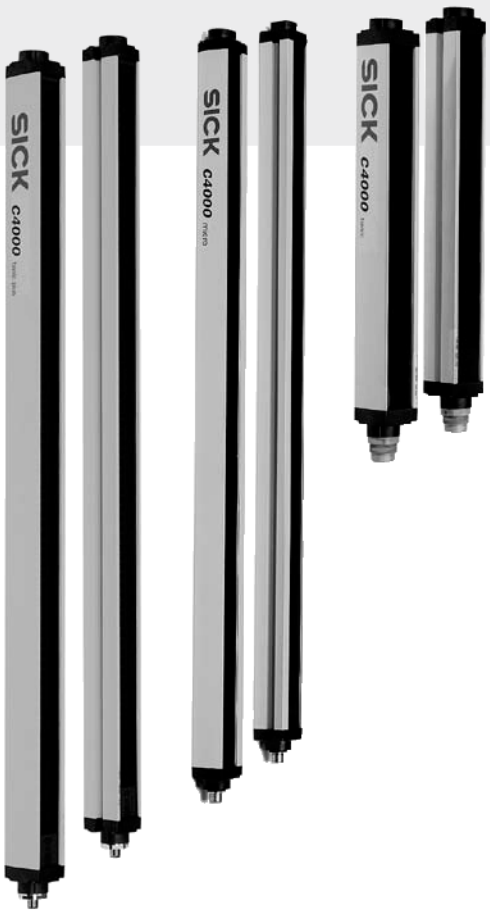
OPERATING INSTRUCTIONS

C4000 Micro, C4000 Basic Plus, C4000 Basic, C4000 Eco

Safety light curtain



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List of contents

1 About this document

Please read this chapter carefully before working with this documentation and the safety light curtain C4000 Micro, C4000 Basic Plus, C4000 Basic or the C4000 Eco.

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, electrical installation, commissioning, operation and maintenance of the safety light curtain C4000 Micro, C4000 Basic Plus, C4000 Basic or C4000 Eco.

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 of the machine.

1.2 Target group

These operating instructions are addressed to *planning engineers, developers and the operators* of plant and systems which are to be protected by one or several safety light curtains C4000. It also addresses people who integrate the C4000 into a machine, initialise its use, or who are in charge of servicing and maintaining the device.

1.3 Depth of information

These operating instructions contain information on:

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

of the safety light curtain C4000.

Planning and using protective devices such as the C4000 also require specific technical skills which are not detailed in this documentation.

When operating the C4000, 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 brochure “Safe Machines with opto-electronic protective devices”.

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 about the C4000
- these operating instructions in different languages for viewing and printing
- certificates on the prototype test, the EU declaration of conformity and other documents

1.4 Scope

This document is an original document.

Note These operating instructions only apply to the safety light curtains C4000 Basic, C4000 Basic Plus, C4000 Micro and C4000 Eco with one of the following entries on the type label in the field *Operating Instructions*:

- 8009410/N082
- 8009410/0855
- 8009410/TI70
- 8009410/YT79

This document is part of SICK part number 8009410 (operating instructions “Safety light curtain C4000 Micro, C4000 Basic Plus, C4000 Basic, C4000 Eco” in all available languages).

1.5 Abbreviations

ESPE Electro-sensitive protective equipment (e.g. C4000)

OSSD Output signal switching device

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.

Display indicators show the status of the 7-segment display of sender or receiver:

9	Constant indication of characters, e.g. 9
8	Flashing indication of characters, e.g. 8
L↻2	Alternating indication of characters, e.g. L and 2

● Red, ☼ Yellow, ○ Green

LED symbols describe the state of a diagnostics LED. Examples:

● **Red**	The red LED is illuminated constantly.
☼ **Yellow**	The yellow LED is flashing.
○ **Green**	The green LED is off.

➢ Take action ...

Instructions for taking action are shown by an arrow. Carefully read and follow the instructions for action.

WARNING

Warning!

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

Read carefully and follow the warnings!

Sender and receiver

In drawings and diagrams, the symbol ▣ denotes the sender and the symbol ▣ denotes the receiver.

The term “dangerous state”

The dangerous state (standard term) of the machine is always shown in the drawings and diagrams of this document as the 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 C4000 or with the machine protected by the C4000.

2.1 Qualified safety personnel

The safety light curtain C4000 must be installed, commissioned and serviced only by qualified safety personnel. Qualified safety personnel are defined as persons who

- have undergone the appropriate technical training

and

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

and

- who have access to these operating instructions.

2.2 Applications of the device

The safety light curtain C4000 is an electro-sensitive protective equipment (ESPE). The physical resolution is 14 or 30 mm with a maximum protective field width of 6 metres. The realisable protective field height is between 300 and 1,800 mm for the C4000 Basic/Eco and between 150 and 1,200 mm for the C4000 Micro.

The device is a *Type 4 ESPE* as defined by IEC 61496-1 and -2 and is therefore allowed for use with controls in safety category 4 in compliance with EN ISO 13849-1. The device 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 chapter 3.3 “Examples of range of use” on page 13 for an illustration of the protection modes.

WARNING

Only use the safety light curtain as an indirect safety 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 protective devices may be required in addition to the safety light curtain.

Note The safety light curtain C4000 Basic, C4000 Micro or C4000 Eco operates as a stand-alone system, comprising a sender and receiver. It cannot be combined with other C4000 systems, e.g. C4000 Advanced.

2.3 Correct use

The safety light curtain C4000 must be used only as defined in chapter 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 SICK AG 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 safety light curtain C4000.

- The national/international rules and regulations apply to the installation, commissioning, use and periodic technical inspections of the safety light curtain, in particular:
  - Machine Directive
  - Equipment Usage Directive
  - the work safety regulations/safety rules
  - other relevant health and safety regulations

  Manufacturers and operators of the machine with 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 “Test notes” on page 38) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- 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 safety light curtain C4000 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.
- The external voltage supply of the device (SELV/PELV) must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1. Suitable power supplies are available as accessories from SICK (SICK Power Supply 50 W (Part number 7028789)/SICK Power Supply 95 W (Part number 7028790)).

2.5 Protection of the environment

The safety light curtain C4000 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. For this reason please note the following information on disposal.

Disposal

- Always dispose of unserviceable or irreparable devices in compliance with local/national rules and regulations with respect to waste disposal.

Note We would be pleased to be of assistance on the disposal of this device. Contact your local SICK representative.

3 Product description

This chapter provides information on the special features and properties of the safety light curtain C4000. It describes the construction and the operating principle of the device, in particular the different operating modes.

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

3.1 Special features

C4000 Basic

- protective operation
- facility for connecting the reset button, model-dependent
- connection option for external device monitoring (EDM), model-dependent
- protective operation with either internal or external restart interlock (realised on machine), model-dependent
- status display with 7-segment display

The C4000 Basic is available in two designs (models).

Tab. 1: C4000 Basic model overview

Designation (Connection Format)	External device monitoring (EDM)	Restart interlock	Reset button
C4000 Basic Plus (M12 × 7 + FE)	Yes	Yes	Yes
C4000 Basic (M26 × 6 + FE, Hirschmann-plug)	Yes	No	No

C4000 Micro

- protective operation with either internal or external (realised on the machine) restart interlock
- facility for connecting the reset button
- facility for connecting the external device monitoring (EDM)
- status display with 7-segment display

The C4000 Micro is available in one design.

Tab. 2: C4000 Micro model overview

Designation (Connection Format)	External device monitoring (EDM)	Restart interlock	Reset button
C4000 Micro (M12 × 7 + FE)	Yes	Yes	Yes

C4000 Eco

- protective operation
- status display with 7-segment display

The C4000 Eco is available in one design.

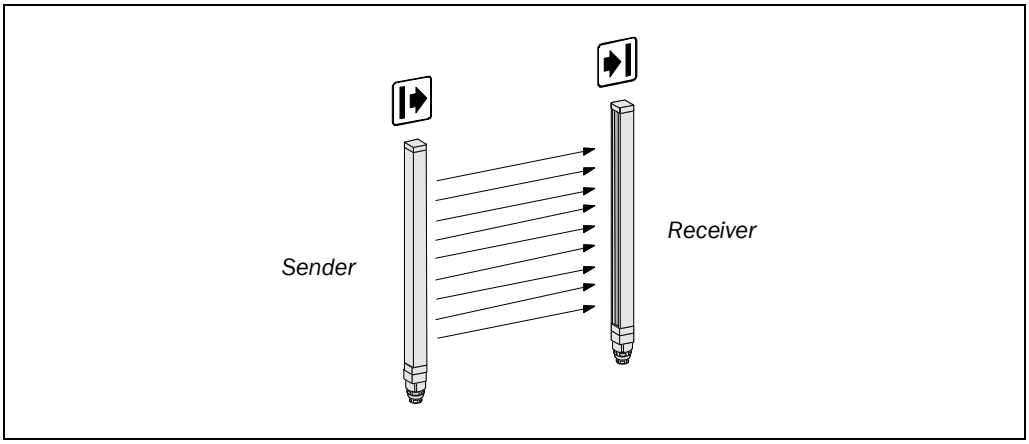
Tab. 3: C4000 Eco model overview

Designation (Connection Format)	External device monitoring (EDM)	Restart interlock	Reset button
C4000 Eco (M12 × 4 + FE)	No	No	No

3.2 Operating principle of the device

3.2.1 Components of the device

Fig. 1: Components of the C4000



Please refer to chapter 10 “Technical specifications” on page 45 for the data sheet. Please refer to pages 51ff. for the dimensional drawings.

3.2.2 The light curtain principle

The safety light curtain C4000 consists of a sender and a receiver (Fig. 1). Between these two units is the protective field, defined as the protective field height and the protective field width.

The construction height determines the *protective field height* of the appropriate system. For the exact protective field height, please see Tab. 21ff. in chapter 10.4 “Dimensional drawings” on page 51.

The *protective field width* is derived from the dimension of the light path between sender and receiver and must not exceed the maximum rated protective field width (see “Technical specifications” on page 45).

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

The C4000 is modular in structure. All optical and electronic components and assemblies are housed in a slim and torsionally rigid housing.

3.3 Examples of range of use

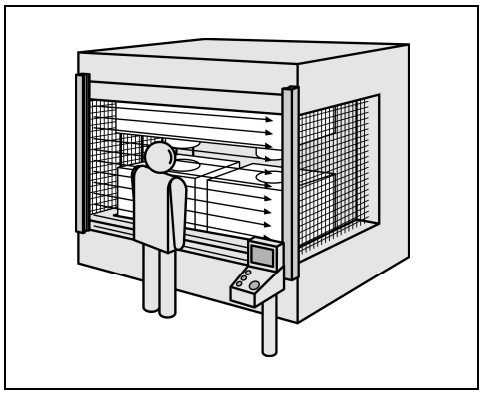


Fig. 2: Protecting hazardous points with a safety light curtain C4000 (left)

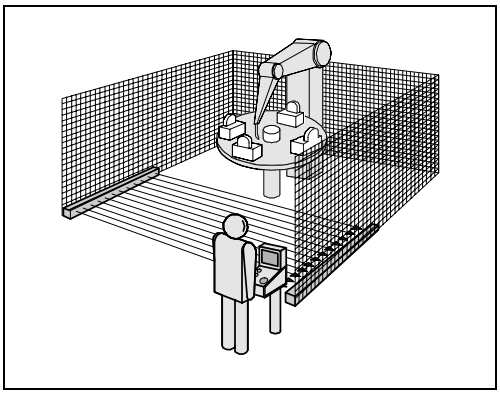


Fig. 3: Hazardous area protection with a safety light curtain C4000 (right)

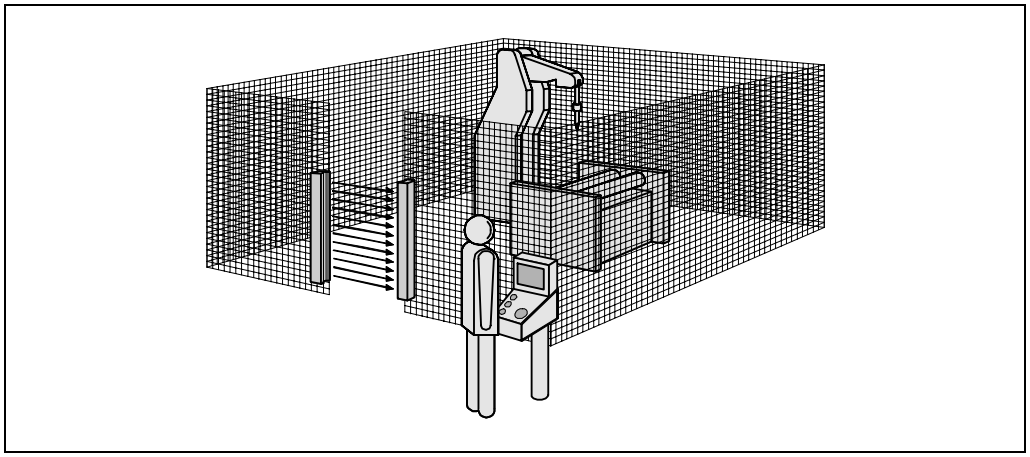


Fig. 4: Access protection using a safety light curtain C4000

The safety light curtain C4000 operates correctly as a protective device only if the following conditions are met:

- The control of the machine must be electrical.
- The dangerous state of the machine must be transferable at any time into a safe state.
- Sender and receiver unit must be so mounted that objects penetrating the hazardous area are safely identified by the C4000.
- 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.

3.4 Configurable functions

This chapter describes the functions of the safety light curtains C4000 Basic and C4000 Micro.

WARNING

Test the protective device after any changes!

After each modification to the protective device or its connection, you must check the whole protective device for effectiveness (see 6.3 on Page 38).

3.4.1 Restart interlock

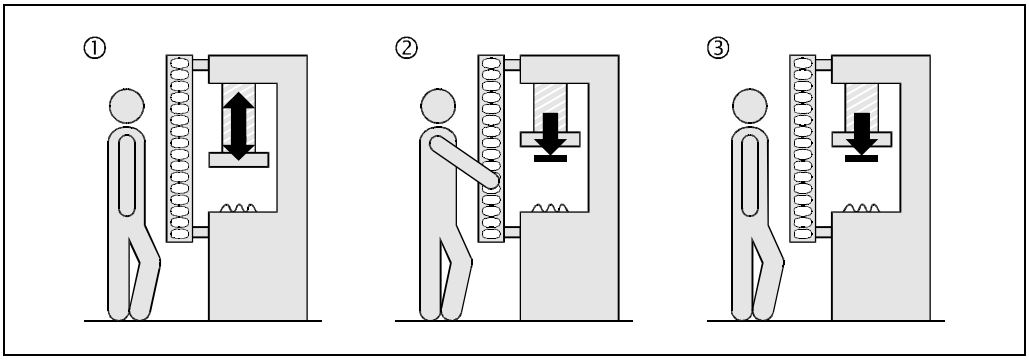


Fig. 5: Outline drawing of the protective operation

The C4000 Micro/Basic has an internal restart interlock. 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.

Notes

- If you use the C4000 Micro/Basic without internal restart interlock, then you must implement the restart interlock externally, i.e. on the machine.
- Do not confuse the restart interlock with the starting interlock on the machine. The start interlock prevents the machine starting after switching on. The restart interlock prevents the machine starting again after an error or an interruption in the light path.

When using the C4000 Micro/Basic, you can implement the restart interlock in two different ways:

- with the internal restart interlock of the C4000 Micro/Basic:
  The C4000 Micro/Basic controls the restart.
- with the restart interlock of the machine (external):
  The C4000 Micro/Basic has no control over the restart.

The possible combinations are shown in the following table:

Tab. 4: Permissible configuration of the restart interlock of the C4000 Micro/Basic

Restart interlock of the C4000 Micro/Basic	Restart interlock of the machine	Permissible application
Deactivated	Deactivated	Only if the light curtain cannot be stood behind. Observe EN 60204-1!
Deactivated	Activated	All
Activated	Deactivated	Only if the light curtain cannot be stood behind. Observe EN 60204-1!
Activated	Activated	All. The restart interlock of the C4000 Micro handles the reset function (see “Reset” below).

WARNING

Always configure the application with restart interlock!

Ensure that there is always a restart interlock. The C4000 is unable to verify if the restart interlock of the machine is operable. If you deactivate both the internal and the machine’s restart interlock, the operators of the machine will be at an acute risk of injury.

The electrical connection of the reset button is described in chapter “Reset button” on page 34.

