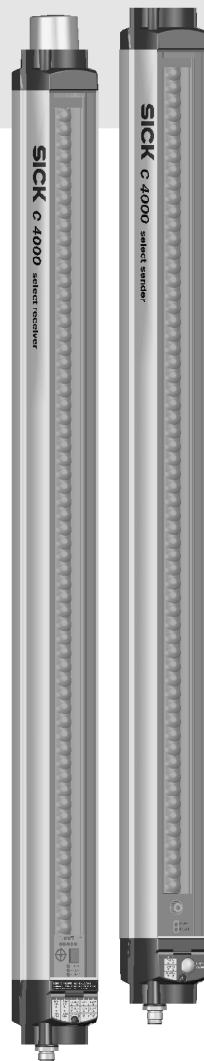


## OPERATING INSTRUCTIONS

### C4000 Select

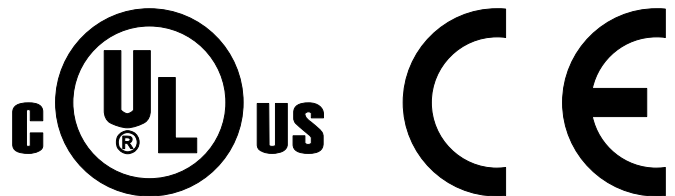
#### Safety Light Curtain



en

**SICK**  
Sensor Intelligence.

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# 1 About this document

Please read this chapter carefully before working with this documentation and the C4000 Select.

## 1.1 Function of this document

These operating instructions are designed to address *the technical personnel of the machine manufacturer or the machine operator* in regards to safe mounting, installation, configuration, electrical installation, commissioning, operation and maintenance of the C4000 Select safety light curtain.

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

## 1.2 Target group

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

## 1.3 Scope

These operating instructions are original operating instructions.

Note These operating instructions apply to the C4000 Select safety light curtain with one of the following entries on the type label in the field *Operating Instructions*:

- 8012198/TI77
- 8012198/YU76

This document is part of SICK part number 8012198 (operating instructions "C4000 Select" in all available languages).

## 1.4 Depth of information

These operating instructions contain information on:

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

of the C4000 Select safety light curtain.

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

When operating the C4000 Select, the national, local and statutory rules and regulations must be observed.

General information on health and safety at work and accident prevention using opto-electronic protective devices can be found in the brochure "Safe Machines with opto-electronic protective devices" from SICK.

**Note** We also refer you to the SICK homepage on the Internet at  
[www.sickusa.com](http://www.sickusa.com) and [www.sick.com](http://www.sick.com)

Here you will find information on:

- sample applications
- a list of frequently asked questions about the C4000 Select
- these operating instructions in different languages for viewing and printing
- certificates on the prototype test, the EU declaration of conformity and other documents

## 1.5 Abbreviations

<b>ESPE</b>	Electro-sensitive protective equipment (e.g. C4000 Select)
<b>OSSD</b>	Output signal switching device
<b>PF<sub>H</sub></b>	The probability of failure per hour in accordance with the functional safety testing requirements outlined in IEC 61508
<b>PL</b>	Performance level in accordance with EN ISO 13849-1
<b>SIL</b>	Safety integrity level in accordance with IEC 61508
<b>SILCL</b>	SIL claim limit in accordance with EN 62061

## 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:



Constant indication of characters, e.g. 2

When using an inverted mounting of the C4000 Select, you must take into account that the information presented by the 7-segment display will also be inverted.

● Red, ● Red, ○ Off

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

● Red The red LED is illuminated constantly.

● Red The red LED is flashing.

○ Off The LED is off.

➤ Take action ...

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



WARNING



### Warning!

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

Read carefully and follow the 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 Select or with the machine protected by the C4000 Select.

### 2.1 Qualified safety personnel

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

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

**and**

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

**and**

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

**and**

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

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

### 2.2 Applications of the device

The C4000 Select safety light curtain is an electro-sensitive protective equipment (ESPE) rated to:

- type 4 in accordance with IEC 61496-1 and IEC 61496-2
- SIL3 in accordance with IEC 61508
- SILCL3 in accordance with EN 62061
- category 4 in accordance with EN ISO 13849-1
- performance level e in accordance with EN ISO 13849-1

The physical resolution of the C4000 Select is 14 mm or 30 mm (depending on the light curtain type code) with a maximum protective field width of 8 m (14 mm resolution) or 19 m (30 mm resolution) and available protective field heights from 300 up to 1800 mm. Configurable parameters are set using DIP switches.

The device is suitable for:

- hazardous point protection (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 20 for an illustration of the protection modes.

**WARNING**

---

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

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

---

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

**Note** The C4000 Select safety light curtain operates as a standalone device, comprising a sender and receiver, or in combination with other extended C4000 Select devices, SICK S300 or S3000 safety laser scanners. This means that the protective field can be adapted to suit individual safety requirements.

## 2.3 Correct use

The C4000 Select safety light curtain must be used only as defined in section 2.2 “Applications of the device”. It must be used only by qualified safety personnel and only on the machine where it has been installed and initialized by qualified safety personnel in accordance with these operating instructions.

If the device is used for any other purposes or modified in any way—including during mounting and installation—any warranty claim against SICK AG and its subsidiary companies shall become void.

**WARNING**

## 2.4 General safety notes and protective measures

### Safety notes

Please observe the following procedures in order to ensure the correct and safe use of the safety light curtain C4000 Select.

Any deviation from the following procedures may cause failure of the safety function and hence expose personnel to risk of the associated hazard!

- The national/international rules and regulations apply to the installation, use and periodic technical inspections of the safety light curtain, in particular:
  - Machinery 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 58) of these operating instructions (e.g. on use, mounting, installation or integration into the existing machine controller) must be observed.
- Changes to the configuration of the devices can degrade the protective function. After every change to the configuration you must therefore reverify and validate the effectiveness of the protective device (e.g. C4000 Select).

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

- The tests must be carried out by authorized qualified safety 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 C4000 Select safety light curtain is installed. 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 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 (i.e. model PS50W-24V, SICK part number 7028789 or PS95W-24V, SICK part number 7028790).

## 2.5 Protection of the environment

The C4000 Select safety light curtain has been designed to minimize 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.

### Notes

- We would be pleased to be of assistance on the disposal of this device. Contact your local SICK representative.
- The disposal of Instapak® foam inserts included in the C4000 Select packaging is completely compatible with waste-to-energy facilities. Instapak® foam has high energy content similar to that of coal. Instapak® foam can actually be used to aid in the processing of other less combustible materials. The process leaves less than one-percent ash and is completely free of any heavy metals. Instapak® foam also has a recycling program available to help companies meet their recycling needs. Instapak® foam may be returned to any one of more than twenty-five worldwide locations. Refer on the internet to <http://www.instapak.com/> for additional information.

## 3 Product description

This chapter provides information on the special features and properties of the C4000 Select safety light curtain. 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

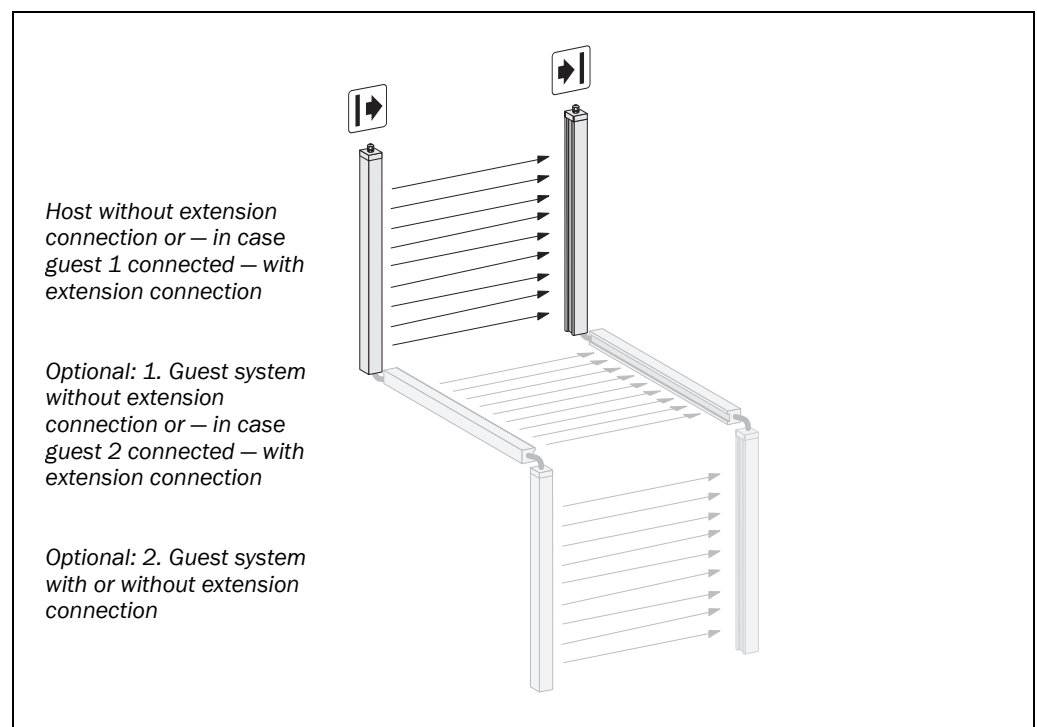
The C4000 Select supports the following special features:

- integrated laser and alignment bar graph
- configuration via DIP switches
- simple diagnostic codes
- an optional integrated LED indicator lamp (red, green, yellow) that can be controlled by external inputs
- cascading additional C4000 Select devices or a single S300/S3000 safety laser scanner
- 2 beam codes possible in addition to non-coded operation
- status display with 7-segment display
- one or two beam floating blanking

### 3.2 Operating principle of the device

#### 3.2.1 C4000 Select components

Fig. 1: Components of the C4000 Select



Please refer to chapter 11 “Technical specifications” on page 66 for the data sheet. Please refer to section 11.4 “Dimensional drawings” on page 77 for the dimensional drawings.

### 3.2.2 The light curtain principle

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

The construction height determines the *height of the protective field* of the appropriate pair. For the exact protective field height, please see chapter 11.4 “Dimensional drawings” on page 77.

The *width of the protective field* is derived from the dimension of the light path between sender and receiver and must satisfy the specification requirements for the protective field (see “Technical specifications” on page 66).

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

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

### 3.2.3 Device variants

The C4000 Select sender and receiver devices support several end cap configurations. You must decide which end cap is best suited for your application at time of order placement. The bottom end cap supports the system connection and optional extended I/O functionality. Three top end cap options are available: cover only, with an optional integrated LED indicator lamp or with an optional extended I/O connection.

There are several variants of the C4000 Select:

- without any extension connection on either the sender or receiver (no extended I/O capability)
- with integrated LED indicator lamp on the top end cap of the receiver unit and without any extension connection on either the sender or receiver
- with extension connection (supports cascading) located on the bottom end cap with the system connection on both the sender and receiver
- with extension connection (supports cascading) located on the top end cap with a separate bottom end cap having the system connection on both the sender and receiver
- with integrated LED indicator lamp on the top end cap of the receiver unit and with extension connection (supports cascading or external control of the integrated LED indicator lamp) located on the bottom end cap with the system connection on both the sender and receiver
- with integrated LED indicator lamp on the top end cap of the receiver unit and with bottom extension connection only on the receiver (supports external control of the integrated LED indicator lamp, allows the sender to be powered by the receiver or supports cascading of a S300/S3000 safety laser scanner)

**C4000 Select****3.2.4 Standalone devices and cascaded systems**

The C4000 Select allows you to coordinate multiple protective devices (e.g. additional C4000 Select devices or SICK S300/S3000 safety laser scanner) in a single safety system.

A maximum of three C4000 Select devices can be connected in series as a “cascade”. The following configurations are possible:

- standalone operation of a single C4000 Select pair
- cascade of a host C4000 Select with a guest C4000 Select
- cascade of a host C4000 Select with two guest C4000 Select devices
- cascade of a host C4000 Select with a SICK S300/S3000 safety laser scanner

Cascaded devices are connected using the extended I/O connection. The extended I/O connection may be located either beside the system connection (extended I/O connection on the bottom end cap) or separate from the system connection (extended I/O connection on the top end cap).

The benefits of cascading include:

- no additional external circuitry required making connection of additional protective devices easy to implement
- the protective field height and resolution may differ among the individual C4000 Select devices
- a combination of hazardous point (i.e. C4000 Select) and area protection devices (e.g. SICK S300/S3000 safety laser scanners) can be realized in a single safety system.

**Limits of cascading**

- The maximum protective field width must be guaranteed for each individual pair!
- The maximum total number of beams must not exceed 480 beams in non-coded operation, and a maximum of 405 beams in coded operation.
- The maximum cable length between two devices in a cascaded systems must not exceed 10 metres.

The following sections describe the different configurations supported by the C4000 Select. For ease of understanding, only the receiver units have been shown in subsequent figures.

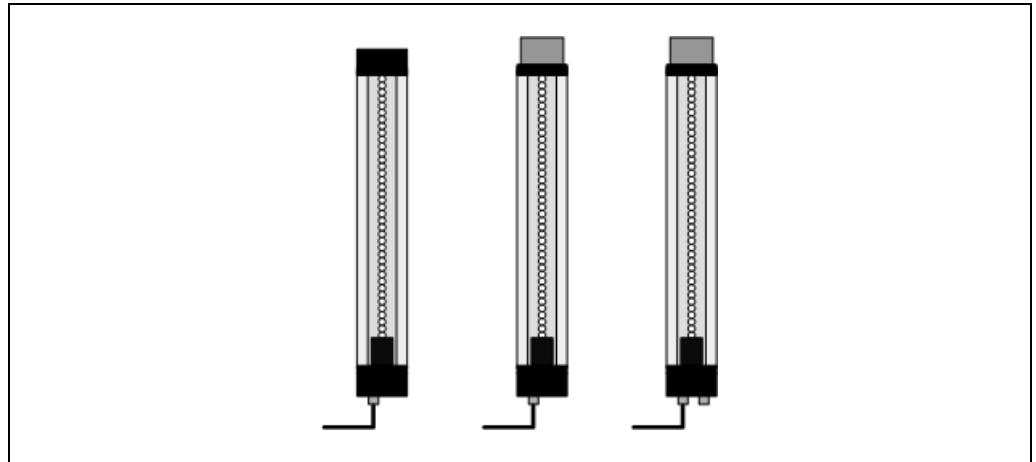
**WARNING****Ensure that you set the Safe Extended I/O DIP switch correctly for your application!**

When cascading additional protective devices to the C4000 Select, you must ensure that the Safe Extended I/O DIP switch has been set to **ON**. Failure to enable the Safe Extended I/O function in cascaded applications will disable the protective function of the guest system and hence expose personnel to risk of the associated hazard! Please refer to chapter 4 “Configurable functions” on page 24 for additional details regarding Safe Extended I/O DIP switch settings and functionality.

### Standalone operation

Standalone operation can be realized with all C4000 Select variants. Regardless of variant, DIP switch configuration can be set for standalone operation (refer to chapter 4 “Configurable functions” on page 24 for additional information).

Fig. 2: C4000 Select receivers used in standalone operation



### Standalone operation with external control of LED indicator lamp

The C4000 Select receiver with integrated LED indicator lamp and extended I/O connection supports external control of the LED indicator lamp in standalone mode. In this configuration, the color shown by the LED indicator lamp can be controlled via the two inputs at the extended I/O connection. The LED indicator lamp can be used as a stacklight to illuminate yellow, red, or green eliminating the need to purchase and install a separate lamp. For example:

- In a muting application (implemented by means of an additional, external muting control unit, e.g. a suitable sens:Control unit) it could illuminate yellow to signal the temporary muting, red when the safety circuit is open, and green when the safety circuit is closed. The display of the LED indicator lamp is not monitored.

#### Note

Depending on the local regulations, the external muting lamp must be monitored. Applications where monitored muting lamps are mandatory can therefore not be solved by externally controlling the C4000 Select's LED indicator lamp as the sole muting lamp.

- If for example C4000 Select is used for guarding an automatic machining center which is controlled by a PLC (programmable logic controller), the C4000 Select could be connected by the inputs of its extended I/O connection to outputs of that PLC. The PLC could then provide the machine's current state coded in these two outputs. For example:
  - If the machine is working normally, it could set the outputs to “low/high” (C4000 select input 1/input 2) causing the C4000 Select to illuminate the LED indicator lamp in green color.
  - If the machine is stopped, it could set the outputs to “high/high” (C4000 select input 1/input 2) causing the C4000 Select to illuminate the LED indicator lamp in red color.
  - If the machine needs user interaction, it could alternate the outputs continuously between “high/high” (C4000 select input 1/input 2) and “high/low” (C4000 select input 1/input 2) causing the C4000 Select's LED indicator lamp to blink red/yellow.

See Tab. 4 for details.



## C4000 Select



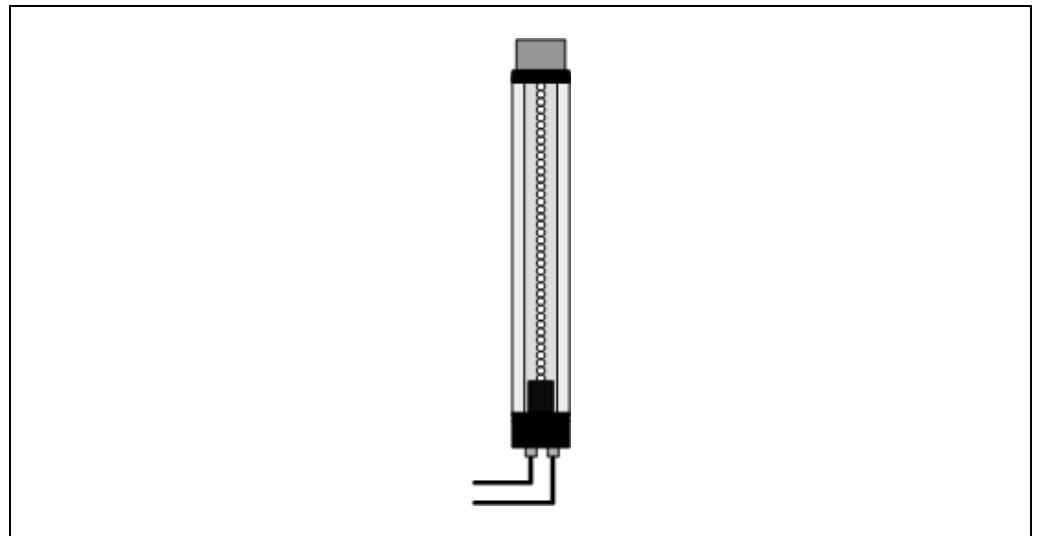
## WARNING

**Only use the “Output” LED of the C4000 Select receiver (see section 3.4.2 on page 22) to determine the status of the output signal switching devices (OSSD/safety outputs). This is especially important if Safe Extended I/O is disabled by DIP switch setting and if you are using a C4000 Select featuring both an integrated LED indicator lamp and an extended I/O connection at the receiver unit.**

For this setup, the color shown by the optional LED indicator lamp is not necessarily related to the state of the OSSDs. This might lead to false assumptions about the receiver unit's current state, especially during daily functional checks of the protective device described in section 7.3.3 on page 58. This may lead to exposure of personnel to risk of the associated hazard!

Refer to section 3.4.3 on page 23 for additional information.

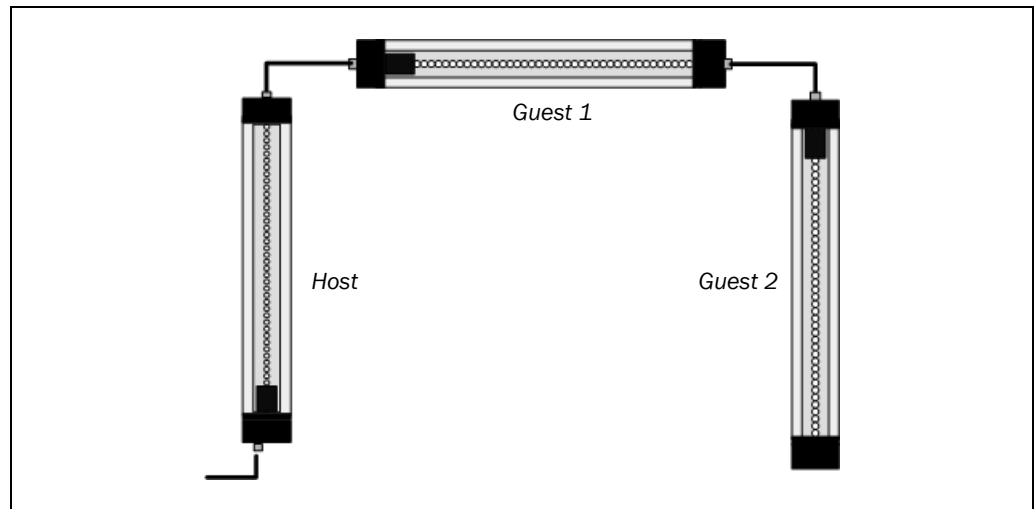
*Fig. 3: C4000 Select receiver used in standalone operation with external LED indicator lamp control*

**Cascade of multiple C4000 Select pairs**

The C4000 Select supports the cascade of up to three 1800 mm protective field height C4000 Select sender and receiver pairs. This may be realized only when the extended I/O connection is available. When three light curtains are cascaded together, a physical barrier may be necessary to prevent optical interference between the two light curtains configured with the same beam code if they are positioned too closely together. Refer to section 4.2 “Beam coding” on page 28 for additional information regarding this requirement.

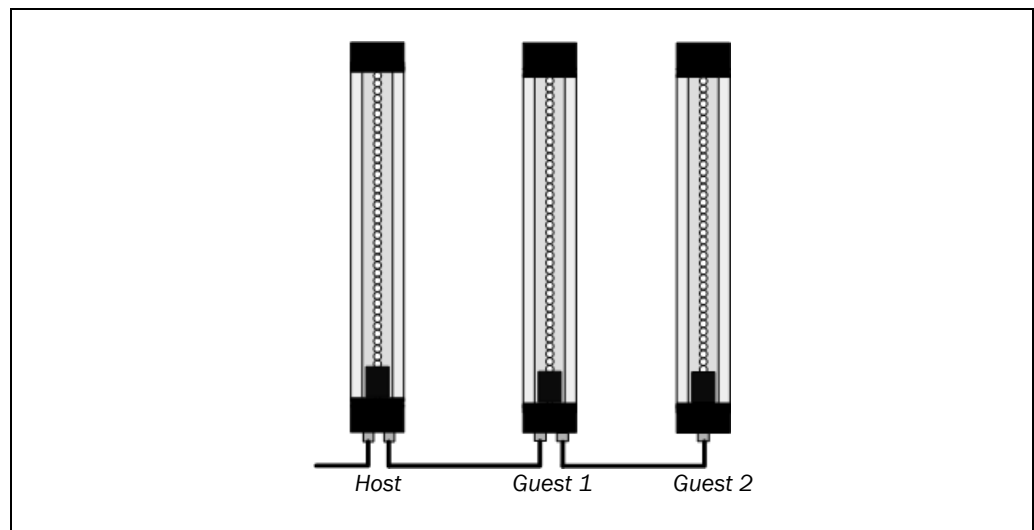
There are two methods of implementing C4000 Select cascades. The first method utilizes an extended I/O connection located on the top end cap for the first C4000 Select (host) and the second C4000 Select (guest 1). The third C4000 Select (guest 2) utilizes a system connection only<sup>1)</sup>.

Fig. 4: C4000 Select receivers used in cascade with extension connection (on top end cap)



Alternatively, the second method of implementing cascaded C4000 Select devices uses an extended I/O connection that is located on the same end cap as the system connection.

Fig. 5: C4000 Select receivers used in cascade with extension connection (on same end cap as system connection)



#### WARNING

**In a cascade (see Fig. 5 as an example) receiver units may never be physically connected to sender units in any combination.**

A receiver unit physically connected to a sender unit might remain without effect on the safety function. This would lead to failure to detect exposing personnel to risk of the associated hazard.

#### Note

The only case where physically connecting a sender unit to a receiver unit is possible is the following setup: In a standalone C4000 Select pair, the sender unit may be powered by connecting it to the extended I/O connection of the corresponding receiver unit for ease of wiring.

<sup>1)</sup> Maximum cable length between Host and Guest 10 m. Maximum cable length between Guest 1 and Guest 2 10 m.

**C4000 Select****Cascade of C4000 Select and SICK S300/S3000 safety laser scanner**

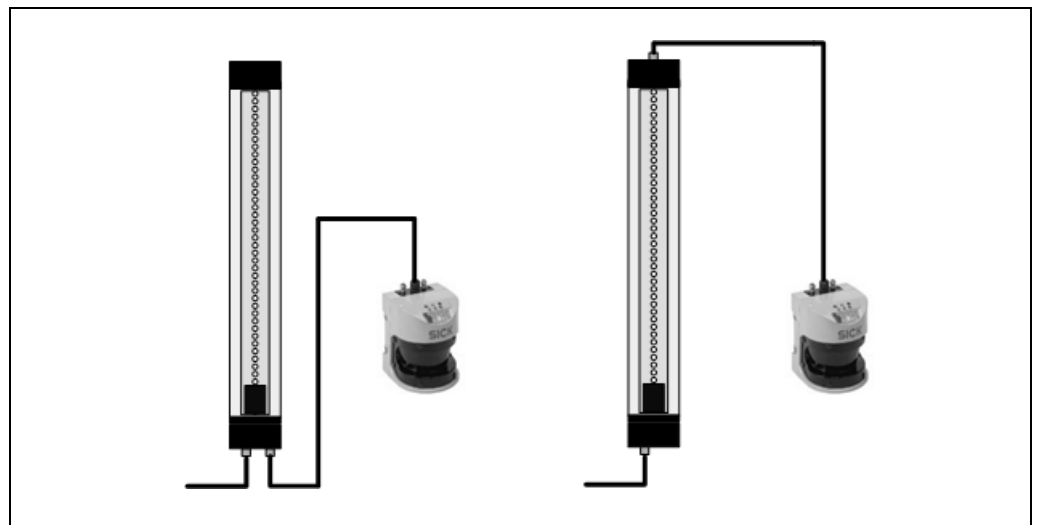
The C4000 Select supports the cascade of a single SICK S300 or S3000 safety laser scanner. Connection of the S300 or S3000 occurs on the extended I/O connection to provide both power and connection of safety relevant signals (i.e. safety outputs from the safety scanner). The extended I/O connection may be located on either the top end cap or with the system connection on the bottom end cap of the C4000 Select receiver. A connection of a safety laser scanner to the extended I/O of the sender is not possible.

**WARNING**

**In a cascade (see Fig. 5 as an example) receiver units may never be physically connected to sender units in any combination.**

A receiver unit physically connected to a sender unit might remain without effect on the safety function. This would lead to failure to detect exposing personnel to risk of the associated hazard.

