **Orange** is illuminated.

- Then check the function of the EDM. If the EDM has not been activated, then repeat the whole process.

- Notes**
- The EDM signal (+24 V DC) must be present at the latest within 4 minutes of switching on. Otherwise the system locks completely 4 minutes after switching on (lock-out).
 - EDM is stored in non-volatile memory in the device. The function can only be deactivated by consciously resetting the configuration (see section 6.8 “Deactivating Reset and EDM” on page 58).

6.7 Test notes

The purpose of the tests described in the following is to confirm the safety requirements specified in the national/international rules and regulations, especially the safety requirements in the Machine and Work Equipment Directive (EU Conformity).

These tests are also used to identify if the protection is affected by external light sources or other unusual ambient effects.

These tests must therefore always be performed.

6.7.1 Tests before the initial commissioning

- Check the effectiveness of the protective device mounted to the machine, using all selectable operating modes on the machine as per the checklist in the annex (see 11.2 on page 80).
- Ensure that the operating personnel of the machine protected by the safety light curtain are correctly instructed by qualified safety personnel before being allowed to operate the machine. Instructing the operating personnel is the responsibility of the machine owner.
- Annex 11.2 of this document shows a checklist for review by the manufacturer and OEM. Use this checklist as a reference before commissioning the system for the first time.

6.7.2 Regular inspection of the protective device by qualified safety personnel

- Check the system following the inspection intervals specified in the national rules and regulations. This procedure ensures that any changes on the machine or manipulations of the protective device after the initial commissioning are detected.
- If any modifications have been made to the machine or the protective device, or if the safety light curtain has been changed or repaired, the system must be checked again as specified in the checklist in the annex.

6.7.3 Daily functional checks of the protective device

The effectiveness of the protective device must be checked daily by a specialist or by authorised personnel, using the correct test rod.

Note Always test along the complete hazardous area to be protected, never solely at the mounting position of the safety light curtain.

How to check the effectiveness and correct function of the safety light curtain:

- Select the correct test rod depending on device resolution.



WARNING

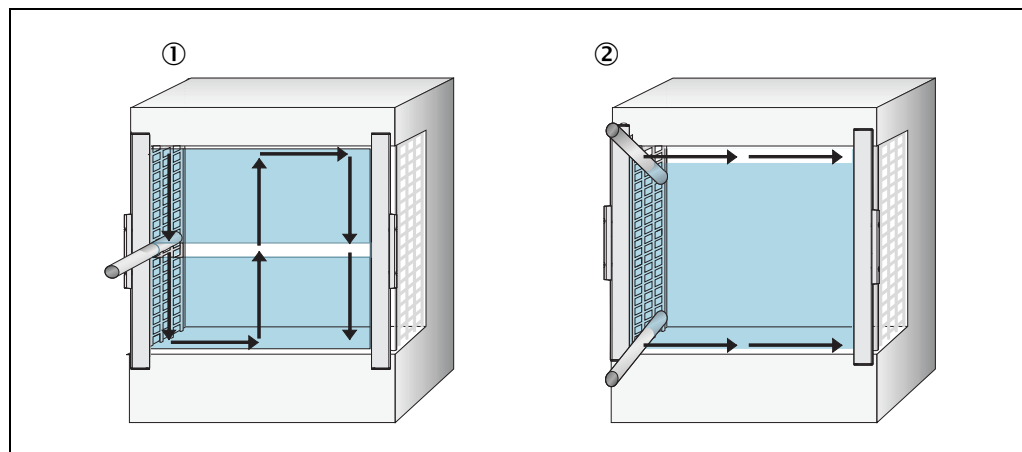
Do not operate the machine if during the test the green LED (OUT) is lit or the orange LED (RES) flashes!

If *during the test* the green LED lights up – even for a short period – or the orange LED flashes, work must stop at the machine. In this case the mounting and the configuration of the safety light curtain must be checked by qualified safety personnel (see chapter 4).

- *Before* inserting the test rod, check that the green OUT LED is illuminated if the Reset function is deactivated or that the orange RES LED is flashing if the Reset function is activated (“Reset required”). If this is not the case, ensure that this condition is reached. The test is otherwise meaningless.
- Move the test rod slowly through the protective field to be tested, as shown under ① in Fig. 46.
- Then move the test rod along the edges of the protective field as shown under ② in Fig. 46. This procedure allows you to test if the presence detection/reaching behind protection is functioning correctly (see 4.2 “Steps for mounting the device” on page 26).

Note During all thorough checks on the miniTwin2 only the OUT LED is allowed to illuminate red and the orange RES LED must **never** flash.

Fig. 46: Daily checks of the protective device



6.8 Deactivating Reset and EDM

- Notes**
- By deactivating Reset and EDM both Twin Sticks are reset to the delivery status.
 - As the system positions (host, guest 1 or guest 2) in a cascaded system are only defined using the system plug and no position data is saved in the EEPROM, it is not necessary to deactivate the system position.
 - If the device is to be used as the host for a cascaded system or as a standalone device without Reset and/or EDM, Reset and/or EDM must be deactivated.
 - If the device is to be used as a guest in a cascaded system, it is not necessary to deactivate the configuration.

The table below shows when the configuration of a Twin Stick, as described above, must be deactivated.

Tab. 9: Overview of the cases in which it is necessary to deactivate the configuration on cascaded systems

		The Twin Stick is to be used as:			
		Standalone or host in protective operation	Standalone or host in protective operation with Reset	Standalone or host in protective operation with EDM	Guest
The Twin Stick was configured with:	Not configured	-	-	-	-
	Reset	■	-	■	-
	EDM	■	■	-	-

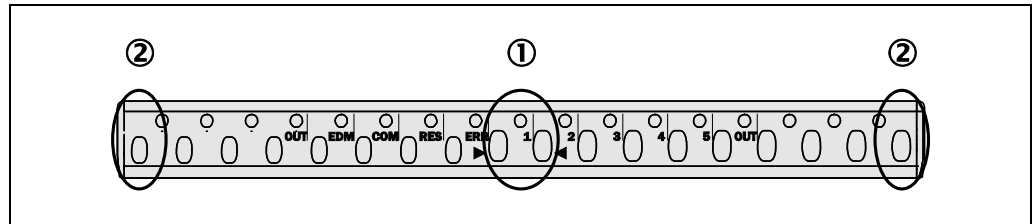
- Notes**
- After deactivating the configuration, check the wiring and if necessary modify to suit the required function!
 - If, after the deactivation of the configuration, you want to re-activate EDM or Reset, you must perform the necessary configuration again (see sections 6.5 and 6.6 on page 55).

How to establish the requirements for deactivating the configuration:

- Ensure that the system or the machine is in a safe condition.
- Ensure the Twin Sticks are aligned. The LEDs 1 to 5 (LED ● **Blue**) indicate the quality of the alignment. At least three of the five LEDs must be illuminated for you to be able to deactivate the configuration.
- Switch off and on again the safety light curtain and start with the deactivation within 2 minutes.

Fig. 47: Interruption points for the deactivation of the configuration

Concise instructions: How to deactivate the configuration:



To deactivate the configuration you must cover the optics in the **middle** (① **between the two triangular marks**) or at the **ends** (②) in a specific sequence. During this process you have 30 seconds to perform the following steps.

- Step 1: Reach into the **middle**
- Step 2: Reach into the **middle** again
- Step 3: Reach into both **ends**
- Step 4: Reach into the **middle**
- Step 5: Reach into both **ends**
- Step 6: Switch off the safety light curtain within the next 2 minutes. The next time switched on, EDM and Reset are deactivated.
- Step 7: Check the effectiveness of the protective device as described in section 6.7 “Test notes” on page 56.

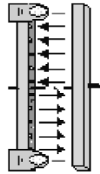

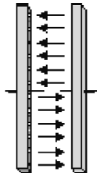


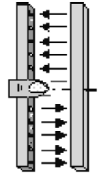

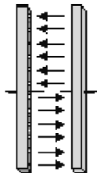


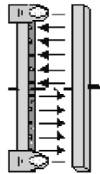

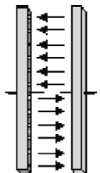


LED indication as aid during step 1 to 5


The COM LED **White** is an aid during step 1 to 5 as a timer for interrupting and clearing the protective field.

The direction indicated by the LEDs 1 to 5 **Blue** shows from step 3 where you must interrupt the protective field (in the middle or at the ends).