Reset

If you want to activate the restart interlock on the C4000 Micro/Basic (internal) and also a restart interlock on the machine (external), then each restart interlock has its own button.

When actuating the reset button (for the internal restart interlock)

- the C4000 Micro/Basic activates the switching outputs
- the safety light curtain changes from red to green

Only the external restart interlock prevents the machine from restarting. After pressing the reset button for the C4000 Micro/Basic, 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 dangerous state with the reset button.

The electrical connection of the reset button is described in chapter “Reset button” on page 34. The configuration of the reset button is described in chapter 7.2 “Activating the restart interlock” on page 40.

3.4.2 External device monitoring (EDM)

C4000 Micro and C4000 Basic have an EDM. The external device monitoring (EDM) checks if the contactors actually de-energise when the protective device responds. If you activate external device monitoring, then the C4000 checks the contactors after each interruption to the light path and prior to machine restart. The EDM can so identify if one of the contactors has fused, for instance. In this case

- the error message 8 appears in the 7-segment display
- the safety light curtain remains red
- with the internal restart interlock activated, the safety light curtain uses the flashing LED **Yellow** to signal “Reset required”

Note If the system is unable to change to a safe operational state (e.g. after contactor failure), the system locks and shuts down completely (“Lock-out”). The 7-segment display will then show the error message 8.

The electrical connection for the external device monitoring is described in chapter “External device monitoring (EDM)” on page 33. The configuration of the external device monitoring is described in chapter 7.4 “Start-up configuration” on page 40.

3.4.3 Scanning range

The safety light curtain is available with different scanning ranges. An overview is contained in Tab. 6.

WARNING

Only use devices with a scanning range that matches the protective field width!

- If the scanning range is set too low, the light curtain may not switch to green.
- If the scanning range is set too great, the light curtain may malfunction. This would mean that the operator is at risk.

Notes

- The additional front screens, which are available as accessories (see page 61), reduce the effective scanning range per additional front screen by 8 %.

Tab. 5: Scanning range of the C4000 without and with additional front screen

Physical resolution	Available scanning ranges	Scanning range with 1 additional front screen	Scanning range with 2 additional front screens
14 mm	0–2.5 m 1–5 m	0–2.3 m 0.9–4.6 m	0–2.1 m 0.7–4.2 m
30 mm	0–6 m	0–5.5 m	0–5 m

- The deflector mirrors available as accessories (see page 62) reduce the overall scanning range depending on the number of deflector mirrors in the light path (see section 11.7.1 for PNS75 and section 11.7.2 for PNS125).

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 of 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.

Tab. 6: Scanning range when using 1 or 2 deflector mirrors

Deflector mirror	14 mm	30 mm
1 × PNS75	4.4 m	5.0 m
2 × PNS75	2.4 m	3.3 m
1 × PNS125	4.4 m	5.3 m
2 × PNS125	2.8 m	3.8 m

The information in the table relates to 90° beam deflection per mirror and a protective field height of 900 mm. If you need more advice on mirror applications, please get in touch with your contact at SICK.

3.4.4 Sender test

The C4000 sender (except C4000 Eco M12 × 4 + FE) has a test input for checking the sender and the related receiver. During the test, the sender no longer emits light beams. Thus, it simulates — for the receiver — an interruption of the protective field.

- During the test the sender indicates [o].
- The test is successful, if the C4000 receiver switches to red, i.e. the switching outputs (OSSDs) are deactivated.

Note C4000 sender and receiver are self-testing. You only need to configure the function of the sender test if this is necessary for an older existing application.

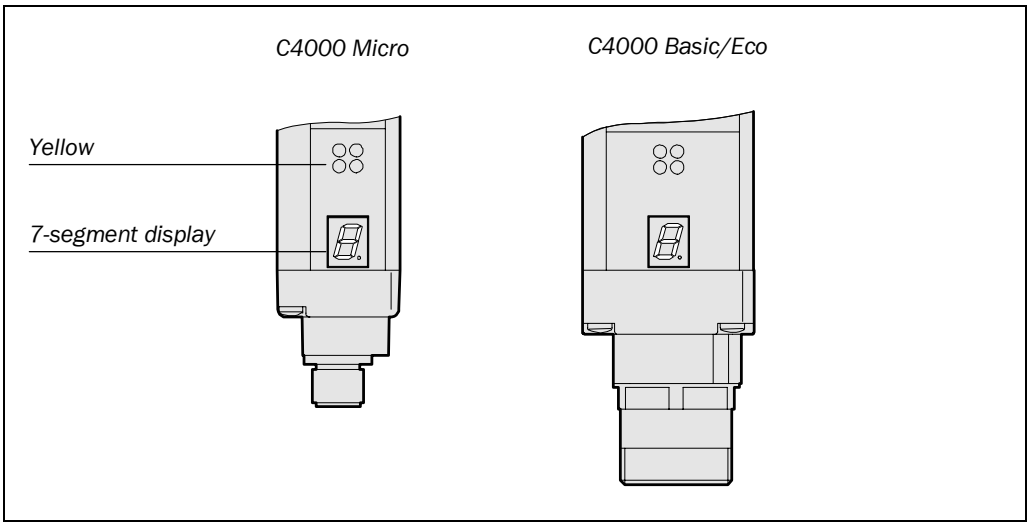
In order to perform a sender test, a means of controlling the test input must be available. The electrical connection at the test input is described in chapter 5.6 “Test input (sender test)” on page 34.

3.5 Status indicators

The LEDs and the 7-segment display of sender and receiver signal the operating status of the C4000.

3.5.1 Status indicators of the sender

Fig. 6: Status indicators of the sender

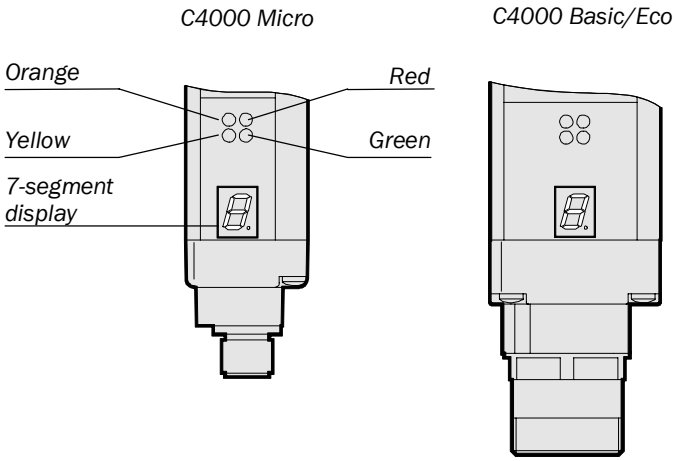


Tab. 7: Status indicators of the sender

Display	Meaning
● **Yellow**	Supply voltage OK
[E]	System error. The device is defective. Replace the sender.
[o]	The device is in the test mode.
[U]	Non-coded operation (only after switching on)
Other displays	All other displays are error messages. Please refer to chapter “Fault diagnosis” on page 43.

3.5.2 Status indicators of the receiver

Fig. 7: Status indicators of the receiver



Tab. 8: Status indicators of the receiver

Display	Meaning
● **Orange**	Cleaning or realignment required
☀ **Yellow**	Reset required
● **Red**	System providing signals for shutting down the machine (switching output off)
● **Green**	System enabled (switching output on)
E.	System error. The device is defective. Replace the receiver.
0.	Poor alignment to sender. Please refer to chapter 6.2 “Aligning sender and receiver” on page 37.
1.	
2.	
r.	Approx. 1 s. Device waits for start-up configuration (Only after switching on. See section 7.4 “Start-up configuration” on page 40).
H.	Approx. 0.5 s. Only for systems with a resolution of 14 mm and a scanning range of 1–5 m: Operation with large protective field width (only after switching on)
U.	Non-coded operation (only after switching on)
Other displays	All other displays are error messages. Please refer to chapter “Fault diagnosis” on page 43.

4 Installation and mounting

This chapter describes the preparation and completion of the installation of the safety light curtain C4000. The installation and mounting requires two steps:

- determining the necessary safety distance
- installation with swivel mount or side brackets

The following steps are necessary after mounting and installation:

- making the electrical connections (chapter 5)
- aligning sender and receiver (chapter 6.2)
- checking the installation (chapter 6.3)

4.1 Determining the safety distance

The light curtain must be mounted with the correct safety distance

- from the hazardous point
- from reflective surfaces

WARNING

No protective function without large enough safety distance!

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

4.1.1 Safety distance from the hazardous point

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

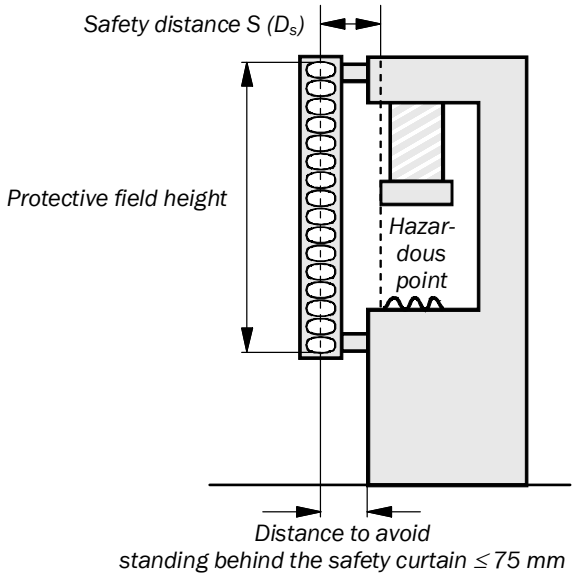
The safety distance as defined in EN ISO 13 855 and EN ISO 13 857 depends on:

- 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. C4000 (response times see chapter “Response time” on page 49)
- reach or approach speed
- resolution of the 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 safety 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. C4000 (response times see chapter “Response time” on page 49)
- reach or approach speed
- other parameters that are stipulated by the standard depending on the application

Fig. 8: Safety distance from the hazardous point



How to calculate the safety distance S according to EN ISO 13855 and EN ISO 13857:

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

- First, calculate S using the following formula:
  S = 2000 × T + 8 × (d – 14) [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 light curtain [mm]

  S = Safety 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 safety distance.
- If the result S is > 500 mm, then recalculate S as follows:
  S = 1600 × T + 8 × (d – 14) [mm]
- If the new value S is > 500 mm, then use the newly determined value as the minimum safety distance.
- If the new value S is ≤ 500 mm, then use 500 mm as the minimum safety distance.

Example:

Stopping/run-down time of the machine = 290 ms
Response time after light path interruption = 30 ms
Resolution of the light curtain = 14 mm
T = 290 ms + 30 ms = 320 ms = 0.32 s
S = 2000 × 0.32 + 8 × (14 – 14) = 640 mm
S > 500 mm, therefore:
S = 1600 × 0.32 + 8 × (14 – 14) = 512 mm

How to calculate the safety 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 safety 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 millimetres/second) is used for H_s.

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

T_c = Stopping/run-down time of the control system

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

T_{bm} = Additional response time allowed for brake monitor to compensate for wear

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

D_{pf} = An additional distance added to the overall safety 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 millimetres to 1220 millimeters) or more depending on application.

Example:

In opto-electronic protecting, such as with a perpendicular safety light curtain applications with object sensitivity (effective resolution) less than 2.5 inches (64 millimetres), the D_{pf} can be approximated based on the following formula:

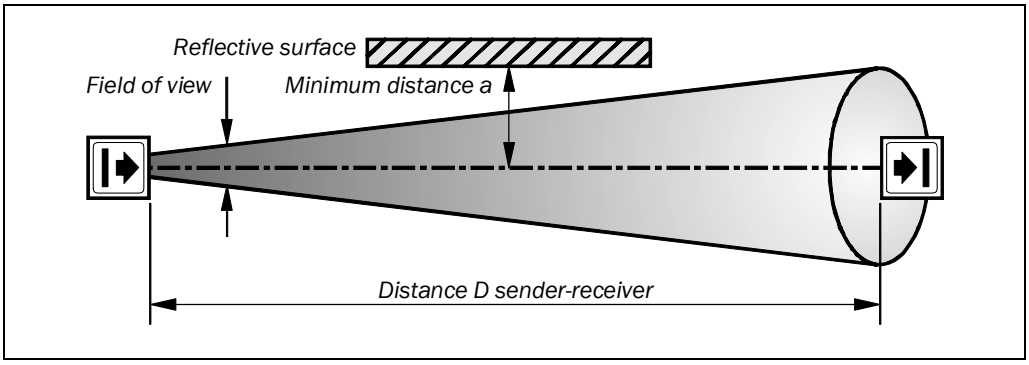
D_{pf} (inches) = 3.4 × (Object Sensitivity – 0.276), but not less than 0.

4.1.2 Minimum distance to reflective surfaces

The light beams from the sender 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 sender and receiver.

Fig. 9: Minimum distance to reflective surfaces

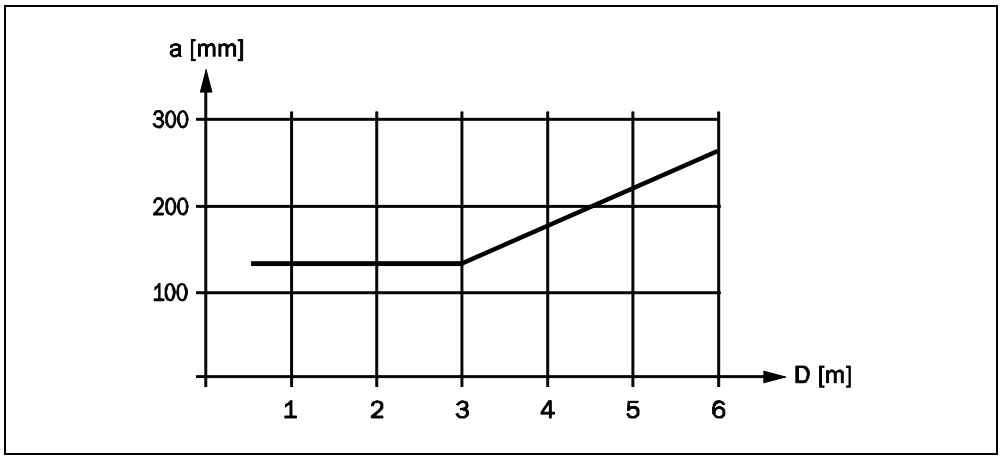


Note The field of view of the sender and receiver optics is identical.

How to determine the minimum distance from reflective surfaces:

- Determine the distance *D* [m] sender-receiver.
- Read the minimum distance *a* [mm] from the graph:

Fig. 10: Graph, minimum distance from reflective surfaces



4.2 Protection from affecting systems in close proximity

WARNING

Prevent the affection of systems mounted in close proximity

If several safety light curtains operate in close proximity to each other, the sender beams of one system may interfere with the receiver of another system. This can disrupt the protective function of the system. This would mean that the operator is at risk. You must avoid such mounting scenarios or take appropriate measures, e.g. by mounting non-reflective sight protection walls or by reversing the transmission direction of a system.

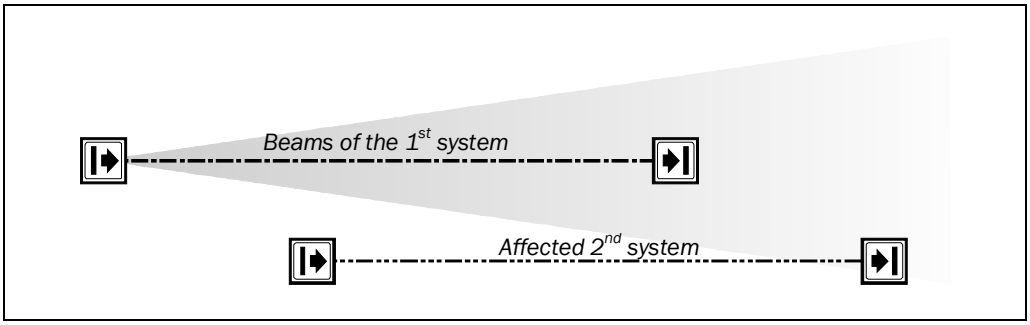


Fig. 11: Unwanted influencing of a 2nd C4000 system. The receiver ◨ of the 2nd system is affected by the beams of the 1st system.