*Fig. 6: C4000 Select receiver with extended I/O connection (shown on top end cap and with system connection) used to cascade a SICK S3000 safety laser scanner*



### 3.3 Examples of range of use

Fig. 7: Hazardous point protection using a C4000 Select safety light curtain (left)

Fig. 8: Hazardous area protection using a C4000 Select safety light curtain (right)

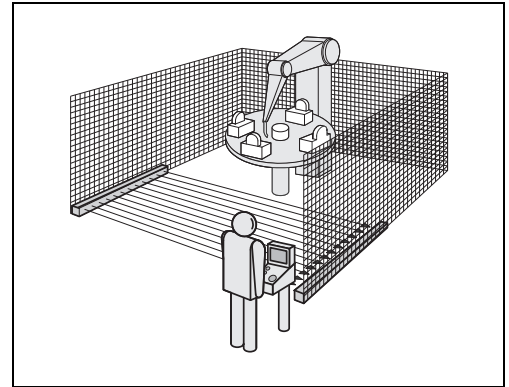
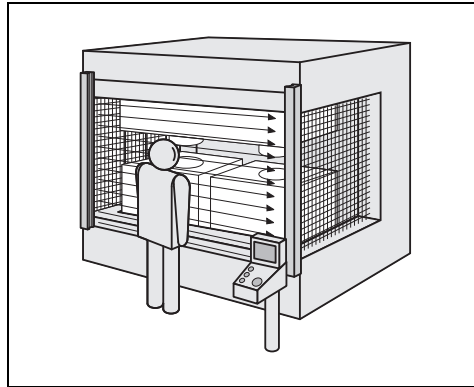
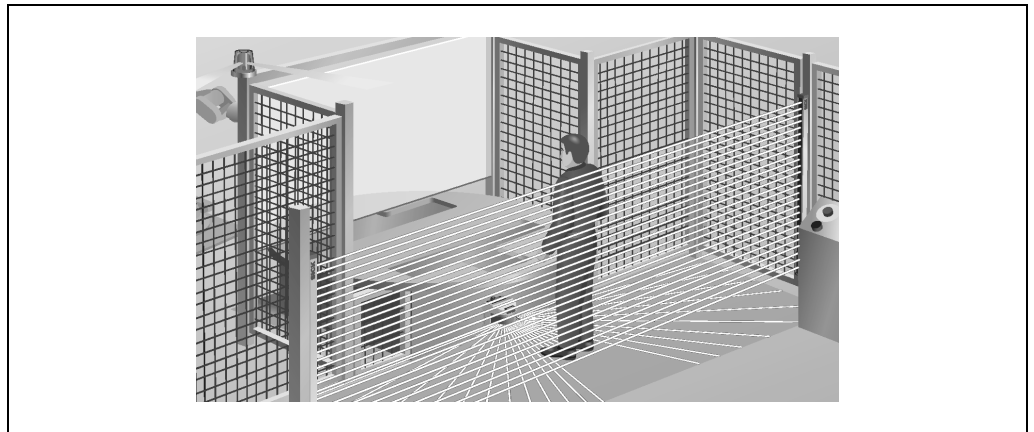


Fig. 9: Access protection using a C4000 Select safety light curtain cascaded with an S3000 safety laser scanner



The C4000 Select safety light curtain 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 mounted so that objects penetrating the hazardous area are safely identified by the C4000 Select.
- An external reset/restart function (e.g. 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.

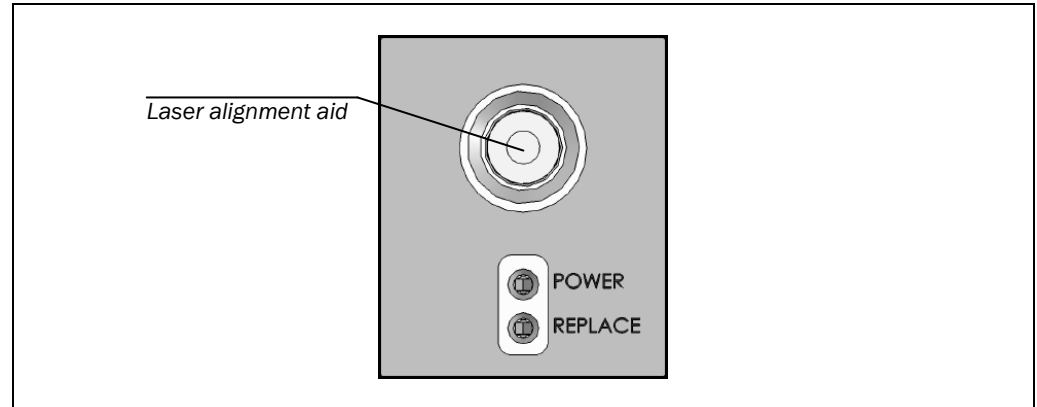
**C4000 Select****3.4 C4000 Select status indicators**

The C4000 Select provides simple operational status information using LED indicators and a 7-segment display.

**3.4.1 Status indicators of the C4000 Select sender unit**

The C4000 Select sender unit has two status indicator LEDs that provide the operational status as shown in the figure below:

Fig. 10: Status indicators of the C4000 Select sender unit



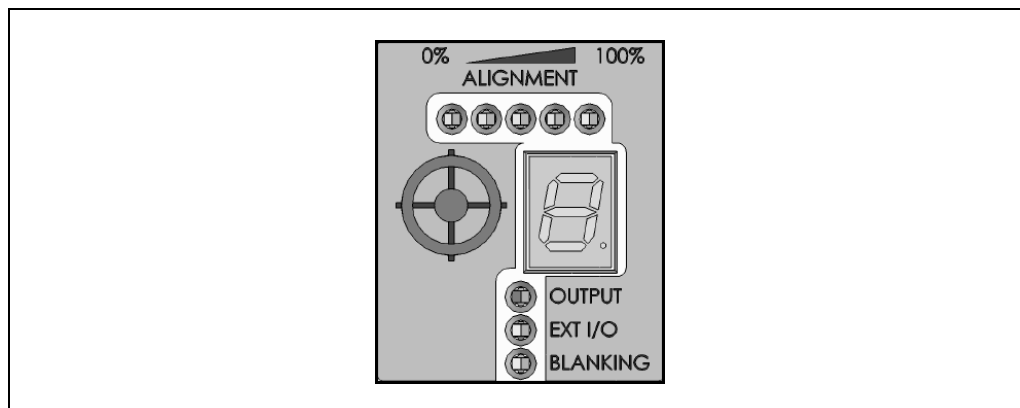
Tab. 1: C4000 Select LED indication on sender

LED Name	Display	Meaning
POWER	● <b>Yellow</b>	Supply voltage OK
	○ <b>Off</b>	Check the power to the sender unit
REPLACE	● <b>Red</b>	The sender unit has detected an internal error. Replace sender unit.
	○ <b>Off</b>	Internal self-test completed successfully or power is off.

### 3.4.2 Status indicators of the C4000 Select receiver unit

The C4000 Select receiver unit has several LED groups and a 7-segment LED display that provide the operational status as shown in the figure below:

Fig. 11: Status indicators of the C4000 Select receiver unit



Tab. 2: C4000 Select receiver LED display indication

LED Name	Display	Meaning
OUTPUT	● <b>Green</b>	Output signal switching devices (OSSD)/safety outputs are ON.
	● <b>Red</b>	Output signal switching devices (OSSD)/safety outputs are OFF.
	○ <b>Off</b>	No power is currently supplied to the receiver unit.
EXT I/O	● <b>Red</b>	Extended I/O (safe) inputs are <b>Inactive</b> (Low) i.e. OFF (Safe Extended I/O enabled).
	○ <b>Off</b>	Extended I/O (safe) inputs are <b>Active</b> (High) i.e. ON or Safe Extended I/O disabled.
BLANKING	● <b>Yellow</b>	Blanking is active.
	○ <b>Off</b>	Blanking is inactive.
ALIGNMENT LEDs	● <b>Yellow</b>	Indicates that one or more beams are aligned between sender and receiver units. The first LED will be ● <b>Yellow</b> when one of the synchronization beams has been aligned. When all five (5) LEDs are ● <b>Yellow</b> , this indicates all beams are aligned between sender and receiver units, but there is a weak signal.
	● <b>Green</b>	When all five (5) LEDs are ● <b>Green</b> , this indicates that all beams are aligned between sender and receiver units.
7-segment display	1	An internal error has been detected. Replace receiver unit.
	2	Check DIP switch settings.
	3	Optical signals have been detected from multiple sender units. Change beam code of this C4000 Select sender/receiver pair.
	4	Check power supply voltage.
	5	Check system wiring for errors.
	6	Check extended I/O wiring for errors and check DIP switch settings.

## C4000 Select

## 3.4.3 Optional integrated LED indicator lamp

When the receiver unit includes the optional integrated LED indicator lamp and

- the receiver unit includes an extended I/O connection and Safe Extended I/O is enabled by DIP switch setting

or

- the receiver unit does not include an extended I/O connection,

the following LED indicator lamp colors are defined:

Tab. 3: C4000 Select integrated LED indicator lamp colors (internal LED indicator lamp control)

Integrated LED indicator lamp	Meaning
● Red	Output signal switching devices (OSSD)/safety outputs are OFF
● Green	Output signal switching devices (OSSD)/safety outputs are ON
○ Off	No power is currently supplied to the receiver unit

When the receiver unit includes both the optional integrated LED indicator lamp and an extended I/O connection and Safe Extended I/O is disabled by DIP switch setting, the LED indicator lamp colors are defined by the states of the two inputs at the extended I/O connection (see Tab. 4) and are not necessarily related to the state of the output signal switching devices.



WARNING

**Only use the “Output” LED of the C4000 Select receiver (see section 3.4.2 on page 22) to determine the status of the output signal switching devices (OSSD/safety outputs). This is especially important if Safe Extended I/O is disabled by DIP switch setting and if you are using a C4000 Select featuring both an integrated LED indicator lamp and an extended I/O connection at the receiver unit.**

For this setup, the color shown by the optional LED indicator lamp is not necessarily related to the state of the OSSDs. This might lead to false assumptions about the receiver unit's current state, especially during daily functional checks of the protective device described in section 7.3.3 on page 58. This may lead to exposure of personnel to risk of the associated hazard!

Tab. 4: C4000 Select integrated LED indicator lamp colors (external LED indicator lamp control)

If such a receiver unit is operated in standalone mode, the color of the integrated LED indicator lamp is controlled by the two inputs at its extended I/O connection as follows:

Extended I/O input 1	Extended I/O input 2	Integrated LED indicator lamp
Low <sup>2)</sup>	Low <sup>2)</sup>	As described in Tab. 3 on page 23
Low <sup>2)</sup>	High	● Yellow
High	Low <sup>2)</sup>	● Green
High	High	● Red

<sup>2)</sup> An open extended I/O input is interpreted as “LOW”.

## 4 Configurable functions

The C4000 Select supports several advanced functions which are configured using DIP switches. Included in these advanced functions are beam coding, extended I/O capability and floating blanking. The DIP switches used for configuration are located under the plastic cover in the system connection end cap.



**WARNING**

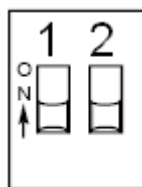
**You must ensure electrostatic discharge does not occur when handling the C4000 Select!**

Before handling the C4000 Select, you must ensure that any electrostatic charge is discharged. An electrostatic discharge that occurs on the C4000 Select may cause damage to the electronic boards.

The following figure and table describe the C4000 Select sender unit DIP switch settings:

Fig. 12: C4000 Select sender unit DIP switch

1 = Beam code 1 select  
2 = Beam code 2 select



Tab. 5: C4000 Select sender unit DIP switch settings

Beam code 1	Beam code 2	Description
OFF	OFF	No beam coding (uncoded)
ON	OFF	Beam code 1 enabled
OFF	ON	Beam code 2 enabled
ON	ON	No beam coding (uncoded)

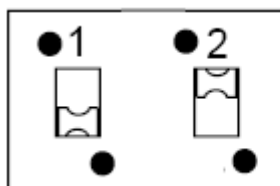
Additional information regarding beam coding can be found in section 4.2 “Beam coding” on page 28.

The following figure and table describe the C4000 Select receiver unit DIP switch settings:

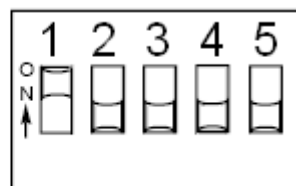
Fig. 13: C4000 Select receiver unit DIP switches

ON position

OFF position



1 = High range  
2 = Safe Extended I/O



1 = Beam code 1  
2 = Beam code 2  
3 = Floating blanking  
4 = One beam floating blanking  
5 = Two beam floating blanking

Tab. 6: C4000 Select receiver unit DIP switch settings for high range

High range select	Description
OFF	Scanning range set to low range (0...2.5 m for 14 mm resolution; 0...6 m for 30 mm resolution)
ON	Scanning range set to high range (2...8 m for 14 mm resolution; 5...19 m for 30 mm resolution)

Additional information regarding the scanning range can be found in section 4.3 “Scanning range” on page 30.



**C4000 Select**

Tab. 7: C4000 Select receiver unit DIP switch settings for Safe Extended I/O enable

Safe Extended I/O enable	Description
<b>OFF</b>	Safe Extended I/O is disabled. If the unit includes the integrated LED indicator lamp, it can be controlled by the state of the two inputs at the extended I/O connection as shown in Tab. 4 on page 23.
<b>ON</b>	Safe Extended I/O is enabled, external control of the optional integrated LED indicator lamp is not possible.

Additional information regarding the extended I/O connection can be found in section 4.1 “Extended I/O connection” on page 26.

Tab. 8: C4000 Select receiver unit DIP switch settings for beam coding

Beam code 1	Beam code 2	Description
<b>OFF</b>	<b>OFF</b>	No beam coding (uncoded)
<b>ON</b>	<b>OFF</b>	Beam code 1 enabled
<b>OFF</b>	<b>ON</b>	Beam code 2 enabled
<b>ON</b>	<b>ON</b>	No beam coding (uncoded)

Additional information regarding beam coding can be found in section 4.2 “Beam coding” on page 28.

Tab. 9: C4000 Select receiver unit DIP switch settings for floating blanking

Floating blanking enable	One beam FB select	Two beam FB select	Description
<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	Floating blanking is disabled
<b>ON</b>	<b>ON</b>	<b>OFF</b>	Floating blanking is enabled for 1 beam blanking
<b>ON</b>	<b>OFF</b>	<b>ON</b>	Floating blanking is enabled for 2 beam blanking
<b>All other configurations</b>			Invalid configuration will result in a fault condition

Additional information regarding floating blanking can be found in section 4.4 “Floating blanking” on page 31.

## 4.1 Extended I/O connection

The C4000 Select extended I/O connection allows either the connection (i.e. cascading) of additional C4000 Select devices or SICK S300/S3000 safety laser scanners with the C4000 Select or external control of the optional integrated LED indicator lamp. Refer to section 3.2.4 “Standalone devices and cascaded systems” on page 15 for additional details regarding C4000 Select cascading options and external control of the optional integrated LED indicator lamp.

When Safe Extended I/O is disabled at the C4000 Select, the inputs of the extended I/O connection do not influence the device's OSSD states. In this case, those inputs can be used to control the optional integrated LED indicator lamp:

Tab. 10: C4000 Select extended I/O input evaluation when Safe Extended I/O disabled

Safe Extended I/O DIP switch setting	Extended I/O input 1	Extended I/O input 2	C4000 Select protective field	C4000 Select receiver optional integrated LED indicator lamp (if included)
Disabled	0 <sup>3)</sup>	0	Unaligned or blocked	● Red
			Aligned and unblocked	● Green
	0	1 <sup>4)</sup>	Any	● Yellow
	1	0		● Green
	1	1		● Red



WARNING

**Only use the “Output” LED of the C4000 Select receiver (see section 3.4.2 on page 22) to determine the status of the output signal switching devices (OSSD/safety outputs). This is especially important if Safe Extended I/O is disabled by DIP switch setting and if you are using a C4000 Select featuring both an integrated LED indicator lamp and an extended I/O connection at the receiver unit.**

For this setup, the color shown by the optional LED indicator lamp is not necessarily related to the state of the OSSDs. This might lead to false assumptions about the receiver unit's current state, especially during daily functional checks of the protective device described in section 7.3.3 on page 58. This may lead to exposure of personnel to risk of the associated hazard!

<sup>3)</sup> Inactive (low or open).

<sup>4)</sup> Active (high).

## C4000 Select

Tab. 11: C4000 Select extended I/O input evaluation of the C4000 Select host device when Safe Extended I/O enabled

Safe Extended I/O DIP switch setting	Extended I/O input 1	Extended I/O input 2	C4000 Select protective field	C4000 Select safety outputs (OSSDs)
Enabled	0 <sup>5)</sup>	0	Aligned and unblocked	OFF
	0	1 <sup>6)</sup>		OFF <sup>7)</sup>
	1	0		OFF <sup>7)</sup>
	1	1		ON

When the extended I/O safe inputs are not at their expected state (e.g. both inputs should be **Active** (High) or **Inactive** (Low)), they are considered “discrepant”. The inputs must reach an equivalent value before the internal discrepancy timer expires. Failure to reach an equivalent value before the discrepancy time expires will cause a lock-out condition to occur.

Electrical-mechanical devices (e.g. emergency stop buttons or safety interlock switches) must not be connected to the extended I/O.



## WARNING

**You must ensure that the Safe Extended I/O DIP switch setting satisfies your safety application requirements!**

When cascading one or more devices with the C4000 Select, you must ensure that the Safe Extended I/O DIP switch setting(s) for extended I/O is enabled as required for your application. You must also validate that the C4000 Select and all cascaded protective devices perform in accordance with your risk assessment, risk reduction strategy as well as applicable local, regional and national regulatory requirements.

False setting of the Safe Extended I/O DIP switch may cause malfunction of the guest pair's safety function and hence expose personnel to risk of the associated hazard!

**You must ensure that protective device outputs attached to the inputs of the extended I/O connection can be read safely!**

The inputs (IN1, IN2) of an extended I/O connection enable the 24 V DC PNP-semiconductor safety outputs from a self-monitoring sensor (e.g. another C4000 Select or an S300/S3000 safety laser scanner) to be read safely. The sensor connected to the inputs of the extended I/O connection (e.g. guest C4000 Select or S3000 safety laser scanner) must ...

- be self-monitoring and detect any error conditions that may occur with its output signal switching devices (OSSDs) using test signals. The host C4000 Select filters these test signals out.
- execute a safe shutdown of the switching outputs when any error is detected.

Integrated safety mechanisms ensure detection of possible errors on safety capable inputs for:

- Internal errors on safety capable inputs which prevent the inputs from returning to the safe state. An internal error on a safety capable input is a failure of the C4000 Select electrical input circuitry.
- Discrepancy of the dual-channel input evaluation

<sup>5)</sup> Inactive (low or open).

<sup>6)</sup> Active (high).

<sup>7)</sup> Lockout, if discrepancy time is expired.

Additional measures must be made to address any external errors that cannot be monitored internally by the C4000 Select. In addition, you must exclude any external errors that could occur due to selected user configuration parameters.

Connecting inappropriate or incompatible device outputs or devices (like electrical-mechanical devices) to the extended I/O connection inputs may lead to an undetected error condition of those device's outputs or the wiring causing failure of the safety function and hence exposing personnel to risk of the associated hazard!

## 4.2 Beam coding

If several safety light curtains operate in close proximity to each other, the sender beams of one pair may optically interfere or even align itself with the receiver of another pair. With code 1 or 2 activated, the receiver can distinguish the beams designated for it from other beams. The following settings are available: non-coded, code 1 and code 2.

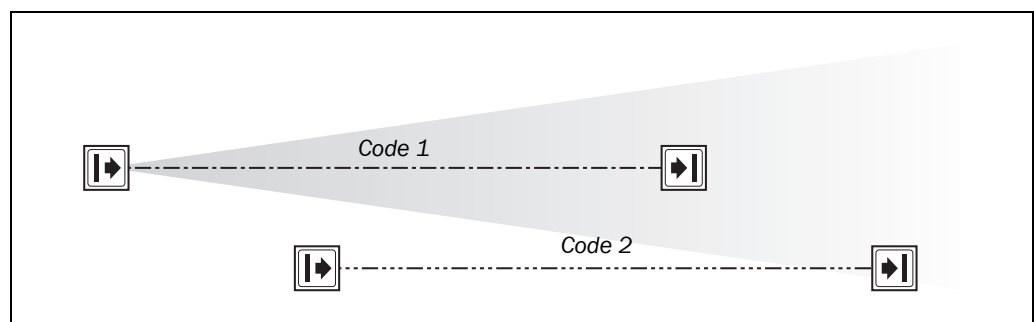


WARNING

### Use different beam codings if the pairs are mounted in close proximity!

Pairs mounted in close proximity to each other must be operated with different beam codings (code 1 or code 2). If this precaution is neglected, the pair may be impaired in its protective function by the beams from the neighboring pair and so change to the unsafe state. This would mean that the operator is at risk.

Fig. 14: Schematic layout of the beam coding



### Notes

- Beam coding increases the availability of the protected machine. Beam coding also enhances the resistance to optical interference such as weld sparks.
- Using different beam coding settings will allow one C4000 series sender/receiver pair to be mounted in close proximity to another C4000 series sender/receiver pair without optical interference.
- Beam coding will increase the response time of the system. This will also change the required safety distance. Instructions can be found in chapter 5.1 "Determining the minimum safety distance" on page 33.
- In order for the C4000 Select system to operate, both the sender and corresponding receiver of each C4000 Select pair must have the same beam code configuration.
- After activating the pair, the C4000 Select receiver will briefly display the coding.

Tab. 12: C4000 Select 7-segment display on power-up for beam coding

7-segment display	Description
	No beam coding
	Beam code 1 active
	Beam code 2 active

To prevent the possibility of optical interference between different C4000 Select pairs that have been configured with the same beam codes (e.g. no coding, beam code 1 or beam code 2), a minimum distance between the two pairs must be implemented. The following

## C4000 Select

figure provides information regarding the minimum distance “a” that must separate the two C4000 Select pairs based on the distance D between the sender of pair 1 and the receiver of pair 2.

Fig. 15: Minimum distance between C4000 Select pairs for systems with the same beam code configuration

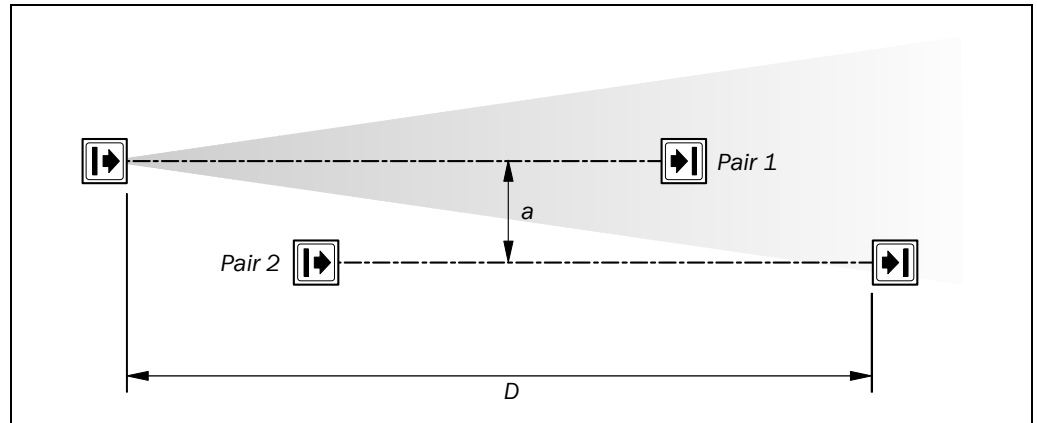
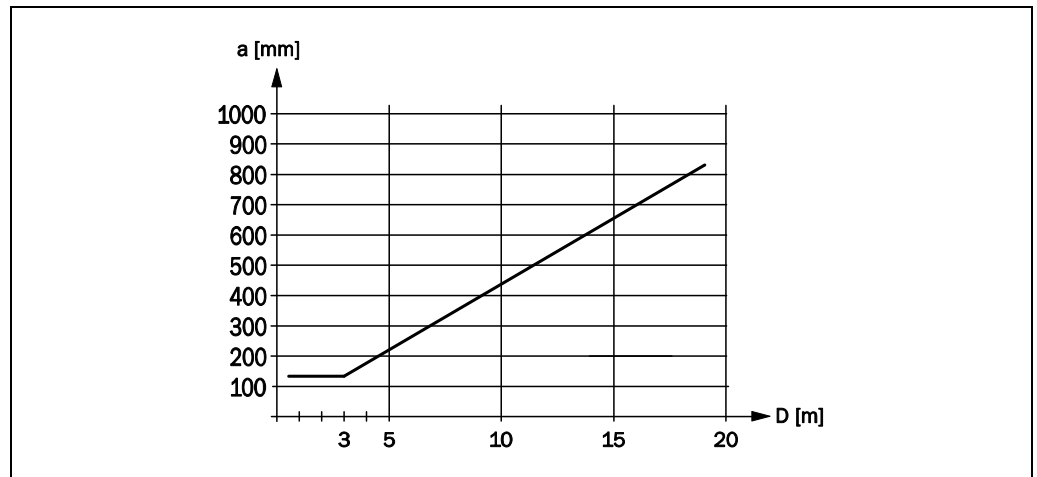


Fig. 16: Minimum distance between C4000 Select pairs based on the same beam coding configuration



Refer to chapter 4 “Configurable functions” on page 24 for additional details on DIP switch setting requirements for beam coding.

### 4.3 Scanning range

Scanning range defines the strength of the C4000 Select protective field beams in order to allow for longer distances between the C4000 Select sender and receiver devices.



WARNING

#### Match the scanning range with the protective field width!

The scanning range of the system (host, guest 1 and guest 2) must be adapted to the protective field width. If the scanning range is set to high range and the light curtains are mounted below the minimum scanning range value, the safety light curtain may not reliably detect objects within the protective field. This would mean that the operator is at risk.

Tab. 13: Typical scanning ranges

Physical resolution	Selectable scanning ranges
14 mm	0...2.5 m (low range) 2...8 m (high range)
30 mm	0...6 m (low range) 5...19 m (high range)

Tab. 14: C4000 Select 7-segment display on power-up for scanning range

7-segment display	Description
No symbol	Low range selected
	High range selected

#### Notes

- If the scanning range is set too low, the safety light curtain may not switch to green.
- Tab. 13 shows the guaranteed scanning ranges for the system.
- Deflector mirrors are available as accessories (see page 93). When used, deflector mirrors will reduce the effective scanning range based on the number used (see Tab. 15). When using deflector mirrors, you **must** configure the safety light curtain for high scanning range.



WARNING

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

The formation of droplets or heavy contamination can be detrimental to the reflection behavior. 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. 15: Scanning range when using 1 or 2 deflector mirrors

Deflector mirror	14 mm resolution		30 mm resolution	
	Minimum	Typical	Minimum	Typical
1 × PNS75	6.6 m	7 m	8 m	13 m
2 × PNS75	6.3 m	7 m	8 m	12 m
1 × PNS125	7.1 m	9 m	17 m	18.5 m
2 × PNS125	6.3 m	8 m	15.2 m	16.8 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 local SICK representative.

Refer to chapter 4 “Configurable functions” on page 24 for additional details on DIP switch setting requirements for scanning range.

## 4.4 Floating blanking

Floating blanking functionality permits the C4000 Select safety outputs (OSSDs) to remain in an active (high) state (e.g. green state) when an object of limited, fixed size is moving in the protective field of the C4000 Select. The C4000 Select supports one- or two-beam floating blanking. It is not required that an object be present for the outputs to be active (high) and only one floating blanking field may exist in a single C4000 Select.

When one-beam floating blanking has been enabled, one beam may be blocked in the protective field of the C4000 Select without causing a stop condition to occur. When two-beam floating blanking is enabled, two contiguous beams may be blocked in the protective field of the C4000 Select without causing a stop condition to occur. When an object that is larger than the floating blanking configuration of the C4000 Select, or when more than one object has been detected in the protective field of the C4000 Select, an immediate stop condition will occur.

The first beam, normally used for synchronization, may be blanked. An algorithm is integrated into the floating blanking function to allow sparks or other small objects to transit through the protective field without causing a stop condition to occur.

Configuration of floating blanking is accomplished by using three of the DIP switch positions. A single switch enables or disables floating blanking, while the other two switches enable either one- or two-beam floating blanking. All three DIP switches must be in the off position in order for floating blanking to be turned off. Refer to chapter 4 “Configurable functions” on page 24 for additional details on DIP switch setting requirements for floating blanking.

When the C4000 Select is used with one or two additional C4000 Select devices via connection to the extended I/O connection, floating blanking may be independently configured on any or all of the devices.