Detailed instructions: How to deactivate the configuration:

- Step 1
-
- Interrupt the safety light curtain's protective field in the middle until the COM LED flashes **White** 1× (after approx. 3 s).
 - Remove the interruption within the next 30 s.
 - Keep the safety light curtain's protective field clear until the COM LED flashes **White** 1× (after approx. 3 s).
- Step 2
-
- Again interrupt within the next 30 s the safety light curtain's protective field in the middle until the COM LED flashes **White** 1× (after approx. 3 s).
 - Remove the interruption within the next 30 s.
 - The direction indicated by the LEDs 1 to 5 **Blue** points toward the ends; they indicate the next interruption is at the ends.
 - Keep the safety light curtain's protective field clear until the COM LED flashes **White** 1× (after approx. 3 s).

- Step 3
- 
- Interrupt within the next 30 s the safety light curtain's protective field at the ends until the COM LED flashes  **White** 1× (after approx. 3 s).
- 
- Remove the interruption within the next 30 s.
 - The direction indicated by the LEDs 1 to 5  **Blue** points toward the inside; they indicate the next interruption is in the middle.
 - Keep the safety light curtain's protective field clear until the COM LED flashes  **White** 1× (after approx. 3 s).
- Step 4
- 
- Again interrupt within the next 30 s the safety light curtain's protective field in the middle until the COM LED flashes  **White** 1× (after approx. 3 s).
- 
- Remove the interruption within the next 30 s.
 - The direction indicated by the LEDs 1 to 5  **Blue** points toward the ends; they indicate the next interruption is at the ends.
 - Keep the safety light curtain's protective field clear until the COM LED flashes  **White** 1× (after approx. 3 s).
- Step 5
- 
- Interrupt within the next 30 s the safety light curtain's protective field at the ends until the COM LED flashes  **White** 1× (after approx. 3 s).
- 
- Remove the interruption within the next 30 s.
 - Keep the safety light curtain's protective field clear until the COM LED flashes  **White** and the LEDs 1 to 5 flash  **Blue** 3× (after approx. 3 s).
- Step 6
- **Switch off the safety light curtain within the next 2 minutes.**
 - The next time switched on, EDM and Reset are deactivated.
- Step 7
- Then configure the required functions (see sections 6.5 and 6.6 on page 55)
 - Check the effectiveness of the protective device as described in section 6.7 "Test notes" on page 56.

Note If the COM LED flashes  **White** 2× in succession during deactivation, the procedure has been interrupted. In this case, repeat the complete procedure.

7 Care and maintenance

The miniTwin2 safety light curtain is maintenance-free. The front screen on the miniTwin2 safety light curtain should however be regularly cleaned and also if contaminated.

- Do not use aggressive cleaning agents.
- Do not use abrasive cleaning agents.

Note Static charges cause dust particles to be attracted to the front screen. You can reduce this effect by using the antistatic plastic cleaner (SICK part number 5600006) and the SICK lens cloth (part number 4003353).

How to clean the front screen:

- Use a clean and soft brush to remove dust from the front screen.
- Now wipe the front screen with a clean and damp cloth.

Note ➤ After cleaning, check the position of the miniTwin2 to ensure that the protective device cannot be bypassed (reaching over, under or standing behind).

➤ Check the effectiveness of the protective device as described in section 6.7 “Test notes” on page 56.

8 Fault diagnosis

This chapter describes how to identify and rectify errors and malfunctions during the operation of the safety light curtain.

8.1 In the event of faults or errors




WARNING

Cease operation if the cause of the malfunction has not been clearly identified!

Stop the machine if you cannot clearly identify or allocate the error and if you cannot safely rectify the malfunction.

The lock-out status

In case of certain faults or an erroneous configuration, the system can go into the lock-out status. The safety light curtain signals this with a flashing ERR LED  **Red**.

- Rectify the cause of the fault as per Tab. 10.
- Switch off and on again the voltage supply for the miniTwin2 in the control cabinet or remove and re-fit the system connection (M12 × 4 + FE) on both Twin Sticks.













8.2 SICK support

If you cannot rectify an error with the help of the information provided in this chapter, please contact your local SICK representative.

8.3 Error displays of the diagnostics LEDs

This section describes the meaning of the error displays of the diagnostics LEDs and how to respond. You will find a description of the status indicators in section 3.4 “Status indicators” on page 15.

Tab. 10: Error displays of the LEDs

Display	Possible cause	Rectification of the error
 Red ERR  Blue 1  Blue 2  Blue 3  Blue 4  Blue 5	System fault	<ul style="list-style-type: none"> ➤ Switch the voltage supply for the miniTwin2 off and back on again (renewed power-up). ➤ Check all connections. ➤ Check the FE connection. ➤ Check 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 fault	<ul style="list-style-type: none"> ➤ Check the reset button for correct function. The button may be defective or stuck. ➤ Check the wiring for short-circuits to 24 V or 0 V. ➤ Check the wiring between host and guest or between host, guest and guest. ➤ Check the wiring between the two OSSDs.

miniTwin2

Display	Possible cause	Rectification of the error
<ul style="list-style-type: none"> ☀ Red ERR ○ Blue 1 ○ Blue 2 ☀ Blue 3 ○ Blue 4 ○ Blue 5 	Operating voltage too low	<ul style="list-style-type: none"> ➤ Check the supply voltage and the power supply. If necessary, replace defective components.
<ul style="list-style-type: none"> ☀ Red ERR ○ Blue 1 ○ Blue 2 ○ Blue 3 ☀ Blue 4 ○ Blue 5 	Interference by ambient light	<ul style="list-style-type: none"> ➤ Check the distance from reflective surfaces (see 4.1.2 on page 24) or from other safety light curtains (see 4.1.3 on page 25). If necessary, fit non-reflective partition walls.
<ul style="list-style-type: none"> ☀ Red ERR ○ Blue 1 ○ Blue 2 ○ Blue 3 ○ Blue 4 ☀ Blue 5 	System error	<ul style="list-style-type: none"> ➤ Switch the voltage supply for the miniTwin2 off and back on again (renewed power-up). ➤ If the indication also illuminates on renewed power-up during the start-up phase, replace the device. ➤ If the indication illuminates in operation, contact SICK support.
<ul style="list-style-type: none"> ☀ White COM 	Communication error between two Twin Sticks	<ul style="list-style-type: none"> ➤ Check the alignment of the two Twin Sticks. Or, if you have replaced one Twin Stick: ➤ Switch the voltage supply for both Twin Sticks off and back on again.
<ul style="list-style-type: none"> ☀ Red ERR ☀ Orange EDM 	EDM error	<ul style="list-style-type: none"> ➤ Check the contactors and their wiring, eliminate any wiring errors, if necessary.
<ul style="list-style-type: none"> ☀ Red ERR ☀ Orange EDM ☀ Orange RES 	Error in the configuration of EDM or Reset or in the cabling for pin 2	<ul style="list-style-type: none"> ➤ Repeat the configuration of EDM or Reset. Or: ➤ Check the cabling of pin 2 (see 5.3 on page 47).
<ul style="list-style-type: none"> ☀ Orange EDM ☀ Orange RES 	EDM or Reset not yet configured	<ul style="list-style-type: none"> ➤ Switch on the relay or the contactor connected. Or: ➤ Press the connected reset button (see 6.5 on page 55). Or: ➤ Check the cabling of pin 2 (see 5.3 on page 47).

9 Technical specifications

9.1 Data sheet

Tab. 11: Data sheet
miniTwin2

	Minimum	Typical	Maximum
General system data			
Type	Type 2 (EN 61496-1)		
Safety integrity level ³⁾	SIL2 (IEC 61508) SILCL2 (EN 62061)		
Category	Category 2 (EN ISO 13849-1)		
Performance Level ³⁾	PL d (EN ISO 13849-1) Pay attention to optical characteristics! ⁴⁾		
PFHd (mean probability of a dangerous failure per hour)			
Standalone system	24 × 10 ⁻⁹		
Cascaded systems	52 × 10 ⁻⁹		
T _M (mission time)	20 years (EN ISO 13849)		
Protection class ⁵⁾	III (EN 61140)		
Enclosure rating	IP 65 (EN 60529)		
Construction size (depending on type)	120 mm to 1200 mm		
Resolution (depending on type)	14, 24 or 34 mm		
Scanning range	0–6.0 m	0–8.0 m	
with 1 additional front screen	0–5.5 m	0–7.3 m	
with 2 additional front screens	0–5.1 m	0–6.7 m	
with 1 deflector mirror ⁶⁾	0–5.4 m	0–7.2 m	
with 2 deflector mirrors ⁶⁾	0–4.8 m	0–6.4 m	
Supply voltage V _S on the device ⁷⁾	19.2 V	24 V	28.8 V
Residual ripple ⁸⁾			±10 %
Power-up delay after connecting the supply voltage		3 s	
Wavelength		850 nm	

³⁾ For detailed information on the exact design of your machine/system, please contact your SICK subsidiary.