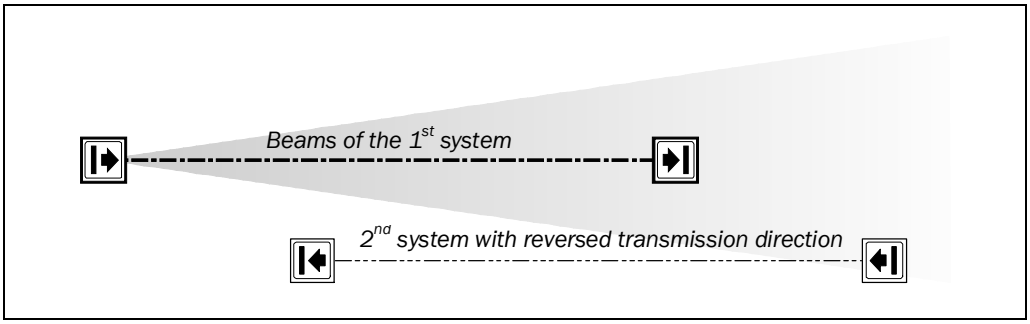


Fig. 12: Reversing the transmission direction of systems in close proximity. The sender ◧ of the 2nd system is not affected by the beams of the 1st system.

4.3 Steps for mounting the device

WARNING

Special features to note during mounting:

- Always mount the sender and receiver parallel to one another.
- During mounting, make sure that sender and receiver are aligned correctly. The optical lens systems of sender and receiver must be located in exact opposition to each other; the display elements must be mounted at the same height. The system plugs of both devices must point in the same direction.
- Take suitable measures to attenuate vibration if the shock requirements are above the values given in chapter 10.1 “Data sheet” on page 45.
- Observe the safety distance of the system during mounting. On this topic read the chapter “Determining the safety distance” on page 19.
- Mount the safety light curtain such that the hazardous point cannot be reached from below, above or behind the safety light curtain and that the light curtain cannot be repositioned.

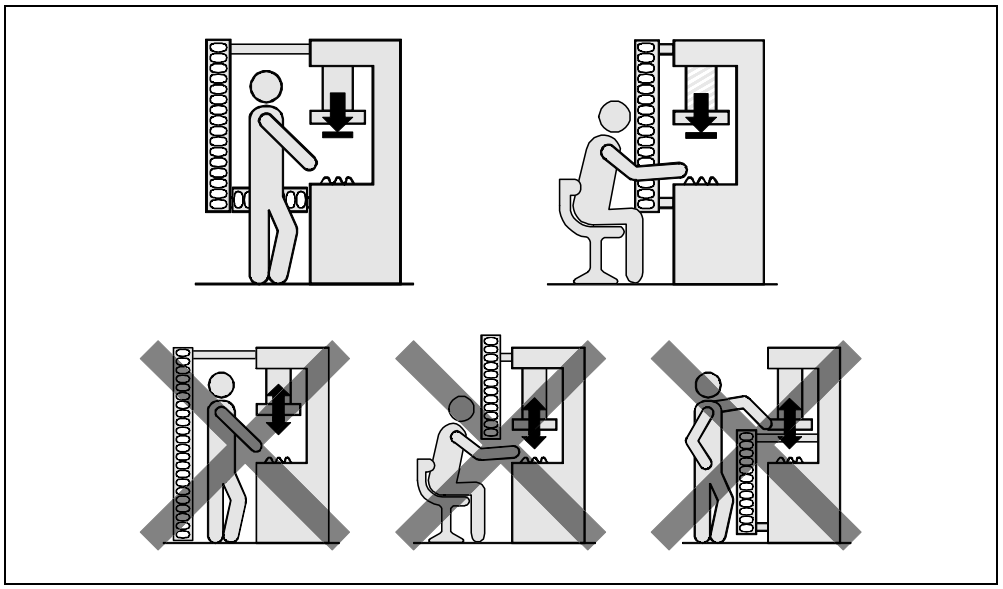


Fig. 13: The correct installation (above) must eliminate the errors (below) stepping behind, reaching below and reaching above.

- Once the system is mounted, one or several of the enclosed self-adhesive safety information labels must be affixed.
  - Use only information labels in the language which the operators of the machine 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 Notices” to the system in close proximity to sender and receiver.

The senders and receivers can be mounted in two different ways:

- mounting with swivel mount bracket
- mounting with side bracket

4.3.1 Mounting with swivel mount bracket

The swivel mount bracket is made of black plastic. The bracket is designed such that sender and receiver can still be accurately aligned even after the bracket has been mounted.

The swivel mount bracket is also suitable for mounting the deflector mirrors PNS75 and PNS125 (see chapter 10.4.5f. on page 54f.).

Note

- Attach the bolts of the swivel mount bracket with a torque of between 2.5 and 3 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.

Fig. 14: Composition of the swivel mount bracket

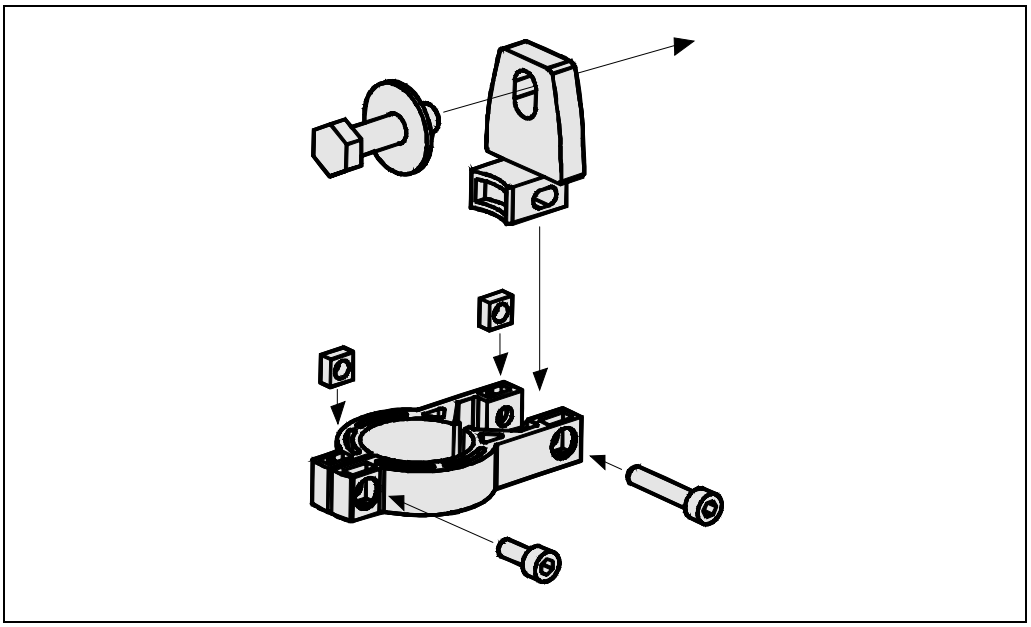
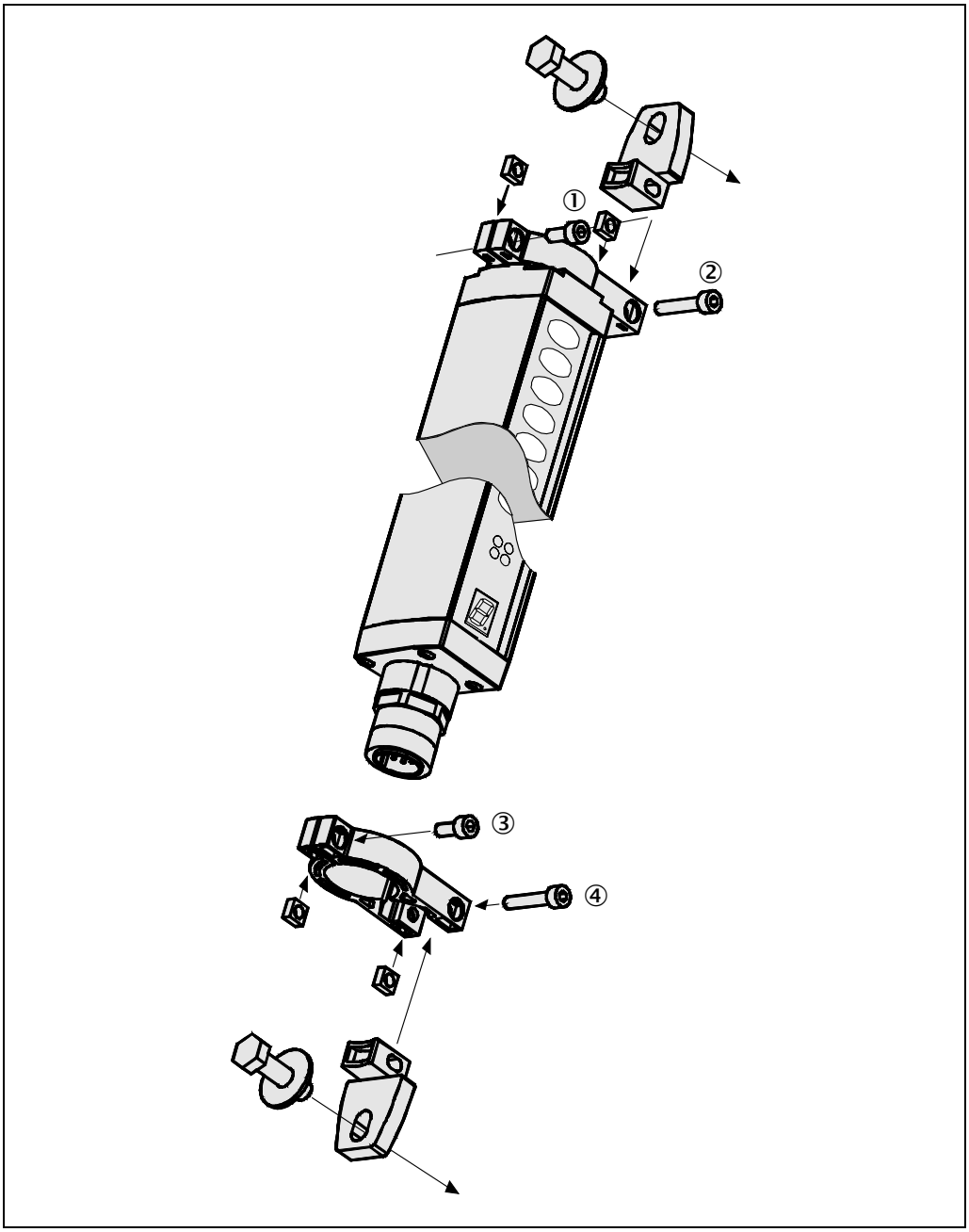


Fig. 15: Mounting sender and receiver using swivel mount brackets



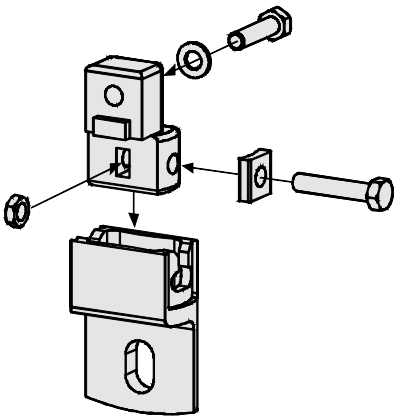
Notes

- Mount the bolts marked with ① to ④ on the operator side of the system to ensure that they remain accessible after mounting and to allow you to readjust the light curtain later, if necessary.
- If you wish to use the additional front screen (see “Additional front screen (weld spark guard)” on page 61), make sure that the curved side of the device remains accessible after mounting.

4.3.2 Mounting with side bracket

The side bracket is made of die cast zinc. It is enamelled in black. The side bracket will be covered by the device after mounting. But it is only suitable for mounting surfaces lying parallel to the desired protective field because the alignment of sender and receiver can only be adjusted by a maximum of ±2.5° after mounting.

Fig. 16: Composition of the side bracket



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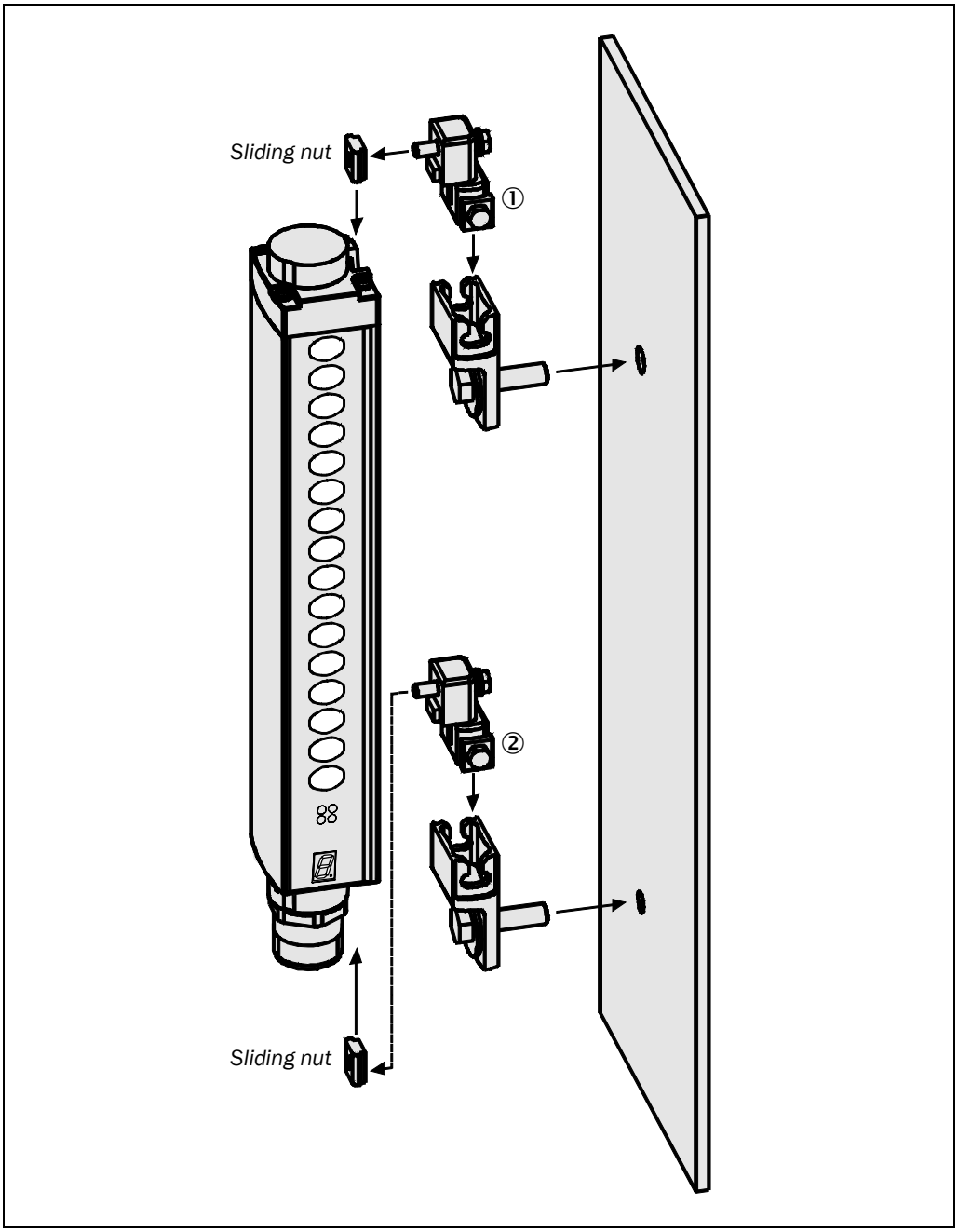
Notes

- Attach the bolts of the side bracket with a torque of between 5 and 6 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.
- When mounting the bracket, note the distance and the position of the sliding nuts as described in chapter 10.4 “Dimensional drawings” on page 51 f.

Fig. 17: Mounting the C4000 with side bracket



Notes

- When mounting the side bracket make sure that the bolts marked ① and ② remain accessible, allowing you later to adjust and lock the light curtain in position.
- If you wish to use the additional front screen (see “Additional front screen (weld spark guard)” on page 61), make sure that the curved side of the device remains accessible after mounting.

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.

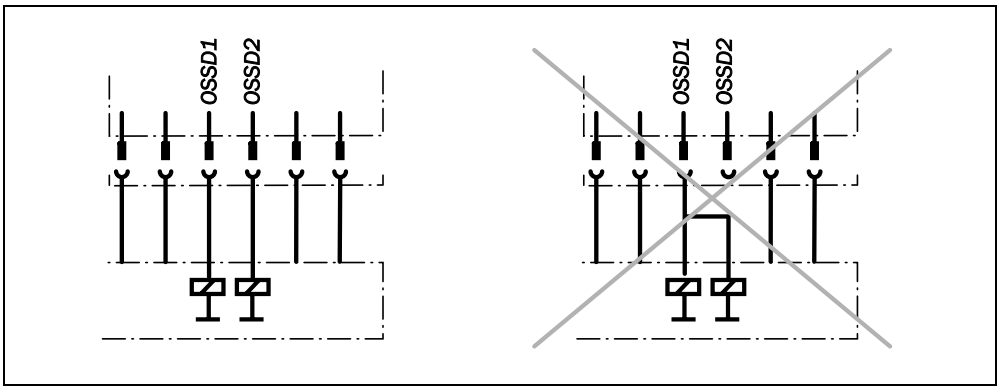
Ensure that downstream contactors are monitored!