A **● Yellow** “Blanking” LED on the C4000 Select receiver indicates when floating blanking is active.

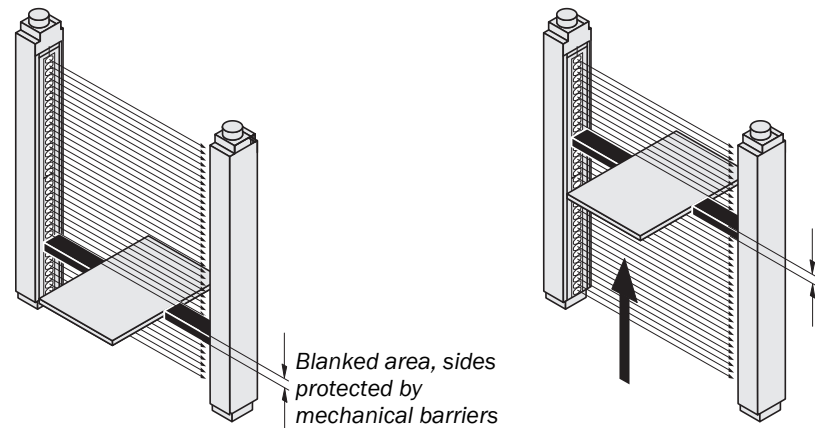


WARNING

Fig. 17: Example of mechanical protection of floating blanking

### Blanked areas require a separate risk assessment!

A blanked area is in principle a hole in the protective field. Check in detail whether and where blanking is actually required. You must protect the blanked area in another way, e.g. mechanically. Otherwise, you must take the blanked area into consideration in the calculation of the safety distance and mount the safety light curtain appropriately.



- After modifying the blanking, check the protective field with the test rod. Instructions can be found in chapter 7.3.3 on page 58.
- Floating blanking is not suitable for all applications. Please consult the relevant safety standards and regulations that apply to your application. Improper use of floating blanking can lead to an unsafe condition exposing personnel to risk of the associated hazard!

When floating blanking has been implemented with a C4000 Select device, **a hole is produced in the protective field**. With the aid of Tab. 16 you can determine the effective resolution of the safety light curtain at this point and the corresponding minimum object size that ensures that the C4000 Select safety outputs switch to inactive (low) (i.e. red state).

Tab. 16: Effective resolution for C4000 Select with floating blanking

Physical resolution	Size of the blanked area	Blanked beams (= reduction)	Effective resolution/size of the hole
<b>14 mm</b>	7.5 mm	1 beam	<b>22 mm</b>
	15 mm	2 beams	<b>30 mm</b>
<b>30 mm</b>	20 mm	1 beam	<b>50 mm</b>
	40 mm	2 beams	<b>70 mm</b>

- Mark the effective resolution on the information label "Warning: During operation with Floating blanking ..." on the related sender and receiver.

Fig. 18: Marking the effective resolution on the device label

<b>Warning:</b> During operation with "Floating blanking" the safety distance that corresponds to the modified effective resolution is to be observed.		
Mark the effective resolution	Physical resolution	
	14 mm	30 mm
Reduction	Effective resolution/ minimum object size	
No blanking	14 mm <input type="checkbox"/>	30 mm <input type="checkbox"/>
Floating blanking - 1 beam	22 mm <input type="checkbox"/>	50 mm <input type="checkbox"/>
Floating blanking - 2 beams	30 mm <input type="checkbox"/>	70 mm <input type="checkbox"/>



## 5 Installation and mounting

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

- determining the necessary safety distance
- mounting with swivel mount or side bracket, rigid or pivoting mounting bracket

The following steps are necessary after mounting and installation:

- completing the electrical connections (chapter 6 “Electrical installation” on page 50)
- aligning sender and receiver (chapter 7.2 “Aligning sender and receiver” on page 57)
- testing the installation (chapter 7.3.1 “Tests before the first commissioning” on page 58)

### 5.1 Determining the minimum safety distance

The C4000 Select must be mounted with an adequate safety distance:

- to the hazard or hazardous area
- from reflective surfaces



WARNING

---

#### No protective function without sufficient safety distance!

- You must mount the C4000 Select with the correct safety distance to the hazardous area. Otherwise the safe protection of the C4000 Select system is not provided and hence operating personnel might be exposed to risk of the associated hazard.

#### Risk of failure to detect!

- Persons who are in the hazardous area but not in the light path between sender and receiver are not detected by the C4000 Select system. It is therefore to be ensured that the hazardous area is fully visible and any dangerous state can only be initiated if there are no personnel in the hazardous area.

---

**Note** The applicable legal and official regulations apply to the use and mounting of the C4000 Select safety light curtain and any associated protective devices. These regulations vary depending on the application.

### 5.1.1 Minimum safety distance to the hazardous area

A minimum safety distance must be maintained between the safety light curtain and the hazardous area. This ensures that the hazardous area can only be reached when the dangerous state of the machine is completely at an end.



WARNING

---

**You must ensure that the minimum safety distance requirements are implemented correctly!**

The minimum safety distance is calculated to ensure that personnel cannot reach a hazardous condition before the hazard ceases to exist. You must ensure that the implementation of the safety system(s) (e.g. the protective device, safety interface and associated actuator(s)) adheres to the requirements of applicable local, regional and national standards and regulations. Consult applicable standards and regulations for additional requirements that may pertain to your application.

You must also take preventive measures to ensure that personnel cannot reach over, under, around or through the protective device undetected. Personnel must be detected by the safety light curtain when approaching the hazard. Improper installation can lead to an unsafe condition exposing personnel to risk of the associated hazard!

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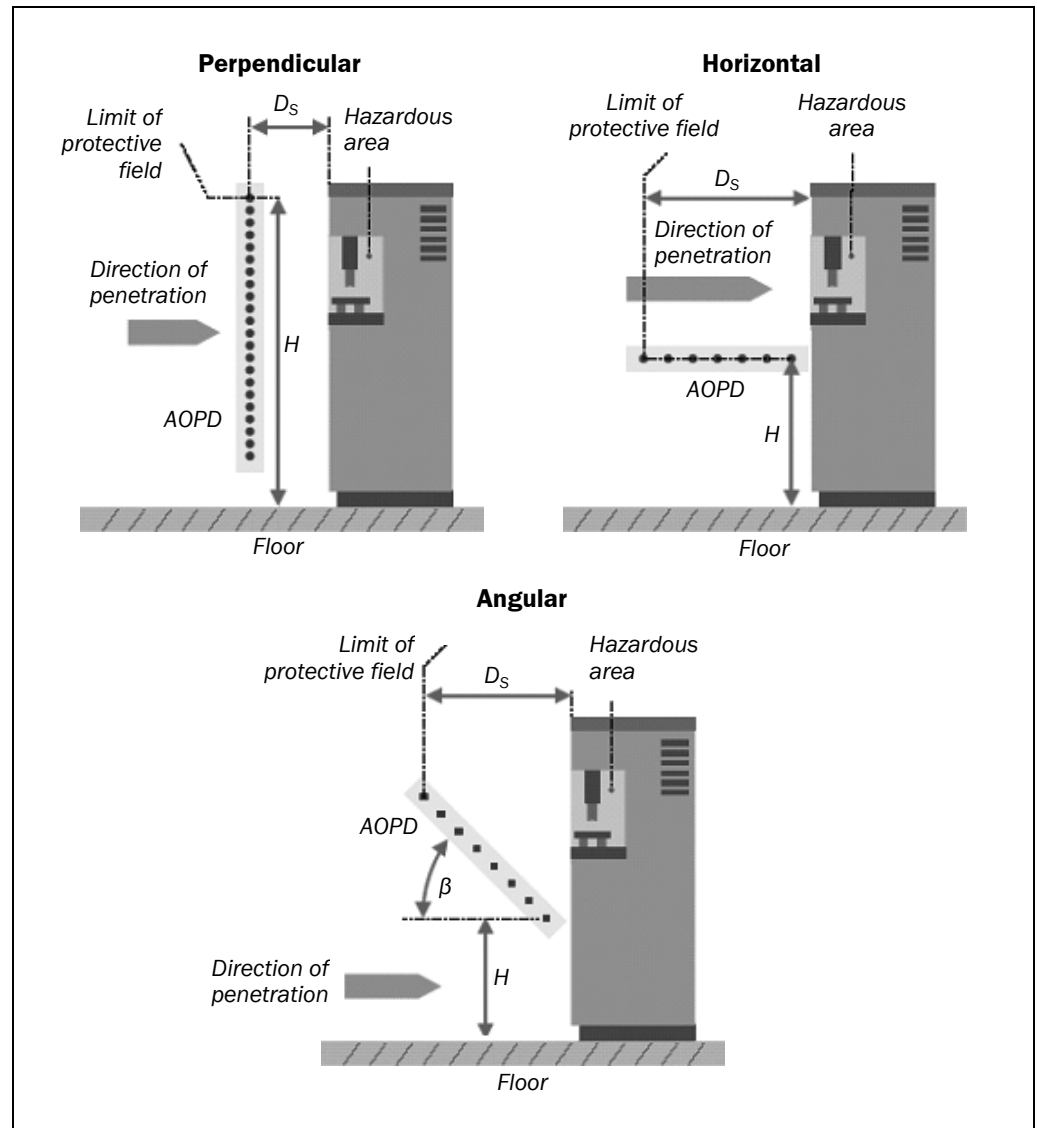
The minimum safety distance is defined by several parameters, including:

- stopping/run-down time of the machine or system  
(the stopping/run-down time is shown in the machine documentation or must be measured under worst case conditions.)
- response time of the protective device (see chapter 11.2 “Response time” on page 71)
- reach or approach speed
- resolution of the safety light curtain
- other parameters that are stipulated by applicable standards and regulations

### 5.1.2 Hazard approach

The minimum safety distance changes based on the implementation of the protective device. Most applications use a perpendicular (e.g. vertical as shown below) mounting of a safety light curtain. However, it may be necessary to install the safety light curtain in a horizontal or angular orientation. The following figure provides examples of perpendicular (vertical), horizontal and angular implementations of a safety light curtain.

Fig. 19: Installation approach considerations for minimum safety distance calculation



### 5.1.3 Minimum safety distance according to ANSI/CSA standards and OSHA regulations

The following table summarizes typical calculations of the minimum safety distance.

Tab. 17: Minimum safety distance formula summary per ANSI/CSA standards

Approach	Minimum safety distance calculation based on 30 mm object detection (resolution)
Perpendicular $\beta = 90^\circ (\pm 5^\circ)$	$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$ Where $D_{pf}$ is 3.08 inches (78.2 mm)
Horizontal $\beta = 0^\circ (\pm 5^\circ)$	$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$ Where $D_{pf}$ is 48 inches (1.21 m)
Angular $5^\circ \leq \beta \leq 85^\circ$	For $\beta \geq 30^\circ$ , use the perpendicular approach. For $\beta \leq 30^\circ$ , use the horizontal approach. The minimum safety distance requirement is based on the beam that is located the closest to the hazard.

This table presents summary information only and additional requirements may apply for your application. Consult the relevant standards and regulations for additional requirements related to the minimum safety distance calculation.

The following example shows the calculation of the minimum safety distance based on ANSI B11.19, CAN/CSA Z434 and OSHA 29 CFR 1910.217 for a perpendicular (e.g. vertical) installation of a safety light curtain. Depending on the application and the ambient conditions, a different calculation may be necessary.

➤ First, 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 safety distance in inches (or mm) from the hazardous point to the protective device

$H_s$  = A parameter in inches/second or mm/second, derived from data on approach speeds of the body or parts of the body.  
Often 63 inches/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

$D_{pf}$  = Depth of penetration factor. An additional distance added to the overall safety distance required. The value is based on the intrusion toward the hazardous point prior to detection by the safety light curtain. The  $D_{pf}$  for a perpendicular (vertical) safety light curtain with 30 mm (1.18 in) object sensitivity (resolution) can be approximated based on the following formula from ANSI/RIA R15.06:

$$\begin{aligned} D_{pf} (\text{inches}) &= 3.4 \times (\text{object sensitivity} - 0.276), \text{ but not less than } 0. \\ &= 3.4 \times (1.18 - 0.276) = 3.08 \text{ in} \end{aligned}$$

**Note** Any additional response times that apply to your application must be accounted for in this calculation.

**C4000 Select****Example**

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

Response time after light path interruption = 30 ms

Resolution of the light curtain = 30 mm

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

$$\begin{aligned} D_s &= (H_s \times T_{\text{total}}) + D_{pf} \\ &= (63 \text{ in/s} \times 0.32 \text{ s}) + 3.08 \text{ in} \\ &= 23.25 \text{ in (591 mm)} \end{aligned}$$

### 5.1.4 Minimum safety distance according to EN ISO 13 855 and EN ISO 13 857

The following table summarizes typical calculations of the minimum safety distance.

Tab. 18: Minimum safety distance formula summary per EN ISO 13 855 and EN ISO 13 857 when no floating blanking is implemented

Approach	Minimum safety distance calculation based on 30 mm object detection (resolution) (mm)
Perpendicular $\beta = 90^\circ (\pm 5^\circ)$	$D_s = 2000 \times T + 128$ If $D_s > 500$ mm, using the formula above, then recalculate using: $D_s = 1600 \times T + 128$ The result of this second calculation cannot be less than 500 mm
Horizontal $\beta = 0^\circ (\pm 5^\circ)$	$D_s = 1600 \times T + (1200 - 0.4 \times H)$ Where H is the mounting height and $(1200 - 0.4 \times H)$ must be greater than 850 mm
Angular $5^\circ \leq \beta \leq 85^\circ$	For $\beta \geq 30^\circ$ , use the perpendicular approach. For $\beta \leq 30^\circ$ , use the horizontal approach. $D_s$ applies to the furthest beam whose height is $\leq 1000$ mm

This table presents summary information only and additional requirements may apply for your application. Consult the relevant standards and regulations for additional requirements related to the minimum safety distance calculation.

The following calculation shows an example calculation of the safety distance for a perpendicular (e.g. vertical) installation of a safety light curtain based on EN ISO 13 855 and EN ISO 13 857.

➤ First, calculate  $D_s$  using the following formula:

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

Where ...

$$D_s = \text{Safety distance [mm]}^{8)}$$

$T$  = 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] i.e. 30 mm

The reach/approach speed is already included in the formula

➤ If the result  $D_s$  is  $\leq 500$  mm, then use the determined value as the safety distance

➤ If the result  $D_s$  is  $> 500$  mm, then recalculate  $D_s$  as follows:

$$D_s = 1600 \times T + 8 \times (d - 14) \text{ [mm]}$$

➤ If the new value  $D_s$  is  $> 500$  mm, then use the newly determined value as the minimum safety distance

➤ If the new value  $D_s$  is  $\leq 500$  mm, then use 500 mm as the 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 = 30 mm

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

$$D_s = 2000 \times 0.32 + 8 \times (30 - 14) = 768 \text{ mm}$$

$D_s > 500$  mm, therefore:

$$D_s = 1600 \times 0.32 + 8 \times (30 - 14) = \underline{640 \text{ mm (25.2 inches)}}$$

<sup>8)</sup>  $D_s$  is referenced as "S" in EN ISO 13 855 and EN ISO 13 857.

## 5.1.5 Minimum distance to reflective surfaces



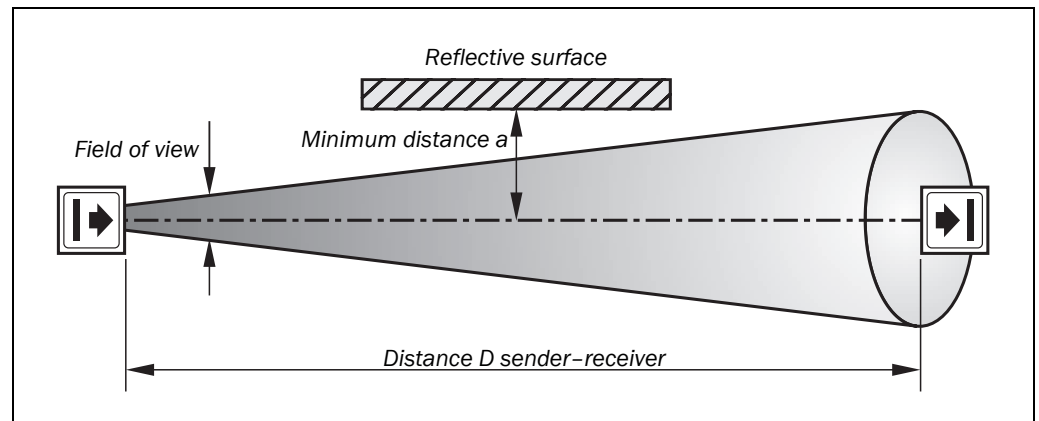
WARNING

### Maintain the minimum distance from reflective surfaces!

The light beams from the sender may be deflected by reflective surfaces. This can result in failure to identify personnel infringing on the protective device causing an operator to be at risk. Ensure that your application adheres to the required minimum distance to reflective surfaces.

All reflective surfaces and objects (e.g. material bins) must be a minimum distance  $a$  from the light path between sender and receiver. The minimum distance  $a$  depends on the distance  $D$  between sender and receiver.

Fig. 20: Minimum distance to reflective surfaces

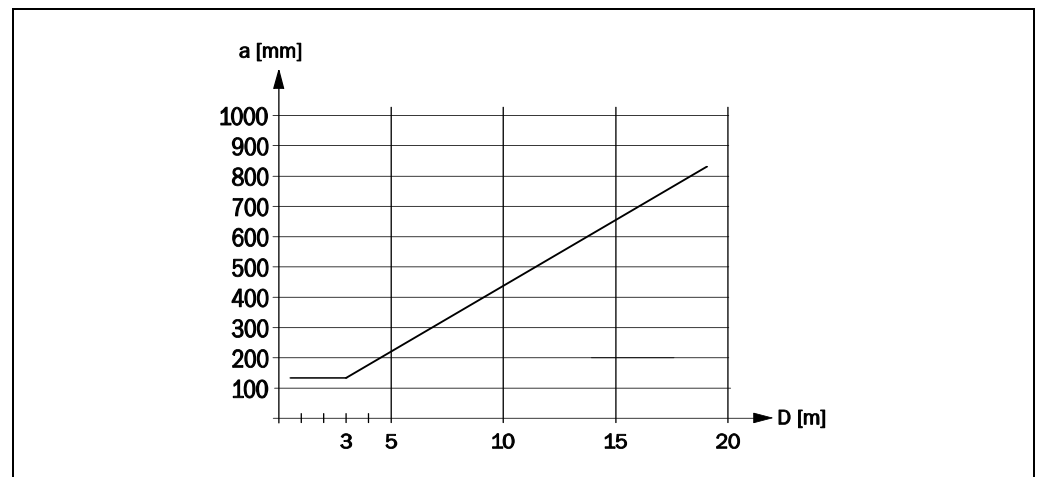


**Note** The field of view of the sender and receiver optics is identical.

### How to determine the minimum distance from reflective surfaces:

- Determine the distance  $D$  [m] sender–receiver.
- The minimum distance to the reflective surface  $a$  [mm] is shown in the diagram below or may be calculated using the formula shown in Tab. 19.

Fig. 21: Graph, minimum distance from reflective surfaces



Tab. 19: Formula for the calculation of the minimum distance to reflective surfaces

Distance $D$ [m] sender–receiver	Calculation of the minimum distance $a$ from reflective surfaces
$D \leq 3$ m	$a$ [mm] = 131
$D > 3$ m	$a$ [mm] = $\tan(2.5^\circ) \times 1000 \times D$ [m] = $43.66 \times D$ [m] <sup>9)</sup>

<sup>9)</sup> For 30 mm resolution, the maximum value used for  $D$  is 6 m for low scanning range and 19 m for high scanning range. For 14 mm resolution, the maximum value used for  $D$  is 2.5 m for low scanning range and 8 m for high scanning range.

## 5.2 Steps for mounting the device

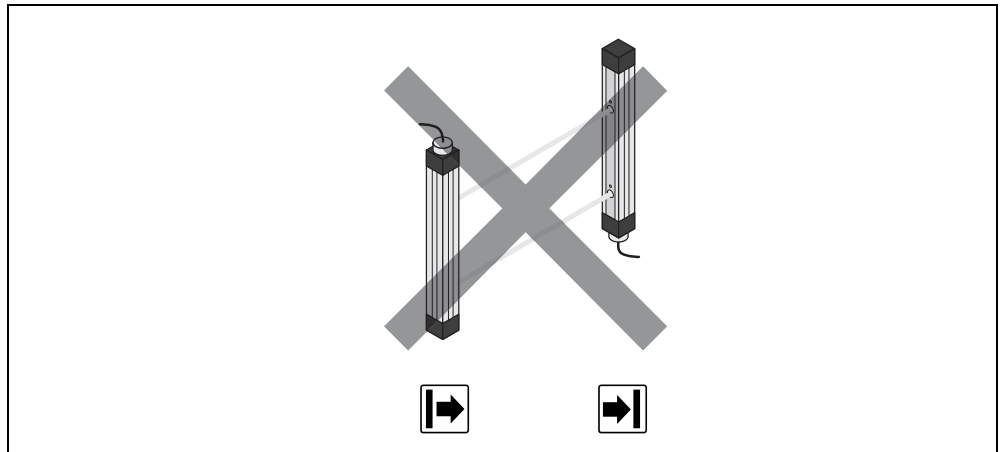


WARNING

### Special features to note during mounting:

- Always mount the sender and receiver parallel to one another. If the units are not parallel, a valid rectangular protective field will not be created. In this case the safety function may not work properly exposing personnel to risk of the associated hazard.
- During mounting, ensure that sender and receiver are aligned correctly. The optical systems of sender and receiver must be located exactly opposite to each other; the status indicators must be mounted at the same height. The system connections of both devices must point in the same direction. Otherwise, a valid rectangular protective field will not be created. In this case the safety function will not work properly exposing personnel to risk of the associated hazard.

Fig. 22: Sender and receiver must not be rotated 180° with respect to each other



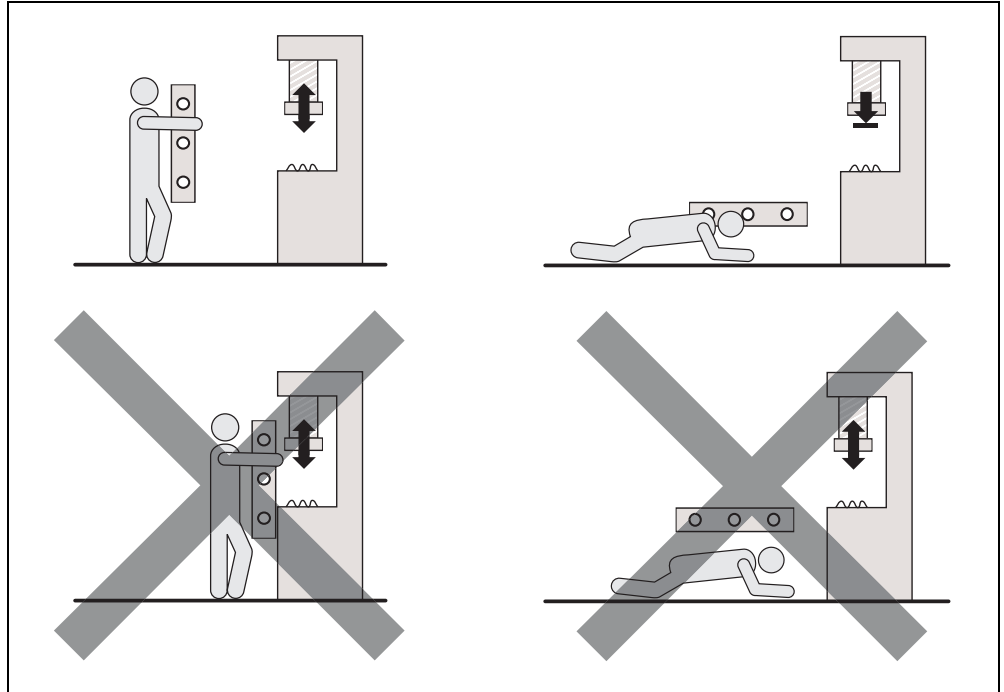
- Observe the safety distance of the system during mounting. Please refer to section 5.1 “Determining the minimum safety distance” on page 33. Insufficient safety distance may enable personnel to reach the hazardous point before the machine is in a safe state. In this case personnel may be exposed to risk of the associated hazard.



**C4000 Select**

- Mount the safety light curtain such that the risk of failure to detect is excluded. Ensure that the protective device cannot be bypassed by crawling underneath, reaching over, climbing between 2 beams, jumping over or moving the safety light curtain. Incorrect mounting of the C4000 Select may enable personnel to reach the hazardous point before the machine is in a safe state. In this case personnel may be exposed to risk of the associated hazard.

Fig. 23: The correct installation (above) must eliminate the errors (below) of reaching through and crawling beneath



- Once the system is mounted, one or several of the enclosed self-adhesive information labels must be affixed:
  - Use only information labels in the language which the users and operators of the machine understand.
  - Affix the information labels such that they are easily visible by the users and operators during operation. After attaching additional objects and equipment, the information labels must not be concealed from view.
  - Operation with floating blanking: Affix the information label for floating blanking to each receiver so configured. Mark the effective resolution on the information label.
  - Affix the information label “Important Notices” to the system in close proximity to sender and receiver.

Following these labeling instructions provides important information to the local personnel. Failure to follow these instructions can expose personnel to risk of the associated hazard!

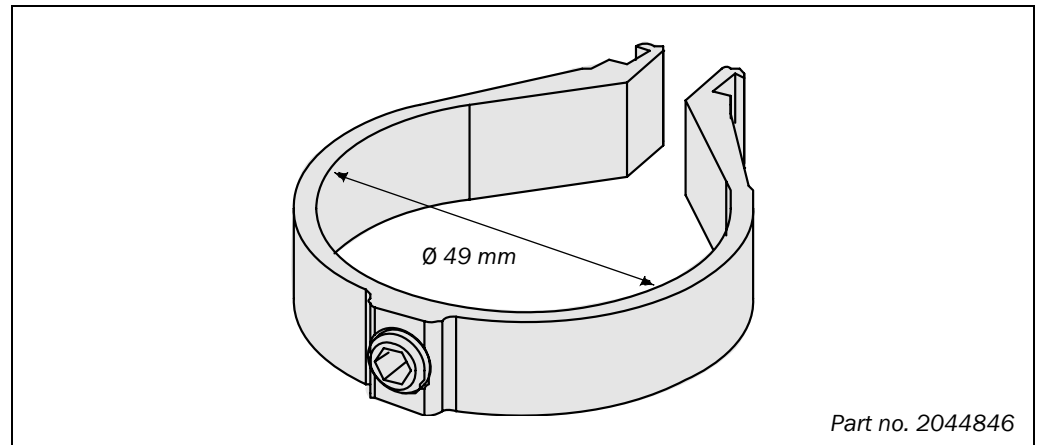
- When mounting a C4000 Select with integrated laser alignment aid, ensure that the laser warning labels on the device remain visible. If the laser warning labels are covered, e.g. on installation of the C4000 Select in a device column (accessory), you must apply a laser warning label in an appropriate location in close proximity to the sender unit in order to alert personnel in the area of the potential danger. Refer to section 5.3 “Laser alignment” on page 48 for details on the risk caused by the integrated laser.