⁴⁾ The Performance Level does not contain any specific requirements on aspects such as the optical characteristics. You will find more detailed information on this topic in www.sick-safetyplus.com, Safety Know-how.

⁵⁾ Safety extra-low voltage SELV/PELV.

⁶⁾ The information in the table relates to 90° beam deflection per mirror. If you need more advice on mirror applications, please get in touch with your contact at SICK.

⚠ Do not use deflector mirrors if the formation of droplets or heavy contamination of the deflector mirrors is to be expected!

⁷⁾ To meet the requirements of the relevant product standards (e.g. EN 61496-1), the external voltage supply for the devices (SELV) must be able to bridge a brief mains failure of 20 ms. The power supply must provide safe mains isolation (SELV/PELV) and have a current limit of max. 8 A. Power supplies according to EN 60204-1 satisfy this requirement. Suitable power supplies are available as accessories from SICK (see section 10.6 "Accessories" on page 77).

⁸⁾ Within the limits of V_S.

	Minimum	Typical	Maximum
Output signal switching devices (OSSD)	PNP semiconductors, short-circuit protected ⁹⁾ , cross-circuit monitored		
Response time standalone device with 14 mm resolution (Protective field height 120 ... 720 mm)	≤ 14 ms		
Response time standalone device with 14 mm resolution (Protective field height 780 ... 1200 mm)	≤ 17 ms		
Response time standalone device with 24 or 34 mm resolution	≤ 13 ms		
Additional response time for cascaded systems (host/guest)	2 ms		
Additional response time for cascaded systems (host/guest/guest)	4 ms		
Switch off time ¹⁰⁾	80 ms		200 ms
Power-up delay			V _S
Switching voltage ^{11) 12)} HIGH (active, U _{rms})	V _S - 2.2 V	24 V	V _S
Switching voltage LOW (inactive)	0 V	0 V	2 V
Switching current	0 mA		300 mA
Leakage current standalone ¹³⁾			0.25 mA
Leakage current cascaded system ¹³⁾			0.5 mA
Load capacity			1 μF
Switching sequence	Depending on load inductance		
Load inductance ¹⁴⁾			2.2 H
Test pulse data ¹⁵⁾			
Test pulse width	120 μs	150 μs	300 μs
Test pulse rate	3 1/s	5 1/s	10 1/s
Permissible cable resistance			1.29 Ω
Power consumption			3 A (host/guest/guest) ¹⁶⁾

⁹⁾ Applies to the voltage range between -30 V and +30 V.

¹⁰⁾ As per IEC 61496-2.

¹¹⁾ As per IEC 61131-2.

¹²⁾ On the device plug.

¹³⁾ In the case of a fault (0 V cable open circuit) the maximum leakage current flowing in the OSSD cable. The downstream controller must detect this status as LOW. A FPLC (fail-safe programmable logic controller) must be able to identify this status.

¹⁴⁾ The maximum rated load inductance is higher with lower switching sequence.

¹⁵⁾ 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.

¹⁶⁾ Maximum power consumption of a system with 1200 mm protective field height and a resolution of 14 mm.

	Minimum	Typical	Maximum
Multifunction connection			
Input voltage ¹⁷⁾ HIGH (inactive)	11 V	24 V	30 V
Input current HIGH	6 mA	15 mA	30 mA
Input voltage ¹⁷⁾ 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 dropout time contactors			300 ms
Permissible pick-up time contactors			300 ms
When used as control switch input (reset button)			
Operation time control switch input	200 ms		
Weight	Depending on the construction size (see Tab. 12 on page 67)		

Operating data

System connection	Plug M12 × 4 + FE		
Cable length			20 m
Wire cross-section	0.34 mm ²		
Bend radius	45 mm		
Ambient operating temperature	-20 °C		+55 °C
Air humidity (non-condensing)	15 %		95 %
Storage temperature	-25 °C		+70 °C
Housing cross section	15 mm × 24 mm		
Dimensions incl. plug	15 mm × 32 mm		
Vibration resistance	5 g, 10-55 Hz (EN 60 068-2-6)		
Shock resistance	10 g/16 ms (EN 60 068-2-27)		

Housing, materials

Dimensions	Depending on type (see Fig. 48 on page 68)		
Housing	AlMgSi 0.5 (ENAW-6060 T6)		
Front screen	PC		
Bracket	Polyamide PA 66 GF30		
End cap	Polyamide PA 66 GF30		
Circuit boards	Glass-fibre reinforced epoxy resin with flame retarding agent TBBPA		
System connection			
Cable sheath material	TPU (PUR)		
Packaging	Corrugated cardboard with polyethylene		

¹⁷⁾ As per IEC 61 131-2.

miniTwin2**9.2 Weight tables****9.2.1 miniTwin2**

Tab. 12: Weight miniTwin2

Construction size [mm]	Weight [g]
120	50
180	75
240	95
300	115
360	135
420	155
480	175
540	195
600	215
660	235
720	255
780	280
840	300
900	320
960	340
1020	360
1080	380
1140	400
1200	420

9.2.2 Deflector mirrors PNS75 and PNS125

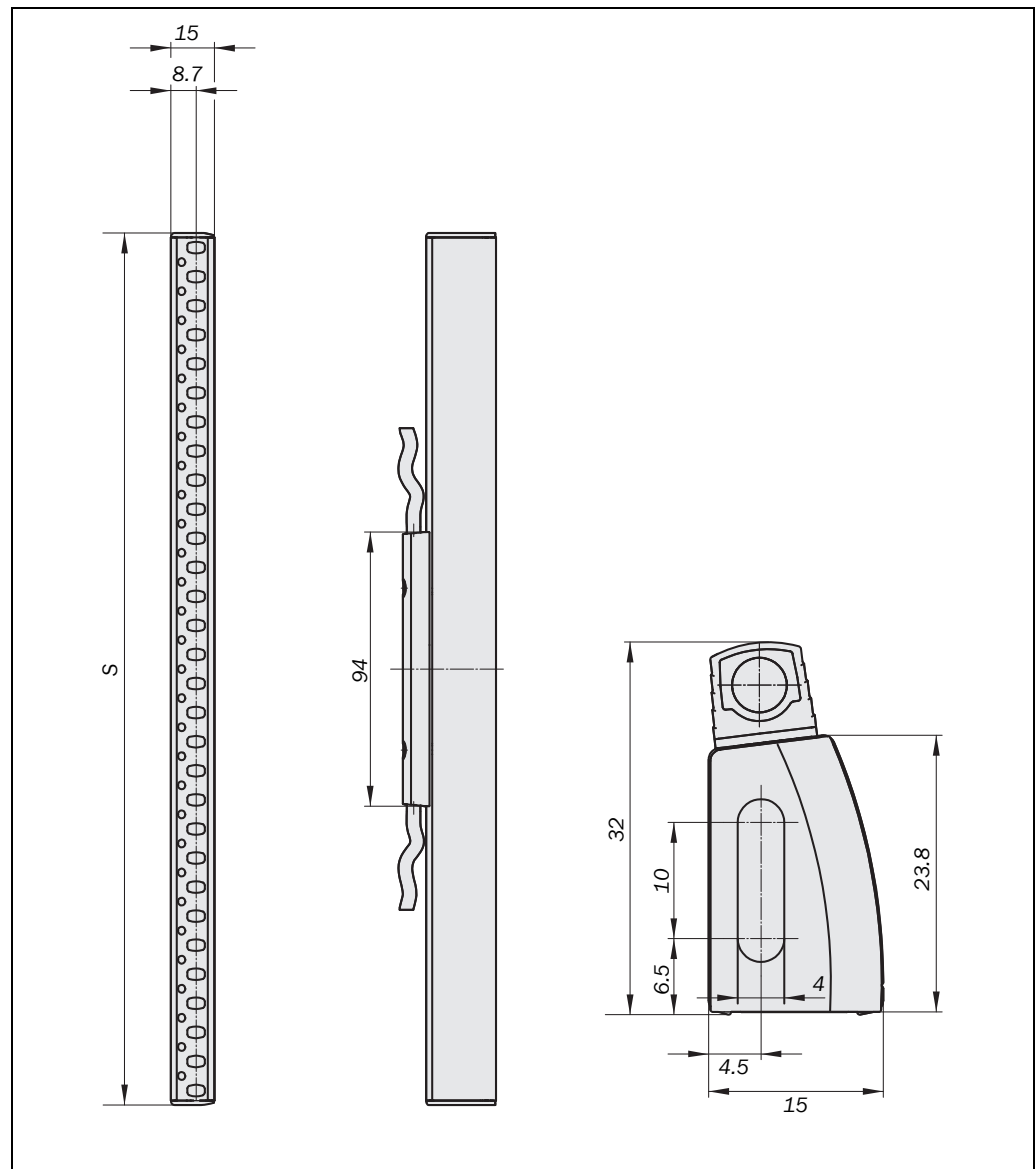
Tab. 13: Weight of the deflector mirrors PNS75 and PNS125