Downstream contactors must be positively guided and monitored (see section 5.4 “External device monitoring (EDM)” on page 33)!

Connect OSSD1 and OSSD2 separately!

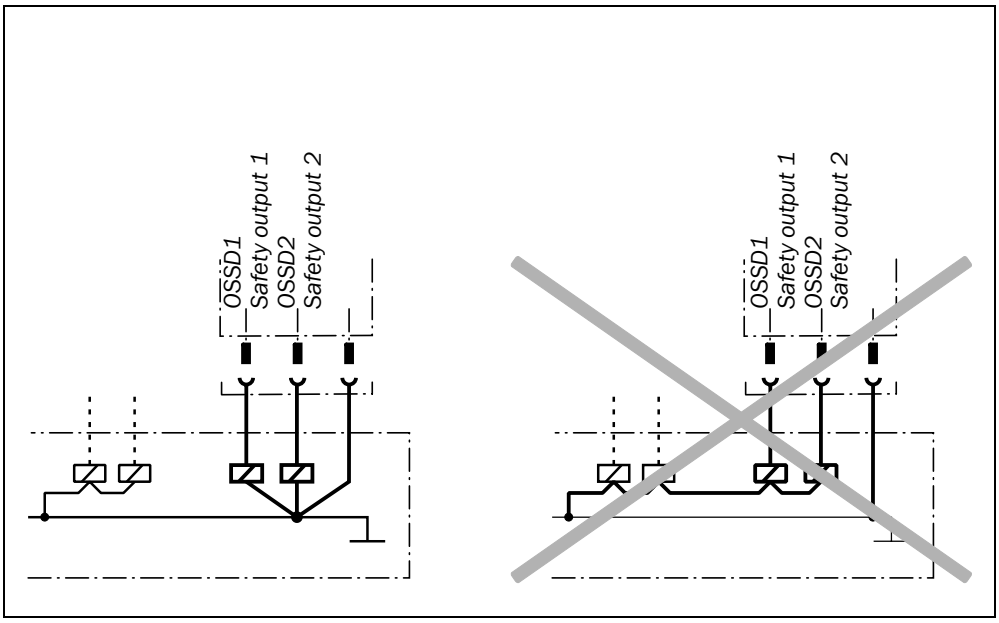
You are not allowed to connect OSSD1 and OSSD2 together, otherwise signal safety will not be ensured.

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



Prevent the formation of a potential difference between the load and the protective device!

➢ If you connect loads that are not reverse-polarity protected to the OSSDs or the safety outputs, you must connect the 0 V connections of these loads and those of the corresponding protective device individually and directly to the same 0 V terminal strip. This is the only way to ensure that, in the event of a defect, there can be no potential difference between the 0 V connections of the loads and those of the corresponding protective device.



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 beams are interrupted or there is a device fault the outputs are LOW DC.
- The safety light curtain C4000 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 earthing (FE) must be connected.
- The external voltage supply of the device must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1. Suitable power supplies are available as accessories from SICK (SICK Power Supply 50 W (Part number 7028789)/SICK Power Supply 95 W (Part number 7028790)).

5.1 System connection C4000 Basic (M26 × 6 + FE)

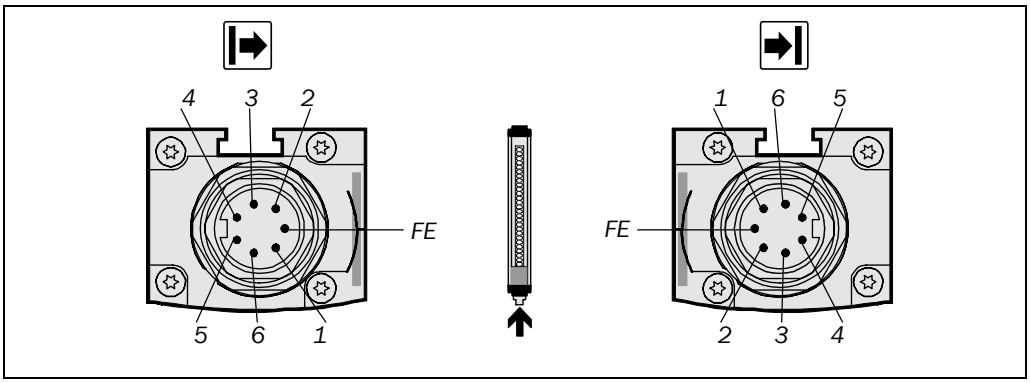


Fig. 18: Pin assignment system connection C4000 Basic (M26 × 6 + FE)

Tab. 9: Pin assignment system connection C4000 Basic (M26 × 6 + FE)

Pin	Wire colour	Sender	Receiver
1	Brown	24 V DC input (voltage supply)	24 V DC input (voltage supply)
2	Blue	0 V DC (voltage supply)	0 V DC (voltage supply)
3	Grey	Test input: 0 V: External test active 24 V: External test inactive	OSSD1 (switching output 1)
4	Pink	Reserved	OSSD2 (switching output 2)
5	Red	Reserved	Start-up configuration 1
6	Yellow	Reserved	External device monitoring (EDM) or start-up configuration 2
FE	Green	Functional earthing	Functional earthing

5.2 System connection C4000 Eco (M12 × 4 + FE)

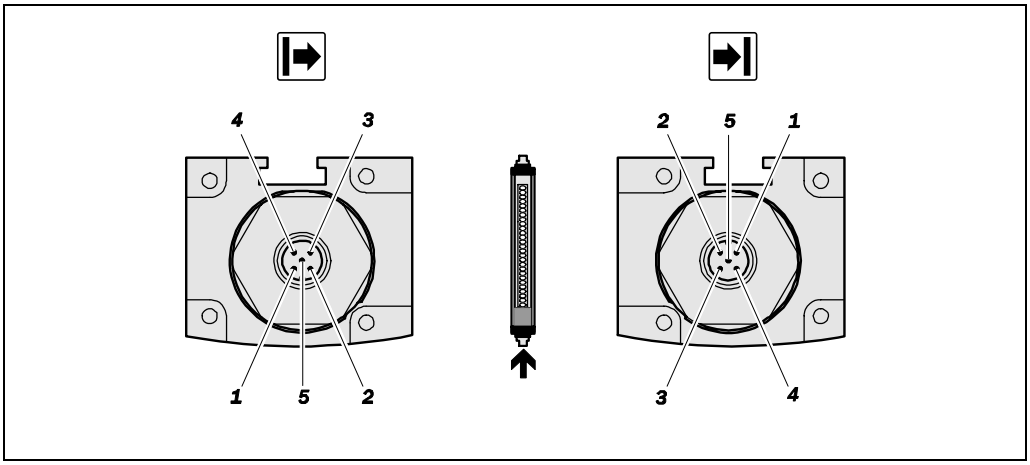


Fig. 19: Pin assignment system connection C4000 Eco (M12 × 4 + FE)

Tab. 10: Pin assignment system connection C4000 Eco (M12 × 4 + FE)

Pin	Wire colour	Sender	Receiver
1	Brown	24 V DC input (voltage supply)	24 V DC input (voltage supply)
2	White	Reserved	OSSD1 (switching output 1)
3	Blue	0 V DC (voltage supply)	0 V DC (voltage supply)
4	Black	Reserved	OSSD2 (switching output 2)
5	Grey	Functional earthing	Functional earthing

5.3 System connection C4000 Micro/Basic Plus (M12 × 7 + FE)

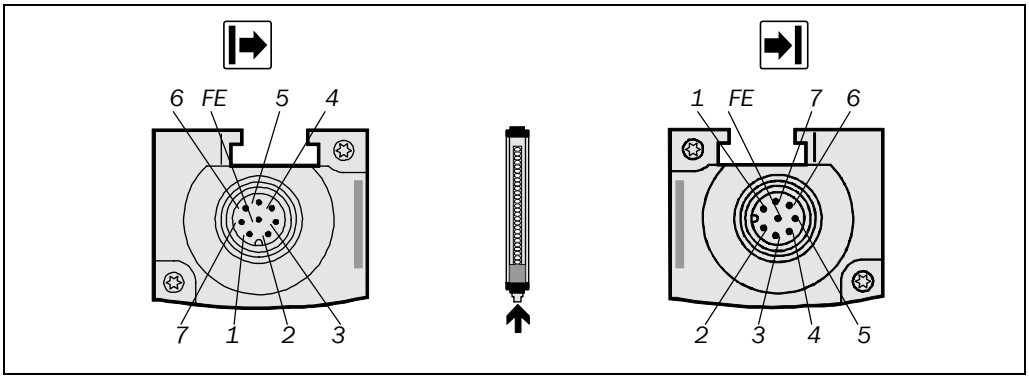


Fig. 20: Pin assignment system connection C4000 Micro/Basic Plus (M12 × 7 + FE)

Tab. 11: Pin assignment system connection C4000 Micro/Basic Plus (M12 × 7 + FE)

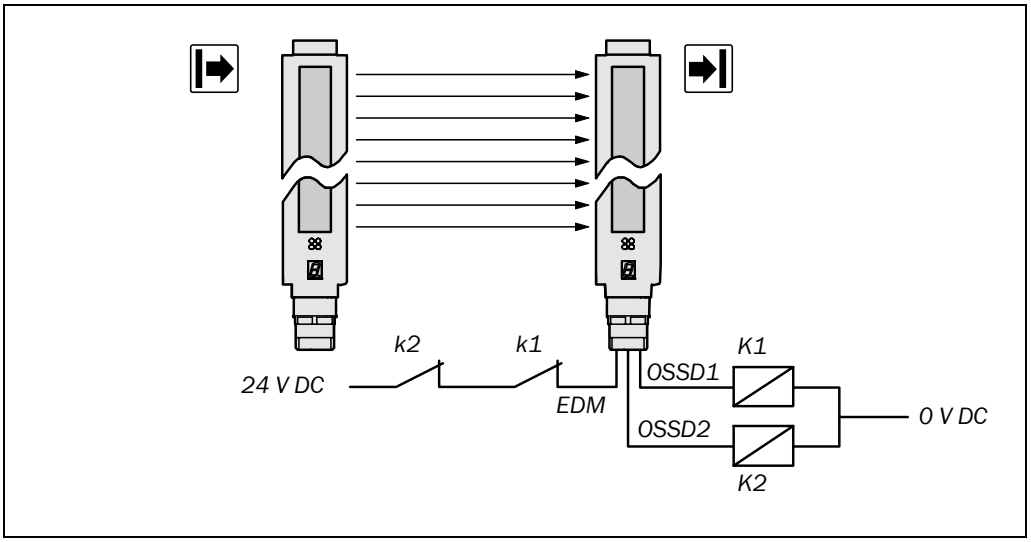
Pin	Wire colour	Sender	Receiver
1	White	Reserved	Reset/restart or start-up configuration 2
2	Brown	24 V DC input (voltage supply)	24 V DC input (voltage supply)
3	Green	Reserved	Start-up configuration 1[1)]
4	Yellow	Reserved	External device monitoring (EDM)[1)]
5	Grey	Test input: 0 V: External test active 24 V: External test inactive	OSSD1 (switching output 1)
6	Pink	Reserved	OSSD2 (switching output 2)
7	Blue	0 V DC (voltage supply)	0 V DC (voltage supply)
FE	Screen	Functional earthing	Functional earthing

[1)] Pins 3 and 4 of the receiver connection are jumped internally.

5.4 External device monitoring (EDM)

The EDM checks if the contactors actually de-energise when the protective device responds. If, after an attempted reset, the EDM does not detect a response from the switched device within 300 ms, the EDM will deactivate the OSSD switching outputs again.

Fig. 21: Connecting the contact elements to the EDM



You must implement the external device monitoring electrically by the positive closing action of both N/C contacts (k1, k2) when the contact elements (K1, K2) reach their de-energised 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 the contact elements to be monitored are connected to the external device monitoring (EDM) input, then the safety light curtain activates external device monitoring during the next start-up and saves this configuration in the device.
- You can again deactivate the external device monitoring at a later time by using the start-up configuration (see section 7.4 “Start-up configuration” on page 40). In this case, pin 6 (C4000 Basic) and pin 4 (C4000 Micro/Basic Plus), respectively, must not be connected to 24 V.

5.5 Reset button

When using C4000 Micro or C4000 Basic (see section 3.4.1 “Restart interlock” on page 14), the operator must press the reset button prior to restart.

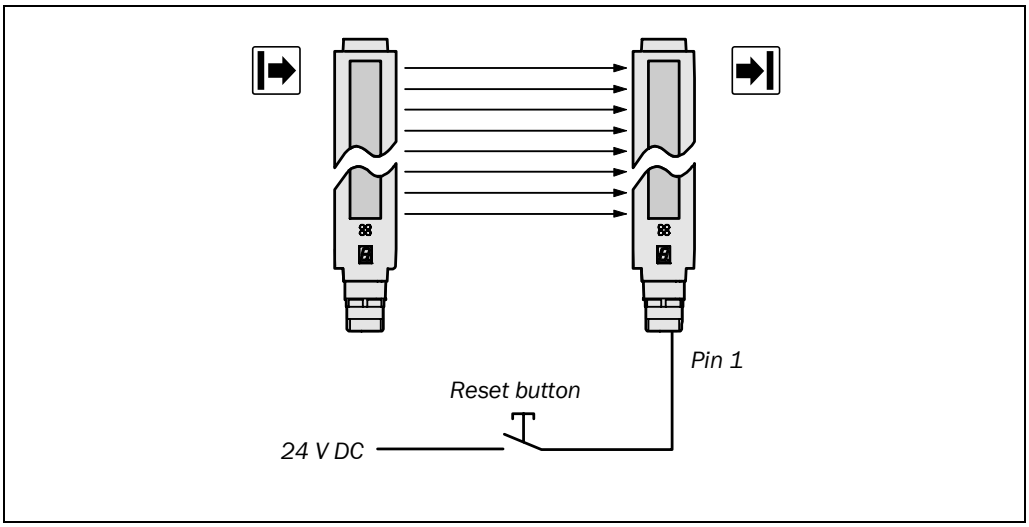
Note If you use the C4000 Micro/Basic without restart interlock, then you must implement the restart interlock externally, i.e. on the machine.

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.

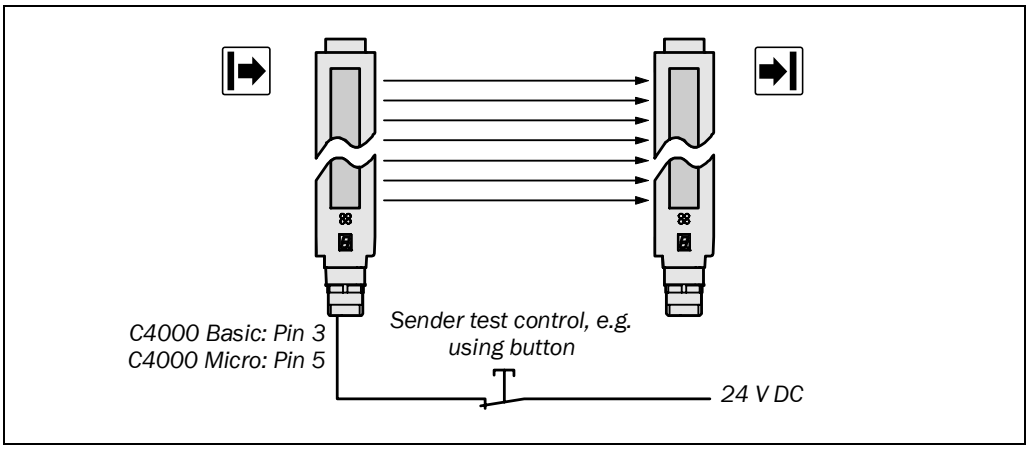
Fig. 22: Connection of the reset button on the C4000 Micro/Basic



Note You must activate the restart interlock function, otherwise the reset button remains without function during operation. (See chapter 7.2 “Activating the restart interlock” on page 40.)