Sender and receiver can be mounted in five different ways:

- mounting with omega bracket
- mounting with swivel mount bracket
- mounting with side bracket
- mounting with rigid mounting bracket
- mounting with pivoting mounting bracket

### 5.2.1 Mounting with omega bracket

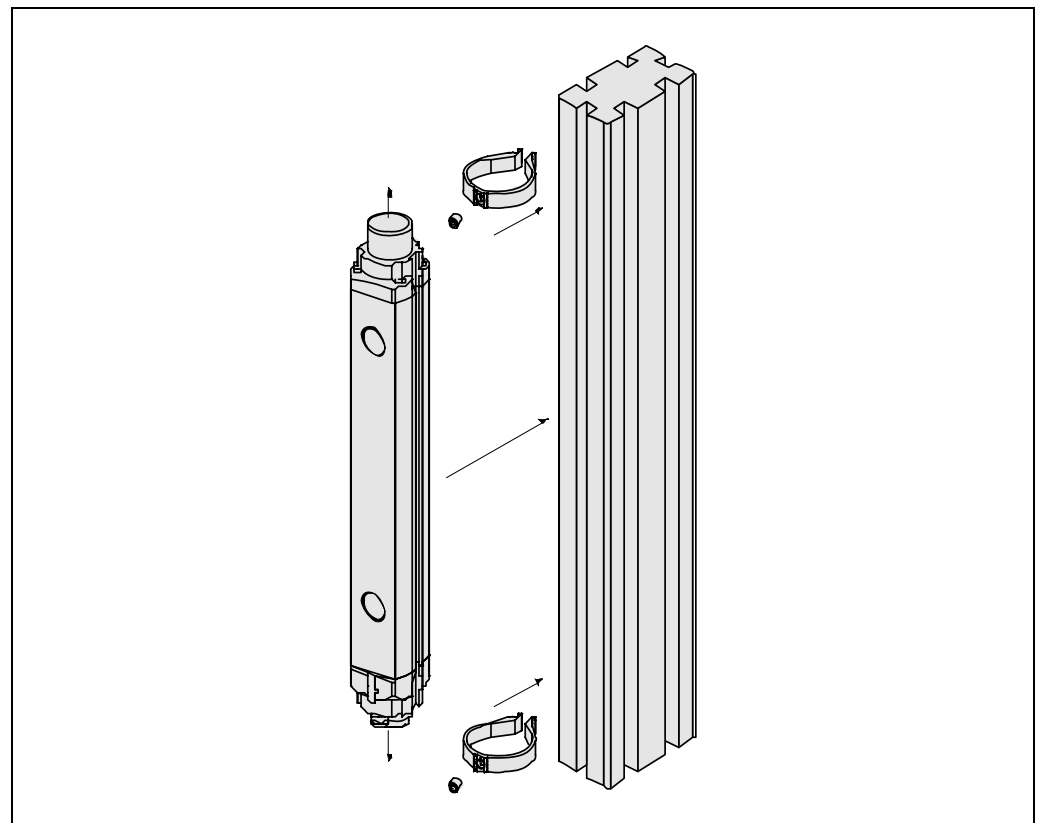
Fig. 24: Omega bracket



The omega bracket is made of aluminum. The bracket is designed such that sender and receiver can still be accurately aligned even after the bracket has been mounted.

**Note** Attach the screws of the omega bracket with a torque of between 2 and 2.5 Nm. Higher torques can damage the bracket; lower torques provide inadequate protection against vibration.

Fig. 25: Mounting the C4000 Select with omega bracket



**C4000 Select**

- Note** ➤ Click the omega bracket into your profile grooves. Additional spacers help to adjust the bracket correctly in the groove. The safety light curtain can be mounted by one screw only and can also be adjusted later.

**5.2.2 Mounting with swivel mount bracket**

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

- Note** Attach the screws 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. 26: Composition of the swivel mount bracket

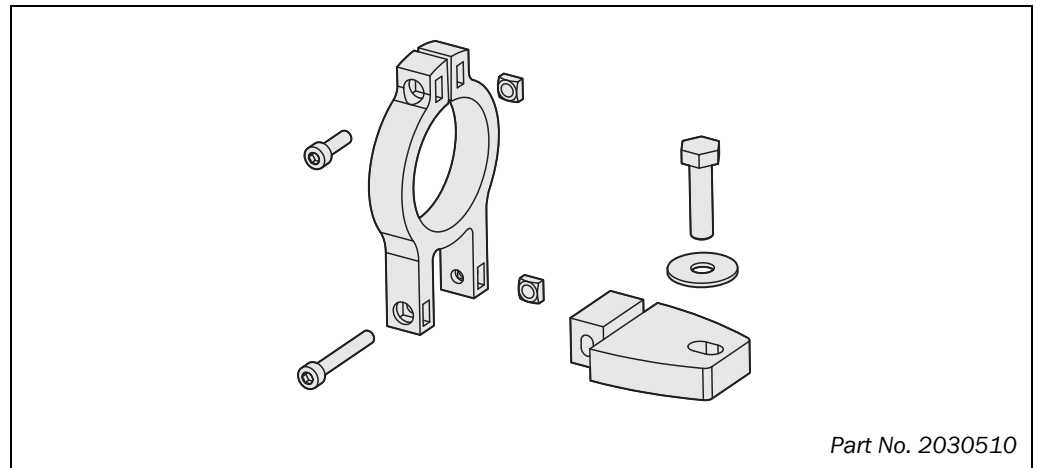
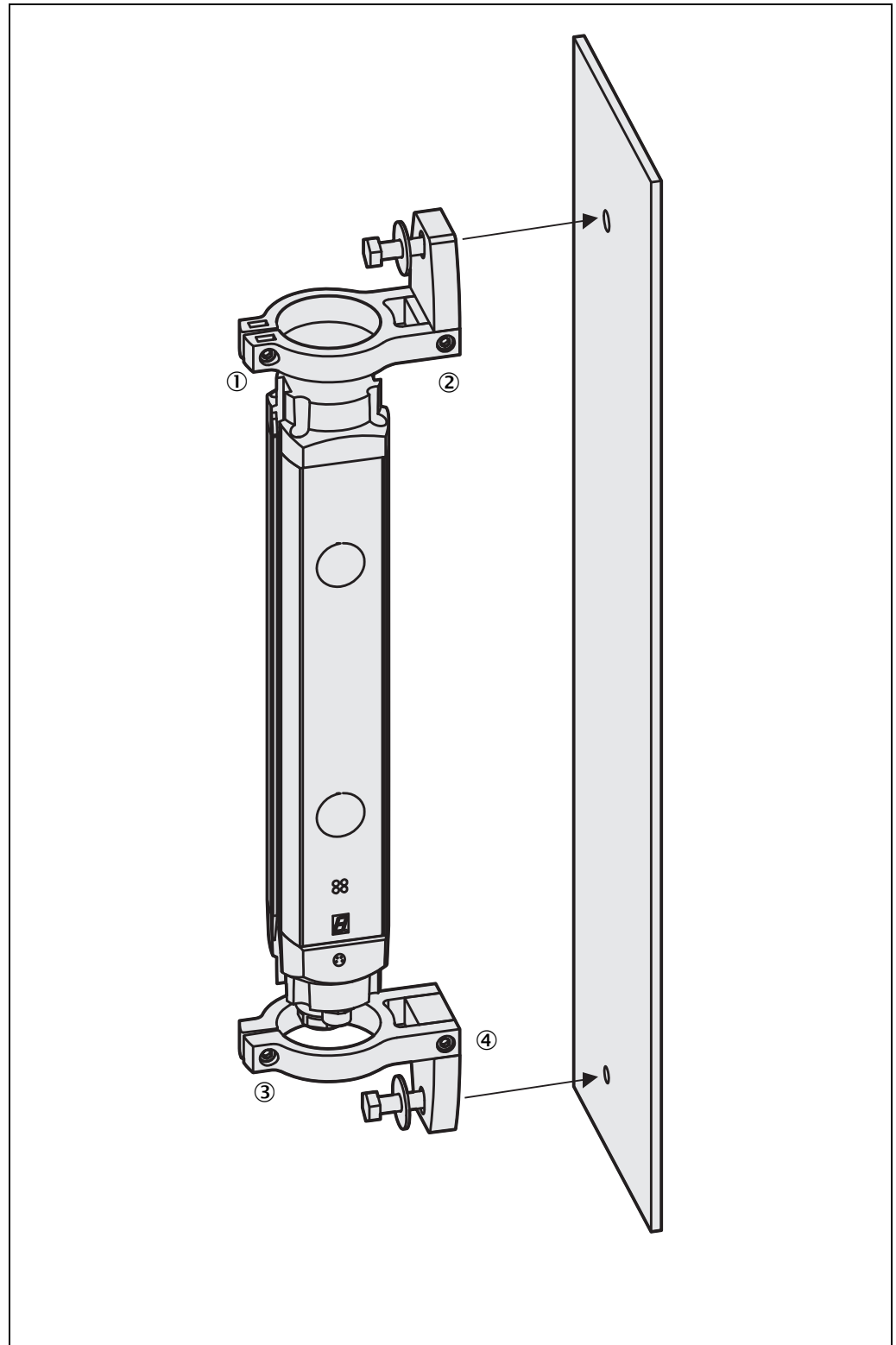


Fig. 27: Mounting the C4000 Select with swivel mount bracket

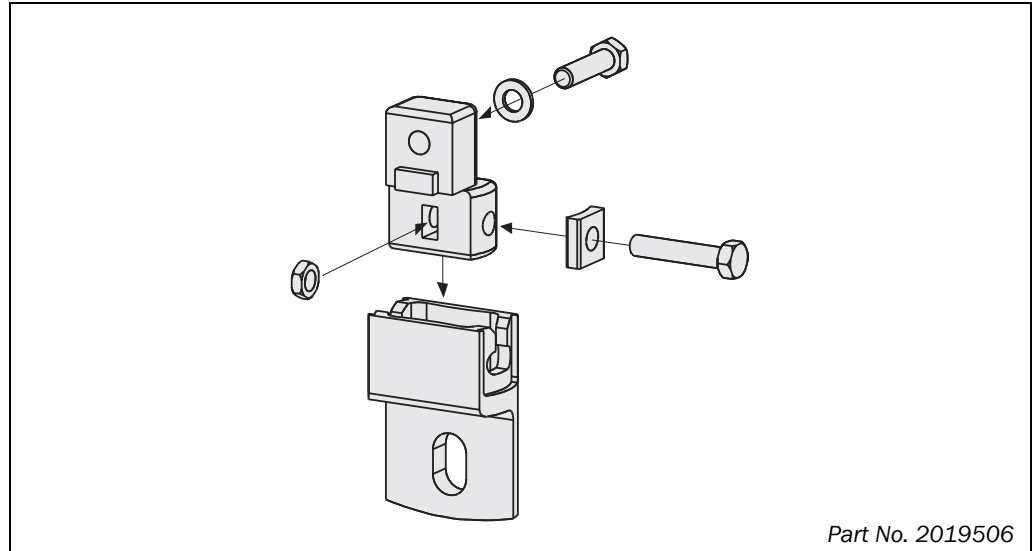


- Notes**
- Mount the bolts marked with ① to ④ on the operator side of the system to ensure that they remain accessible after mounting. The safety light curtain can then also be adjusted later.
  - The mounting nuts and bolts are not included in the delivery.

**C4000 Select****5.2.3 Mounting with side bracket**

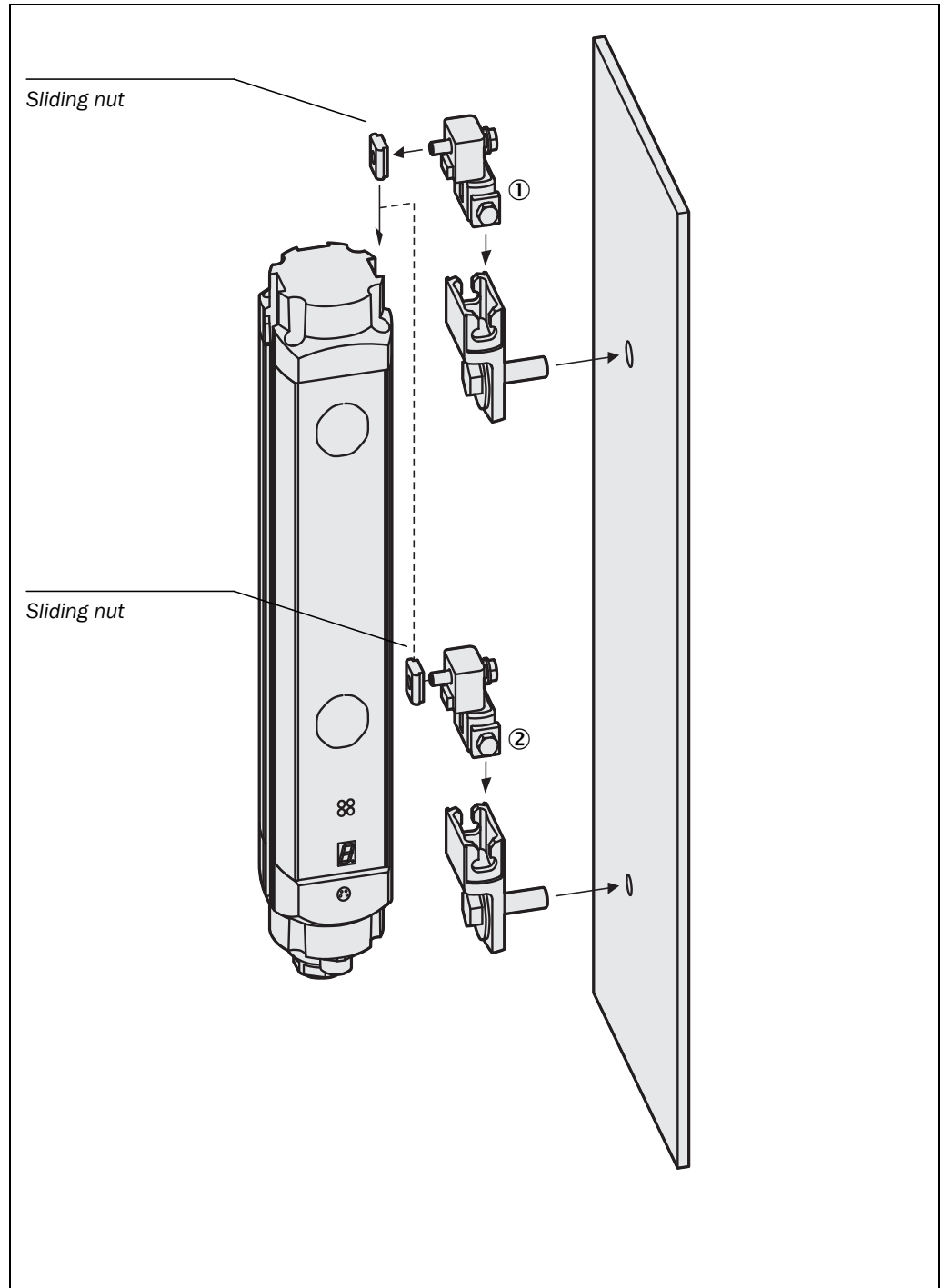
The side bracket is made of die cast zinc ZP 0400. It is enamelled in black. The side bracket will be covered by the device after mounting. It provides adjustment so that the vertical alignment of sender and receiver can be corrected by  $\pm 2.5^\circ$  after mounting.

Fig. 28: Composition of the side bracket

**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.

Fig. 29: Mounting the C4000 Select with side bracket



- Notes**
- When mounting the side bracket ensure that the bolts marked ① and ② remain accessible, allowing you later to adjust and lock the safety light curtain in position.
  - The mounting nuts and bolts are not included in the delivery.

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## 5.2.4 Mounting with rigid mounting bracket

The rigid mounting bracket is a black, powder-coated bracket without adjustment. It is only suitable for mounting surfaces on which it is not necessary to compensate for large mechanical tolerances. The alignment of the sender and receiver can be corrected after mounting using only the slots.

Fig. 30: Rigid mounting bracket

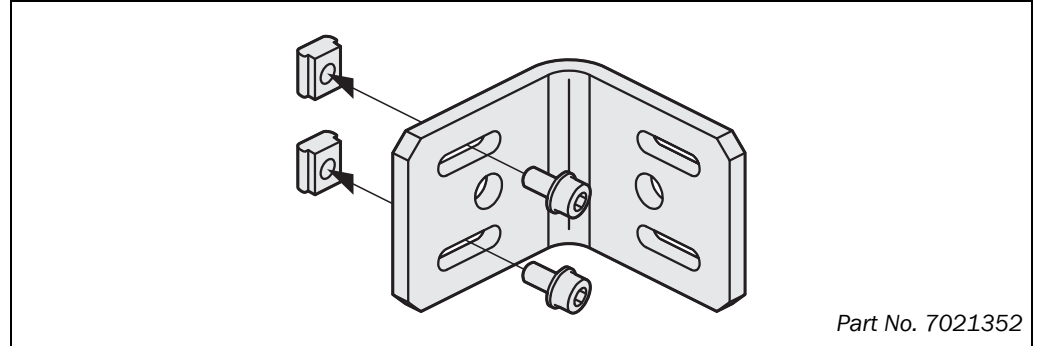
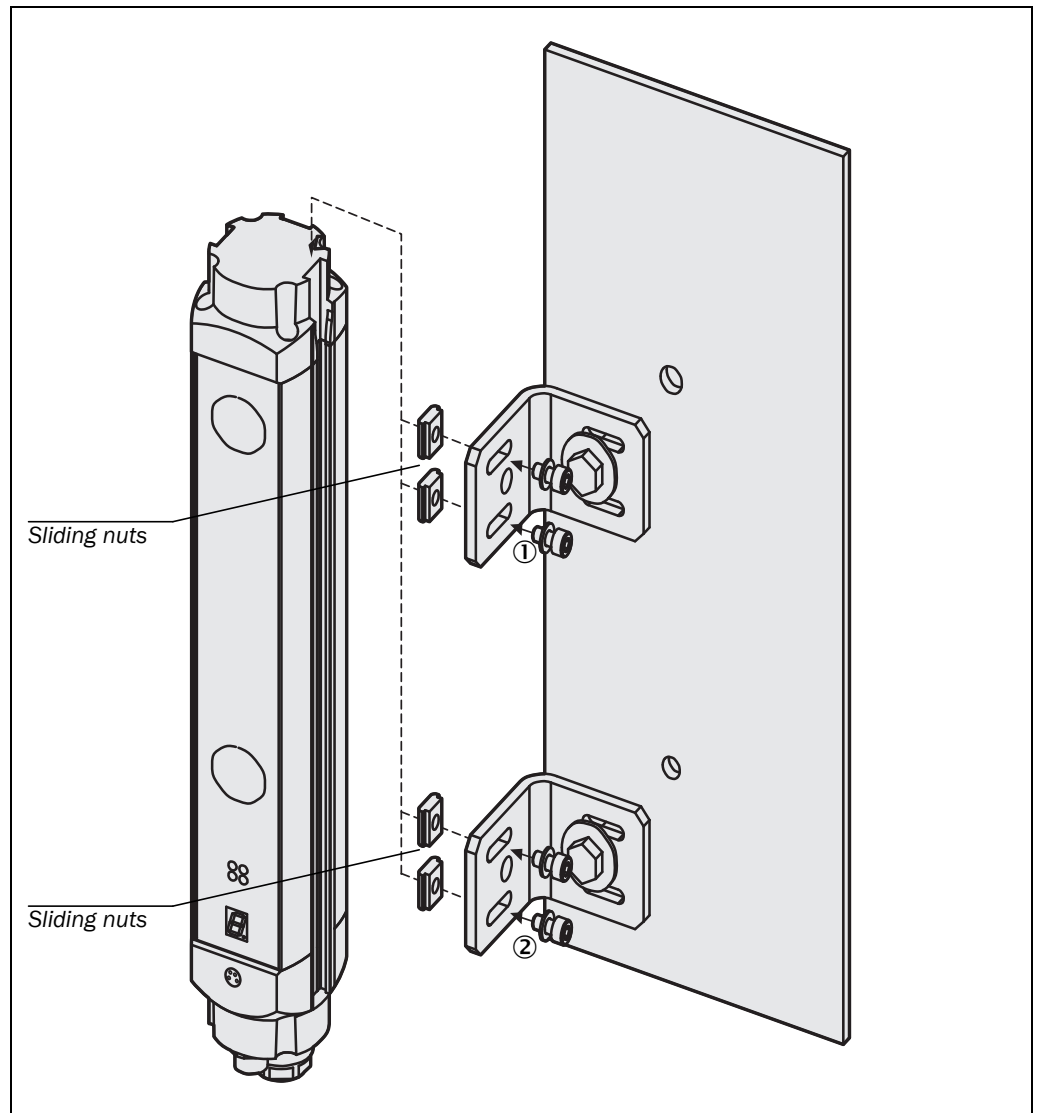


Fig. 31: Mounting the C4000 Select with rigid mounting bracket



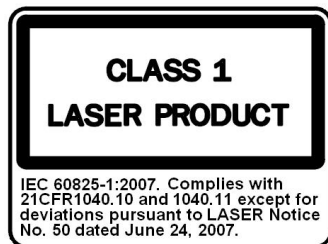
- Notes**
- When mounting the rigid mounting bracket ensure that the four bolts marked ① and ② remain accessible, allowing you later to adjust and lock the safety light curtain in position.
  - The mounting nuts and bolts are not included in the delivery.

### 5.3 Laser alignment

The C4000 Select provides an internal, collimated, visible class 1 laser to assist you with the alignment of C4000 Select sender and receiver units. The laser used for aligning the sender to receiver is located in the C4000 Select sender unit. Further adjustments should be performed at the C4000 Select receiver unit until the system is properly aligned.

To activate the laser, locate the button near the DIP switches in the C4000 Select sender unit. Press the button for more than 0.25 seconds. Once pressed and released, the laser will be illuminated for four (4) minutes. If the button is pressed again, it will shut the laser off.

The signal indicator on the C4000 Select receiver unit indicates the current state of alignment between it and the corresponding sender unit. There are five (5) LEDs that are related to this function. When the first LED is yellow, the synchronization beam of the sender and receiver has been detected. As the percentage of beams increases, the number of yellow LEDs that are illuminated also increase. When all five LEDs are illuminated yellow, the sender and receiver units are aligned, but there is a weak signal. When all five LEDs are illuminated green, the sender and receiver units are aligned with adequate signal detected.



*The laser alignment tool of the C4000 Select is rated to laser safety class 1. Additional measures for screening the laser radiation are not necessary.*

This device meets the standard CDRH 21 CFR 1040.10 as well as IEC 60825-1.



WARNING

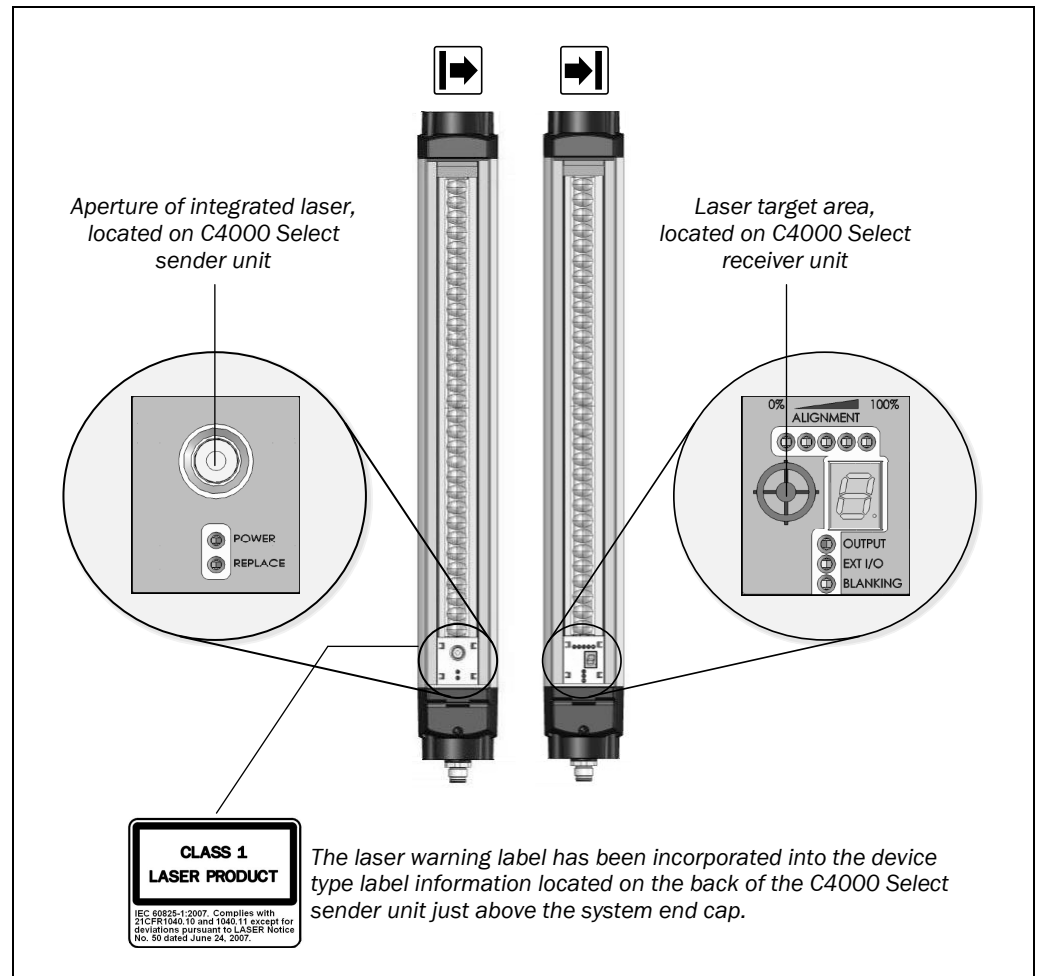
**Caution — use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure!**

**Note** The laser is used to align the optics between a single sender and receiver pair. However, when a cascaded system is implemented, the laser from one C4000 Select sender could cause a lockout condition in a receiver in another C4000 Select sender/receiver pair in the cascade. If this lockout condition occurs, cycle power and perform the alignment procedure again.



**C4000 Select**

Fig. 32: C4000 Select laser alignment location and label details



**WARNING**

**Do not look into the laser aperture!**

The laser alignment aid of the C4000 Select sender unit is rated Class 1 (eye safe) to applicable standards. However, as with any source of radiated energy (e.g. light), prolonged, direct exposure to laser light may cause damage to vision.

## 6 Electrical installation



WARNING

### Switch the entire machine/system off line!

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

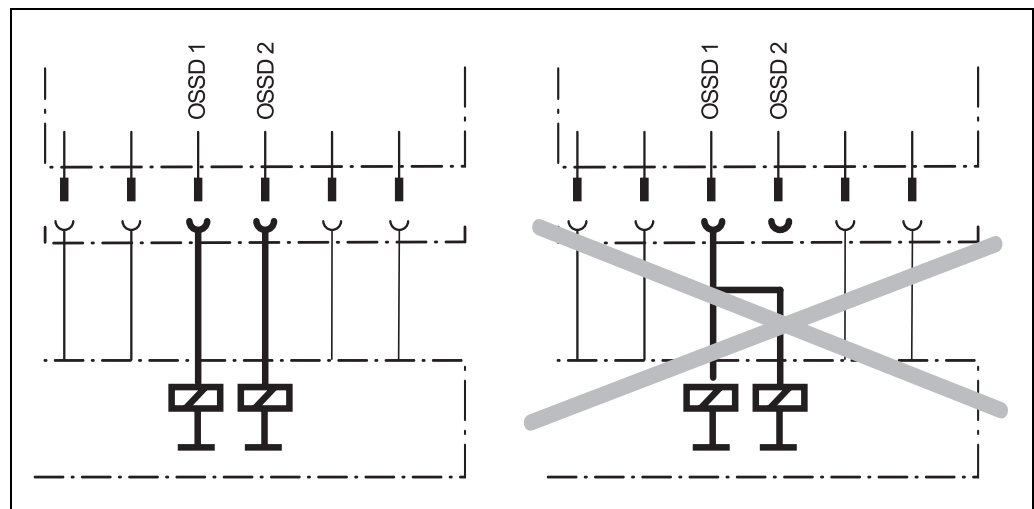
- Ensure that the entire machine/system is disconnected during the electrical installation.