Mirror height [mm]	Weight [g]	
	PNS75	PNS125
340	1035	1580
490	1435	2190
640	1850	2820
790	2270	3450
940	2680	4080
1090	3095	4710
1240	3510	5345

9.3 Dimensional drawings

9.3.1 miniTwin2

Fig. 48: Dimensional drawing miniTwin2 (mm)

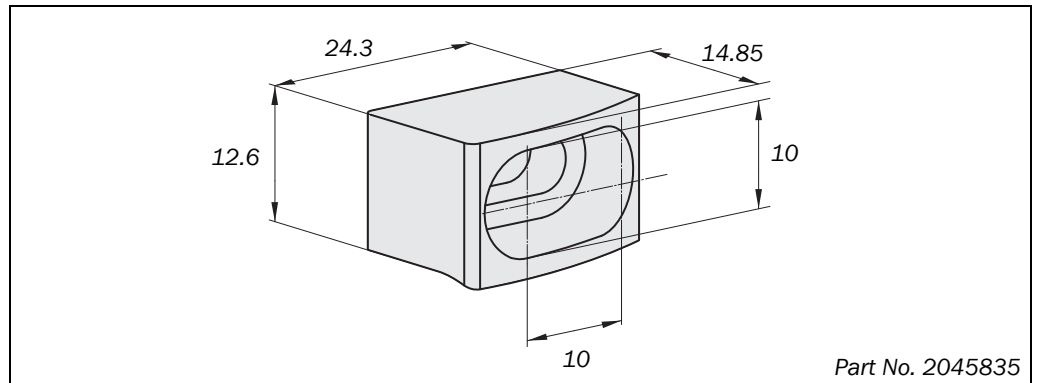


Note The protective field height S is the same as the size of the safety light curtain (see Tab. 16, Tab. 17 and Tab. 18 from page 73).

miniTwin2

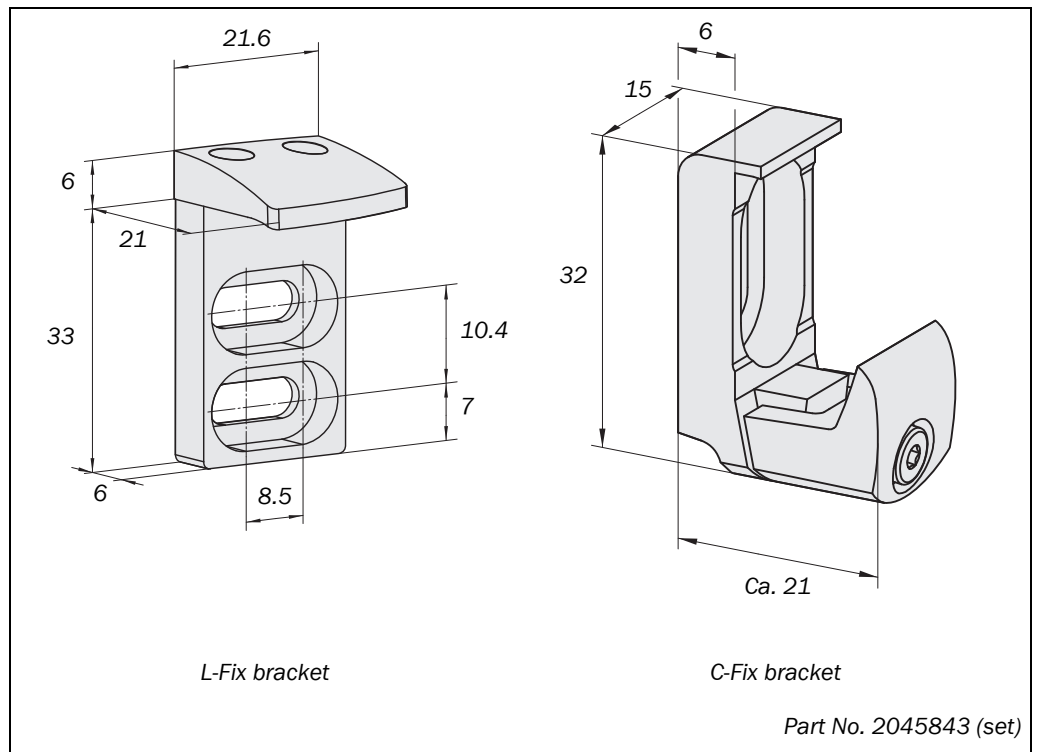
9.3.2 O-Fix bracket

Fig. 49: Dimensional drawing O-Fix bracket (mm)



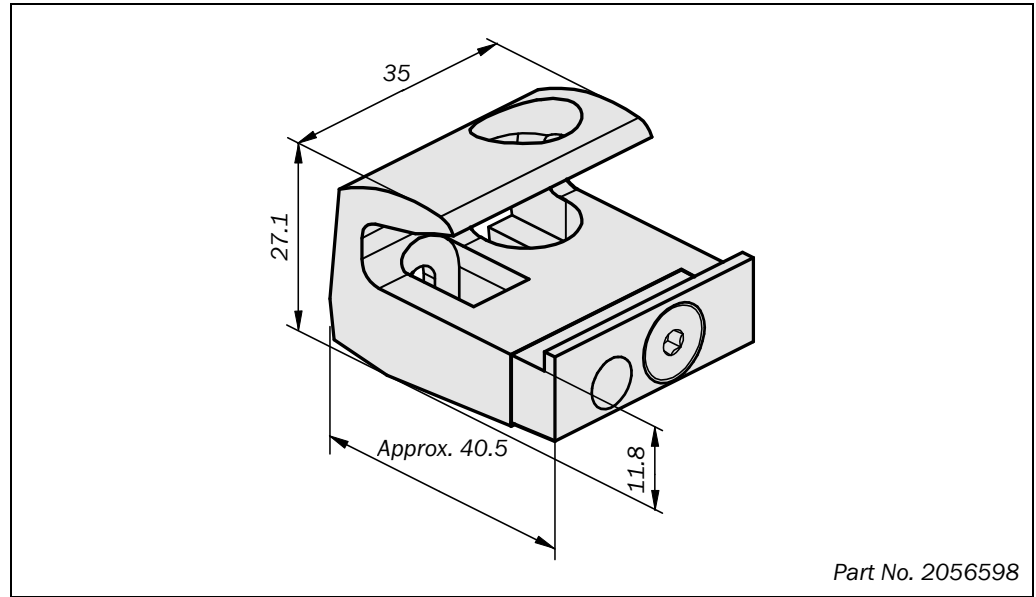
9.3.3 L-Fix bracket, C-Fix bracket (set)

Fig. 50: Dimensional drawing L-Fix bracket, C-Fix bracket (mm)