5.6 Test input (sender test)

Fig. 23: Connection of the sender test button



The sender test is performed when 0 V is present at the test input.

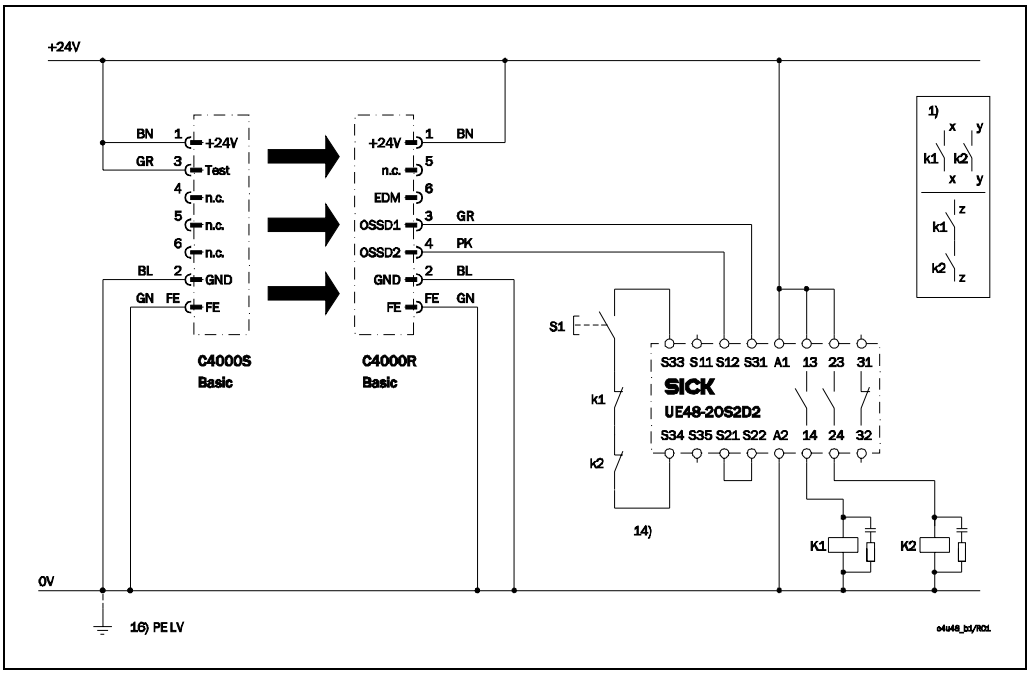
5.7 Switching examples

Note Please observe the respective operating instructions of the integrated devices!

5.7.1 C4000 Basic on UE48-20S/UE48-30S with restart interlock and EDM

The C4000 Basic light curtain can be integrated in the switching amplifiers UE48-20S or UE48-30S. Operation is carried out with restart lock and EDM.

Fig. 24: Switching example for C4000 Basic on UE48-20S



Mode of operation:

If the light path is not interrupted, the outputs OSSD1 and OSSD2 are energised. The system is ready to switch on when K1 and K2 are in the de-energised position. Pressing the button S1 switches on the UE48 switching amplifier. The contacts 13-14 and 23-24 of the UE48 activate the contact elements K1 and K2.

If the light path is interrupted, the outputs OSSD1 and OSSD2 are de-energised. This switches off the UE48 and deactivates K1, K2.

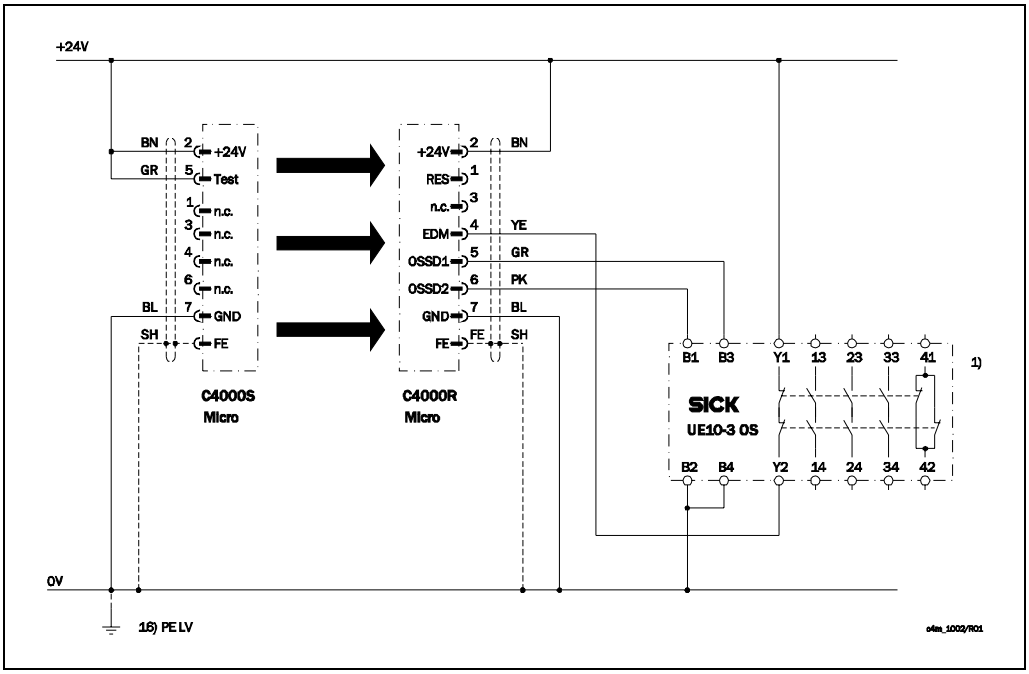
Possible fault sources:

Cross and short-circuiting of the outputs OSSD1 and OSSD2 are detected and lead to a lock-out. Malfunctions of the contact elements K1 and K2 are detected; the switch-off function remains active.

5.7.2 C4000 Micro/Basic on UE10-30S without restart interlock, with EDM

The C4000 Micro/Basic light curtain can be integrated in the UE10-30S switching amplifier. Operation is carried out without a restart interlock but with an EDM.

Fig. 25: Switching example for C4000 Micro/Basic on UE10-30S



Mode of operation:

If the light path is not interrupted and the UE10 is in the de-energised position, the system is released for use. The outputs OSSD1 and OSSD2 are energised. This switches on the UE10.

If the light path is interrupted, the outputs OSSD1 and OSSD2 are de-energised. This switches off the UE10.

Possible fault sources:

Cross and short-circuiting of the outputs OSSD1 and OSSD2 are detected and lead to a lock-out. Malfunctions of the UE10 are detected; the switch-off function remains active.

6 Commissioning

WARNING

Commissioning requires a thorough check by qualified safety personnel!

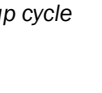
Before you operate a system protected by the safety light curtain C4000 for the first time, make sure that the system is first checked and approved by qualified safety personnel. Please read the notes in chapter “On safety” on page 8.

6.1 Display sequence during start-up

After the system is activated, sender and receiver go through a power-up cycle.
The 7-segment display indicates the device status during the power-up cycle.

The display values have the following meaning:

Tab. 12: Displays shown during the power-up cycle

Display	Meaning
	Testing the 7-segment display. All segments are activated sequentially.
	Approx. 0.5 s. Only for systems with a resolution of 14 mm and a scanning range of 1–5 m: Operation with large protective field width
	Approx. 0.5 s. Uncoded operation. This display is due to reasons of compatibility to other C4000 systems.
	Approx. 1 s. Device waits for start-up configuration (see section 7.4 “Start-up configuration” on page 40).
or	Receivers only: Receiver-sender alignment incorrect (see “Aligning sender and receiver” below).
Other display	Device error. See “Fault diagnosis” on page 43.

6.2 Aligning sender and receiver

After the light curtain has been mounted and connected, the sender and receiver must be aligned precisely in relation to each other.

How to align sender and receiver in relation to each other:

WARNING

Secure the plant/system. No dangerous movement possible!

Make sure 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.

- Loosen the clamping bolts which hold the light curtain in place.
- Switch on the power supply to the light curtain.
- Watch the alignment information on the 7-segment display of the receiver (see Tab. 13). Correct the alignment of the sender and receiver, until the 7-segment display goes off.
- Using the clamping bolts, fix the light curtain in place.
- Switch the power supply off and then back on again and check via the 7-segment display whether the alignment is correct after tightening the clamping bolts (Tab. 13).

The display values have the following meaning:

Tab. 13: Display values during the alignment of sender and receiver

Display	Meaning
0.	The receiver cannot synchronise with the sender; the alignment is very poor.
1.	Some light beams do not hit the receiver.
2.	All the light beams hit the receiver, but the alignment is still slightly off.
No display	The alignment is now true; the devices must be locked in this position.

Notes

- If the optimum alignment (= no display) persists for longer than 2 minutes without the light beam being interrupted, the system automatically deactivates the alignment mode.
- If you wish to read just the alignment later, switch the power supply of the C4000 off and back on again.

6.3 Test notes

6.3.1 Tests before the first commissioning

Check the protective device as described below and in accordance with the applicable standards and regulations.

- ➢ Check the effectiveness of the protective device mounted to the machine, using all selectable operating modes as specified in the checklist in the annex (see 12.2 on page 66).
- ➢ Make sure 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 12.2 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.

6.3.2 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 are detected before use/re-use.
- ➢ 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.

6.3.3 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 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 the green or yellow LED is lit during the test!

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

➢ *Before* inserting the test rod, check ...
  – if, for the C4000 Micro or C4000 Basic Plus (M12 × 7+ FE) with de-activated internal restart interlock or the C4000 Basic, the green LED lights up.
  – if, for the C4000 Micro with activated internal restart interlock, the yellow LED flashes (“Reset required”).

  If this is not the case, make sure that this condition is reached. The test is otherwise meaningless.

➢ Move the test rod slowly through the area to be protected, as shown under ① in Fig. 26.

➢ Then, guide the test rod along the edges of the area to be protected as shown under ② in Fig. 26. This procedure allows you to test if the point-of-operation guard/reaching behind protection is functioning correctly (see chapter 4.3 “Steps for mounting the device” on page 24).

➢ If you use one or more deflector mirrors (e.g. PNS), then also guide the test rod slowly through the area to be protected directly in front of the mirrors.

Note In both tests, the receiver of the C4000 must show the red LED only.

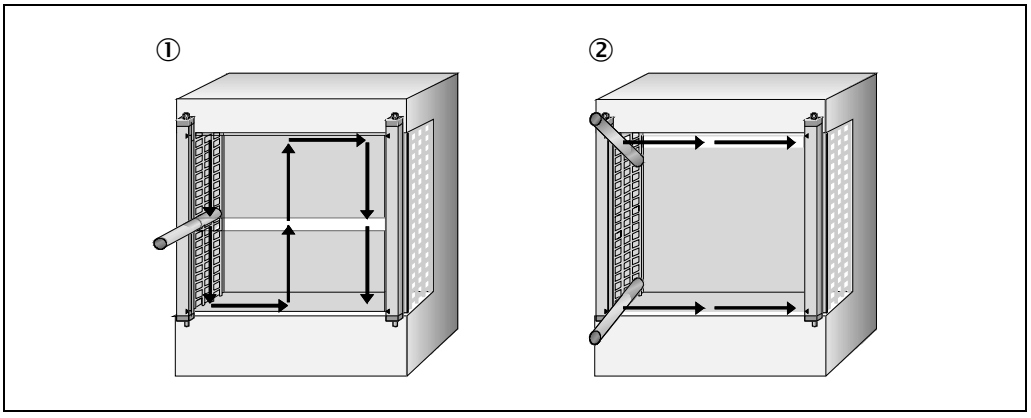


Fig. 26: Daily checks of the protective device

7 Configuration

7.1 Delivery status

The C4000, as supplied, is parameterised ready for protective operation:

- EDM **deactivated**
- Internal restart interlock **deactivated**

7.2 Activating the restart interlock

To activate the restart interlock, a reset button must be connected to the C4000 Micro/Basic (see page 34).

How to activate the internal restart interlock of the C4000 Micro/Basic:

WARNING

Ensure the machine is in a safe condition!

While you configure the safety light curtain, the machine could start unintentionally.

➢ Ensure that the whole system is in a safe condition during the configuration process.

➢ Switch the safety light curtain off.

➢ Keep the reset button pressed.

➢ Switch the safety light curtain on again. The LED ● **Yellow** lights up.

➢ Release the reset button. The LED ☀ **Yellow** begins to flash.

➢ Press the reset button again within 5 seconds. The safety light curtain now activates the restart interlock function and then immediately operates in protective operation mode.

➢ Ensure that the machine is in a safe condition. Then check the function of the restart interlock. If the restart interlock has not been activated, then repeat the whole process.

Notes The configuration of the restart interlock is permanently saved in the device. The restart interlock can only be deactivated by the start-up configuration (see below).

7.3 Activating external device monitoring

You do not have to activate external device monitoring separately. If the contact elements to be monitored are connected to the external device monitoring (EDM) input, then the safety light curtain activates external device monitoring during the next start-up and saves this configuration in the device.

7.4 Start-up configuration

To avoid unintended configuration changes, the configurable functions of restart interlock and external device monitoring can only be deactivated when switching the system on. This procedure is only required if you have to change the application or if the safety light curtain is to be used on another machine.

Notes

- You can only deactivate the functions of restart interlock and external device monitoring together. If you want to deactivate only one of the two functions then you must, after the start-up configuration, reactivate the respective other function.
- The start-up configuration requires that the assignment of the unit's inputs be switched over quickly. Ask for the assistance of the electrician responsible, if required.

How to deactivate the restart interlock and external device monitoring:

WARNING

Ensure the machine is in a safe condition!

While you configure the safety light curtain, the machine could start unintentionally.

➢ Ensure that the whole system is in a safe condition during the configuration process.

Note Only authorised personnel must perform the start-up configuration.

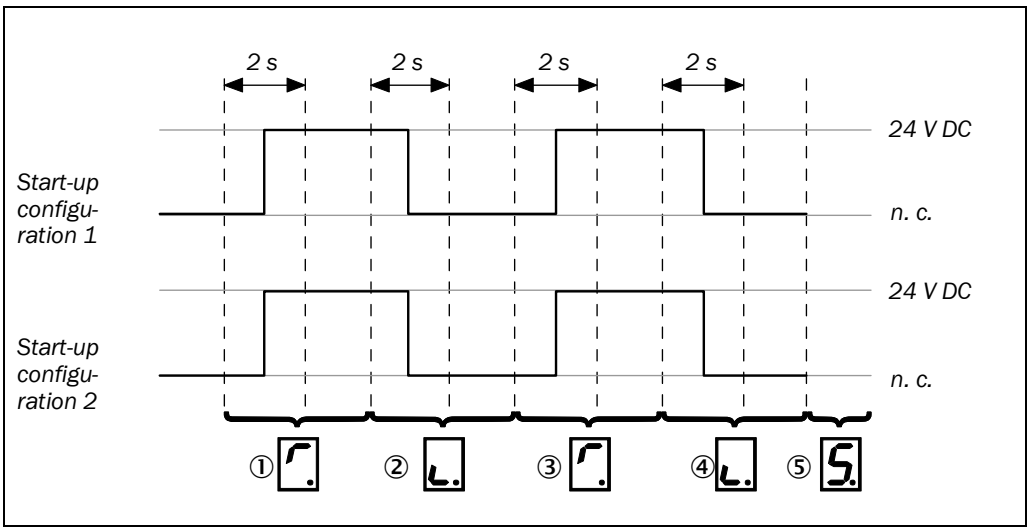


Fig. 27: Time sequence diagram of the start-up configuration (n. c. = not connected)

➢ Switch the safety light curtain off.

➢ If an EDM is connected, disconnect the wiring.

➢ Connect the start-up configuration 1 and start-up configuration 2 inputs.

➢ Switch the safety light curtain on. The 7-segment display shows ⌜. as confirmation. ①

➢ Within the next 2 seconds, connect the start-up configuration 1 and start-up configuration 2 inputs with 24 V. The 7-segment display shows ⌞. as confirmation. ②

➢ Disconnect the inputs start-up configuration 1 and Switch-on configuration 2 from 24 V within the next 2 seconds. The 7-segment display shows ⌜. as confirmation. ③

➢ Once again, connect the start-up configuration 1 and start-up configuration 2 inputs with 24 V, within the next 2 seconds. The 7-segment display shows ⌞. as confirmation for 2 seconds. ④

➢ Disconnect the inputs start-up configuration 1 and start-up configuration 2 from 24 V within the next 2 seconds. After successful completion of the start-up configuration, the 7-segment display shows 5. ⑤

➢ Switch the safety light curtain off.