### Connect OSSD1 and OSSD2 separately!

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

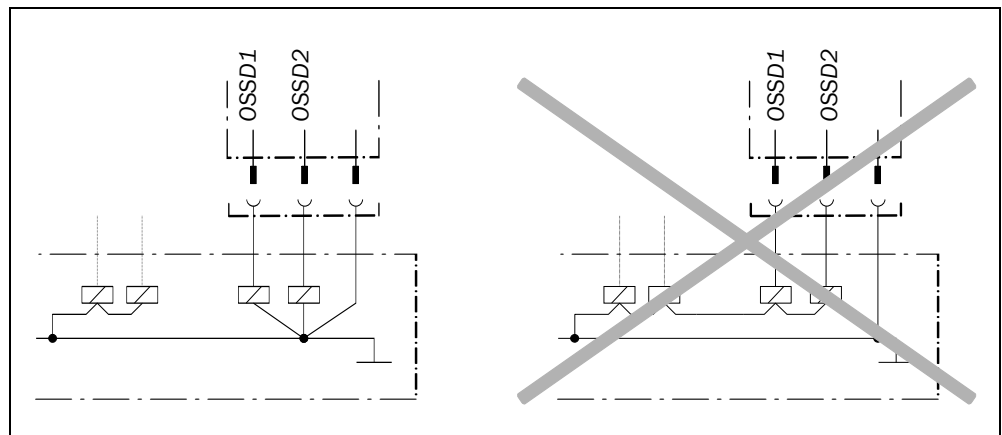
- Ensure that the machine controller processes the two signals separately.

Contactors connected in series must be positively guided and monitored.



### 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.



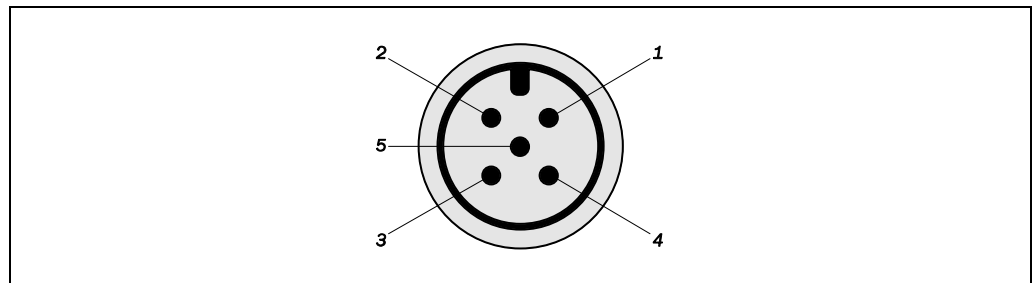
## C4000 Select

**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 Select meets the interference suppression requirements (EMC) for industrial use (interference suppression class A). When used in residential areas it can cause interference.
- To ensure full electromagnetic compatibility (EMC), functional earth (FE) must be connected.
- The external voltage supply of the devices must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60 204-1. The power supply unit must provide safe isolation (SELV/PELV). Suitable power supplies are available as accessories from SICK (see section 12.11 “Accessories” on page 94).
- System connections and extension connections in a cascaded system must be connected only if the system is off line.

## 6.1 Bottom end cap with system connection M12 × 5 male

Fig. 33: Pin assignment for system connection M12 × 5 male



Tab. 20: Pin assignment for system connection M12 × 5 male

Pin No.	Wire Color <sup>10)</sup>	Sender	Receiver	Description
1	Brown	+24 V DC	+24 V DC	Supply voltage (+)
2	White	–	OSSD1	Output Signal Switching Device 1
3	Blue	0 V DC	0 V DC	Supply voltage (–)
4	Black	–	OSSD2	Output Signal Switching Device 2
5	Gray	FE	FE	Functional Earth

<sup>10)</sup> Wire colors shown in this table are in accordance with SICK C4000 Select M12 × 5 cable accessories. When utilizing other M12 × 5 cable manufacturers' cables, you may need to verify that the conductor colors shown in this table correspond with the cable that you are using.

## 6.2 Bottom end cap with system connection M12 × 5 male and extended I/O connection M12 × 5 female

In addition to the system connection, the C4000 Select may have an extended I/O connection included in the same end cap. This extended I/O connection is either used for external control of the optional integrated LED indicator lamp or for cascading additional protective devices (e.g. another C4000 Select or SICK S300/S3000 safety laser scanner).

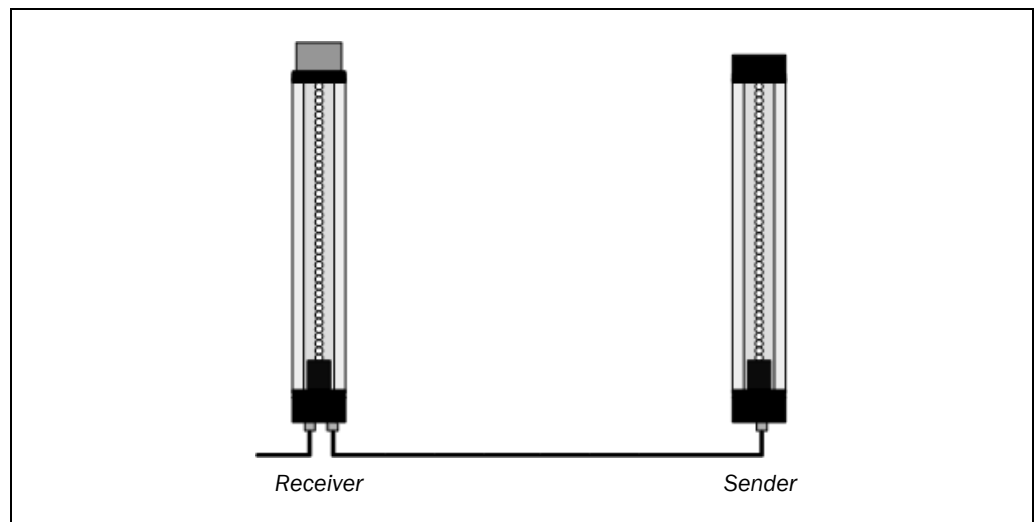
### 6.2.1 Cascading

Connection of the safety-rated outputs associated with these additional cascaded devices occurs at the extended I/O connection of the C4000 Select receiver.

Only PNP-type semiconductor-based safety outputs may be connected via the extended I/O connection. Electro-mechanical devices (i.e. contact-based devices) are strictly prohibited from being connected to the extended I/O connection.

When cascading C4000 Select devices via the extended I/O connection, the sender unit may also utilize an extended I/O connection for ease of wiring<sup>11)</sup>.

Fig. 34: C4000 Select stand-alone pair where the sender is powered via the extended I/O connection of the correspondent C4000 Select receiver



<sup>11)</sup> Maximum cable length between sender and receiver 15 m.



## WARNING

**Electro-mechanical devices are not to be connected to the (safe) inputs on the extended I/O connection!**

Extended I/O connections allow you to cascade additional devices to the C4000 Select. When implementing such a system, you are only allowed to connect PNP-type semiconductor safety-rated devices to the inputs on the extended I/O connection. Electro-mechanical devices (e.g. emergency stops, safety interlock switches, etc.) may not be connected to the inputs on the extended I/O connection!

**You must ensure that protective device outputs attached to the inputs of the extended I/O connection can be read safely!**

The inputs (IN1, IN2) of an extended I/O connection enable the 24 V DC PNP-semiconductor safety outputs from a self-monitoring sensor (e.g. another C4000 Select or an S300/S3000 safety laser scanner) to be read safely. The sensor connected to the inputs of the extended I/O connection (e.g. guest C4000 Select or S3000 safety laser scanner) must ...

- be self-monitoring and detect any error conditions that may occur with its output signal switching devices (OSSDs) using test signals. The host C4000 Select filters these test signals out.
- execute a safe shutdown of the switching outputs when any error is detected.

Integrated safety mechanisms ensure detection of possible errors on safety capable inputs for:

- internal errors on safety capable inputs which prevent the inputs from returning to the safe state. An internal error on a safety capable input is a failure of the C4000 Select electrical input circuitry.
- discrepancy of the dual-channel input evaluation

Additional measures must be made to address any external errors that cannot be monitored internally by the C4000 Select. In addition, you must exclude any external errors that could occur due to selected user configuration parameters.

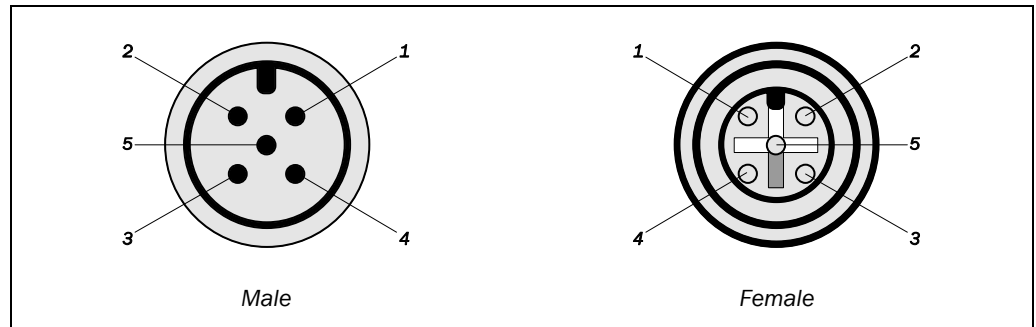
Connecting inappropriate or incompatible device outputs or devices (like electrical-mechanical devices) to the extended I/O connection inputs may lead to an undetected error condition of those device's outputs or the wiring causing failure of the safety function and hence exposing personnel to risk of the associated hazard!

**6.2.2 External control of optional integrated LED indicator lamp**

If Safe Extended I/O is disabled, the inputs at the extended I/O connection may be used to externally control the color shown by the optional integrated LED indicator lamp. For example, to achieve this, the inputs may be connected to PNP outputs of a PLC. See section 4.1 "Extended I/O connection" on page 26 for detailed information on configuration of this operation mode and on information about the color shown by the optional integrated LED indicator lamp depending on the states of the two inputs.

## 6.2.3 Pin assignment

Fig. 35: Pin assignment for system connection M12 × 5 male and M12 × 5 female



Tab. 21: Pin assignment for system connection M12 × 5 male

Pin No.	Wire Color <sup>12)</sup>	Sender	Receiver	Description
1	Brown	+24 V DC	+24 V DC	Supply voltage (+)
2	White	–	OSSD1	Output Signal Switching Device 1
3	Blue	0 V DC	0 V DC	Supply voltage (–)
4	Black	–	OSSD2	Output Signal Switching Device 2
5	Gray	FE	FE	Functional Earth

Tab. 22: Pin assignment for extended I/O connection M12 × 5 female

Pin No.	Wire Color <sup>12)</sup>	Sender	Receiver	Description
1	Brown	+24 V DC	+24 V DC OUT	Output voltage (+)
2	White	–	IN1	Input 1
3	Blue	0 V DC	0 V DC OUT	Output voltage (–)
4	Black	–	IN2	Input 2
5	Gray	FE	FE	Functional Earth

<sup>12)</sup> Wire colors shown in this table are in accordance with SICK C4000 Select M12 × 5 cable accessories. When utilizing other M12 × 5 cable manufacturers' cables, you may need to verify that the conductor colors shown in this table correspond with the cable that you are using.

### 6.3 Top end cap with extended I/O M12 × 5 female connection

In addition to the end cap with the system connection, the C4000 Select may also utilize a top end cap that has an extended I/O connection that is used for cascading additional protective devices (e.g. another C4000 Select or SICK S300/S3000 safety laser scanner). Connection of the safety-rated outputs associated with these additional cascaded devices occurs at the C4000 Select receiver extended I/O connection. When an extended I/O end cap is used on the top of the C4000 Select receiver unit, the integrated LED cannot be used. If an integrated LED is required, specify a combined system and extended I/O bottom end cap when ordering. Refer to section 6.2 “Bottom end cap with system connection M12 × 5 male and extended I/O connection M12 × 5 female” on page 52 for additional information.

Only PNP-type semiconductor-based safety outputs may be connected via the extended I/O connection. Electro-mechanical devices (i.e. contact-based devices) are strictly prohibited from being connected to the extended I/O connection.

When cascading C4000 Select devices via the extended I/O connection, the sender unit may also utilize an extended I/O connection for ease of wiring.



WARNING

#### **Electro-mechanical devices are not to be connected to the (safe) inputs on the extended I/O connection!**

Extended I/O connections allow you to cascade additional devices to the C4000 Select. When implementing such a system, you are only allowed to connect PNP-type semiconductor safety-rated devices to the inputs on the extended I/O connection. Electro-mechanical devices (e.g. emergency stops, safety interlock switches, etc.) may not be connected to the inputs on the extended I/O connection!

#### **You must ensure that protective device outputs attached to the inputs of the extended I/O connection can be read safely!**

The inputs (IN1, IN2) of an extended I/O connection enable the 24 V DC PNP-semiconductor safety outputs from a self-monitoring sensor (e.g. another C4000 Select or an S300/S3000 safety laser scanner) to be read safely. The sensor connected to the inputs of the extended I/O connection (e.g. guest C4000 Select or S3000 safety laser scanner) must ...

- be self-monitoring and detect any error conditions that may occur with its output signal switching devices (OSSDs) using test signals. The host C4000 Select filters these test signals out.
- execute a safe shutdown of the switching outputs when any error is detected.

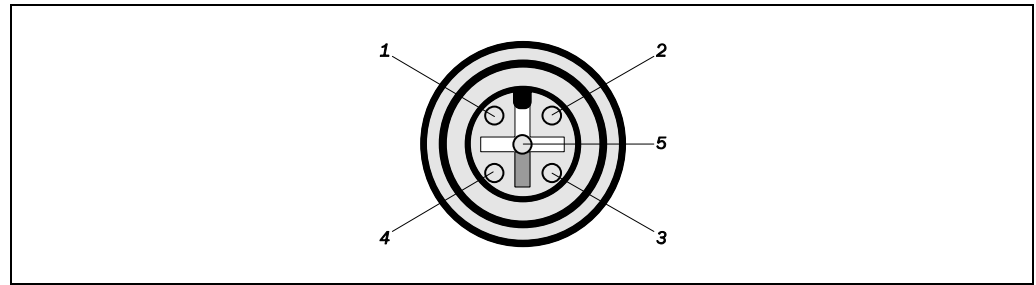
Integrated safety mechanisms ensure detection of possible errors on safety capable inputs for:

- internal errors on safety capable inputs which prevent the inputs from returning to the safe state. An internal error on a safety capable input is a failure of the C4000 Select electrical input circuitry.
- discrepancy of the dual-channel input evaluation

Additional measures must be made to address any external errors that cannot be monitored internally by the C4000 Select. In addition, you must exclude any external errors that could occur due to selected user configuration parameters.

Connecting inappropriate or incompatible device outputs or devices (like electrical-mechanical devices) to the extended I/O connection inputs may lead to an undetected error condition of those device's outputs or the wiring causing failure of the safety function and hence exposing personnel to risk of the associated hazard!

Fig. 36: Pin assignment for extended I/O connection M12 × 5 female



Tab. 23: Pin assignment for end cap with extended I/O connection M12 × 5 female

Pin No.	Wire Color <sup>13)</sup>	Sender	Receiver	Description
1	Brown	+24 V DC	+24 V DC OUT	Output voltage (+)
2	White	–	IN1	Input 1
3	Blue	0 V DC	0 V DC OUT	Output voltage (–)
4	Black	–	IN2	Input 2
5	Gray	FE	FE	Functional Earth

<sup>13)</sup> Wire colors shown in this table are in accordance with SICK C4000 Select M12 × 5 cable accessories. When utilizing other M12 × 5 cable manufacturers' cables, you may need to verify that the conductor colors shown in this table correspond with the cable that you are using.



# 7 Commissioning



WARNING

## Commissioning requires a thorough check by qualified safety personnel!

Before you operate a system protected by the C4000 Select safety light curtain for the first time, make sure that the system is first checked and released by qualified safety personnel. Please read the notes in chapter “On safety” on page 9.

Tab. 24: Displays shown during the power-up cycle

## 7.1 Display sequence during power-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:

Display	Meaning
	Testing the 7-segment display. All segments are activated sequentially.
	0.5 s (typical). Is displayed only at the receiver and only in operation with high scanning range.
	0.5 s (typical). Non-coded operation or operation with code 1 or 2.
Other display	Device error. See “Fault diagnosis” on page 63.

## 7.2 Aligning sender and receiver

After the light curtain has been mounted and connected, the sender and receiver must be aligned in relation to each other. The light beams emitted by the sender must hit the receiver with pin-point accuracy. For additional information regarding the laser alignment capability of the C4000 Select, see section 5.3 “Laser alignment” on page 48.

### 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. Ignoring this warning could expose personnel to risk of the associated hazard when the light curtains goes green during the alignment procedure. Section 7.3 must be completed prior to machine operation to ensure the light curtains are installed properly.

- Loosen the clamping bolts which hold the light curtain in place.
- Switch on the power supply to the light curtain.
- Watch the five (5) alignment LEDs on the receiver unit. As the number of illuminated LEDs increases, an increased percentage of beams are aligned between sender and receiver unit. When all beams are aligned, all five (5) LEDs will be illuminated. If all five (5) LEDs are yellow, then there is a weak signal between sender and receiver. If all five (5) LEDs are green, then the alignment is correct with adequate signal strength.
- Using the clamping bolts, fix the light curtain in place.

- Switch the power supply off and then back on again and check the five (5) alignment LEDs to ensure alignment is still adequate.

**Notes**

- The laser alignment mode will be active for four (4) minutes after activation. To reactivate the laser alignment mode, press the laser activation button on the sender device.
- If you wish to readjust the alignment later, press the laser activation button on the C4000 Select sender unit.
- The safety outputs of a host C4000 Select device that is cascaded will remain inactive (low) i.e. red until all guests have been correctly aligned and their corresponding outputs are active (high) i.e. green.

## 7.3 Test notes

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

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

These tests must therefore always be performed.

### 7.3.1 Tests before the first commissioning

- 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 13.2 on page 98).
- Ensure that the operating personnel of the machine in which the C4000 Select is installed 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 13.2 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.

### 7.3.2 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.

### 7.3.3 Daily functional checks of the protective device

The effectiveness of the protective device must be checked daily by a specialist or by authorized 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. By means of the configuration, the entire system or individual areas can have a *physical resolution* that is different to the *effective resolution*, e.g. in case of floating blanking. In this case you must select the test rod to suit the effective resolution. The effective resolution is described with the related function in chapter 4.

Example:

- physical resolution 30 mm
- operation with single beam floating blanking
- effective resolution 50 mm

➤ Use a test rod for a resolution of 50 mm.

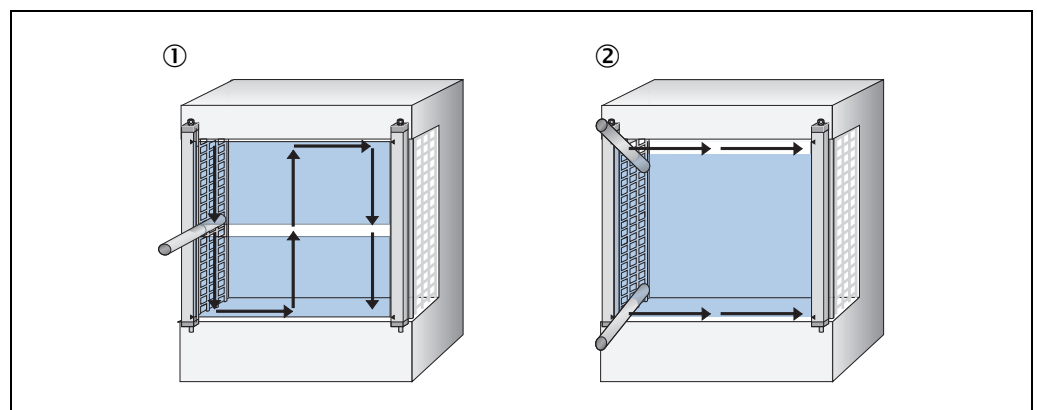
**WARNING****Do not operate the machine if the “Output” LED of the C4000 Select receiver turns green during the test!**

If the “Output” LED of the C4000 Select receiver turns green *during the test*, even for a short period, work must stop at the machine. In this case the mounting and the configuration of the safety light curtain must be checked by qualified safety personnel (see chapter 5). Ignoring this warning could lead to failure to detect and therefore result in unsafe operation of the machine exposing personnel to risk of the associated hazard.

- Before inserting the test rod, ensure that the “Output” LED of the C4000 Select receiver is green and that the protective field is clear of obstruction. As soon as the test rod is inserted into the protective field, the “Output” LED of the C4000 Select receiver must turn red and must remain red during the entire time the test rod is present in the protective field. This test is meaningless if it is completed when the “Output” LED of the C4000 Select receiver is already red before the test rod is inserted into the protective field.
- Move the test rod slowly through the hazardous area to be protected, as shown in ① in Fig. 37.
- Then move the test rod along the edges of the hazardous area to be protected, as shown in ② in Fig. 37. This procedure allows you to test if the point-of-operation/reaching around protection is functioning correctly (see 5.2 “Steps for mounting the device” on page 40).
- If you use one or more deflector mirrors (e.g. PNS), then also guide the test rod slowly through the protective field directly in front of the mirrors.
- If you use C4000 Select in cascading mode, you must check the effectiveness and correct function of every single pair in the cascade as described above.

**Note** During all tests, the “Output” LED of the C4000 Select receiver must remain red.

Fig. 37: Daily checks of the protective device



**Additional check of the effectiveness and correct function of a cascaded system**

If you use the C4000 Select in cascading mode, in addition to testing every single C4000 Select pair that is part of the cascade with the test described above, you have to perform the following procedure:

- Before beginning the next steps, ensure that the “Output” LED of the host light curtain receiver is green and the protective fields of all cascaded protective devices are clear of obstruction. This test is meaningless if it is completed when the “Output” LED of the host light curtain receiver is already red before the protective fields of the guest devices get obstructed.
- Obstruct the protective field of the first guest protective device with the test rod. While doing so, do not obstruct the host light curtain’s protective field or the second guest light curtain’s protective field (if available). Ensure that the “Output” LED of the host light curtain receiver turns red as soon as the protective field of the first guest protective device gets obstructed.
- Remove the obstruction from the first guest protective device’s protective field. Ensure that the “Output” LED of the host light curtain receiver turns green again as soon as the protective field of the first guest protective device gets clear from obstruction.
- If your cascaded system contains only one guest protective device, the procedure is finished at this point. If another guest protective device is present, continue with the following steps.
- Obstruct the protective field of the second guest protective device with the test rod. While doing so, do not obstruct the host light curtain’s protective field or the first guest light curtain’s protective field. Ensure that the “Output” LED of the host light curtain receiver turns red as soon as the protective field of the second guest protective device gets obstructed.
- Remove the obstruction from the second guest protective device’s protective field. Ensure that the “Output” LED of the host light curtain receiver turns green again as soon as the protective field of the second guest protective device gets clear from obstruction.

**WARNING****Do not operate the machine if the “Output” LED of the host light curtain receiver does not behave exactly as described above!**

If the “Output” LED of the host light curtain receiver is or turns green while the host light curtain’s protective field is clear of obstruction and the protective field of at least one guest protective device is obstructed, the protective function of the cascaded system is not ensured and work must stop at the machine. In this case the mounting and the configuration of the safety light curtain must be checked by qualified safety personnel (see chapter 5). Ignoring this warning could lead to risk of failure to detect and therefore result in unsafe operation of the machine exposing personnel to risk of the associated hazard.

# 8 Configuration

## Default delivery status

As delivered the C4000 Select is configured ready for protective operation. The following tables indicate the default switch settings for C4000 Select sender and receiver units:

Tab. 25: Default DIP switch settings for C4000 Select sender unit

Switch Description	Default setting (out of box)
Beam code 1 select	OFF i.e. no beam coding
Beam code 2 select	OFF i.e. no beam coding

Tab. 26: Default DIP switch settings for C4000 Select receiver unit when extended I/O connection is not present

Switch Description	Default setting (out of box)
High range select	OFF i.e. low range
Safe Extended I/O enable	OFF i.e. Safe Extended I/O disabled
Beam code 1 select	OFF
Beam code 2 select	OFF
Floating blanking enable	OFF i.e. disabled
One beam floating blanking	OFF i.e. disabled
Two beam floating blanking	OFF i.e. disabled

Tab. 27: Default DIP switch settings for C4000 Select receiver unit when extended I/O connection is available

Switch Description	Default setting (out of box)
High range select	OFF i.e. low range
Safe Extended I/O enable	ON i.e. Safe Extended I/O enabled, external control of the optional integrated LED indicator lamp disabled
Beam code 1 select	OFF
Beam code 2 select	OFF
Floating blanking enable	OFF i.e. disabled
One beam floating blanking	OFF i.e. disabled
Two beam floating blanking	OFF i.e. disabled

## 9 Care and maintenance

The C4000 Select safety light curtain is maintenance-free. The front screen of the C4000 Select safety light curtain and any additional front screen(s) (see “Additional front screen (weld spark guard)” on page 93) 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 over, under or around).

➤ Verify the effectiveness of the protective device as described in chapter 7.3 “Test notes” on page 58.



WARNING

### **Only factory authorized personnel may repair C4000 Select devices!**

The C4000 Select is designed for maintenance-free operation. When a device requires repair, contact your local SICK representative to coordinate the repair or exchange of the device. Do not attempt to repair the device yourself! Any attempt to repair your C4000 Select device (e.g. removal of end cap, etc.) will void product warranty and may lead to the loss of the safety function!

Use of controls or adjustments or performance of procedures other than those specified in this document may result in hazardous radiation exposure per IEC 60825. **Do not attempt to disassemble this sensor for repair!** A defective device must be returned to the manufacturer or a regional repair center authorized by the manufacturer for the repair of this device.

# 10 Fault diagnosis

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

## 10.1 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 or if you cannot safely remedy the malfunction. Ignoring this warning could lead to failure to detect and therefore result in unsafe operation of the machine exposing personnel to risk of the associated hazard.

### **The system state lock-out**

In case of certain faults or an erroneous configuration, the system can go into the lock-out status. The 7-segment display on the safety light curtain then indicates a number ranging from 1 through 6. To place the device back in operation:

- Rectify the cause of the fault as per Tab. 30.
- Switch the power supply for the C4000 Select off and on again (e.g. by unplugging the system connection and reinserting it).

## 10.2 SICK Support

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

### 10.3 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 3.4 "C4000 Select status indicators" on page 21.

Tab. 28: C4000 Select LED troubleshooting on sender unit

LED Name	Display	Possible cause	Rectification
<b>POWER</b>	○ Off	No operating voltage, or voltage too low	➤ Check the voltage supply and activate, if necessary.
<b>REPLACE</b>	● Red	The sender unit has detected an internal error.	➤ Cycle power. If the error persists, replace sender unit

Tab. 29: C4000 Select LED troubleshooting on receiver unit







LED Name	Display	Possible cause	Rectification
<b>OUTPUT</b>	○ Off	No operating voltage, or voltage too low	➤ Check the voltage supply and activate, if necessary.
<b>EXT I/O</b>	● Red	Extended I/O inputs are inactive (low) i.e. OFF in cascading mode	<ul style="list-style-type: none"> <li>➤ Check guest device(s) to ensure that their outputs are active (high).</li> <li>➤ Check wiring for errors.</li> <li>➤ Check DIP switches to ensure that the settings are correct</li> </ul>
<b>ALIGNMENT LEDs</b>	Not all LEDs are ● Green	Not all beams are aligned between sender and receiver units	<ul style="list-style-type: none"> <li>➤ Check alignment and make any necessary adjustments in order to have all five alignment LEDs ● Green</li> <li>➤ Clean C4000 Select front windows</li> </ul>



## 10.4 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. Please refer to chapter 3.4 “C4000 Select status indicators” on page 21 for a description of the 7-segment display.