9.3.4 C-Fix-Flex bracket (pivoting)

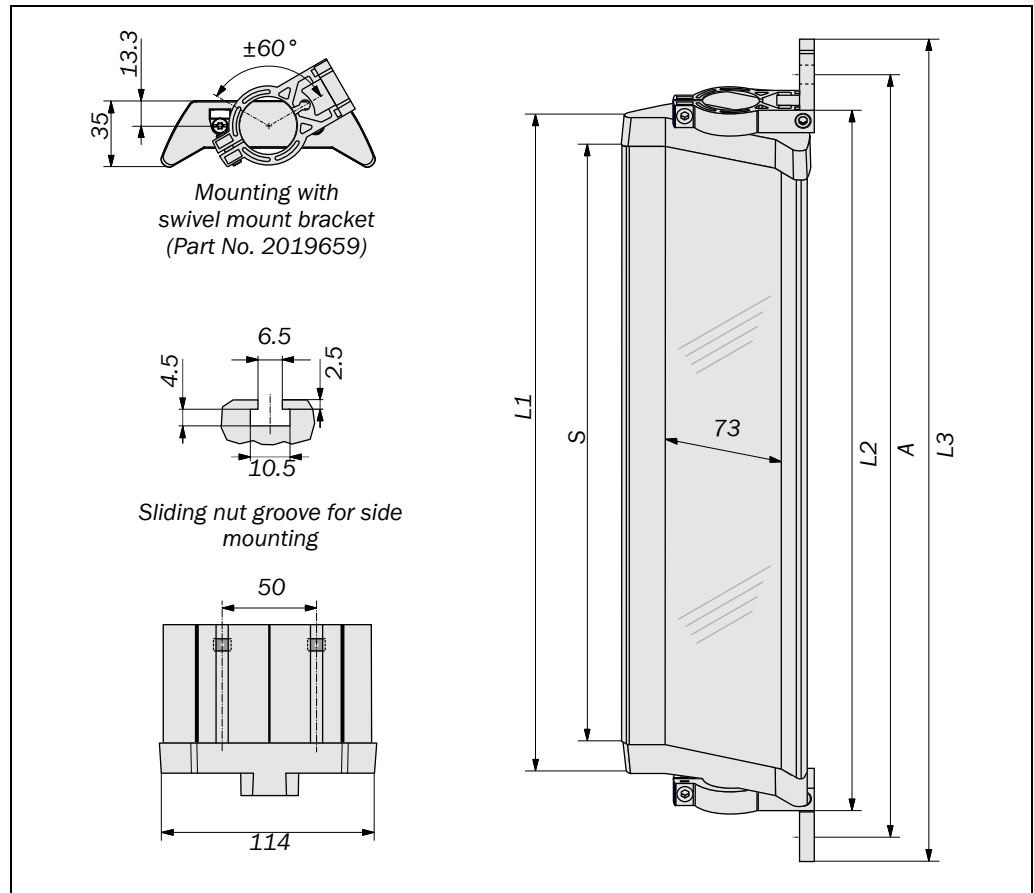
Fig. 51: Dimensional drawing C-Fix-Flex bracket, pivoting (mm)



miniTwin2

9.3.5 Deflector mirror PNS75

Fig. 52: Dimensional drawing deflector mirror PNS75 (mm)



Tab. 14: Dimensions for the deflector mirror PNS75 depending on the mirror height

Mirror height S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension L3 [mm]	Dimension A [mm]
340	372	396	460	440
490	522	546	610	590
640	672	696	760	740
790	822	846	910	890
940	972	996	1060	1040
1090	1122	1146	1210	1190
1240	1272	1296	1360	1340

When using deflector mirrors, the effective scanning range is reduced (see section 9.1 “Data sheet” on page 64).



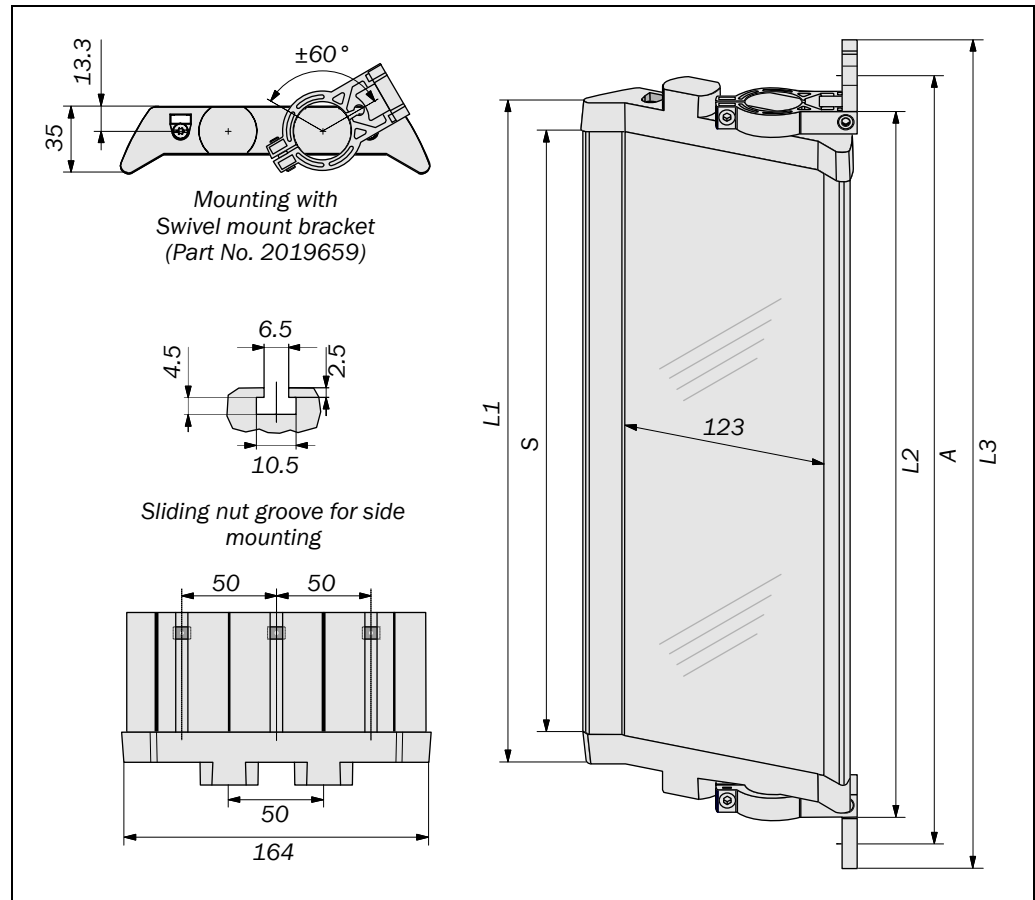
WARNING

Do not use deflector mirrors if the formation of droplets or heavy contamination of the deflector mirrors is to be expected!

The formation of droplets or heavy contamination can be detrimental to the reflection behaviour. The protective function of the system will be affected and the system will thus become unsafe. This would mean that the operator is at risk.

9.3.6 Deflector mirror PNS125

Fig. 53: Dimensional drawing deflector mirror PNS125 (mm)



Tab. 15: Dimensions for the deflector mirror PNS125 depending on the mirror height

Mirror height S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension L3 [mm]	Dimension A [mm]
340	372	396	460	440
490	522	546	610	590
640	672	696	760	740
790	822	846	910	890
940	972	996	1060	1040
1090	1122	1146	1210	1190
1240	1272	1296	1360	1340

When using deflector mirrors, the effective scanning range is reduced (see section 9.1 "Data sheet" on page 64).



WARNING

Do not use deflector mirrors if the formation of droplets or heavy contamination of the deflector mirrors is to be expected!

The formation of droplets or heavy contamination can be detrimental to the reflection behaviour. The protective function of the system will be affected and the system will thus become unsafe. This would mean that the operator is at risk.