➢ Remove the connecting cables of the external device monitoring, if you do not want to use this function any more.

➢ Switch the safety light curtain on again. External device monitoring and restart interlock are now deactivated.

➢ Verify the effectiveness of the protective device as described in chapter 6.3 “Test notes” on page 38.

8 Care and maintenance

The safety light curtain C4000 is maintenance-free. The front screen of the safety light curtain C4000 and any additional front screen(s) (see “Additional front screen (weld spark guard)” on page 61) should be cleaned at regular intervals and when dirty.

- 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 prevent 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 and/or the additional front screen (optional extra):

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

Note

- After cleaning, check the position of sender and receiver to make sure that the protective device cannot be bypassed (reaching above, below or stepping behind).
- Verify the effectiveness of the protective device as described in chapter 6.3 “Test notes” on page 38.

9 Fault diagnosis

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

9.1 What to do in case of faults

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 remedy the malfunction.

The system state “Lock-out”

In case of certain faults or an erroneous configuration, the system can go into the “Lock-out” state. The 7-segment display on the safety light curtain then indicates E., F. or L.. To place the device back in operation:

- ➢ Rectify the cause of the fault as per Tab. 15.
- ➢ Switch the power supply for the C4000 off and on again (e.g. by unplugging the system plug and reinserting it).

9.2 SICK Support

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

9.3 Error displays of the diagnostics LEDs

This chapter explains the meaning of the error displays of the LEDs and how to respond. Please refer to the description in chapter “Status indicators” on page 17.

Tab. 14: Error displays of the LEDs

Display		Possible cause	Remedying the error
● **Orange**	LED of receiver lights up	Weak signal	➢ Check the alignment of sender and receiver. ➢ Check the front screen (dirt) and clean, if necessary.
☀ **Yellow**	LED of receiver flashes	Reset required	➢ Press the reset button.
○ **Yellow**	LED of sender fails to light up	No operating voltage, or voltage too low	➢ Check the voltage supply and activate, if necessary.
○ **Red** and ○ **Green**	Neither the red nor the green receiver LED lights up		

9.4 Error displays of the 7-segment display

This chapter explains the meaning of the error displays of the 7-segment display and how to respond to the messages. Please refer to section " Status indicators" on page 17 for a description of the 7-segment display.

Tab. 15: Error displays of the 7-segment display

Display	Possible cause	Remedying the error
0, 1 or 2	Inadequate alignment	➢ Re-align sender and receiver (see page 37). The display extinguishes 2 minutes after the system has been correctly aligned.
8 or 8	EDM error	➢ Check the contacts and their wiring, eliminate any wiring errors, if necessary. ➢ If 8 is displayed, switch the device off and back on again.
9	Reset button fault	➢ Check the reset button for correct function. The button may be defective or stuck. ➢ Check the wiring of the reset button/for any short-circuit to 24 V.
E	System error	➢ Replace the unit (receiver or sender).
F↻1	Overcurrent at switching output 1	➢ Check the contactor. Replace, if necessary. ➢ Check the wiring for short-circuit to 0 V.
F↻2	Short-circuit at switching output 1	➢ Check the wiring for short-circuit to 24 V.
F↻3	Short-circuit at switching output 1	➢ Check the wiring for short-circuit to 0 V.
F↻4	Overcurrent at switching output 2	➢ Check the contactor. Replace, if necessary. ➢ Check the wiring for short-circuit to 0 V.
F↻5	Short-circuit at switching output 2	➢ Check the wiring for short-circuit to 24 V.
F↻6	Short-circuit at switching output 2	➢ Check the wiring for short-circuit to 0 V.
F↻7	Short-circuit between switching output 1 and 2	➢ Check the wiring and rectify the error.
L↻2	Invalid configuration of the EDM	➢ Verify that the machine-side EDM is connected correctly.
L↻3	External sender detected	➢ Check the distance from reflective surfaces (page 22) or from other light curtains. ➢ Swap sender and receiver (inversion of the beam direction) or fit non-reflective partition walls.
L↻6	Start-up configuration not successfully completed	➢ Repeat the start-up configuration
L↻9	Supply voltage too low	➢ Check the supply voltage and the power supply. If necessary, replace defective components.

10 Technical specifications

10.1 Data sheet

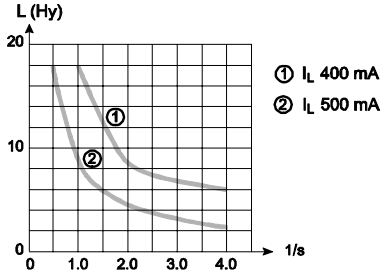
Tab. 16: Technical data C4000 Basic/Micro/Eco

	Minimum	Typical	Maximum
General system data			
Type	Type 4 (IEC 61496-1)		
Safety integrity level[2)]	SIL3 (IEC 61508)		
SIL claim limit[2)]	SILCL3 (EN 62061)		
Category	Category 4 (EN ISO 13849-1)		
Performance Level[2)]	PL e (EN ISO 13849-1)		
PFHd (mean probability of a dangerous failure per hour)	15×10^{-9}		
T_M (mission time)	20 years (EN ISO 13849-1)		
Protective field height, depending on type			
C4000 Basic/Basic Plus/Eco	300 mm to 1800 mm		
C4000 Micro	150 mm to 1200 mm		
Resolution, depending on type	14 mm and 30 mm		
Protective field width			
Resolution 14 mm	0 m		5 m
Resolution 30 mm	0 m		6 m
Protection class	III (EN 61140)		
Enclosure rating	IP 65 (IEC 60529)		
Supply voltage U_V at device[3)]	19.2 V	24 V	28.8 V
Residual ripple[4)] (SELV)			±10 %
Synchronisation	Optical, without separate synchronisation		
Power-up delay of sender and receiver before ready			8 s

2) For detailed information on the exact design of your machine/system, please contact your local SICK representative.
3) The external voltage supply must be capable of buffering brief mains failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK (SICK Power Supply 50 W (Part number 7028789)/SICK Power Supply 95 W (Part number 7028790)).
4) Within the limits of U_V.

	Minimum	Typical	Maximum
Sender unit			
Test input			
Input voltage[5] HIGH (active)	11 V	24 V	30 V
Input current HIGH	7 mA	10 mA	20 mA
Switching voltage LOW (inactive)	–30 V	0 V	5 V
Input current LOW[5]	–3.5 mA	0 mA	0.5 mA
Response time to test	Depending on the number of beams, maximum 150 ms		
Wavelength of sender		950 nm	
Power consumption			0.35 A
Weight	Depending on protective field height (see page 50)		
Receiver unit			
Switching outputs (OSSDs)	2 PNP semiconductor, short-circuit protected[6], cross-circuit monitored		
Response time	See chapter 10.2 on page 49		
Switch off time	100 ms		
Switch on time			2.5 × response time
Switching voltage[7] HIGH (active, U_{eff})	15 V	24 V	28.8 V
Switching voltage[7] LOW (inactive)	0 V	0 V	2 V
Switching current	0 mA		500 mA
Leakage current[8]			0.25 mA
Load capacity			2.2 µF
Switching sequence	Depending on load inductance		
Load inductance[9]			2.2 H
Test pulse data[10]			
Test pulse width	120 µs	150 µs	300 µs
Test pulse rate	3 1/s	5 1/s	10 1/s

5) As per IEC 61131-2.
6) Applies to the voltage range between –30 V and +30 V.
7) As per IEC 61131-2.
8) In the case of a fault (0 V cable open circuit) the max. leakage current flows in the OSSD cable. The downstream controller must detect this status as LOW. A safe PLC (Programmable Logic Controller) must be able to identify this status.
9) The maximum rated load inductance is higher with lower switching sequence.



10) 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.

	Minimum	Typical	Maximum
Permissible cable resistance			
Between device and load[11)]			2.5 Ω
Supply lead			1 Ω
Power consumption			0.45 A + max. 1 A OSSD load
External device monitoring (EDM) input			
Input voltage[12)] HIGH (inactive)	11 V	24 V	30 V
Input current HIGH	6 mA	10 mA	20 mA
Input voltage[12)] LOW (active)	–30 V	0 V	5 V
Input current LOW	–2.5 mA	0 mA	0.5 mA
Contactors			
Permissible dropout time			300 ms
Permissible pick-up time			300 ms
Control switch input (reset button)			
Input voltage[12)] HIGH (active)	11 V	24 V	30 V
Input current HIGH	6 mA	10 mA	20 mA
Input voltage[12)] LOW (inactive)	–30 V	0 V	5 V
Input current LOW	–2.5 mA	0 mA	0.5 mA
Operation time control switch input		110 ms	
Weight	Depending on protective field height (see page 50)		

[11)] Make sure to limit the individual cable resistance to the downstream controller to this value to ensure that a cross-circuit between the outputs is safely detected. (Also note EN 60 204 Electrical Machine Equipment, Part 1: General Requirements.)
[12)] As per IEC 61 131-2.

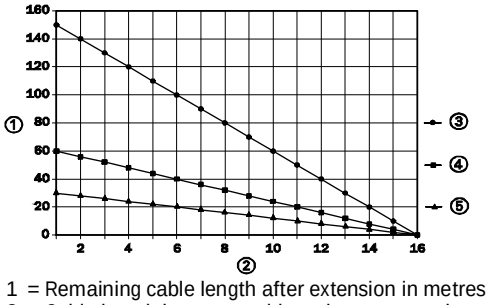
	Minimum	Typical	Maximum

Operating data

Connection			
C4000 Basic	M26 × 6 + FE		
C4000 Eco	M12 × 4 + FE		
C4000 Micro / Basic Plus	M12 × 7 + FE		
Line length and cross section[13]			
C4000 Basic			50 m / 0.75 mm²
C4000 Eco			15 m / 0.25 mm²
C4000 Micro / Basic Plus[14]			15 m / 0.25 mm²
Ambient operating temperature	0 °C		+55 °C
Air humidity (non-dewing)	15 %		95 %
Storage temperature	–25 °C		+70 °C
Housing cross-section			
C4000 Basic / Basic Plus / Eco	40 mm × 48 mm		
C4000 Micro	28.5 mm × 33.5 mm		
Rigidity	5 g, 10–55 Hz acc. to EN 60068-2-6		
Shock resistance	10 g, 16 ms acc. to EN 60068-2-27		

[13] Dependent on loading, power supply. The technical specifications must be observed.

[14] If connection cables with large wire cross-section are used, the distance between the devices may be extended. Possible cable lengths for M12 connectors (0.25 mm²) when extended with a larger wire cross-section area cable after x metres:



1 = Remaining cable length after extension in metres
2 = Cable length in metres with a wire cross-section area of 0.25 mm²
3 = Wire cross-section area of 2.5 mm²
4 = Wire cross-section area of 1.0 mm²
5 = Wire cross-section area of 0.5 mm²

10.2 Response time

The response time of the C4000 Basic/Micro/Eco is dependent on the number of beams of the system.

How to determine the response time of the system:

➢ Read the response times of the individual systems (shown on type label).

Note If you are planning the application without actually having any devices available, you may also determine the response time using Tab. 17 and Tab. 18:

➢ Read from Tab. 17 the number of beams of the intended system by means of the protective field height and the physical resolution.

➢ Read from Tab. 18 the response time of the system by means of the number of beams.

Tab. 17: Number of beams depending on the protective field height and the physical resolution

Protective field height [mm]	Number of beams for physical resolution	
	14 mm	30 mm
150	20	8
300	40	15
450	60	23
600	80	30
750	100	38
900	120	45
1050	140	53
1200	160	60
1350	180	68
1500	200	75
1650	220	83
1800	240	90

Tab. 18: Response time depending on the number of beams

Number of beams	Response time
10	9 ms
15	10 ms
20	10 ms
23	10 ms
25	10 ms
30	11 ms
35	11 ms
38	11 ms
40	11 ms
45	12 ms
50	12 ms
53	12 ms
55	12 ms
60	13 ms
68	13 ms
75	14 ms

Number of beams	Response time
75	14 ms
80	14 ms
83	14 ms
90	15 ms
100	16 ms
105	16 ms
120	17 ms
135	18 ms
140	19 ms
150	19 ms
160	20 ms
165	20 ms
180	22 ms
200	23 ms
220	24 ms
240	26 ms

10.3 Table of weights

10.3.1 C4000 Basic/Micro/Eco

Tab. 19: Weight of sender and receiver

Protective field height [mm]	Weight [g] C4000 Basic/Eco		Weight [g] C4000 Micro	
	Sender	Receiver	Sender	Receiver
150	–	–	275	290
300	820	850	370	385
450	1100	1130	510	525
600	1390	1420	650	665
750	1670	1700	795	810
900	1960	1990	940	955
1050	2250	2280	1085	1100
1200	2530	2560	1235	1250
1350	2820	2850	–	–
1500	3110	3140	–	–
1650	3390	3420	–	–
1800	3680	3710	–	–

10.3.2 Deflector mirrors PNS75 and PNS125

Tab. 20: 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
1390	3925	5980
1540	4340	6610
1690	4755	7240
1840	5170	7870

10.4 Dimensional drawings

10.4.1 C4000 Basic/Basic Plus/Eco

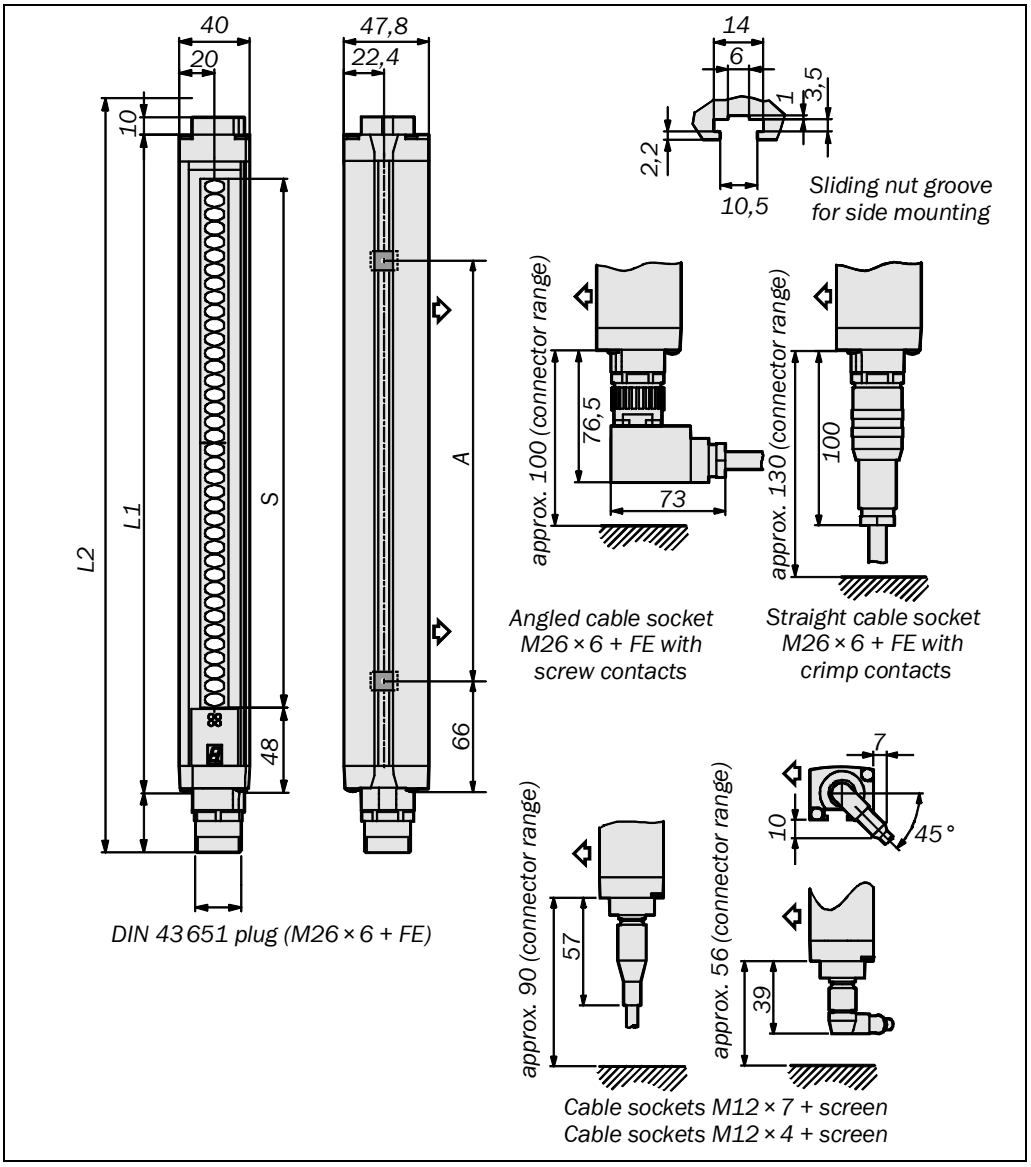


Fig. 28: Dimensional drawing C4000 Basic/Basic Plus/Eco sender (mm)
Receiver mirror image