Tab. 30: Error displays of the 7-segment display

	Display	Possible cause	Rectification
7-segment display		An internal error has been detected	➤ Cycle power. If the error condition persists, replace receiver unit
		A configuration error has been detected	➤ Check DIP switch settings
		Receiver unit has detected beams from multiple sender units	➤ Add beam coding for guest segment(s)
		Power supply voltage too low	➤ Check the supply voltage and the power supply. If necessary, replace defective components
		A fault or unexpected state has been detected at the OSSDs on the system connection (e.g. overcurrent, stuck-at-high, or stuck-at-low)	➤ Check system wiring for errors
		An unexpected signal has been detected at the extended I/O connection (e.g. discrepancy error at extended I/O inputs when Safe Extended I/O is enabled)	<ul style="list-style-type: none"> <li>➤ Verify guest device safety outputs are either both active (high) or inactive (low) (e.g. equivalent).</li> <li>➤ Check guest device(s) wiring to the C4000 Select host device.</li> <li>➤ Verify guest device is operating correctly.</li> <li>➤ If no extended I/O connection is present and this error code exists, replace device.</li> </ul>

# 11 Technical specifications

## 11.1 Data sheet

Tab. 31: Data sheet C4000 Select

	Minimum	Typical	Maximum
General system data			
Type	Type 4 (IEC 61496-1)		
Safety integrity level <sup>14)</sup>	SIL3 (IEC 61508)		
SIL claim limit <sup>14)</sup>	SILCL3 (EN 62061)		
Category	Category 4 (EN ISO 13849-1)		
Performance level <sup>14)</sup>	PL e (EN ISO 13849-1)		
PFHd (mean probability of a dangerous failure per hour)			
Standalone system <sup>15)</sup>	16 × 10 <sup>-9</sup>		
Cascaded system (host/guest)	32 × 10 <sup>-9</sup>		
Cascaded system (host/guest/guest)	48 × 10 <sup>-9</sup>		
T <sub>M</sub> (mission time)	20 years (EN ISO 13849)		
Protection class	III (EN 50178) <sup>16)</sup>		
Enclosure rating <sup>17)</sup>	IP 65 (EN 60529)		
Protective field height, depending on type	300 mm		1800 mm
Resolution, depending on type	14 mm or 30 mm		
Scanning range, DIP switch configurable			
Resolution 14 mm			
Low range	0...2.5 m	2...10 m <sup>18)</sup>	
High range	2...8 m		
Resolution 30 mm			
Low range	0...6 m	5...21 m <sup>18)</sup>	
High range	5...19 m		
Supply voltage U <sub>V</sub> at device <sup>19)</sup>	19.2 V DC	24 V DC	28.8 V DC
Residual ripple <sup>20)</sup>			± 10 %
Synchronization	Optical, without separate synchronization		

<sup>14)</sup> For detailed information regarding the accurate interpretation of this data, please contact your local SICK representative.

<sup>15)</sup> These values apply to systems with a resolution of 14 mm. As a rule systems with other resolutions will achieve better results.

<sup>16)</sup> Safety extra-low voltage SELV/PELV.

<sup>17)</sup> In order to satisfy enclosure rating, the cover plate over the DIP switches must be secured correctly. Further, system and extended I/O cables must be rated IP 65 or better and must also be attached to the C4000 Select correctly. You must use protective caps that are suitable for IP 65 enclosure rating for any unused connectors.

<sup>18)</sup> On the utilization of this protective field width, it must be expected the yellow alignment LEDs will be yellow (cleaning or realignment required). The system then only has a reserve of 30 %.

<sup>19)</sup> The external voltage supply must be capable of buffering brief mains voltage failures of 20 ms as specified in EN 60204-1. Suitable power supplies are available as accessories from SICK.

<sup>20)</sup> Within the limits of U<sub>V</sub>.

**C4000 Select**

	Minimum	Typical	Maximum
Power-up delay of sender and receiver before ready			8 s

**▣ Sender unit**

Wavelength of sender		950 nm	
Power consumption	See Tab. 32		
Permissible line resistance Supply lead			1 $\Omega$
Max. cable length in a cascaded system (host/guest and guest 1/guest 2)			10 m
Alignment laser	Class 1 in accordance with IEC 60825-1 and 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, June 24, 2007, optical output power $\leq 390 \mu\text{W CW}$ $\lambda_{\text{typical}} = 650 \text{ nm}$		
Weight, type dependent	Depending on protective field height (see page 76)		

Minimum	Typical	Maximum
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### Receiver unit

Switching outputs (OSSDs)	Dual-channel, PNP semiconductor, short-circuit protected <sup>21)</sup> , cross-circuit monitored		
Response time	See chapter 11.2 on page 71		
Switch off time <sup>22)</sup>	100 ms		
Switching voltage <sup>23)</sup> <sup>24)</sup> HIGH (active, $U_{eff}$ )	$U_V - 2.25 \text{ V DC}$	24 V DC	$U_V$
Switching voltage <sup>23)</sup> LOW (inactive)	0 V	0 V	2.0 V DC
Switching current	0 mA		500 mA
Leakage current <sup>25)</sup>			0.25 mA
Load capacity			2.2 $\mu\text{F}$
Switching sequence	Depending on load inductance		
Load inductance <sup>26)</sup>			2.2 H
Test pulse data <sup>27)</sup>			
Test pulse width	120 $\mu\text{s}$	150 $\mu\text{s}$	300 $\mu\text{s}$
Test pulse rate	3 $1/\text{s}$	5 $1/\text{s}$	10 $1/\text{s}$
Permissible line resistance between device and load <sup>28)</sup>			2.5 $\Omega$
Supply lead			1 $\Omega$
Power consumption	See Tab. 32		

<sup>21)</sup> Applies to the voltage range between  $-30 \text{ V DC}$  and  $+30 \text{ V DC}$ .

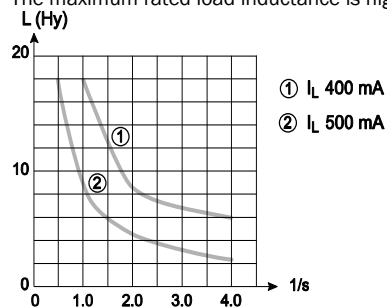
<sup>22)</sup> Switch off time represents the minimum amount of time that the OSSDs will be switched off when the C4000 Select transitions to an inactive (low) (i.e. red) state.

<sup>23)</sup> As per IEC 61131-2.

<sup>24)</sup> On the device plug.

<sup>25)</sup> 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 FPLC (Fail-safe Programmable Logic Controller) must be able to identify this status.

<sup>26)</sup> The maximum rated load inductance is higher with lower switching sequence.



<sup>27)</sup> 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.

<sup>28)</sup> Make sure to limit the individual line core resistance to the downstream controller to this value to ensure that a short-circuit between the outputs is safely detected. (Also note EN 60 204 Electrical Machine Equipment, Part 1: General Requirements.)

## C4000 Select

	Minimum	Typical	Maximum
Extended I/O input type when Safe Extended I/O Enabled DIP switch is set to Enabled	Type 3 <sup>29)</sup> (EN 61131-2). Dual-channel, PNP semiconductor, externally short-circuit protected, externally cross-circuit monitored e.g. from an S3000 safety laser scanner or another C4000 Select receiver		
Extended I/O input type when Safe Extended I/O Enabled DIP switch is set to Disabled	PNP semiconductor		
Input voltage <sup>30)</sup> HIGH	11 V DC	24 V DC	30 V DC
Input current HIGH	3 mA	5 mA	7 mA
Input voltage LOW	-30 V DC	0 V DC	5 V DC
Input current LOW	-1.2 mA	0 mA	2.5 mA <sup>31)</sup>
Input capacitance		5 nF	
Input test pulse filtering <sup>32)</sup>			
Test pulse rate			160/s
Test pulse gap			700 µs
Safe input discrepancy time			20 ms

## Operating data

System connection	M12 × 5, male		
Maximum cable length <sup>33)</sup>			30 m
Extension connection	M12 × 5, female		
Maximum cable length			10 m
Ambient operating temperature	0 °C		+55 °C
Air humidity (non-condensing)	15 %		95 %
Storage temperature	-25 °C		+70 °C (≤24 h)
Housing cross-section	52 mm × 55.5 mm		
Vibration resistance	5 g, 10-55 Hz (EN 60068-2-6)		
Shock resistance	10 g, 16 ms (EN 60068-2-27)		

## Environmental data, materials

Housing	Aluminium alloy ALMGSI 0.5 (powder coated)
Front screen	Polycarbonate, scratch-resistant coating
End caps	Polyamide 6.6 CF30
Packaging	Corrugated cardboard with Instapak® inlays
Circuit boards	Glass-fibre reinforced epoxy resin with flame retarding agent TBBPA

<sup>29)</sup> The "Type" designation listed here describes the kind of outputs that may be connected to the extended I/O safe input connection. This particular designation is not related to the "Type" designation defined by IEC 61496-1 and IEC 61496-2.

<sup>30)</sup> As per IEC 61131-2, type 3.

<sup>31)</sup> Maximum leakage current allowed, even in the event of an error or fault condition.

<sup>32)</sup> These values indicate the filtering capability of the C4000 Select in evaluating OSSD signals at the extended I/O safety capable inputs without generating a stop condition based on the test pulse occurrence.

<sup>33)</sup> Depending on load, power supply and wire cross-section. The technical specifications must be observed; e.g. supply voltage and permissible line resistance.

Tab. 32: C4000 Select power consumption information

Protective field height [mm]	Power consumption for 14 mm resolution devices		
	Sender unit	Receiver unit	Sender/receiver pair
300	5.3 W	8.0 W	13.3 W
450	5.7 W	8.4 W	14.1 W
600	6.1 W	8.7 W	14.8 W
750	6.5 W	9.0 W	15.5 W
900	6.9 W	9.3 W	16.2 W
1050	7.3 W	9.6 W	16.9 W
1200	7.7 W	10.0 W	17.7 W
1350	8.1 W	10.3 W	18.4 W
1500	8.5 W	10.6 W	19.1 W
1650	8.9 W	10.9 W	19.8 W
1800	9.3 W	11.2 W	20.5 W

Protective field height [mm]	Power consumption for 30 mm resolution devices		
	Sender unit	Receiver unit	Sender/receiver pair
300	4.9 W	7.6 W	12.5 W
450	5.1 W	7.8 W	12.9 W
600	5.3 W	7.9 W	13.2 W
750	5.5 W	8.0 W	13.5 W
900	5.7 W	8.1 W	13.8 W
1050	5.9 W	8.2 W	14.1 W
1200	6.1 W	8.4 W	14.5 W
1350	6.3 W	8.5 W	14.8 W
1500	6.5 W	8.6 W	15.1 W
1650	6.7 W	8.7 W	15.4 W
1800	6.9 W	8.8 W	15.7 W

## 11.2 Response time

The response time depends on the following parameters:

- number of beams (length and resolution dependent)
- beam coding
- configuration of floating blanking
- number of cascaded systems
- the output signal switching device used

### How to determine the response time of the system:

- Determine the response time of the individual components of the system.
  - The response time of a C4000 Select standalone or host device is described in section 11.2.1 “Calculating the host/standalone response time” on page 72.
  - The response time for guest 1 using a C4000 Select pair or an S300/S3000 safety laser scanner as guest 1 is described in section 11.2.2 “Calculating the guest 1 response time” on page 73.
  - The response time for guest 2 using a C4000 Select pair as guest 2 is described in section 11.2.3 “Calculating the guest 2 response time” on page 73.

You must also consider other components of the response time when performing minimum safety distance calculations. Other components include, but are not limited to, safety interfaces, safety communication networks, machine stopping time, etc. See section 5.1.1 “Minimum safety distance to the hazardous area” on page 34 for additional information.



### WARNING

**Observe the maximum response time in cascaded systems without protection against standing behind!**

In cascaded systems without protection against standing behind, the maximum response time must not exceed 85.6 ms!

**11.2.1 Calculating the host/standalone response time**

The following table provides details for the C4000 Select response times based on resolution and configuration with (beam code 1 or beam code 2) or without beam coding (uncoded operation). The information presented in this table is then used to calculate the host/standalone C4000 Select response time.

Tab. 33: Response times of the C4000 Select with and without beam coding

Protective field height [mm]	Uncoded		Code 1/Code 2	
	Resolution 14 mm	Resolution 30 mm	Resolution 14 mm	Resolution 30 mm
300	11 ms	9 ms	17 ms	12 ms
450	13 ms	10 ms	21 ms	14 ms
600	14 ms	11 ms	25 ms	15 ms
750	16 ms	11 ms	29 ms	16 ms
900	17 ms	12 ms	33 ms	18 ms
1050	19 ms	12 ms	36 ms	19 ms
1200	20 ms	13 ms	40 ms	21 ms
1350	21 ms	13 ms	44 ms	22 ms
1500	23 ms	14 ms	48 ms	24 ms
1650	24 ms	14 ms	52 ms	25 ms
1800	26 ms	15 ms	56 ms	27 ms

Identify the response time value that corresponds to your C4000 Select based on the beam code DIP switch setting (i.e. Uncoded, Beam code 1 or Beam code 2 operation) and the protective field height that is used and then complete the following table:

Tab. 34: Response time calculation of host/standalone C4000 Select safety light curtain

Line	Description	Value
1	C4000 Select response time from Tab. 33 above	
2	When floating blanking is enabled, multiply the value from line 1 by 0.50 and enter the result as the value for line 2.	
3	Add lines 1 and 2 together and enter the value for line 3. <b>Line 3 value is the response time for the C4000 Select host.</b>	



## C4000 Select

## 11.2.2 Calculating the guest 1 response time

The information presented in Tab. 33 “Response times of the C4000 Select with and without beam coding” also applies for C4000 Select sender/receiver pairs that are in the guest 1 position. For applications where the guest 1 device is an S300/S3000 safety laser scanner, consult the operating instructions of the S300 or S3000 for the response time value that will be used in line 4 of the table below.

Identify the response time value that corresponds to your C4000 Select guest 1 based on the resolution, the beam code DIP switch setting (i.e. Uncoded, Beam code 1 or Beam code 2 operation) and the protective field height that is used.

Tab. 35: Response time calculation of guest 1 devices in a host-guest 1 system with C4000 Select as host

Line	Description	Value
4	Enter the value for the guest 1 response time based on Tab. 33 for the C4000 Select, or the value determined for the S300/S3000 safety laser scanner	
5	If the device in line 4 is a C4000 Select and floating blanking is enabled, multiply the value on line 4 by 0.50 and enter the result as the line 5 value.	
6	Add lines 4 and 5 together. Enter the result as the line 6 value.	
7	Multiply line 1 from the host response time calculation by 0.50 and then add 2 ms. Enter the result as the line 7 value.	
8	Add lines 6 and 7 together. Enter the result in line 8 value. <b>Line 8 value is the response time of the guest 1 device.</b>	

## 11.2.3 Calculating the guest 2 response time

The information presented in Tab. 33 “Response times of the C4000 Select with and without beam coding” also applies for C4000 Select sender/receiver pairs that are in the guest 2 position. Identify the response time value that corresponds to your guest 2 C4000 Select based on the resolution, the beam code DIP switch setting (i.e. Uncoded, Beam code 1 or Beam code 2 operation) and the protective field height that is used.

Tab. 36: Response time calculation of guest 2 devices in a host-guest 1-guest 2 system with C4000 Select

Line	Description	Value
9	Enter the value for the guest 2 response time based on Tab. 33 for the C4000 Select	
10	If floating blanking is enabled, multiply the value on line 9 by 0.50 and enter the result as the line 10 value	
11	Add lines 9 and 10 together. Enter the result in line 11 value	
12	Multiply line 1 from the host response time calculation by 0.50 and then add 2 ms. Enter the result as the line 12 value	
13	Multiply line 4 from the guest 1 response time calculation by 0.50 and then add 2 ms. Enter the result as the line 13 value	
14	Add lines 11, 12 and 13 together. Enter the result in line 14 value. <b>Line 14 value is the response time of the guest 2 device.</b>	

### 11.2.4 Response time calculation examples

#### Standalone C4000 Select device

The calculation example shown below is based on the following:

- C4000 Select, 30 mm resolution, 300 mm protective field height, no beam coding, no floating blanking

Tab. 37: Response time calculation for a standalone C4000 Select device

Line	Description	Value
1	C4000 Select response time from Tab. 33	9 ms
2	When floating blanking is enabled, multiply the value from line 1 by 0.50 and enter the result as the value located for line 2	0 ms
3	Add lines 1 and 2 together and enter the value for line 3. <b>Line 3 value is the response time for the C4000 Select host.</b>	9 ms

#### C4000 Select host and S3000 safety laser scanner as guest 1

The calculation example shown below is based on the following:

- C4000 Select, 30 mm resolution, 900 mm protective field height, beam code 1, with 1 beam floating blanking
- S3000 safety laser scanner as guest 1 with 60 ms response time based on scanner configuration

Tab. 38: Response time calculation for C4000 Select host and S3000 safety laser scanner as guest 1

Line	Description	Value
1	C4000 Select response time from Tab. 33	18 ms
2	When floating blanking is enabled, multiply the value from line 1 by 0.50 and enter the result as the value for line 2	9 ms
3	Add lines 1 and 2 together and enter the value for line 3. Line 3 value is the response time for the C4000 Select host.	27 ms
4	Enter the value for the guest 1 response time based on Tab. 33 for the C4000 Select, or the value determined for the S300/S3000 safety laser scanner	60 ms
5	If the device in line 4 is a C4000 Select and floating blanking is enabled, multiply the value on line 4 by 0.50 and enter the result as the line 5 value.	0 ms
6	Add lines 4 and 5 together. Enter the result as the line 6 value.	60 ms
7	Multiply line 1 from the host response time calculation by 0.50 and then add 2 ms. Enter the result as the line 7 value.	11 ms
8	Add lines 6 and 7 together. Enter the result in line 8 value. <b>Line 8 value is the response time of the guest 1 S3000 safety laser scanner.</b>	71 ms

## C4000 Select

## Host-guest 1-guest 2 C4000 Select system

The calculation example shown below is based on the following:

- Host C4000 Select, 30 mm resolution, 900 mm protective field height, beam code 1, with 1 beam floating blanking
- Guest 1 C4000 Select, 30 mm resolution, 1200 mm protective field height, beam code 2, floating blanking is disabled
- Guest 2 C4000 Select, 30 mm resolution, 600 mm protective field height, uncoded, with 2 beam floating blanking

Tab. 39: Response time calculation for host-guest 1-guest 2 C4000 Select system

Line	Description	Value
1	C4000 Select response time from Tab. 33	18 ms
2	When floating blanking is enabled, multiply the value from line 1 by 0.50 and enter the result as the value for line 2	9 ms
3	Add lines 1 and 2 together and enter the value for line 3. <b>Line 3 value is the response time for the host C4000 Select.</b>	<b>27 ms</b>
4	Enter the value for the guest 1 response time based on Tab. 33 for C4000 Select, or the value determined for the S300/S3000 safety laser scanner	21 ms
5	If the device in line 4 is a C4000 Select and floating blanking is enabled, multiply the value on line 4 by 0.50 and enter the result as the line 5 value.	0 ms
6	Add lines 4 and 5 together. Enter the result as the line 6 value.	21 ms
7	Multiply line 1 from the host response time calculation by 0.50 and then add 2 ms. Enter the result as the line 7 value.	11 ms
8	Add lines 6 and 7 together. Enter result in line 8 value. <b>Line 8 value is the response time of the guest 1 C4000 Select.</b>	<b>32 ms</b>
9	Enter the value for the guest 2 response time based on Tab. 33 for the C4000 Select	11 ms
10	If floating blanking is enabled, multiply the value on line 9 by 0.50 and enter the result as the line 10 value.	5.5 ms
11	Add lines 9 and 10 together. Enter the result in line 11 value.	16.5 ms
12	Multiply line 1 from the host response time calculation by 0.50 and then add 2 ms. Enter the result as the line 12 value.	11 ms
13	Multiply line 4 from the guest 1 response time calculation by 0.50 and then add 2 ms. Enter the result as the line 13 value.	12.5 ms
14	Add lines 11, 12 and 13 together. Enter the result in line 14 value. <b>Line 14 value is the response time of the guest 2 C4000 Select.</b>	<b>40 ms</b>

## 11.3 Table of weights

### 11.3.1 C4000 Select

Tab. 40: Weight of sender and receiver C4000 Select

Protective field height [mm]	Weight (typical)	
	☑ Sender	☑ Receiver
300	1.216 kg	1.242 kg
450	1.678 kg	1.693 kg
600	2.146 kg	2.149 kg
750	2.614 kg	2.605 kg
900	3.076 kg	3.056 kg
1050	3.541 kg	3.510 kg
1200	4.006 kg	3.963 kg
1350	4.474 kg	4.419 kg
1500	4.936 kg	4.870 kg
1650	5.401 kg	5.324 kg
1800	5.866 kg	5.778 kg

### 11.3.2 Deflector mirrors PNS75 and PNS125

Tab. 41: 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

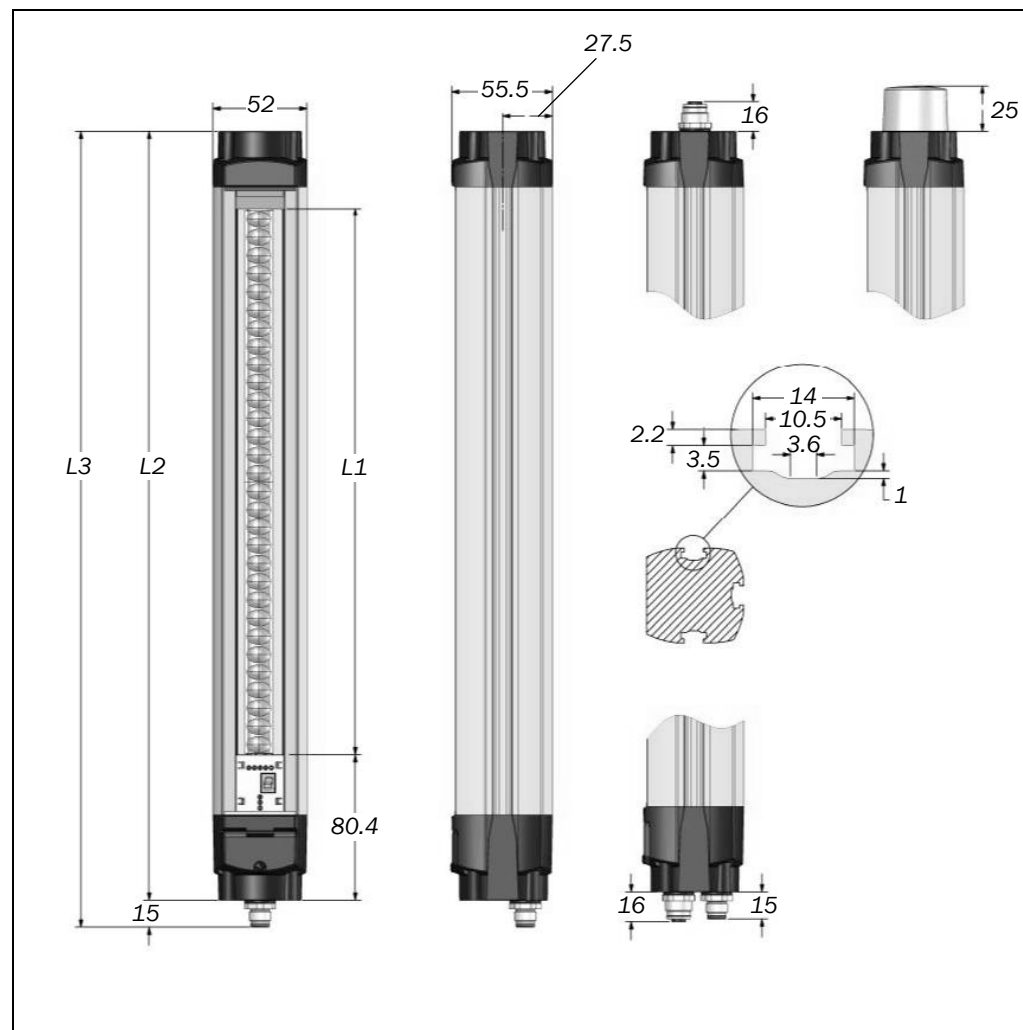
## C4000 Select

## 11.4 Dimensional drawings

## 11.4.1 C4000 Select receiver (all variants)

C4000 Select receiver dimensions for front and side views, with system connection, with system connection and top extension connection, with system and extension connection on bottom and with top end cap LED; units in mm. Values are typical; consult SICK for engineering.

Fig. 38: Dimensional drawing C4000 Select receiver (mm)



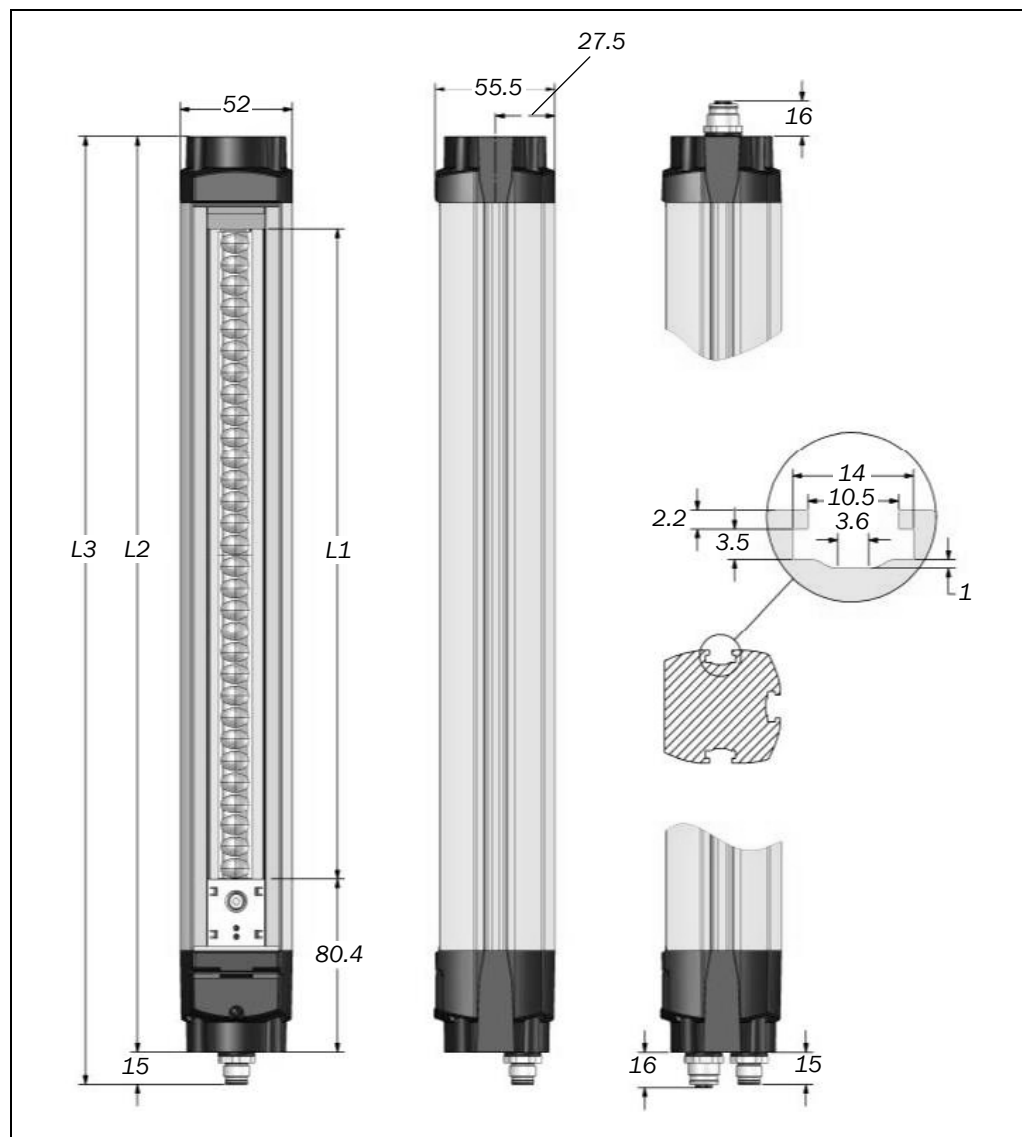
Tab. 42: Dimensions dependent on the protective field height, C4000 Select receiver (typical)

Protective field height [mm]	L1	L2	L3
300	302	425	440
450	452	575	590
600	602	725	740
750	752	875	890
900	902	1025	1040
1050	1052	1175	1190
1200	1202	1325	1340
1350	1352	1475	1490
1500	1502	1625	1640
1650	1652	1775	1790
1800	1802	1925	1940

### 11.4.2 C4000 Select sender (all variants)

C4000 Select sender dimensions for front and side views, with system connection, with system connection and top extension connection and with system and extension connection on bottom; units in mm. Values are typical; consult SICK for engineering.