10 Ordering information

10.1 miniTwin2: standalone devices or cascade end units

- 1 Twin Stick
- 1 standalone system plug including connecting cable with plug M12 × 4 + FE
(length 160 mm for a protective field height up to 180 mm,
length 350 mm for a protective field height up to 540 mm,
length 700 mm for a protective field height up to 1200 mm)
- 2 C-Fix brackets with L-Fix bracket including 4 screws M5 (DIN 7984/6912)
- 1 test rod with diameter corresponding to the physical resolution of the safety light curtain
- 1 label "Important Information"
- 1 operating instructions on CD-ROM

Tab. 16: Type codes for the standalone devices or cascade end units

Protective field height [mm]	Resolution		
	14 mm	24 mm	34 mm
120	1207793 (C2MT-01214BBC03BE0)	1207822 (C2MT-01224BBC03BE0)	1207847 (C2MT-01234BBC03BE0)
180	1207795 (C2MT-01814BBC03BE0)	1207823 (C2MT-01824BBC03BE0)	1207848 (C2MT-01834BBC03BE0)
240	1207795 (C2MT-02414BBC03DE0)	1207824 (C2MT-02424BBC03DE0)	1207849 (C2MT-02434BBC03DE0)
300	1207796 (C2MT-03014BBC03DE0)	1207825 (C2MT-03024BBC03DE0)	1207850 (C2MT-03034BBC03DE0)
360	1207797 (C2MT-03614BBC03DE0)	1207832 (C2MT-03624BBC03DE0)	1207851 (C2MT-03634BBC03DE0)
420	1207798 (C2MT-04214BBC03DE0)	1207833 (C2MT-04224BBC03DE0)	1207852 (C2MT-04234BBC03DE0)
480	1207799 (C2MT-04814BBC03DE0)	1207834 (C2MT-04824BBC03DE0)	1207853 (C2MT-04834BBC03DE0)
540	1207800 (C2MT-05414BBC03DE0)	1207835 (C2MT-05424BBC03DE0)	1207854 (C2MT-05434BBC03DE0)
600	1207801 (C2MT-06014BBC03FE0)	1207836 (C2MT-06024BBC03FE0)	1207855 (C2MT-06034BBC03FE0)
660	1207802 (C2MT-06614BBC03FE0)	1207837 (C2MT-06624BBC03FE0)	1207856 (C2MT-06634BBC03FE0)
720	1207803 (C2MT-07214BBC03FE0)	1207838 (C2MT-07224BBC03FE0)	1207857 (C2MT-07234BBC03FE0)
780	1207813 (C2MT-07814BBC03FE0)	1207839 (C2MT-07824BBC03FE0)	1207858 (C2MT-07834BBC03FE0)
840	1207814 (C2MT-08414BBC03FE0)	1207840 (C2MT-08424BBC03FE0)	1207859 (C2MT-08434BBC03FE0)
900	1207816 (C2MT-09014BBC03FE0)	1207841 (C2MT-09024BBC03FE0)	1207860 (C2MT-09034BBC03FE0)
960	1207817 (C2MT-09614BBC03FE0)	1207842 (C2MT-09624BBC03FE0)	1207861 (C2MT-09634BBC03FE0)
1020	1207818 (C2MT-10214BBC03FE0)	1207843 (C2MT-10224BBC03FE0)	1207862 (C2MT-10234BBC03FE0)
1080	1207819 (C2MT-10814BBC03FE0)	1207844 (C2MT-10824BBC03FE0)	1207863 (C2MT-10834BBC03FE0)
1140	1207820 (C2MT-11414BBC03FE0)	1207845 (C2MT-11424BBC03FE0)	1207864 (C2MT-11434BBC03FE0)
1200	1207821 (C2MT-12014BBC03FE0)	1207846 (C2MT-12024BBC03FE0)	1207865 (C2MT-12034BBC03FE0)

10.2 miniTwin2: cascade devices

- 1 Twin Stick
- 1 cascade system plug including connecting cable with plug and socket M12 × 4 + FE
(length 160 mm for a protective field height up to 180 mm,
length 350 mm for a protective field height up to 540 mm,
length 700 mm for a protective field height up to 1200 mm)
- 2 C-Fix brackets with L-Fix bracket including 4 screws M5 (DIN 7984/6912)
- 1 test rod with diameter corresponding to the physical resolution of the safety light curtain
- 1 label "Important Information"
- 1 operating instructions on CD-ROM

Tab. 17: Type code for the cascade devices

Protective field height [mm]	Resolution		
	14 mm	24 mm	34 mm
120	1207866 (C2MT-01214BBC04BE0)	1207885 (C2MT-01224BBC04BE0)	1207904 (C2MT-01234BBC04BE0)
180	1207867 (C2MT-01814BBC04BE0)	1207886 (C2MT-01824BBC04BE0)	1207905 (C2MT-01834BBC04BE0)
240	1207868 (C2MT-02414BBC04DE0)	1207887 (C2MT-02424BBC04DE0)	1207906 (C2MT-02434BBC04DE0)
300	1207869 (C2MT-03014BBC04DE0)	1207888 (C2MT-03024BBC04DE0)	1207907 (C2MT-03034BBC04DE0)
360	1207870 (C2MT-03614BBC04DE0)	1207889 (C2MT-03624BBC04DE0)	1207908 (C2MT-03634BBC04DE0)
420	1207871 (C2MT-04214BBC04DE0)	1207890 (C2MT-04224BBC04DE0)	1207909 (C2MT-04234BBC04DE0)
480	1207872 (C2MT-04814BBC04DE0)	1207891 (C2MT-04824BBC04DE0)	1207910 (C2MT-04834BBC04DE0)
540	1207873 (C2MT-05414BBC04DE0)	1207892 (C2MT-05424BBC04DE0)	1207911 (C2MT-05434BBC04DE0)
600	1207874 (C2MT-06014BBC04FE0)	1207893 (C2MT-06024BBC04FE0)	1207912 (C2MT-06034BBC04FE0)
660	1207875 (C2MT-06614BBC04FE0)	1207894 (C2MT-06624BBC04FE0)	1207913 (C2MT-06634BBC04FE0)
720	1207876 (C2MT-07214BBC04FE0)	1207895 (C2MT-07224BBC04FE0)	1207914 (C2MT-07234BBC04FE0)
780	1207877 (C2MT-07814BBC04FE0)	1207896 (C2MT-07824BBC04FE0)	1207915 (C2MT-07834BBC04FE0)
840	1207878 (C2MT-08414BBC04FE0)	1207897 (C2MT-08424BBC04FE0)	1207916 (C2MT-08434BBC04FE0)
900	1207879 (C2MT-09014BBC04FE0)	1207898 (C2MT-09024BBC04FE0)	1207917 (C2MT-09034BBC04FE0)
960	1207880 (C2MT-09614BBC04FE0)	1207899 (C2MT-09624BBC04FE0)	1207918 (C2MT-09634BBC04FE0)
1020	1207881 (C2MT-10214BBC04FE0)	1207900 (C2MT-10224BBC04FE0)	1207919 (C2MT-10234BBC04FE0)
1080	1207882 (C2MT-10814BBC04FE0)	1207901 (C2MT-10824BBC04FE0)	1207920 (C2MT-10834BBC04FE0)
1140	1207883 (C2MT-11414BBC04FE0)	1207902 (C2MT-11424BBC04FE0)	1207921 (C2MT-11434BBC04FE0)
1200	1207884 (C2MT-12014BBC04FE0)	1207903 (C2MT-12024BBC04FE0)	1207922 (C2MT-12034BBC04FE0)

10.3 miniTwin2: standalone devices with O-Fix bracket

- 1 Twin Stick
- 1 standalone system plug including connecting cable with plug M12 × 4 + FE
(length 160 mm for a protective field height up to 180 mm,
length 350 mm for a protective field height up to 540 mm,
length 700 mm for a protective field height up to 1200 mm)
- 2 O-Fix brackets including 2 screws M5 (EN ISO 4762)
- 1 test rod with diameter corresponding to the physical resolution of the safety light curtain
- 1 label "Important Information"
- 1 operating instructions on CD-ROM