Tab. 21: Dimensions dependent on the protective field height, C4000 Basic/Eco sender

Protective field height S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension A [mm]
300	372	417	224
450	523	568	374
600	674	718	524
750	824	869	674
900	975	1020	824
1050	1125	1170	974
1200	1274	1319	1124
1350	1426	1471	1274
1500	1577	1622	1424
1650	1727	1772	1574
1800	1878	1923	1724

10.4.2 C4000 Micro

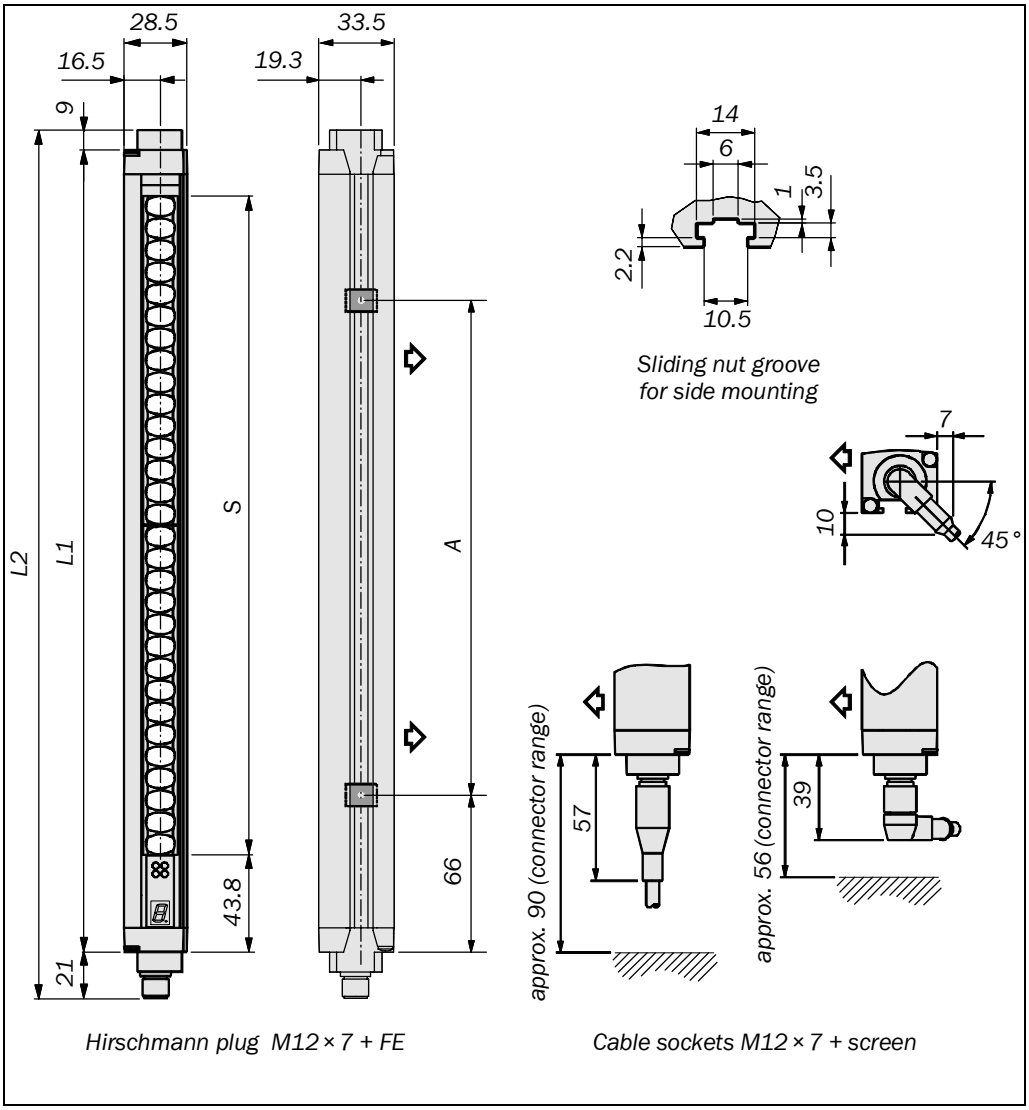


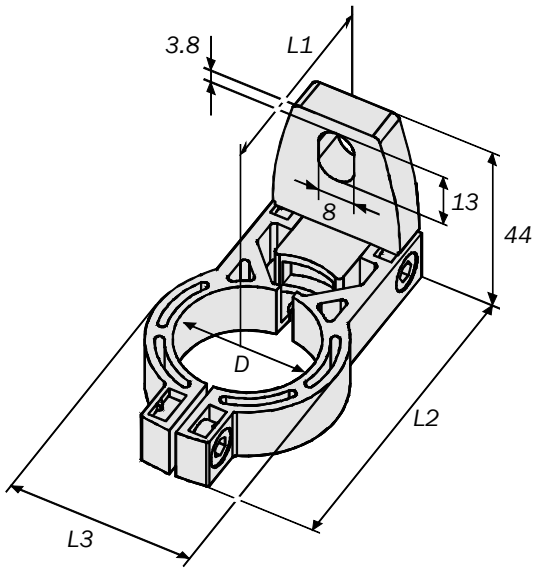
Fig. 29: Dimensional drawing C4000 Micro sender (mm) Receiver mirror image

Tab. 22: Dimensions dependent on the protective field height, C4000 Micro sender

Protective field height S [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension A [mm]
150	246	276	106
300	364	394	224
450	515	545	374
600	666	696	524
750	816	846	674
900	967	997	824
1050	1117	1147	974
1200	1266	1296	1124

10.4.3 Swivel mount bracket

Fig. 30: Dimensional drawing swivel mount bracket (mm)



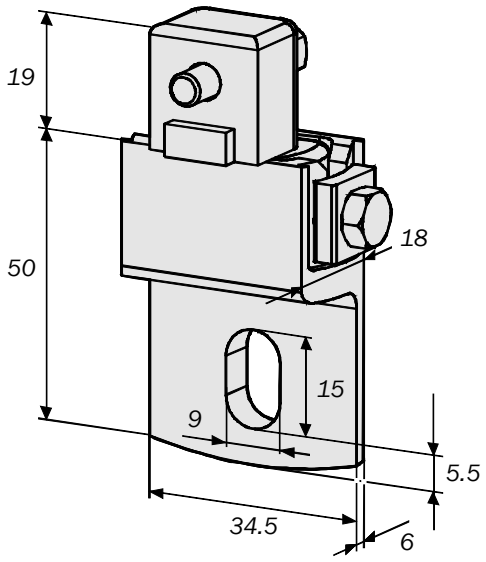
Part No. 2019659 (for C4000 Basic/Eco and deflector mirror PNS)
Part No. 2019649 (for C4000 Micro)

Tab. 23: Dimensions of the swivel mount bracket dependent on the housing profile

Swivel mount for ...	Dimension D [mm]	Dimension L1 [mm]	Dimension L2 [mm]	Dimension L3 [mm]
C4000 Basic/Eco, PNS75 and PNS125	30.6	44.4	75	42
C4000 Micro	24	34.3	62	36

10.4.4 Side bracket

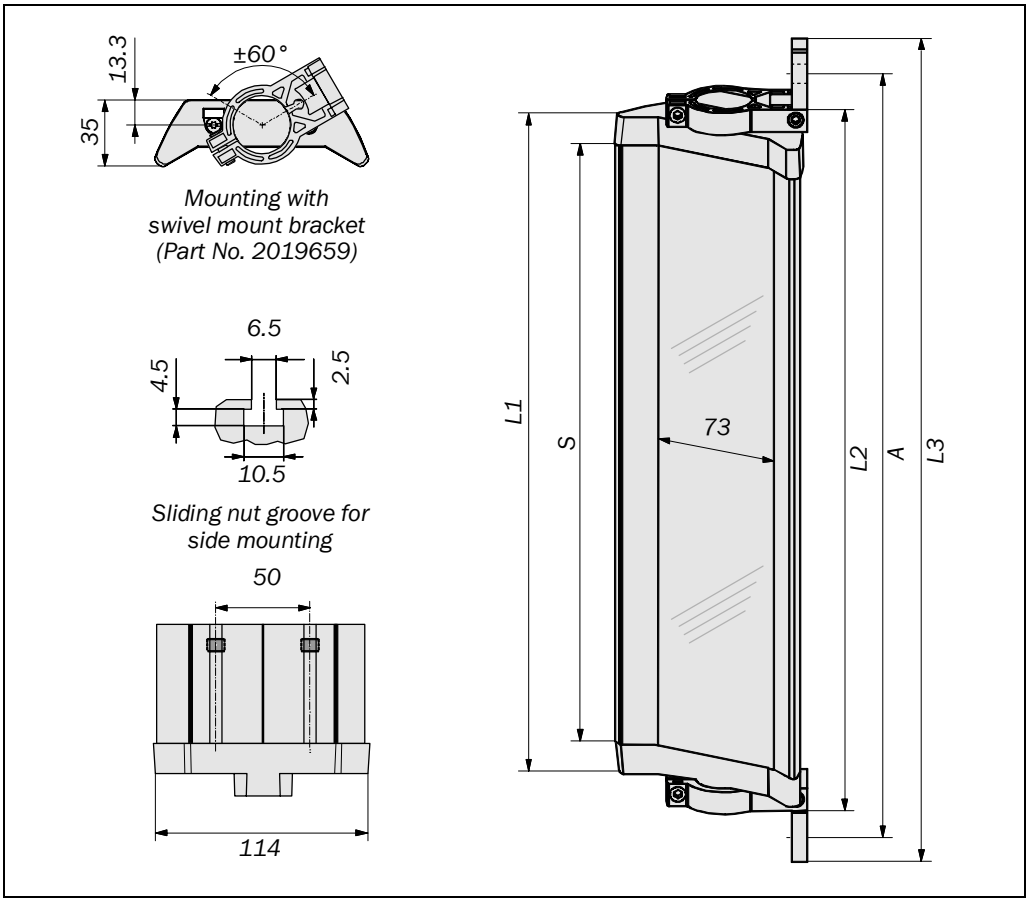
Fig. 31: Dimensional drawing, side bracket (mm)



Part No. 2019506

10.4.5 Deflector mirror PNS75

Fig. 32: Dimensional drawing deflector mirror PNS75 (mm)



Tab. 24: Dimensions for the deflector mirror PNS75 dependent 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
1390	1422	1446	1510	1490
1540	1572	1596	1660	1640
1690	1722	1746	1810	1790
1840	1872	1896	1960	1940

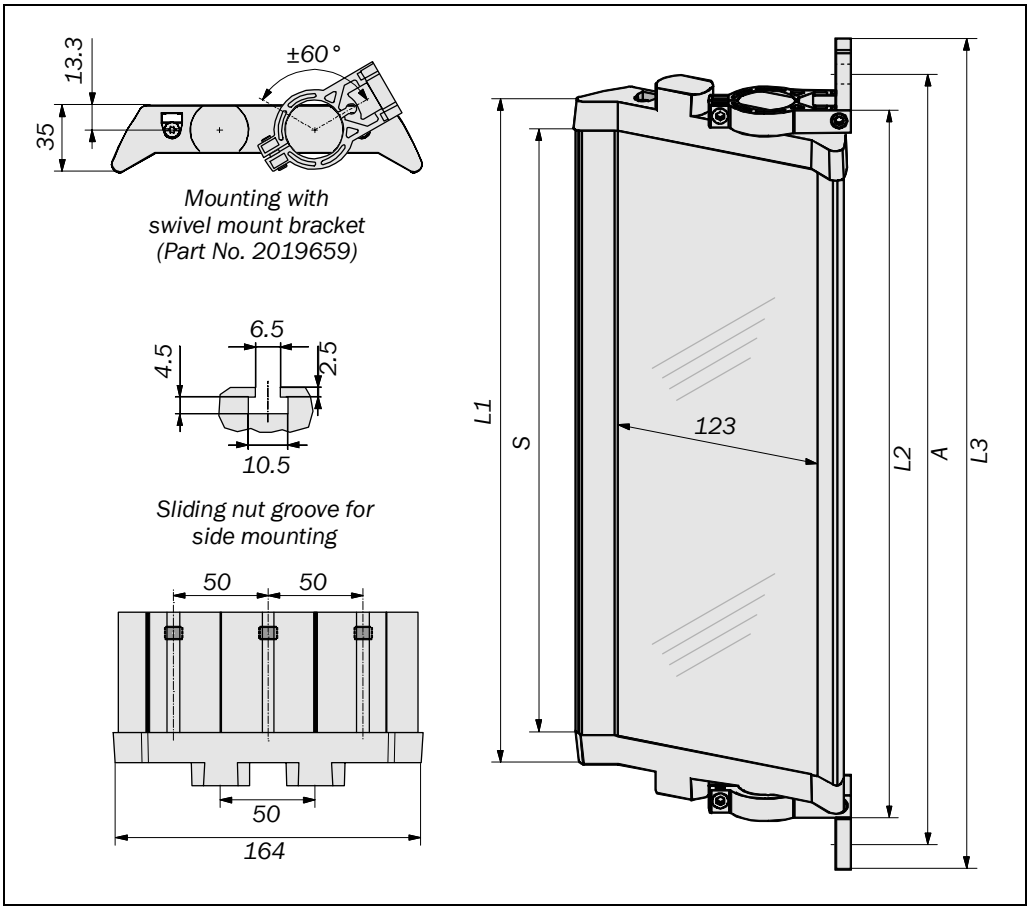
When using deflector mirrors, the effective scanning range is reduced (see Tab. 6 on page 16).

WARNING

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

10.4.6 Deflector mirror PNS125

Fig. 33: Dimensional drawing deflector mirror PNS125 (mm)



Tab. 25: Dimensions for the deflector mirror PNS125 dependent 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
1390	1422	1446	1510	1490
1540	1572	1596	1660	1640
1690	1722	1746	1810	1790
1840	1872	1896	1960	1940

When using deflector mirrors, the effective scanning range is reduced (see Tab. 6 on page 16).