Fig. 39: Dimensional drawing C4000 Select sender (mm)



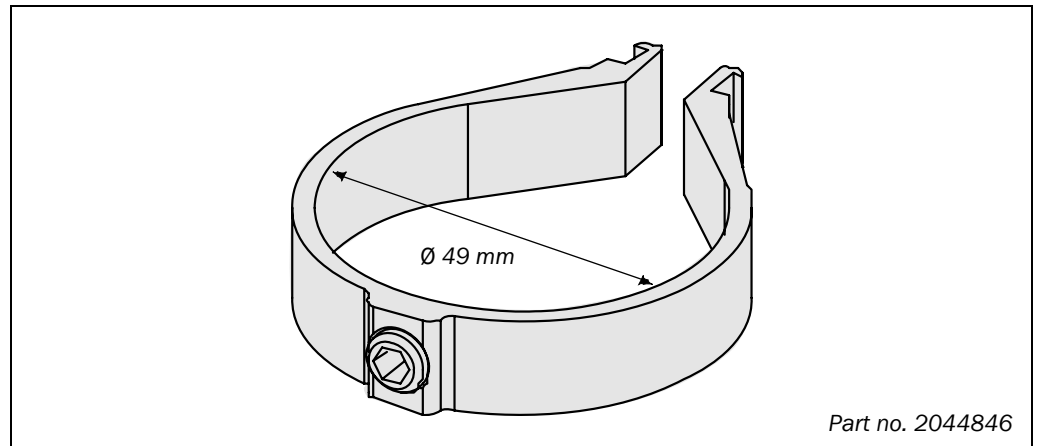
Tab. 43: Dimensions dependent on the protective field height, C4000 Select sender (typical)

Protective field height [mm]	L1	L2	L3
300	302	425	440
450	452	575	590
600	602	725	740
750	752	875	890
900	902	1025	1040
1050	1052	1175	1190
1200	1202	1325	1340
1350	1352	1475	1490
1500	1502	1625	1640
1650	1652	1775	1790
1800	1802	1925	1940

## C4000 Select

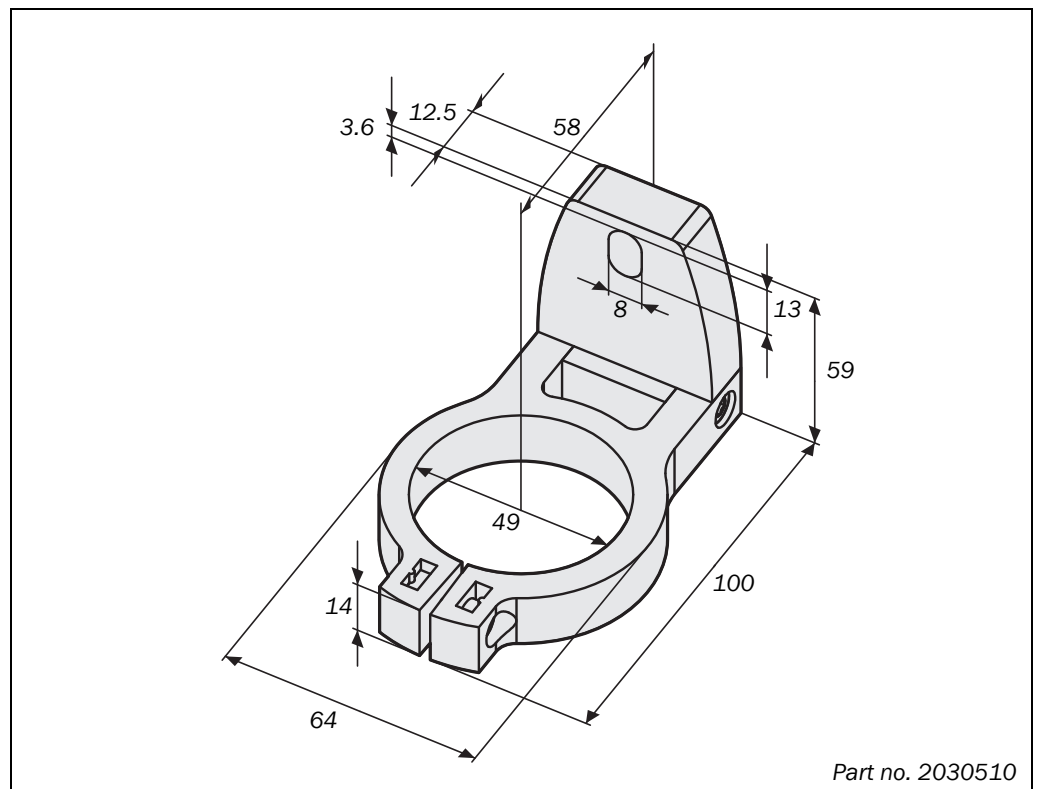
## 11.4.3 Omega bracket

Fig. 40: Omega bracket



## 11.4.4 Swivel mount bracket

Fig. 41: Dimensional drawing, swivel mount bracket (mm)



**11.4.5 Side mount bracket**

Fig. 42: Dimensional drawing, side bracket (mm)

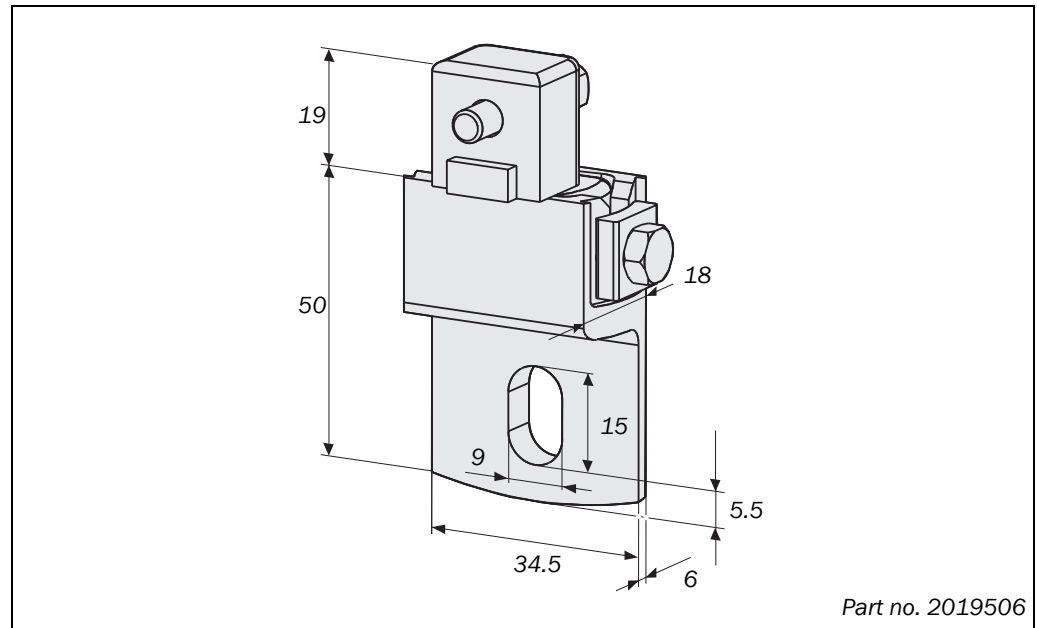
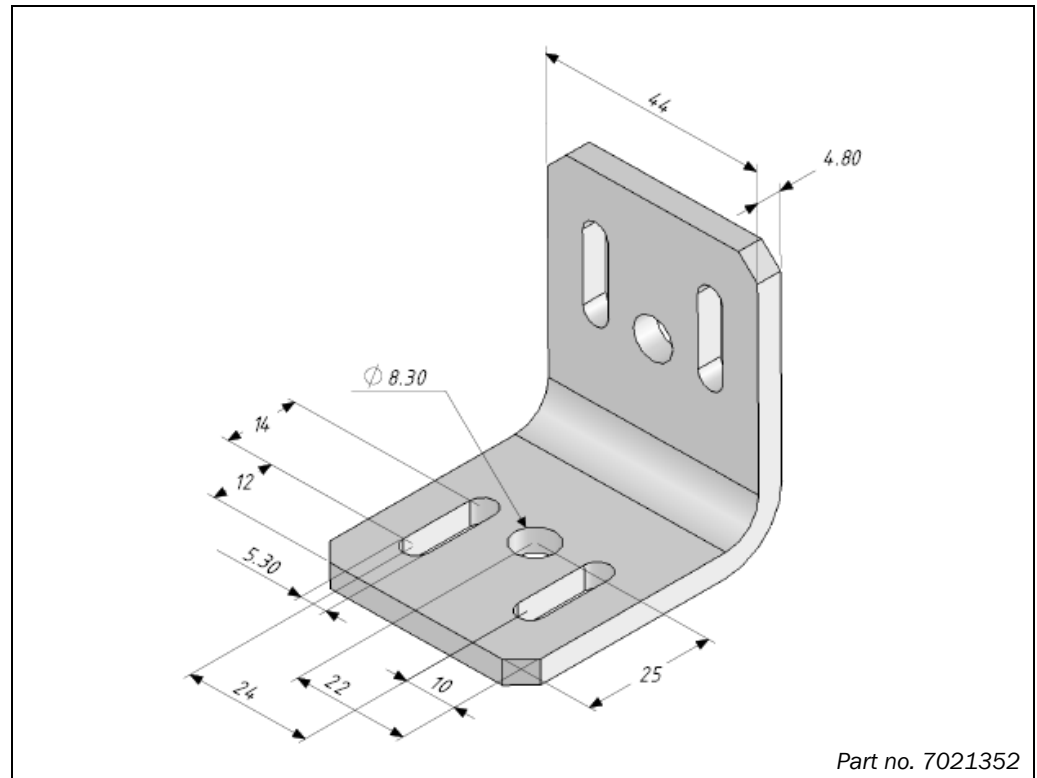
**11.4.6 Standard L-type mounting brackets**

Fig. 43: Standard L-type mounting bracket (mm)

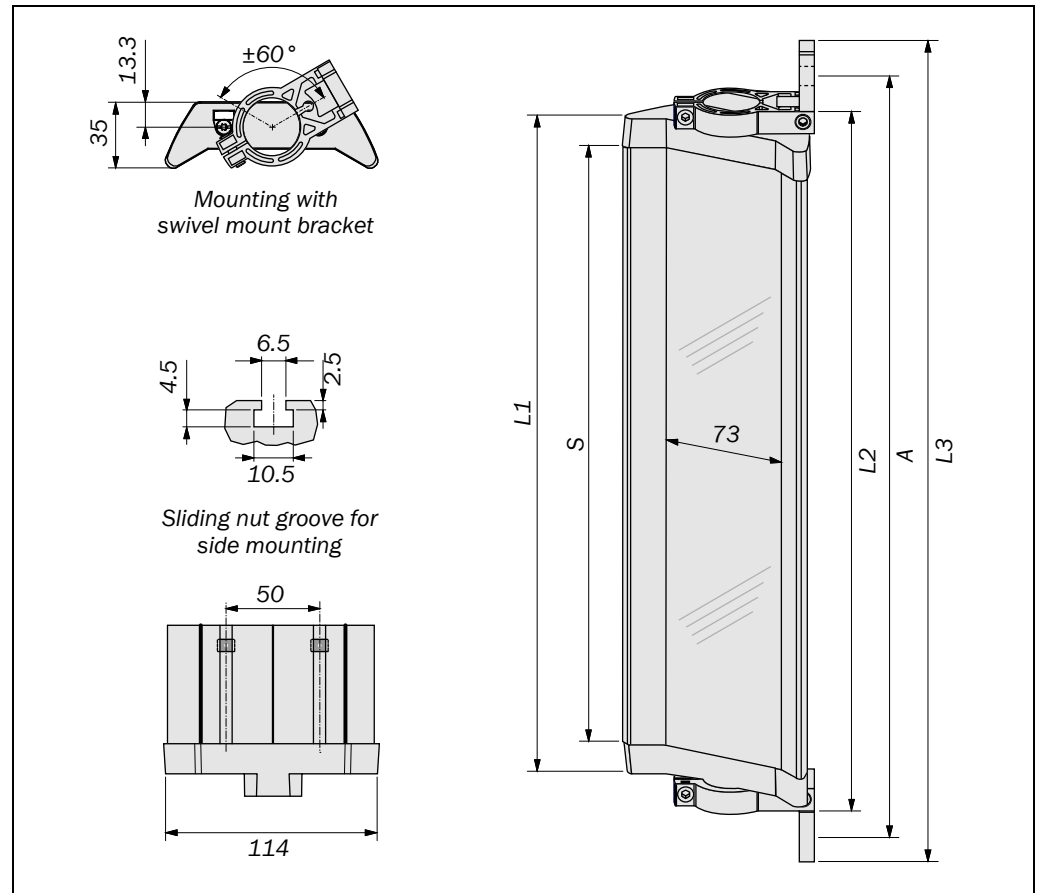




## C4000 Select

## 11.4.7 Deflector mirror PNS75

Fig. 44: Dimensional drawing deflector mirror PNS75 (mm)



Tab. 44: 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

**Note** When using deflector mirrors, the effective scanning range is reduced (see Tab. 15 on page 30).



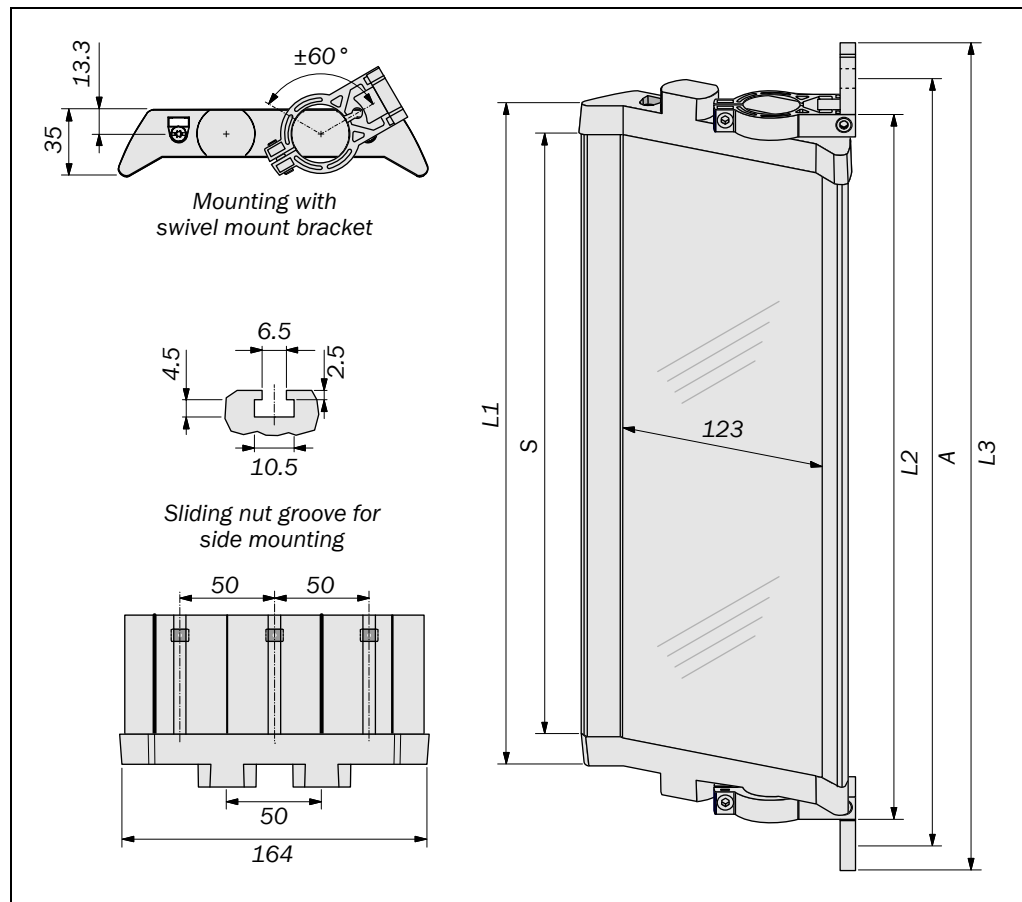
WARNING

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

The formation of droplets or heavy contamination can be detrimental to the reflection behavior. The protective function of the system will be affected and the system may thus become unsafe. This would expose personnel to risk of the associated hazard.

## 11.4.8 Deflector mirror PNS125

Fig. 45: Dimensional drawing deflector mirror PNS125 (mm)



Tab. 45: 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

**Note** When using deflector mirrors, the effective scanning range is reduced (see Tab. 15 on page 30).



**WARNING**

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

The formation of droplets or heavy contamination can be detrimental to the reflection behavior. 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.

# 12 Ordering information

## 12.1 Delivery

### **C4000 Select sender unit**

- sender unit
- 4 sliding nuts for side bracket

### **C4000 Select receiver unit**

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





### **Deflector mirror**

- deflector mirror
- 2 swivel mount brackets





## 12.2 C4000 Select without extension connection

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in standalone operation (as single system) or as the last segment (guest) of a cascaded system.

Tab. 46: C4000 Select without extension connection (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208918 (XC40S-0301A0A00AA0)	1208951 (XC40E-0301A0A0AAA0)	1052742 (XC40P-0301A0A0AAA0)
<b>450</b>	1208825 (XC40S-0401A0A00AA0)	1208824 (XC40E-0401A0A0AAA0)	1052743 (XC40P-0401A0A0AAA0)
<b>600</b>	1208919 (XC40S-0601A0A00AA0)	1208952 (XC40E-0601A0A0AAA0)	1052744 (XC40P-0601A0A0AAA0)
<b>750</b>	1208920 (XC40S-0701A0A00AA0)	1208953 (XC40E-0701A0A0AAA0)	1052745 (XC40P-0701A0A0AAA0)
<b>900</b>	1208921 (XC40S-0901A0A00AA0)	1208954 (XC40E-0901A0A0AAA0)	1052746 (XC40P-0901A0A0AAA0)
<b>1050</b>	1208922 (XC40S-1001A0A00AA0)	1208955 (XC40E-1001A0A0AAA0)	1052747 (XC40P-1001A0A0AAA0)
<b>1200</b>	1208923 (XC40S-1201A0A00AA0)	1208956 (XC40E-1201A0A0AAA0)	1052748 (XC40P-1201A0A0AAA0)
<b>1350</b>	1208924 (XC40S-1301A0A00AA0)	1208957 (XC40E-1301A0A0AAA0)	1052749 (XC40P-1301A0A0AAA0)
<b>1500</b>	1208925 (XC40S-1501A0A00AA0)	1208958 (XC40E-1501A0A0AAA0)	1052750 (XC40P-1501A0A0AAA0)
<b>1650</b>	1208926 (XC40S-1601A0A00AA0)	1208959 (XC40E-1601A0A0AAA0)	1052751 (XC40P-1601A0A0AAA0)
<b>1800</b>	1208927 (XC40S-1801A0A00AA0)	1208960 (XC40E-1801A0A0AAA0)	1052752 (XC40P-1801A0A0AAA0)

Tab. 47: C4000 Select without extension connection (30 mm resolution)





Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204061 (XC40S-0303A0A00AA0)	1204063 (XC40E-0303A0A0AAA0)	1043111 (XC40P-0303A0A0AAA0)
<b>450</b>	1208853 (XC40S-0403A0A0AAA0)	1208852 (XC40E-0403A0A0AAA0)	1052707 (XC40P-0403A0A0AAA0)
<b>600</b>	1204068 (XC40S-0603A0A00AA0)	1204116 (XC40E-0603A0A0AAA0)	1043112 (XC40P-0603A0A0AAA0)
<b>750</b>	1208855 (XC40S-0703A0A00AA0)	1208854 (XC40E-0703A0A0AAA0)	1052708 (XC40P-0703A0A0AAA0)
<b>900</b>	1204071 (XC40S-0903A0A00AA0)	1204191 (XC40E-0903A0A0AAA0)	1043113 (XC40P-0903A0A0AAA0)
<b>1050</b>	1208856 (XC40S-1003A0A00AA0)	1208857 (XC40E-1003A0A0AAA0)	1052709 (XC40P-1003A0A0AAA0)
<b>1200</b>	1204118 (XC40S-1203A0A00AA0)	1204102 (XC40E-1203A0A0AAA0)	1043114 (XC40P-1203A0A0AAA0)
<b>1350</b>	1208858 (XC40S-1303A0A00AA0)	1208859 (XC40E-1303A0A0AAA0)	1052710 (XC40P-1303A0A0AAA0)
<b>1500</b>	1204119 (XC40S-1503A0A00AA0)	1204137 (XC40E-1503A0A0AAA0)	1043115 (XC40P-1503A0A0AAA0)
<b>1650</b>	1208860 (XC40S-1603A0A00AA0)	1208861 (XC40E-1603A0A0AAA0)	1052711 (XC40P-1603A0A0AAA0)
<b>1800</b>	1204112 (XC40S-1803A0A00AA0)	1204138 (XC40E-1803A0A0AAA0)	1043116 (XC40P-1803A0A0AAA0)

## C4000 Select





## 12.3 C4000 Select with integrated LED indicator lamp

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in standalone operation (as single system) or as the last segment (guest) of a cascaded system. An LED indicator lamp (360° view) that provides safety output status information is integrated into the top end cap of the C4000 Select receiver unit.

Tab. 48: C4000 Select without extension connection and integrated LED indicator lamp on the receiver unit (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208918 (XC40S-0301A0A00AA0)	1208961 (XC40E-0301A0A0AAC0)	1052753 (XC40P-0301A0A0AAC0)
<b>450</b>	1208825 (XC40S-0401A0A00AA0)	1208962 (XC40E-0401A0A0AAC0)	1052754 (XC40P-0401A0A0AAC0)
<b>600</b>	1208919 (XC40S-0601A0A00AA0)	1208963 (XC40E-0601A0A0AAC0)	1052755 (XC40P-0601A0A0AAC0)
<b>750</b>	1208920 (XC40S-0701A0A00AA0)	1208964 (XC40E-0701A0A0AAC0)	1052756 (XC40P-0701A0A0AAC0)
<b>900</b>	1208921 (XC40S-0901A0A00AA0)	1208965 (XC40E-0901A0A0AAC0)	1052757 (XC40P-0901A0A0AAC0)
<b>1050</b>	1208922 (XC40S-1001A0A00AA0)	1208966 (XC40E-1001A0A0AAC0)	1052758 (XC40P-1001A0A0AAC0)
<b>1200</b>	1208923 (XC40S-1201A0A00AA0)	1208967 (XC40E-1201A0A0AAC0)	1052759 (XC40P-1201A0A0AAC0)
<b>1350</b>	1208924 (XC40S-1301A0A00AA0)	1208968 (XC40E-1301A0A0AAC0)	1052760 (XC40P-1301A0A0AAC0)
<b>1500</b>	1208925 (XC40S-1501A0A00AA0)	1208969 (XC40E-1501A0A0AAC0)	1052761 (XC40P-1501A0A0AAC0)
<b>1650</b>	1208926 (XC40S-1601A0A00AA0)	1208970 (XC40E-1601A0A0AAC0)	1052762 (XC40P-1601A0A0AAC0)
<b>1800</b>	1208927 (XC40S-1801A0A00AA0)	1208971 (XC40E-1801A0A0AAC0)	1052763 (XC40P-1801A0A0AAC0)





Tab. 49: C4000 Select without extension connection and integrated LED indicator lamp on the receiver unit (30 mm resolution)

Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204061 (XC40S-0303A0A00AA0)	1204139 (XC40E-0303A0A0AAC0)	1043117 (XC40P-0303A0A0AAC0)
<b>450</b>	1208853 (XC40S-0403A0A0AAA0)	1208862 (XC40E-0403A0A0AAC0)	1052712 (XC40P-0403A0A0AAC0)
<b>600</b>	1204068 (XC40S-0603A0A00AA0)	1204140 (XC40E-0603A0A0AAC0)	1043118 (XC40P-0603A0A0AAC0)
<b>750</b>	1208855 (XC40S-0703A0A00AA0)	1208863 (XC40E-0703A0A0AAC0)	1052713 (XC40P-0703A0A0AAC0)
<b>900</b>	1204071 (XC40S-0903A0A00AA0)	1204141 (XC40E-0903A0A0AAC0)	1043119 (XC40P-0903A0A0AAC0)
<b>1050</b>	1208856 (XC40S-1003A0A00AA0)	1208864 (XC40E-1003A0A0AAC0)	1052714 (XC40P-1003A0A0AAC0)
<b>1200</b>	1204118 (XC40S-1203A0A00AA0)	1204142 (XC40E-1203A0A0AAC0)	1043120 (XC40P-1203A0A0AAC0)
<b>1350</b>	1208858 (XC40S-1303A0A00AA0)	1208865 (XC40E-1303A0A0AAC0)	1052715 (XC40P-1303A0A0AAC0)
<b>1500</b>	1204119 (XC40S-1503A0A00AA0)	1204143 (XC40E-1503A0A0AAC0)	1043121 (XC40P-1503A0A0AAC0)
<b>1650</b>	1208860 (XC40S-1603A0A00AA0)	1208866 (XC40E-1603A0A0AAC0)	1052716 (XC40P-1603A0A0AAC0)
<b>1800</b>	1204112 (XC40S-1803A0A00AA0)	1204144 (XC40E-1803A0A0AAC0)	1043122 (XC40P-1803A0A0AAC0)





## 12.4 C4000 Select with top end cap extension connection

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in standalone operation (as single system) or as a host segment, first guest segment or the last guest segment of a cascaded system. An extension connection is incorporated into the top end cap of the devices for connection of extended I/O devices. The system connection is located in the bottom end cap of the devices.