Tab. 18: Type codes for the standalone devices with O-Fix bracket

Protective field height [mm]	Resolution		
	14 mm	24 mm	34 mm
120	1207923 (C2MT-01214BBC03BB0)	1207942 (C2MT-01224BBC03BB0)	1207961 (C2MT-01234BBC03BB0)
180	1207924 (C2MT-01814BBC03BB0)	1207943 (C2MT-01824BBC03BB0)	1207962 (C2MT-01834BBC03BB0)
240	1207925 (C2MT-02414BBC03DB0)	1207944 (C2MT-02424BBC03DB0)	1207963 (C2MT-02434BBC03DB0)
300	1207926 (C2MT-03014BBC03DB0)	1207945 (C2MT-03024BBC03DB0)	1207964 (C2MT-03034BBC03DB0)
360	1207927 (C2MT-03614BBC03DB0)	1207946 (C2MT-03624BBC03DB0)	1207965 (C2MT-03634BBC03DB0)
420	1207928 (C2MT-04214BBC03DB0)	1207947 (C2MT-04224BBC03DB0)	1207966 (C2MT-04234BBC03DB0)
480	1207929 (C2MT-04814BBC03DB0)	1207948 (C2MT-04824BBC03DB0)	1207967 (C2MT-04834BBC03DB0)
540	1207930 (C2MT-05414BBC03DB0)	1207949 (C2MT-05424BBC03DB0)	1207968 (C2MT-05434BBC03DB0)
600	1207931 (C2MT-06014BBC03FB0)	1207950 (C2MT-06024BBC03FB0)	1207969 (C2MT-06034BBC03FB0)
660	1207932 (C2MT-06614BBC03FB0)	1207951 (C2MT-06624BBC03FB0)	1207970 (C2MT-06634BBC03FB0)
720	1207933 (C2MT-07214BBC03FB0)	1207952 (C2MT-07224BBC03FB0)	1207971 (C2MT-07234BBC03FB0)
780	1207934 (C2MT-07814BBC03FB0)	1207953 (C2MT-07824BBC03FB0)	1207972 (C2MT-07834BBC03FB0)
840	1207935 (C2MT-08414BBC03FB0)	1207954 (C2MT-08424BBC03FB0)	1207973 (C2MT-08434BBC03FB0)
900	1207936 (C2MT-09014BBC03FB0)	1207955 (C2MT-09024BBC03FB0)	1207974 (C2MT-09034BBC03FB0)
960	1207937 (C2MT-09614BBC03FB0)	1207956 (C2MT-09624BBC03FB0)	1207975 (C2MT-09634BBC03FB0)
1020	1207938 (C2MT-10214BBC03FB0)	1207957 (C2MT-10224BBC03FB0)	1207976 (C2MT-10234BBC03FB0)
1080	1207939 (C2MT-10814BBC03FB0)	1207958 (C2MT-10824BBC03FB0)	1207977 (C2MT-10834BBC03FB0)
1140	1207940 (C2MT-11414BBC03FB0)	1207959 (C2MT-11424BBC03FB0)	1207978 (C2MT-11434BBC03FB0)
1200	1207941 (C2MT-12014BBC03FB0)	1207960 (C2MT-12024BBC03FB0)	1207979 (C2MT-12034BBC03FB0)

10.4 Additional front screen (weld spark guard)

- Notes**
- Two additional front screens (weld spark guards) supplied for each part number.
 - An additional front screen reduces the scanning range of the system by 7.5%. Using an additional front screen on two Twin Sticks opposite each other will reduce the scanning range by 15%.

Tab. 19: Part numbers additional front screen (weld spark guard)

Protective field height [mm]	Part number	Protective field height [mm]	Part number
120	2058479	720	2058491
180	2058482	780	2058492
240	2058483	840	2058493
300	2058484	900	2058494
360	2058485	960	2058495
420	2058486	1020	2058496
480	2058487	1080	2058497
540	2058488	1140	2058498
600	2058489	1200	2058499
660	2058490		

10.5 Deflector mirror

Tab. 20: Part numbers deflector mirrors PNS75 and PNS125

For protective field height [mm]	PNS75	PNS125
120 ... 300	1019414 (PNS75-034)	1019425 (PNS125-034)
360 ... 480	1019415 (PNS75-049)	1019426 (PNS125-049)
540 ... 600	1019416 (PNS75-064)	1019427 (PNS125-064)
660 ... 780	1019417 (PNS75-079)	1019428 (PNS125-079)
840 ... 900	1019418 (PNS75-094)	1019429 (PNS125-094)
960 ... 1080	1019419 (PNS75-109)	1019430 (PNS125-109)
1140 ... 1200	1019420 (PNS75-124)	1019431 (PNS125-124)

Dimensional drawing see section 9.3 "Dimensional drawings" on page 71. Effect on the effective scanning range see section 9.1 "Data sheet" on page 64.



WARNING

Do not use deflector mirrors if the formation of droplets or heavy contamination of the deflector mirrors is to be expected!

miniTwin2

10.6 Accessories

Note You can order the accessories separately or together with the Twin Sticks.

Tab. 21: Part numbers accessories

Part	Part number
miniTwin2 system connection	
Standalone system plug, 1 connecting cable	
160 mm with plug M12 × 4 + FE	2046447
350 mm with plug M12 × 4 + FE	2046449
700 mm with plug M12 × 4 + FE	2046451
10 m, stripped	2051290
Cascade system plug, 1 connecting cable with plug and socket M12 × 4 + FE	
160 mm	2046452
350 mm	2046454
700 mm	2046456
Connecting cable ¹⁸⁾ , Socket M12 × 4 + FE straight/stripped	
2 m	6008899
5 m	6009868
10 m	6010544
15 m	6029215
20 m	6036386
Plug connectors	
M12 × 5 cable plug, straight, can be preformed	6022083
M12 × 5 cable socket, straight, can be preformed	6009719
Two-way splitter, plug M12 × 5	6024744
Cascade extension connection, plug and socket M12 × 4 + FE, straight	
1 m	6029280
2 m	6025931
Mounting systems	
Combination C-Fix bracket ¹⁹⁾ with L-Fix bracket, 2 pieces each	2045843
C-Fix-Flex bracket, can be pivoted by ±4°, aluminium, 2 pieces	2056598
O-Fix bracket, 2 pieces	2045835
Other accessories	
AR60, external laser alignment aid	1015741
Adapter for AR60 for attaching to the miniTwin2-housing	4064710
Power supply 24 V, 100/240 V AC, 50 W	7028789
Power supply 24 V, 120/240 V AC, 95 W	7028790

¹⁸⁾ The cable sheath is made of PVC (UL listed).

¹⁹⁾ From devices with a size of 360 mm we recommend the usage of an additional C-Fix bracket near the L-Fix bracket.

11 Annex



11.1 EC Declaration of Conformity

Fig. 54: EC declaration of conformity (page 1)

SICK	
TYPE: minitwin2	Ident-No.: 9151051
EC declaration of conformity	en
The undersigned, representing the following manufacturer herewith declares that the product is in conformity with the provisions of the following EC directive(s) (including all applicable amendments), and that the respective standards and/or technical specifications have been applied.	
EG-Konformitätserklärung	de
Der Unterzeichner, der den nachstehenden Hersteller vertritt, erklärt hiermit, dass das Produkt in Übereinstimmung mit den Bestimmungen der nachstehenden EG-Richtlinie(n) (einschließlich aller zutreffenden Änderungen) ist, und dass die entsprechenden Normen und/oder technischen Spezifikationen zur Anwendung gelangt sind.	
ЕС декларация за съответствие	bg
Подписаният, който представя долуупоменатия производител, обявява, че продуктът съответва на разпоредбите на долуизброените директиви на ЕС (включително на всички действащи изменения) и че отговаря на съответните норми и/или технически спецификации за приложение.	
ES prohlášení o shodě	cs
Niže podepsaný, zastupující následujícího výrobce, tímto prohlašuje, že výrobek je v souladu s ustanoveními následující(ch) směrnice (směrnic) ES (včetně všech platných změn) a že byly použity odpovídající normy a/nebo technické specifikace.	
EF-overensstemmelseserklæring	da
Undertegnede, der repræsenterer følgende producent erklærer hermed at produktet er i overensstemmelse med bestemmelserne i følgende EF-direktiv(er) (inklusive alle gældende ændringer) og at alle tilsvarende standarder og/eller tekniske specifikationer er blevet anvendt.	
ΕΕ-Δήλωση συμμόρφωσης	el
Ο Υπογράφων, εκπροσωπών τον ακόλουθο κατασκευαστή δηλώνει με το παρόν έγγραφο ότι το προϊόν συμμορφώνεται με τους όρους της (των) ακόλουθης (-ών) Οδηγίας (-ών) της ΕΕ (συμπεριλαμβανομένων όλων των εφαρμοζόμενων τροποποιήσεων) και ότι έχουν εφαρμοστεί τα αντίστοιχα πρότυπα και/ή οι τεχνικές προδιαγραφές.	
Declaración de conformidad CE	es
El abajo firmante, en representación del fabricante indicado a continuación, declara que el producto es conforme con las disposiciones de la(s) siguiente(s) directiva(s) de la CE (incluyendo todas las modificaciones aplicables) y que las respectivas normas y/o especificaciones técnicas han sido aplicadas.	
EÜ vastavusdeklaratsioon	et
Allkirjutanu, kes esindab järgmist tootjat, kinnitab käesolevaga, et antud toode vastab järgneva(te) EÜ direktiivi(de) sätetele (kaasa arvatud kõikidele asjakohastele muudatustele) ja et on kohaldatud vastavaid nõudeid ja/või tehnilisi kirjeldusi.	
EY-vaatimustenmukaisuusvakuutus	fi
Allekirjoittanut, joka edustaa alla mainittua valmistajaa, vakuuttaa täten, että tuote on seuraavan (-ien) EU-direktiivin (-ien) vaatimusten mukainen (mukaan lukien kaikki sovellettavat muutokset) ja että vastaavia standardeja ja teknisiä erittelyjä on sovellettu.	
Déclaration CE de conformité	fr
Le soussigné, représentant le constructeur ci-après, déclare par la présente que le produit est conforme aux exigences de la (des) directive(s) CE suivantes (y compris tous les amendements applicables) et que les normes et/ou spécifications techniques correspondantes ont été appliquées.	
EK megfeleléségi nyilatkozat	hu
Alulírott, az alábbi gyártó képviselőtében ezennel kijelenti, hogy a termék megfelel az alábbi EK-irányelv(ek) követelményeinek (beleértve azok minden vonatkozó módosítását) és kijelenti hogy a megfelelő szabványokat és/vagy műszaki előírásokat alkalmazta.	
EB-samræmisýfirlýsing	is
Undirritaður, fyrir hönd framleiðandans sem nefndur er hér að neðan, lýsir því hér með yfir að varan er í samræmi við ákvæði eftirtalinnna EB-tilskipana (að meðtöldum öllum breytingum sem við eiga) og að varan er í samræmi við viðeigandi staðla og/eða tækniforskriftir.	
Dichiarazione CE di conformità	it
Il sottoscritto, rappresentante il seguente costruttore dichiara qui di seguito che il prodotto risulta in conformità a quanto previsto dalla(e) seguente(i) direttiva(e) comunitaria(e) (comprese tutte le modifiche applicabili) e che sono state applicate tutte le relative norme e/o specifiche tecniche.	
EB atitikties deklaracija	lt
Pasirašiusysis, atstovaujantis šiam gamintojui deklaruoja, kad gaminys atitinka šios (-ių) EB direktyvos (-ų) reikalavimus (įskaitant visus taikytinus keitinius) ir kad buvo taikomi antrajame puslapyje nurodyti standartai ir (arba) techninės specifikacijos.	