WARNING

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

11 Ordering information

11.1 Delivery

Delivery, sender

- sender unit
- 4 sliding nuts for side bracket
  (C4000 Basic, C4000 Basic Plus, C4000 Eco only)

Delivery, receiver

- receiver unit
- 4 sliding nuts for side bracket
- test rod with diameter corresponding to the physical resolution of the safety light curtain
- information label " Important Information"
- operating instructions on CD-ROM
- information label "Operator's notes"

Delivery, deflector mirror

- deflector mirror
- 2 swivel mount brackets

11.2 C4000 Basic (M26 × 6 + FE)

Tab. 26: Part numbers C4000 Basic (M26 × 6 + FE)

Protective field height [mm]	Part numbers for resolution and scanning range		
	14 mm	14 mm	30 mm
	0–2.5 m	1–5 m	0–6 m
300	1022195 (C40S-0301AA030) 1022196 (C40E-0301AH030)	1022195 (C40S-0301AA030) 1022240 (C40E-0301BH030)	1022218 (C40S-0303AA030) 1022219 (C40E-0303AH030)
450	1022198 (C40S-0401AA030) 1022199 (C40E-0401AH030)	1022198 (C40S-0401AA030) 1022241 (C40E-0401BH030)	1022220 (C40S-0403AA030) 1022221 (C40E-0403AH030)
600	1022200 (C40S-0601AA030) 1022201 (C40E-0601AH030)	1022200 (C40S-0601AA030) 1022242 (C40E-0601BH030)	1022222 (C40S-0603AA030) 1022223 (C40E-0603AH030)
750	1022202 (C40S-0701AA030) 1022203 (C40E-0701AH030)	1022202 (C40S-0701AA030) 1022243 (C40E-0701BH030)	1022224 (C40S-0703AA030) 1022225 (C40E-0703AH030)
900	1022204 (C40S-0901AA030) 1022205 (C40E-0901AH030)	1022204 (C40S-0901AA030) 1022244 (C40E-0901BH030)	1022226 (C40S-0903AA030) 1022227 (C40E-0903AH030)
1050	1022206 (C40S-1001AA030) 1022207 (C40E-1001AH030)	1022206 (C40S-1001AA030) 1022245 (C40E-1001BH030)	1022228 (C40S-1003AA030) 1022229 (C40E-1003AH030)
1200	1022208 (C40S-1201AA030) 1022209 (C40E-1201AH030)	1022208 (C40S-1201AA030) 1022246 (C40E-1201BH030)	1022230 (C40S-1203AA030) 1022231 (C40E-1203AH030)
1350	1022210 (C40S-1301AA030) 1022211 (C40E-1301AH030)	1022210 (C40S-1301AA030) 1022247 (C40E-1301BH030)	1022232 (C40S-1303AA030) 1022233 (C40E-1303AH030)
1500	1022212 (C40S-1501AA030) 1022213 (C40E-1501AH030)	1022212 (C40S-1501AA030) 1022248 (C40E-1501BH030)	1022234 (C40S-1503AA030) 1022235 (C40E-1503AH030)
1650	1022214 (C40S-1601AA030) 1022215 (C40E-1601AH030)	1022214 (C40S-1601AA030) 1022249 (C40E-1601BH030)	1022236 (C40S-1603AA030) 1022237 (C40E-1603AH030)
1800	1022216 (C40S-1801AA030) 1022217 (C40E-1801AH030)	1022216 (C40S-1801AA030) 1022250 (C40E-1801BH030)	1022238 (C40S-1803AA030) 1022239 (C40E-1803AH030)

11.3 C4000 Eco (M12 × 4 + FE)

Tab. 27:Part numbers C4000 Eco (M12 × 4 + FE)

Protective field height [mm]	Part numbers for resolution and scanning range		
	14 mm	14 mm	30 mm
	0–2,5 m	1–5 m	0–6 m
300	1027440 (C40S-0301AA310) 1027441 (C40E-0301AN310)	1027440 (C40S-0301AA310) 1027486 (C40E-0301BN310)	1027464 (C40S-0303AA310) 1027465 (C40E-0303AN310)
450	1027442 (C40S-0401AA310) 1027443 (C40E-0401AN310)	1027442 (C40S-0401AA310) 1027487 (C40E-0401BN310)	1027466 (C40S-0403AA310) 1027467 (C40E-0403AN310)
600	1027444 (C40S-0601AA310) 1027445 (C40E-0601AN310)	1027444 (C40S-0601AA310) 1027488 (C40E-0601BN310)	1027468 (C40S-0603AA310) 1027469 (C40E-0603AN310)
750	1027446 (C40S-0701AA310) 1027447 (C40E-0701AN310)	1027446 (C40S-0701AA310) 1027489 (C40E-0701BN310)	1027470 (C40S-0703AA310) 1027471 (C40E-0703AN310)
900	1027448 (C40S-0901AA310) 1027449 (C40E-0901AN310)	1027448 (C40S-0901AA310) 1027490 (C40E-0901BN310)	1027472 (C40S-0903AA310) 1027473 (C40E-0903AN310)
1050	1027450 (C40S-1001AA310) 1027451 (C40E-1001AN310)	1027450 (C40S-1001AA310) 1027491 (C40E-1001BN310)	1027474 (C40S-1003AA310) 1027475 (C40E-1003AN310)
1200	1027452 (C40S-1201AA310) 1027453 (C40E-1201AN310)	1027452 (C40S-1201AA310) 1027492 (C40E-1201BN310)	1027476 (C40S-1203AA310) 1027477 (C40E-1203AN310)
1350	1027454 (C40S-1301AA310) 1027455 (C40E-1301AN310)	1027454 (C40S-1301AA310) 1027493 (C40E-1301BN310)	1027478 (C40S-1303AA310) 1027479 (C40E-1303AN310)
1500	1027456 (C40S-1501AA310) 1027457 (C40E-1501AN310)	1027456 (C40S-1501AA310) 1027494 (C40E-1501BN310)	1027480 (C40S-1503AA310) 1027481 (C40E-1503AN310)
1650	1027458 (C40S-1601AA310) 1027459 (C40E-1601AN310)	1027458 (C40S-1601AA310) 1027495 (C40E-1601BN310)	1027482 (C40S-1603AA310) 1027483 (C40E-1603AN310)
1800	1027460 (C40S-1801AA310) 1027463 (C40E-1801AN310)	1027460 (C40S-1801AA310) 1027496 (C40E-1801BN310)	1027484 (C40S-1803AA310) 1027485 (C40E-1803AN310)

11.4 C4000 Basic Plus (M12 × 7 + FE)

Tab. 28:Part numbers C4000 Basic Plus (M12 × 7 + FE)

Protective field height [mm]	Part numbers for resolution and scanning range		
	14 mm	14 mm	30 mm
	0–2,5 m	1–5 m	0–6 m
300	1027922 C40S-0301AA300 1027944 C40E-0301AG300	1027922 C40S-0301AA300 1027966 C40E-0301BG300	1027933 C40S-0303AA300 1027955 C40E-0303AG300
450	1027923 C40S-0401AA300 1027945 C40E-0401AG300	1027923 C40S-0401AA300 1027967 C40E-0401BG300	1027934 C40S-0403AA300 1027956 C40E-0403AG300
600	1027924 C40S-0601AA300 1027946 C40E-0601AG300	1027924 C40S-0601AA300 1027968 C40E-0601BG300	1027935 C40S-0603AA300 1027957 C40E-0603AG300
750	1027925 C40S-0701AA300 1027947 C40E-0701AG300	1027925 C40S-0701AA300 1027969 C40E-0701BG300	1027936 C40S-0703AA300 1027958 C40E-0703AG300
900	1027926 C40S-0901AA300 1027948 C40E-0901AG300	1027926 C40S-0901AA300 1027970 C40E-0901BG300	1027937 C40S-0903AA300 1027959 C40E-0903AG300
1050	1027927 C40S-1001AA300 1027949 C40E-1001AG300	1027927 C40S-1001AA300 1027971 C40E-1001BG300	1027938 C40S-1003AA300 1027960 C40E-1003AG300
1200	1027928 C40S-1201AA300 1027950 C40E-1201AG300	1027928 C40S-1201AA300 1027972 C40E-1201BG300	1027939 C40S-1203AA300 1027961 C40E-1203AG300
1350	1027929 C40S-1301AA300 1027951 C40E-1301AG300	1027929 C40S-1301AA300 1027973 C40E-1301BG300	1027940 C40S-1303AA300 1027962 C40E-1303AG300
1500	1027930 C40S-1501AA300 1027952 C40E-1501AG300	1027930 C40S-1501AA300 1027974 C40E-1501BG300	1027941 C40S-1503AA300 1027963 C40E-1503AG300
1650	1027931 C40S-1601AA300 1027953 C40E-1601AG300	1027931 C40S-1601AA300 1027975 C40E-1601BG300	1027942 C40S-1603AA300 1027964 C40E-1603AG300
1800	1027932 C40S-1801AA300 1027954 C40E-1801AG300	1027932 C40S-1801AA300 1027976 C40E-1801BG300	1027943 C40S-1803AA300 1027965 C40E-1803AG300

11.5 C4000 Micro

Tab. 29: Part numbers C4000 Micro

Protective field height [mm]	Part numbers for resolution and scanning range		
	14 mm	14 mm	30 mm
	0–2.5 m	1–5 m	0–6 m
150	1024054 (C415-0101AA300) 1024055 (C41E-0101AG300)	1024054 (C415-0101AA300) 1024037 (C41E-0101BG300)	1023563 (C415-0103AA300) 1023860 (C41E-0106AG300)
300	1023458 (C41S-0301AA300) 1023459 (C41E-0301AG300)	1023458 (C41S-0301AA300) 1023486 (C41E-0301BG300)	1023472 (C41S-0303AA300) 1023473 (C41E-0303AG300)
450	1023460 (C41S-0401AA300) 1023461 (C41E-0401AG300)	1023460 (C41S-0401AA300) 1023487 (C41E-0401BG300)	1023474 (C41S-0403AA300) 1023475 (C41E-0403AG300)
600	1023462 (C41S-0601AA300) 1023463 (C41E-0601AG300)	1023462 (C41S-0601AA300) 1023488 (C41E-0601BG300)	1023476 (C41S-0603AA300) 1023477 (C41E-0603AG300)
750	1023464 (C41S-0701AA300) 1023465 (C41E-0701AG300)	1023464 (C41S-0701AA300) 1023489 (C41E-0701BG300)	1023478 (C41S-0703AA300) 1023479 (C41E-0703AG300)
900	1023466 (C41S-0901AA300) 1023467 (C41E-0901AG300)	1023466 (C41S-0901AA300) 1023490 (C41E-0901BG300)	1023480 (C41S-0903AA300) 1023481 (C41E-0903AG300)
1050	1023468 (C41S-1001AA300) 1023469 (C41E-1001AG300)	1023468 (C41S-1001AA300) 1023491 (C41E-1001BG300)	1023482 (C41S-1003AA300) 1023483 (C41E-1003AG300)
1200	1023470 (C41S-1201AA300) 1023471 (C41E-1201AG300)	1023470 (C41S-1201AA300) 1023492 (C41E-1201BG300)	1023484 (C41S-1203AA300) 1023485 (C41E-1203AG300)

11.6 Additional front screen (weld spark guard)

Notes

- Two additional front screens (weld spark guards) supplied for each part number.
- The additional front screen fits both on the sender and on the receiver.
- The additional front screen may be used only if the curved enclosure side is accessible.
- An additional front screen reduces the scanning range of the system by 8 %. If sender and receiver each use an additional front screen, the scanning range will be reduced by 16 %.

Tab. 30: Part numbers, additional front screen (weld spark guard)

Protective field height [mm]	Part number for C4000 Basic	Part number for C4000 Micro
300	2022412	2022405
450	2022413	2022406
600	2022414	2022407
750	2022415	2022408
900	2022416	2022409
1050	2022417	2022410
1200	2022418	2022411
1350	2022419	–
1500	2022420	–
1650	2022421	–
1800	2022422	–

11.7 Deflector mirror

11.7.1 Deflector mirror PNS75 for protective field width 0 ... 5.4 m (total)

Tab. 31: Part numbers, deflector mirror PNS75

Protective field height [mm]	Type number	Part number
300	PNS75-034	1019414
450	PNS75-049	1019415
600	PNS75-064	1019416
750	PNS75-079	1019417
900	PNS75-094	1019418
1050	PNS75-109	1019419
1200	PNS75-124	1019420
1350	PNS75-139	1019421
1500	PNS75-154	1019422
1650	PNS75-169	1019423
1800	PNS75-184	1019424

Dimensional drawing see Fig. 32 on page 54. Effect on the scanning range see Tab. 6 on page 16.

WARNING

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

11.7.2 Deflector mirror PNS125 for protective field width 4 ... 5.4 m (total)

Tab. 32: Part numbers, deflector mirror PNS125

Protective field height [mm]	Type number	Part number
300	PNS125-034	1019425
450	PNS125-049	1019426
600	PNS125-064	1019427
750	PNS125-079	1019428
900	PNS125-094	1019429
1050	PNS125-109	1019430
1200	PNS125-124	1019431
1350	PNS125-139	1019432
1500	PNS125-154	1019433
1650	PNS125-169	1019434
1800	PNS125-184	1019435

Dimensional drawing see Fig. 33 on page 55. Effect on the scanning range see Tab. 6 on page 16.

WARNING

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

11.8 Accessories

Tab. 33: Part numbers, accessories

Part	Part number
C4000 Basic	
Hirschmann cable socket M26 × 6 + FE, crimp contacts, straight	6006612
Hirschmann cable socket M26 × 6 + FE, screw contacts, angled	6007363
Connection cable	
Socket straight/stripped, 2.5 m	2023993
Socket straight/stripped, 5 m	2023994
Socket straight/stripped, 7.5 m	2023995
Socket straight/stripped, 10 m	2023996
Socket straight/stripped, 15 m	2023997
Socket straight/stripped, 20 m	2023998
Socket straight/stripped, 30 m	2023999
C4000 Micro/Basic Plus	
Cable socket M12 × 7 + FE (max. 0,75 mm²), straight	6028422
Connection cable 7 × 0.25 + FE	
Socket straight/stripped, 2.5 m	6020537
Socket straight/stripped, 5 m	6020354
Socket straight/stripped, 7.5 m	6020353
Socket straight/stripped, 10 m	6020352
Socket straight/stripped, 15 m	6020872
Socket angled/stripped, 5 m	6021342
Socket angled/stripped, 15 m	6021343
C4000 Eco	
Connection cable 4 × 0.25 + FE	
Socket straight/stripped, 2 m	6008899
Socket straight/stripped, 5 m	6009868
Socket straight/stripped, 10 m	6010544
Socket straight/stripped, 15 m	6029215
Connecting cable (4 × 0.25 + FE) for connection to T-distributor	
Plug straight/socket straight, 0.6 m	6025930
Plug straight/socket straight, 2 m	6025931
T-distributor to connection for connecting cable	6030664
Mounting kit 1 for C4000 Micro and C4000 Basic Plus	
Swivel mount, 4 pcs. for any protective field height	2019649
Mounting kit 2 for C4000 Basic, C4000 Eco and PNS deflector mirror	
Swivel mount, 4 pcs. for any protective field height	2019659
Mounting kit 6	
Swivel function (side bracket), 4 pcs. for any protective field height For higher vibration and shock exposure	2019506

Part	Part number
Laser alignment aid AR60	
Laser alignment aid AR60	1015741
Adapter for AR60, large (is required for C4000 Basic)	4032461
Adapter for AR60, small (is required for C4000 Micro)	4032462
Accessories included in a standard delivery	
Sliding nuts for side bracket, 4 pcs.	2017550
Operating instructions C4000 Micro/Basic/Eco on CD-ROM	2026783
Reset tool	6022103
Adapter cable for reset tool	2026866

12 Annex

12.1 Compliance with EU directives

EU declaration of conformity (excerpt)

The undersigned, representing the following manufacturer herewith declares that the product is in conformity with the provisions of the following EU directive(s) (including all applicable amendments), and that the respective standards and/or technical specifications are taken as the basis.

Complete EU declaration of conformity for download: www.sick.com

12.2 Checklist for the manufacturer

SICK

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

The details on the items listed below must be available at the latest when the system is commissioned for the first time, depending, however, on the various applications the requirements of which must be reviewed by the manufacturer/OEM.

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 ☐ No ☐
2.	Are the applied directives and standards listed in the declaration of conformity?	Yes ☐ No ☐
3.	Does the protective device comply with the required PL/SIL claim limit and PFHd in accordance with EN ISO 13849-1/EN 62061 and the required type in accordance with IEC 61496-1?	Yes ☐ No ☐
4.	Is the access to the hazardous area/hazardous point only possible through the protective field of the ESPE?	Yes ☐ No ☐
5.	Have appropriate measures been taken to protect (mechanical protection) or monitor (protective devices) any persons or objects in the hazardous area when protecting a hazardous area or hazardous point, and have these devices been secured or locked to prevent their removal?	Yes ☐ No ☐
6.	Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching below, above or behind the ESPE?	Yes ☐ No ☐
7.	Has the maximum stopping and/or run-down time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)?	Yes ☐ No ☐
8.	Has the ESPE been mounted such that the required minimum distance from the nearest hazardous point has been achieved?	Yes ☐ No ☐
9.	Are the ESPE devices correctly mounted and secured against manipulation after adjustment?	Yes ☐ No ☐
10.	Are the required protective measures against electric shock in effect (protection class)?	Yes ☐ No ☐
11.	Is the control switch for resetting the protective devices (ESPE) or restarting the machine present and correctly installed?	Yes ☐ No ☐
12.	Are the outputs of the ESPE (OSSD) integrated according to required PL/SILCL compliant with EN ISO 13849-1/EN 62061 and does the integration correspond to the comply with the circuit diagrams?	Yes ☐ No ☐
13.	Has the protective function been checked in compliance with the test notes of this documentation?	Yes ☐ No ☐
14.	Are the specified protective functions effective at every operating mode that can be set?	Yes ☐ No ☐
15.	Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?	Yes ☐ No ☐
16.	Is the ESPE effective over the entire period of the dangerous state?	Yes ☐ No ☐
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 ☐ No ☐
18.	Has the information label “Important Information” for the daily check been attached so that it is well visible for the operator?	Yes ☐ No ☐

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

12.3 List of tables

12.4 List of illustrations

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