Tab. 50: C4000 Select with top end cap extension connection (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208928 (XC40S-0301A0A00AB0)	1208972 (XC40E-0301A0A00CAB0)	1052764 (XC40P-0301A0A00CAB0)
<b>450</b>	1208929 (XC40S-0401A0A00AB0)	1208973 (XC40E-0401A0A00CAB0)	1052765 (XC40P-0401A0A00CAB0)
<b>600</b>	1208930 (XC40S-0601A0A00AB0)	1208974 (XC40E-0601A0A00CAB0)	1052766 (XC40P-0601A0A00CAB0)
<b>750</b>	1208931 (XC40S-0701A0A00AB0)	1208975 (XC40E-0701A0A00CAB0)	1052767 (XC40P-0701A0A00CAB0)
<b>900</b>	1208932 (XC40S-0901A0A00AB0)	1208976 (XC40E-0901A0A00CAB0)	1052768 (XC40P-0901A0A00CAB0)
<b>1050</b>	1208933 (XC40S-1001A0A00AB0)	1208977 (XC40E-1001A0A00CAB0)	1052769 (XC40P-1001A0A00CAB0)
<b>1200</b>	1208934 (XC40S-1201A0A00AB0)	1208978 (XC40E-1201A0A00CAB0)	1052770 (XC40P-1201A0A00CAB0)
<b>1350</b>	1208935 (XC40S-1301A0A00AB0)	1208979 (XC40E-1301A0A00CAB0)	1052771 (XC40P-1301A0A00CAB0)
<b>1500</b>	1208936 (XC40S-1501A0A00AB0)	1208980 (XC40E-1501A0A00CAB0)	1052772 (XC40P-1501A0A00CAB0)
<b>1650</b>	1208937 (XC40S-1601A0A00AB0)	1208981 (XC40E-1601A0A00CAB0)	1052773 (XC40P-1601A0A00CAB0)
<b>1800</b>	1208938 (XC40S-1801A0A00AB0)	1208982 (XC40E-1801A0A00CAB0)	1052774 (XC40P-1801A0A00CAB0)

Tab. 51: C4000 Select with top end cap extension connection (30 mm resolution)





Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204069 (XC40S-0303A0A00AB0)	1204134 (XC40E-0303A0A00CAB0)	1043123 (XC40P-0303A0A00CAB0)
<b>450</b>	1208867 (XC40S-0403A0A00AB0)	1208868 (XC40E-0403A0A00CAB0)	1052717 (XC40P-0403A0A00CAB0)
<b>600</b>	1204132 (XC40S-0603A0A00AB0)	1204146 (XC40E-0603A0A00CAB0)	1043124 (XC40P-0603A0A00CAB0)
<b>750</b>	1208869 (XC40S-0703A0A00AB0)	1208870 (XC40E-0703A0A00CAB0)	1052718 (XC40P-0703A0A00CAB0)
<b>900</b>	1204145 (XC40S-0903A0A00AB0)	1204147 (XC40E-0903A0A00CAB0)	1043125 (XC40P-0903A0A00CAB0)
<b>1050</b>	1208871 (XC40S-1003A0A00AB0)	1208872 (XC40E-1003A0A00CAB0)	1052719 (XC40P-1003A0A00CAB0)
<b>1200</b>	1204148 (XC40S-1203A0A00AB0)	1204149 (XC40E-1203A0A00CAB0)	1043126 (XC40P-1203A0A00CAB0)
<b>1350</b>	1208873 (XC40S-1303A0A00AB0)	1208874 (XC40E-1303A0A00CAB0)	1052720 (XC40P-1303A0A00CAB0)
<b>1500</b>	1204150 (XC40S-1503A0A00AB0)	1204151 (XC40E-1503A0A00CAB0)	1043127 (XC40P-1503A0A00CAB0)
<b>1650</b>	1208875 (XC40S-1603A0A00AB0)	1208876 (XC40E-1603A0A00CAB0)	1052721 (XC40P-1603A0A00CAB0)
<b>1800</b>	1204152 (XC40S-1803A0A00AB0)	1204153 (XC40E-1803A0A00CAB0)	1043128 (XC40P-1803A0A00CAB0)

## C4000 Select





## 12.5 C4000 Select with bottom end cap system and extension connections

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in standalone operation (as single system) or as a host segment, first guest segment or the last guest segment of a cascaded system. The extension and system connections are both incorporated into the bottom end cap of the devices. There are no connections on the top end cap of the devices.

Tab. 52: C4000 Select with bottom end cap extension connection (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208939 (XC40S-0301A0A00BA0)	1208983 (XC40E-0301A0A0CBA0)	1052775 (XC40P-0301A0A0CBA0)
<b>450</b>	1208940 (XC40S-0401A0A00BA0)	1208984 (XC40E-0401A0A0CBA0)	1052776 (XC40P-0401A0A0CBA0)
<b>600</b>	1208941 (XC40S-0601A0A00BA0)	1208985 (XC40E-0601A0A0CBA0)	1052777 (XC40P-0601A0A0CBA0)
<b>750</b>	1208942 (XC40S-0701A0A00BA0)	1208986 (XC40E-0701A0A0CBA0)	1052778 (XC40P-0701A0A0CBA0)
<b>900</b>	1208944 (XC40S-0901A0A00BA0)	1208987 (XC40E-0901A0A0CBA0)	1052779 (XC40P-0901A0A0CBA0)
<b>1050</b>	1208943 (XC40S-1001A0A00BA0)	1208988 (XC40E-1001A0A0CBA0)	1052780 (XC40P-1001A0A0CBA0)
<b>1200</b>	1208945 (XC40S-1201A0A00BA0)	1208989 (XC40E-1201A0A0CBA0)	1052781 (XC40P-1201A0A0CBA0)
<b>1350</b>	1208946 (XC40S-1301A0A00BA0)	1208990 (XC40E-1301A0A0CBA0)	1052782 (XC40P-1301A0A0CBA0)
<b>1500</b>	1208947 (XC40S-1501A0A00BA0)	1208991 (XC40E-1501A0A0CBA0)	1052783 (XC40P-1501A0A0CBA0)
<b>1650</b>	1208948 (XC40S-1601A0A00BA0)	1208992 (XC40E-1601A0A0CBA0)	1052784 (XC40P-1601A0A0CBA0)
<b>1800</b>	1208949 (XC40S-1801A0A00BA0)	1208993 (XC40E-1801A0A0CBA0)	1052785 (XC40P-1801A0A0CBA0)





Tab. 53: C4000 Select with bottom end cap extension connection (30 mm resolution)

Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204154 (XC40S-0303A0A00BA0)	1204155 (XC40E-0303A0A0CBA0)	1043129 (XC40P-0303A0A0CBA0)
<b>450</b>	1208877 (XC40S-0403A0A00BA0)	1208878 (XC40E-0403A0A0CBA0)	1052722 (XC40P-0403A0A0CBA0)
<b>600</b>	1204156 (XC40S-0603A0A00BA0)	1204157 (XC40E-0603A0A0CBA0)	1043130 (XC40P-0603A0A0CBA0)
<b>750</b>	1208879 (XC40S-0703A0A00BA0)	1208894 (XC40E-0703A0A0CBA0)	1052723 (XC40P-0703A0A0CBA0)
<b>900</b>	1204158 (XC40S-0903A0A00BA0)	1204159 (XC40E-0903A0A0CBA0)	1043131 (XC40P-0903A0A0CBA0)
<b>1050</b>	1208880 (XC40S-1003A0A00BA0)	1208881 (XC40E-1003A0A0CBA0)	1052724 (XC40P-1003A0A0CBA0)
<b>1200</b>	1204160 (XC40S-1203A0A00BA0)	1204161 (XC40E-1203A0A0CBA0)	1043132 (XC40P-1203A0A0CBA0)
<b>1350</b>	1208882 (XC40S-1303A0A00BA0)	1208883 (XC40E-1303A0A0CBA0)	1052725 (XC40P-1303A0A0CBA0)
<b>1500</b>	1204162 (XC40S-1503A0A00BA0)	1204163 (XC40E-1503A0A0CBA0)	1043133 (XC40P-1503A0A0CBA0)
<b>1650</b>	1208884 (XC40S-1603A0A00BA0)	1208885 (XC40E-1603A0A0CBA0)	1052726 (XC40P-1603A0A0CBA0)
<b>1800</b>	1204164 (XC40S-1803A0A00BA0)	1204165 (XC40E-1803A0A0CBA0)	1043134 (XC40P-1803A0A0CBA0)

## 12.6 C4000 Select with bottom end cap system/extension connections and integrated LED indicator lamp

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in standalone operation (as single system) or as a host segment, first guest segment or the last guest segment of a cascaded system. The extension and system connections are both incorporated into the bottom end cap of the devices. An LED indicator lamp (360° view) that provides status information is integrated into the top end cap of the C4000 Select receiver unit. In standalone operation, alternatively, the integrated LED indicator lamp of these devices may be externally controlled via the inputs of the extended I/O connection.





Tab. 54: C4000 Select with bottom end cap extension connection and integrated LED indicator lamp on the receiver unit (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208939 (XC40S-0301A0A00BA0)	1208994 (XC40E-0301A0A0CBC0)	1052786 (XC40P-0301A0A0CBC0)
<b>450</b>	1208940 (XC40S-0401A0A00BA0)	1208995 (XC40E-0401A0A0CBC0)	1052787 (XC40P-0401A0A0CBC0)
<b>600</b>	1208941 (XC40S-0601A0A00BA0)	1208996 (XC40E-0601A0A0CBC0)	1052788 (XC40P-0601A0A0CBC0)
<b>750</b>	1208942 (XC40S-0701A0A00BA0)	1208997 (XC40E-0701A0A0CBC0)	1052789 (XC40P-0701A0A0CBC0)
<b>900</b>	1208944 (XC40S-0901A0A00BA0)	1208998 (XC40E-0901A0A0CBC0)	1052790 (XC40P-0901A0A0CBC0)
<b>1050</b>	1208943 (XC40S-1001A0A00BA0)	1208999 (XC40E-1001A0A0CBC0)	1052791 (XC40P-1001A0A0CBC0)
<b>1200</b>	1208945 (XC40S-1201A0A00BA0)	1209000 (XC40E-1201A0A0CBC0)	1052792 (XC40P-1201A0A0CBC0)
<b>1350</b>	1208946 (XC40S-1301A0A00BA0)	1209001 (XC40E-1301A0A0CBC0)	1052793 (XC40P-1301A0A0CBC0)
<b>1500</b>	1208947 (XC40S-1501A0A00BA0)	1209002 (XC40E-1501A0A0CBC0)	1052794 (XC40P-1501A0A0CBC0)
<b>1650</b>	1208948 (XC40S-1601A0A00BA0)	1209003 (XC40E-1601A0A0CBC0)	1052795 (XC40P-1601A0A0CBC0)
<b>1800</b>	1208949 (XC40S-1801A0A00BA0)	1209004 (XC40E-1801A0A0CBC0)	1052796 (XC40P-1801A0A0CBC0)



**C4000 Select**





Tab. 55: C4000 Select with bottom end cap extension connection and integrated LED indicator lamp on the receiver unit (30 mm resolution)

Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204154 (XC40S-0303A0A00BA0)	1204166 (XC40E-0303A0A0CBC0)	1043135 (XC40P-0303A0A0CBC0)
<b>450</b>	1208877 (XC40S-0403A0A0BAA0)	1208950 (XC40E-0403A0A0CBC0)	1052727 (XC40P-0403A0A0CBC0)
<b>600</b>	1204156 (XC40S-0603A0A00BA0)	1204167 (XC40E-0603A0A0CBC0)	1043136 (XC40P-0603A0A0CBC0)
<b>750</b>	1208879 (XC40S-0703A0A00BA0)	1208886 (XC40E-0703A0A0CBC0)	1052728 (XC40P-0703A0A0CBC0)
<b>900</b>	1204158 (XC40S-0903A0A00BA0)	1204168 (XC40E-0903A0A0CBC0)	1043137 (XC40P-0903A0A0CBC0)
<b>1050</b>	1208880 (XC40S-1003A0A00BA0)	1208887 (XC40E-1003A0A0CBC0)	1052729 (XC40P-1003A0A0CBC0)
<b>1200</b>	1204160 (XC40S-1203A0A00BA0)	1204169 (XC40E-1203A0A0CBC0)	1043138 (XC40P-1203A0A0CBC0)
<b>1350</b>	1208882 (XC40S-1303A0A00BA0)	1208888 (XC40E-1303A0A0CBC0)	1052730 (XC40P-1303A0A0CBC0)
<b>1500</b>	1204162 (XC40S-1503A0A00BA0)	1204170 (XC40E-1503A0A0CBC0)	1043139 (XC40P-1503A0A0CBC0))
<b>1650</b>	1208884 (XC40S-1603A0A00BA0)	1208889 (XC40E-1603A0A0CBC0)	1052731 (XC40P-1603A0A0CBC0)
<b>1800</b>	1204164 (XC40S-1803A0A00BA0)	1204171 (XC40E-1803A0A0CBC0)	1043140 (XC40P-1803A0A0CBC0)





## 12.7 C4000 Select with bottom extension connection (receiver only)

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in a system extending a S300 or S3000 safety laser scanner. The extension and system connections are both incorporated into the bottom end cap of the devices.

Tab. 56: C4000 Select with bottom end cap extension connection (receiver only) (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208918 (XC40S-0301A0A00AA0)	1208983 (XC40E-0301A0A0CBA0)	1052797 (XC40P-0301A0A0CCA0)
<b>450</b>	1208825 (XC40S-0401A0A00AA0)	1208984 (XC40E-0401A0A0CBA0)	1052798 (XC40P-0401A0A0CCA0)
<b>600</b>	1208919 (XC40S-0601A0A00AA0)	1208985 (XC40E-0601A0A0CBA0)	1052799 (XC40P-0601A0A0CCA0)
<b>750</b>	1208920 (XC40S-0701A0A00AA0)	1208986 (XC40E-0701A0A0CBA0)	1052800 (XC40P-0701A0A0CCA0)
<b>900</b>	1208921 (XC40S-0901A0A00AA0)	1208987 (XC40E-0901A0A0CBA0)	1052801 (XC40P-0901A0A0CCA0)
<b>1050</b>	1208922 (XC40S-1001A0A00AA0)	1208988 (XC40E-1001A0A0CBA0)	1052802 (XC40P-1001A0A0CCA0)
<b>1200</b>	1208923 (XC40S-1201A0A00AA0)	1208989 (XC40E-1201A0A0CBA0)	1052803 (XC40P-1201A0A0CCA0)
<b>1350</b>	1208924 (XC40S-1301A0A00AA0)	1208990 (XC40E-1301A0A0CBA0)	1052804 (XC40P-1301A0A0CCA0)
<b>1500</b>	1208925 (XC40S-1501A0A00AA0)	1208991 (XC40E-1501A0A0CBA0)	1052805 (XC40P-1501A0A0CCA0)
<b>1650</b>	1208926 (XC40S-1601A0A00AA0)	1208992 (XC40E-1601A0A0CBA0)	1052806 (XC40P-1601A0A0CCA0)
<b>1800</b>	1208927 (XC40S-1801A0A00AA0)	1208993 (XC40E-1801A0A0CBA0)	1052807 (XC40P-1801A0A0CCA0)

Tab. 57: C4000 Select with bottom end cap extension connection (receiver only) (30 mm resolution)





Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204061 (XC40S-0303A0A00AA0)	1204155 (XC40E-0303A0A0CBA0)	1043141 (XC40P-0303A0A0CCA0)
<b>450</b>	1208853 (XC40S-0403A0A0AAA0)	1208878 (XC40E-0403A0A0CBA0)	1052732 (XC40P-0403A0A0CCA0)
<b>600</b>	1204068 (XC40S-0603A0A00AA0)	1204157 (XC40E-0603A0A0CBA0)	1043142 (XC40P-0603A0A0CCA0)
<b>750</b>	1208855 (XC40S-0703A0A00AA0)	1208894 (XC40E-0703A0A0CBA0)	1052733 (XC40P-0703A0A0CCA0)
<b>900</b>	1204071 (XC40S-0903A0A00AA0)	1204159 (XC40E-0903A0A0CBA0)	1043143 (XC40P-0903A0A0CCA0)
<b>1050</b>	1208856 (XC40S-1003A0A00AA0)	1208881 (XC40E-1003A0A0CBA0)	1052734 (XC40P-1003A0A0CCA0)
<b>1200</b>	1204118 (XC40S-1203A0A00AA0)	1204161 (XC40E-1203A0A0CBA0)	1043144 (XC40P-1203A0A0CCA0)
<b>1350</b>	1208858 (XC40S-1303A0A00AA0)	1208883 (XC40E-1303A0A0CBA0)	1052735 (XC40P-1303A0A0CCA0)
<b>1500</b>	1204119 (XC40S-1503A0A00AA0)	1204163 (XC40E-1503A0A0CBA0)	1043145 (XC40P-1503A0A0CCA0)
<b>1650</b>	1208860 (XC40S-1603A0A00AA0)	1208885 (XC40E-1603A0A0CBA0)	1052736 (XC40P-1603A0A0CCA0)
<b>1800</b>	1204112 (XC40S-1803A0A00AA0)	1204165 (XC40E-1803A0A0CBA0)	1043146 (XC40P-1803A0A0CCA0)

## C4000 Select





## 12.8 C4000 Select with bottom extension connection and integrated LED indicator lamp (receiver only)

The following tables provide part number and model designation information for C4000 Select sender and receiver units that may be used in a system extending a S300 or S3000 safety laser scanner. The extension and system connections are both incorporated into the bottom end cap of the devices. An LED indicator lamp (360° view) that provides status information is integrated into the top end cap of the C4000 Select receiver unit. In standalone operation, alternatively, the integrated LED indicator lamp of these devices may be externally controlled via the inputs of the extended I/O connection.

Tab. 58: C4000 Select with bottom end cap extension connection and integrated LED indicator lamp (receiver only) (14 mm resolution)

Protective field height [mm]	Part numbers and model designations (14 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1208918 (XC40S-0301A0A00AA0)	1208994 (XC40E-0301A0A0CBC0)	1052808 (XC40P-0301A0A0CCC0)
<b>450</b>	1208825 (XC40S-0401A0A00AA0)	1208995 (XC40E-0401A0A0CBC0)	1052809 (XC40P-0401A0A0CCC0)
<b>600</b>	1208919 (XC40S-0601A0A00AA0)	1208996 (XC40E-0601A0A0CBC0)	1052810 (XC40P-0601A0A0CCC0)
<b>750</b>	1208920 (XC40S-0701A0A00AA0)	1208997 (XC40E-0701A0A0CBC0)	1052811 (XC40P-0701A0A0CCC0)
<b>900</b>	1208921 (XC40S-0901A0A00AA0)	1208998 (XC40E-0901A0A0CBC0)	1052812 (XC40P-0901A0A0CCC0)
<b>1050</b>	1208922 (XC40S-1001A0A00AA0)	1208999 (XC40E-1001A0A0CBC0)	1052813 (XC40P-1001A0A0CCC0)
<b>1200</b>	1208923 (XC40S-1201A0A00AA0)	1209000 (XC40E-1201A0A0CBC0)	1052814 (XC40P-1201A0A0CCC0)
<b>1350</b>	1208924 (XC40S-1301A0A00AA0)	1209001 (XC40E-1301A0A0CBC0)	1052815 (XC40P-1301A0A0CCC0)
<b>1500</b>	1208925 (XC40S-1501A0A00AA0)	1209002 (XC40E-1501A0A0CBC0)	1052816 (XC40P-1501A0A0CCC0)
<b>1650</b>	1208926 (XC40S-1601A0A00AA0)	1209003 (XC40E-1601A0A0CBC0)	1052817 (XC40P-1601A0A0CCC0)
<b>1800</b>	1208927 (XC40S-1801A0A00AA0)	1209004 (XC40E-1801A0A0CBC0)	1052818 (XC40P-1801A0A0CCC0)

Tab. 59: C4000 Select with bottom end cap extension connection and integrated LED indicator lamp (receiver only) (30 mm resolution)

Protective field height [mm]	Part numbers and model designations (30 mm resolution)		
	Sender  only	Receiver  only	Sender  and receiver 
<b>300</b>	1204061 (XC40S-0303A0A00AA0)	1204166 (XC40E-0303A0A0CBC0)	1043147 (XC40P-0303A0A0CCC0)
<b>450</b>	1208853 (XC40S-0403A0A0AAA0)	1208950 (XC40E-0403A0A0CBC0)	1052737 (XC40P-0403A0A0CCC0)
<b>600</b>	1204068 (XC40S-0603A0A00AA0)	1204167 (XC40E-0603A0A0CBC0)	1043148 (XC40P-0603A0A0CCC0)
<b>750</b>	1208855 (XC40S-0703A0A00AA0)	1208886 (XC40E-0703A0A0CBC0)	1052738 (XC40P-0703A0A0CCC0)
<b>900</b>	1204071 (XC40S-0903A0A00AA0)	1204168 (XC40E-0903A0A0CBC0)	1043149 (XC40P-0903A0A0CCC0)
<b>1050</b>	1208856 (XC40S-1003A0A00AA0)	1208887 (XC40E-1003A0A0CBC0)	1052739 (XC40P-1003A0A0CCC0)
<b>1200</b>	1204118 (XC40S-1203A0A00AA0)	1204169 (XC40E-1203A0A0CBC0)	1043150 (XC40P-1203A0A0CCC0)
<b>1350</b>	1208858 (XC40S-1303A0A00AA0)	1208888 (XC40E-1303A0A0CBC0)	1052740 (XC40P-1303A0A0CCC0)
<b>1500</b>	1204119 (XC40S-1503A0A00AA0)	1204170 (XC40E-1503A0A0CBC0)	1043151 (XC40P-1503A0A0CCC0)
<b>1650</b>	1208860 (XC40S-1603A0A00AA0)	1208889 (XC40E-1603A0A0CBC0)	1052741 (XC40P-1603A0A0CCC0)
<b>1800</b>	1204112 (XC40S-1803A0A00AA0)	1204171 (XC40E-1803A0A0CBC0)	1043152 (XC40P-1803A0A0CCC0)

## 12.9 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. 60: Part numbers additional front screen (weld spark guard)

Protective field height [mm]	Part number
300	2033235
450	2033236
600	2033237
750	2033238
900	2033239
1050	2033240
1200	2033241
1350	2033242
1500	2033243
1650	2033244
1800	2033245

## 12.10 Deflector mirror

### 12.10.1 Deflector mirror PNS75

Tab. 61: 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

Tab. 62: Part number  
deflector mirror PNS75,  
stainless steel version

Protective field height [mm]	Type number	Part number
<b>800</b> (suitable for 300, 450, 600 and 750 mm)	PNS75-079S05	1046075

Dimensional drawing see Fig. 44 on page 81. Effect on the scanning range see Tab. 15 on page 30.

### 12.10.2 Deflector mirror PNS125

Tab. 63: Part numbers  
deflector mirror PNS125

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

Dimensional drawing see Fig. 45 on page 82. Effect on the scanning range see Tab. 15 on page 30.

## 12.11 Accessories

Tab. 64: Part numbers  
accessories

Part	Part number
<b>System connection cables</b>	
M12 × 5 connection cable, single-ended female connection with flying leads	
Plug straight/stripped, 2 m	6008899
Plug straight/stripped, 5 m	6009868
Plug straight/stripped, 10 m	6010544
Plug straight/stripped, 15 m	6029215
Plug straight/stripped, 30 m	6032956
M12 × 5 connection cable, double-ended connection, male straight and female straight with FE tied to M12 housing e.g. for use with UE4400 IP67-rated remote I/O bus nodes.	
Plug straight/plug straight, 2 m	2044610
Plug straight/plug straight, 5 m	2044611
Plug straight/plug straight, 10 m	2044612
Plug straight/plug straight, 15 m	2044613
Plug straight/plug straight, 30 m	2044614

## C4000 Select

Part	Part number
<b>Extension connection cables for extended I/O</b> Used for cascade connection between a host/guest 1 C4000 Select extension connection and subsequent C4000 Select guest 1/guest 2 system connection.	
M12 × 5 connection cable, double-ended connections, male and female for extended I/O connection of a C4000 Select Plug straight/plug straight, 1 m Plug straight/plug straight, 2 m Plug straight/plug straight, 5 m	6029280 6025931 6029282
M12 × 5 connection cable, single-ended male connection with flying leads for extended I/O connection of S300 or S3000 <sup>34)</sup> Plug straight/flying leads, 2 m Plug straight/flying leads, 5 m Plug straight/flying leads, 10 m	6026133 6026134 6026135
M12 × 5 field attachable connectors. Use with 10 m system cable for extension cable requirements 5...10 m (e.g. for cascading systems) Male connector, M12 × 5, straight, unshielded Male connector, M12 × 5, right angle, unshielded	6022083 6022082
<b>Device columns</b> Robust device columns with 2 external mounting grooves for safety light curtains and multiple light beam safety devices Column height 985 mm Column height 1165 mm Column height 1265 mm Column height 1720 mm Column height 2020 mm Column height 2250 mm Column height 2400 mm	2045490 2045641 2045642 2045643 2045644 2045645 2045646
<b>Mirror columns</b> Mirror columns with protective field height mirror for safety light curtains and multiple light beam safety devices Column height 1285 mm, mirror length 900 mm Column height 1720 mm, mirror length 1350 mm Column height 2000 mm, mirror length 1650 mm Column height 2200 mm, mirror length 1800 mm	1043453 1043454 1043455 1043456

<sup>34)</sup> S300 and S3000 system plugs are sold separately. Please refer to the device operating instructions for system plug details and ordering information.

Part	Part number
<b>Mounting brackets</b>	
Swivel mounting bracket kit (mounting kit 12, see page 79)	2030510
Side mounting bracket kit (mounting kit 6, see page 80)	2019506
Standard "L" type mounting bracket kit (see page 80)	7021352
Omega mounting bracket kit (see page 79)	2044846
Omega mounting bracket for device columns (see page 79)	2045736
<b>Power supplies</b>	
24 V DC 50 W (2.1 A) output, NEC class 2 power supply, SELV, PELV, 120-240 V AC input, (PS50W-24V)	7028789
24 V DC 95 W (3.9 A) output, NEC class 2 power supply, SELV, PELV, 100-120/220-240 V AC input, (PS95W-24V)	7028790
<b>Test rod</b>	
Test rod, 14 mm diameter	2022599
Test rod, 30 mm diameter	2022602
<b>Test rod holder</b>	
Test rod holder	2052249
<b>Protective caps (e.g. for IP65 integrity)</b>	
M12 protective cap for extended I/O connector (female), 10 pieces	2019706
M12 protective cap for system connector (male), 1 piece	5311099
<b>T-splitter</b>	
M12 T-splitter used for single connection of sender and receiver unit(s) in standalone or cascade applications. Maximum load current not to exceed 4 A.	6030664



# 13 Annex

## 13.1 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](http://www.sick.com)

## 13.2 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 <input type="checkbox"/> No <input type="checkbox"/> |
| 2. Are the applied directives and standards listed in the declaration of conformity?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 3. Does the protective device comply with the required PL/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 <input type="checkbox"/> No <input type="checkbox"/> |
| 4. Is the access to the hazardous area/hazardous point only possible through the protective field of the ESPE?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 5. Have appropriate measures been taken to protect (mechanical protection) or monitor (protective devices) any persons or objects in the hazardous area when protecting a hazardous area or hazardous point, and have these devices been secured or locked to prevent their removal? | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 6. Are additional mechanical protective measures fitted and secured against manipulation which prevent reaching under, over or around the ESPE?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 7. Has the maximum shutdown and/or stopping time of the machine been measured, specified and documented (at the machine and/or in the machine documentation)?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 8. Has the ESPE been mounted such that the required minimum distance from the nearest hazardous point has been achieved?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 9. Are the ESPE devices correctly mounted and secured against manipulation after adjustment?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 10. Are the required protective measures against electric shock in effect (protection class)?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 11. Is the command device for resetting the protective devices (ESPE) or restarting the machine present and correctly installed?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 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 <input type="checkbox"/> No <input type="checkbox"/> |
| 13. Has the protective function been checked in compliance with the test notes of this documentation?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 14. Are the specified protective functions effective at every operating mode that can be set?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 15. Are the switching elements activated by the ESPE, e.g. contactors, valves, monitored?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 16. Is the ESPE effective over the entire period of the dangerous state?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 17. Once initiated, will a dangerous state be stopped when switching the ESPE on or off and when changing the operating mode, or when switching to another protective device?  | Yes <input type="checkbox"/> No <input type="checkbox"/> |
| 18. Has the information label "Important Information" for the daily check been attached so that it is well visible for the operator?   | Yes <input type="checkbox"/> No <input type="checkbox"/> |

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

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