miniTwin2

Fig. 55: EC declaration of conformity (page 2)

SICK	
TYPE: minitwin2	Ident-No.: 9151051
EK atbilstības deklarācija Apakšā parakstījies persona, kas pārstāv zemāk minēto ražotāju ar šo deklarē, ka izstrādājums atbilst zemāk minētajai (-ām) EK direktīvai (-ām) (ieskaitot visus atbilstošos grozījumus) un ka izstrādājumam ir piemēroti attiecīgie standarti un/vai tehniskās specifikācijas.	lv
EG-verklaring van overeenstemming Ondergetekende, vertegenwoordiger van de volgende fabrikant, verklaart hiermee dat het product voldoet aan de bepalingen van de volgende EG-richtlijn(en) (inclusief alle van toepassing zijnde wijzigingen) en dat de overeenkomstige normen en/of technische specificaties zijn toegepast.	nl
EF-samsvarserklæring Undertegnede, som repræsenterer nedennevnte producent, erklærer herved at produktet er i samsvar med bestemmelsene i følgende EU-direktiv(er) (inkludert alle relevante endringer) og at relevante normer og/eller tekniske specifikasjoner er blitt anvendt.	no
Deklaracja zgodności WE Niżej podpisany, reprezentujący następującego producenta niniejszym oświadczam, że wyrób jest zgodny z postanowieniami następujących dyrektyw WE (wraz z odnośnymi poprawkami) oraz, że zastosowano odpowiednie normy i/lub specyfikacje techniczne.	pl
Declaração CE de conformidade O abaixo assinado, que representa o seguinte fabricante, declara deste modo que o produto está em conformidade com as disposições da(s) seguinte(s) diretiva(s) CE (incluindo todas as alterações aplicáveis) e que foram aplicadas as respectivas normas e/ou especificações técnicas.	pt
Declarație de conformitate CE Semnatarul, în calitate de reprezentant al producătorului numit mai jos, declară prin prezenta că produsul este în conformitate cu prevederile directivelor CE enumerate mai jos (inclusiv cu toate modificările aferente) și că s-au îndeplinit normele și/sau specificațiile tehnice corespunzătoare.	ro
ES vyhlásenie o zhode Dolu podpísaný zástupca výrobcu týmto vyhlasuje, že výrobok je v súlade s ustanoveniami nasledujúcej (nasledujúcich) smernice (smerníc) ES (vrátane všetkých platných zmien) a že sa použili príslušné normy a/alebo technické špecifikácie.	sk
Izjava ES o skladnosti Podpisani predstavnik spodaj navedenega proizvajalca izjavljam, da je proizvod v skladu z določbami spodaj navedenih direktiv ES (vključno z vsemi ustreznimi spremembami) in da so bili uporabljeni ustrezni standardi in/ali tehnične specifikacije.	sl
EG-försäkran om överensstämmelse Undertecknad, som representerar nedanstående tillverkare, försäkras härmed att produkten överensstämmer med bestämmelserna i följande EU-direktiv (inklusive samtliga tillämpliga tillägg till dessa) och att relevanta standarder och/eller tekniska specifikationer har tillämpats.	sv
AB-Uygunluk Beyanı Aşağıdaki üreticiyi temsil eden imza sahibi böylelikle, ürünün aşağıdaki AB-Yönergesinin(lerin) direktifleri ile (tüm ilgili değişiklikleri kapsayacak şekilde) uyumlu olduğunu ve ilgili normların ve/veya teknik spesifikasyonların uygulandığını beyan eder.	tr
Directives used:	MAS-DIRECTIVE 2006/42/EC EMC-DIRECTIVE 2004/108/EC
You can obtain the EC declaration of conformity with the standards used at: www.sick.com	
SICK AG Erwin-Sick-Straße 1 D-79183 Waldkirch Germany	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>2009-11-30 Date</p> </div> <div style="width: 45%; text-align: center;">  ppa. Dr. Georg Plasberg Management Board (Industrial Safety Systems) authorized for technical documentation </div> <div style="width: 45%; text-align: center;">  ppa. Birgit Knobloch Division Manager Production (Industrial Safety Systems) </div> </div>

11.2 Checklist for the manufacturer

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Checklist for the manufacturer/installer for the installation of electro-sensitive protective equipment (ESPE)

Details about the points listed below must be present at least during initial commissioning – they are, however, dependent on the respective application, the specifications of which are to be controlled by the manufacturer/installer. This checklist should be retained and kept with the machine documentation to serve as reference during recurring tests.

- | | | |
|--|------------------------------|-----------------------------|
| 1. Have the safety rules and regulations been observed in compliance with the directives/standards applicable to the machine? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 2. Are the applied directives and standards listed in the declaration of conformity? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 3. Does the protective device comply with the required PL/SILCL and PFHd as per EN ISO 13849-1/EN 62061 and the type as per EN 61496-1? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 4. Is the access to the hazardous area/hazardous point only possible through the protective field of the ESPE? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 5. Have appropriate measures been taken to prevent (mechanical protection) or monitor unprotected presence in the hazardous area when protecting a hazardous area/hazardous point and have these been secured against removal? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 6. Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching under, over or around the ESPE? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 7. Has the maximum stopping and/or stopping/run-down time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 8. Has the ESPE been mounted such that the required minimum distance from the nearest hazardous point has been achieved? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 9. Are the ESPE devices correctly mounted and secured against manipulation after adjustment? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 10. Are the required protective measures against electric shock in effect (protection class)? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 11. Is the control switch for resetting the electro-sensitive protective equipment (ESPE) or restarting the machine present and correctly installed? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 12. Are the outputs on the ESPE (OSSD, AS-Interface Safety at Work interface) integrated in accordance with the required PL/SILCL as per EN ISO 13849-1/EN 62061, and do they comply with the circuit diagrams? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 13. Has the protective function been checked in compliance with the test notes of this documentation? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 14. Are the given protective functions effective at every setting of the operating mode selector switch? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 15. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 16. Is the ESPE effective over the entire period of the dangerous state? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 17. Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| 18. Has an information label for the daily check been attached so that it is easily visible for the operator? | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

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

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